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From rags to riches, from riches to rags: Intra-generational mobility in Europe before and after the Great Recession*

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Abstract

This paper analyses short-term intra-generational income mobility in France, Italy, Spain and the UK. For this purpose, we perform cross-country analysis by means of mobility indexes and transition matrices as well as estimation of a 2SLS model. The analysis exploits the longitudinal component of EU-SILC for the periods 2005-2008 and 2011-2014. We uncover heterogeneities in income mobility across countries with Italy experiencing the smallest income variations. Overall, mobility decreases in the aftermath of the crisis, especially in France, Italy and Spain. The econometric analysis also suggests the existence of a convergence process, whereby income of the previous period is negatively associated with income mobility. Among the microeconomic drivers of mobility, we identify education and employment status as positive determinants, while age and the presence of economically dependent household members as negative ones.

Keywords: intra-generational income mobility, mobility indexes, transition matrices, EU-SILC.
JEL classification: D31, C26, J60.

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1. Introduction and literature review

Beginning from 2009, the global economic and financial crisis has severely affected countries worldwide both from a macroeconomic and microeconomic perspective. Among its effects, economists have focused on studying its implications on economic inequality. The crisis not only made the distribution of incomes more unequal, but in its first three years inequality in individual incomes increased as much as in the previous twelve (OECD, 2013). These insights are confirmed by De Beer (2012) who finds that the crisis exerted a significant impact on inequality in the EU.

However, measures of inequality can provide only a snapshot of the relative wealth of a society and they do not provide a full account of the extent to which individuals move along the income distribution thereby improving, or worsening, their economic condition over time (Caroll and Chen, 2016). Against this backdrop, renewed attention has been given to intra-generational income mobility, henceforth income mobility (Aristei and Perugini, 2015, and Bachmann et al., 2016).[1]

Despite the fast development in the relevant literature, it is still very hard to find a unified framework to define and study income mobility, the main reason being its double nature. Higher income mobility, on one hand, may translate in a greater ability of individuals to improve their living standards over time. On the other hand, it may increase the risk of moving down the income distribution. Therefore, income mobility matters for individuals because it offers opportunities to climb the income ladder. Yet, it can also be a source of economic insecurity justifying policy intervention (OECD, 2015). Although we acknowledge these two sides of the same coin and their different economic implications, in this paper we define income mobility as the degree of movement of individuals through the income distribution. In this sense, we leave the task of qualifying higher income mobility as a bad or a good thing for future developments of this same work. Notwithstanding, in the first part of our empirical analysis we seek to provide some preliminary evidence on the degree of upward and downward mobility observed in our data.

Here our aim is to investigate short-term intra-generational income mobility in Europe across time and space.[2] Across time, we are interested in analysing and juxtaposing income mobility patterns before and after the outburst of the crisis. For this purpose, we exploit the longitudinal sample of the European

[1] For an early discussion on intra-generational income mobility, see, among others, Atkinson et al. (1992) and Jenkins (2000). Another way of examining income mobility is to look at inter-generational income mobility, i.e. documenting the persistence between parents and children's economic outcomes (see Chul In-Lee and Solon, 2009, and Chetty et al, 2014 for the United States). In this paper we focus on intra-generational mobility as we are interested in studying the ability of individuals in climbing the income ladder within their own life cycle.

[2] Income mobility can also be classified in short- and long-term mobility. Here we consider short-term mobility as the data at our disposal allows us to follow individuals up to four years.

Union Survey of Income and Living Conditions (EU-SILC) for the time spans 2005-2008 and 2011-2014. Thus, we are able to compare income mobility in a period of relative economic stability (2005-2008) with that in a period of relative economic uncertainty (2011-2014). Across space, we aim at uncovering the heterogeneity of income mobility patterns among European countries. To this end, we focus on the main four European countries, namely France, Italy, Spain and the United Kingdom.[3] By merging the information from these two separate but complementary sets of analysis, we are also able to say something more on how income mobility has reacted to the latest crisis in different countries. Our analysis also allows us to dissect the drivers of income mobility or in other words, the individual characteristics that are associated with movements of incomes along the income distribution.

The final purpose of a research agenda on income mobility is to explore the factors associated with movements of individuals through the income distribution. In particular, it allows understanding the characteristics of individuals that remain stuck or fall along the income distribution. In terms of policy implications, the empirical analysis of income mobility suggests key answers to the following questions: (i) are underprivileged individuals able to climb the income ladder on their own? (ii) even if they cannot, is it a problem? (iii) can they really be helped? and finally, (iv) what would the economic cost of helping them be? Answers to these questions can ultimately suggest ways to lift people out of poverty, reduce their vulnerability and advice on the best practices to make all individuals benefit from a growing economy (Cancho et al., 2015).

From this point of view, a study on income mobility is particularly relevant for Europe, where the incidence of poverty, as measured by the at-risk-of-poverty rate (ARPR), increased in the aftermath of the crisis from 15.4% in 2005 to 17.1% in 2014, with Italy and Spain well above the European average in both years. Moreover, the European labour market experienced growing unemployment rising from 9% in 2005 to 11.6% in 2014, with Spain having an unemployment rate almost twice as much that of the European average in 2014.[4] It is worth stressing that the crisis is not the only factor to blame for the increase in poverty and unemployment rates. Nevertheless, these are signs of the increasing vulnerability that individuals have

[3] Unfortunately, EU-SILC is not available for Germany.

[4] The ARPR is the percentage of people over the total population with an equivalised disposable income below the risk-of-poverty threshold, which is conventionally set at 60% of the national median equivalised disposable income. The latest data point to an overall increase in the poverty incidence in three of the four countries: from 13% in 2005 to 13.3% to 2014 in France (with a peak of 14.1% in 2012), from 19.2% to 19.4% in Italy, from 20.1% to 22.2% in Spain. In the UK poverty fell from 19% in 2005 to 16.8% in 2014. Similarly, the unemployment rate grew from 8.9% in 2005 to 10.3% in 2014 in France, from 7.7% to 12.7% in Italy, from 4.8% to 6.1% in the UK and to a far greater extent in Spain, namely from 9.2% in 2005 to 24.5% in 2014. The source of this information is Eurostat, downloadable from http://ec.europa.eu/eurostat/data/database.

been facing between 2005 and 2014 and that have made it harder for them to improve their economic conditions.

To achieve our objective we implement an analysis based on descriptive statistics as well as econometric techniques. In the first part of our work we look at some aggregate mobility indexes (see Shorrocks, 1978a,1978b; Fields and OK, 1996) to get a sense of income mobility patterns across time and space. As income mobility is connected with the concept of income inequality, we take a glimpse at the relationship between initial period income inequality and subsequent income mobility. We then turn to a less aggregate level of analysis by building transition matrices which show the movement of individual's income between quintiles of the income distribution, thus allowing us to provide some preliminary evidence on the degree of upward and downward mobility observed in our data. In the last part of our work, we complement the descriptive statistics with a micro-level analysis by means of a dynamic econometric model. The aim of the econometric analysis is to test some of the results of the descriptive analysis and to inspect the set of individual characteristics that are more strongly associated with income mobility.

Despite the speed at which the relevant literature has evolved in recent years, there is no consolidated approach to study income mobility yet. Research in this field differs according to a number of dimensions, among which the level of analysis (individual vs. household level analysis), the type of income measure used (e.g. household disposable income vs. individual wages) and the methodology applied (descriptive vs. econometric, or a combination of the two). Also, there are a variety of papers focusing on the case of a single country and as many focusing on cross-country comparisons. Among the former, Jarvis and Jenkins (1997, 1998) make use of the British Household Panel Survey (BHPS) to study short-term mobility in Britain between 1991 and 1994. In the same line, but for the Italian case, Cappellari (2007) uses the Survey of Household and Income Wealth (SHIW) to investigate the earnings mobility of low-paid employees from the early 1990s up to the 2000s. Hofer and Weber (2002) and Raferzeder et al. (2007) use administrative data from social security records to study income mobility patterns in Austria over the 1990s. Using recent data, Kennedy et al. (2015) compare income mobility before and after the outburst of the recent economic and financial crisis in Ireland. Outside of the European context, Lamman et al. (2016) tracks a sample of Canadians starting in 1993 to measure short- and long-run income changes. A number of papers provide cross-country comparisons among European countries (Bigard et al. 1995, Ayala and Sastre 2008, Sologon and O'Donogue, 2009, Alves and Martins, 2012,). Overall, this line of research finds that there are relevant heterogeneities in income mobility between countries in Europe. Another line of research compares income mobility between Europe and North America, most notably the United States and Canada, such as Aaberge et al. (2002) and Chen (2009).

The most relevant papers for our work, however, are the recent papers by Aristei and Perugini (2015), and Bachmann et al. (2016). The former provide an overview of income mobility at the household

level from 2004 and 2006 across 25 European countries. They confirm previous findings on the high heterogeneity in income dynamics among different country groups. Similarly, Bachmann et al. (2016) study wage mobility at the individual level for all EU member states plus Norway and Iceland. Their findings also reveal large cross-country differences in income mobility across Europe. We supplement their analyses in two ways. First, we look at income mobility prior to and after the crisis so that we are able to observe how much income mobility has changed in the aftermath of the Great Recession. Second, we concentrate on the experience of four countries thereby leaving space for a more accurate understanding of income mobility and the forces behind it, although still allowing us to make cross-country comparisons.

Our preliminary findings imply a reduction of income mobility after 2011 and the presence of differences between the countries analysed, with Italy experiencing the lowest level. We also find evidence that downward and upward mobility are lower over the period 2011-2014, with upward mobility decreasing much more than downward mobility, with the only exception of the UK. The estimation of the econometric model suggests the existence of an income catching-up process, whereby income of the previous period is negatively associated with income mobility. Additionally, the model uncovers other results related to the socio-economic characteristics of the household. On the one hand, the positive contribution of education and the share of workers within the household and, on the other hand, the negative contribution of age and the presence of household members who are not income earners.

The remainder of the article is organized as follows. Section 2 describes the dataset. In Section 3 we show some stylized facts on income mobility by calculating mobility indexes and transition matrices on the data at our disposal. The econometric model used to estimate mobility is presented in Section 4. Section 5 shows and discusses the empirical results and Section 6 concludes with a summary of the main findings and with suggestions for further development of our work.

2. The dataset: descriptive statistics

The dataset used in this paper is from the longitudinal component of European Union Statistics on Income and Living Conditions (EU-SILC) for the two four-year periods 2005-2008 and 2011-2014.[5] The countries analysed are France, Italy, Spain and the UK. EU-SILC is the reference source for comparative statistics on income distribution and social exclusion at the European level. It collects information on income, socio-economic characteristics of individuals and households, and qualitative non-monetary variables of deprivation. The reference population is all private households and their current members residing in the territory of the member states at the time of data collection.

[5] The versions of the datasets are "UDB 2008 – version 4 of March 2012" for 2005-2008 and "UDB 2014 – version 1 of August 2016" for 2011-2014.

For our empirical analysis, we select individuals aged 16-64 years who have remained part of the survey for all four consecutive years in the two sub-periods 2005-2008 and 2011-2014. The overall number of observations is $N_{TOT} = 135{,}220$, of which $N_1 = 72{,}008$ in 2005-2008 and $N_2 = 63{,}212$ in 2011-2014. The composition of the sample is presented in Table 1.

TABLE 1 ABOUT HERE

Table 2 reports 2005-2008 and 2011-2014 descriptive statistics of the variables used in the econometric analysis. The unit of the analysis is the individual. We build our variables separately on each of the two sets of data and for each country and then stack them to obtain a single dataset. For each period, the outcome variable is the percentage variation in real terms of equivalised income between two consecutive years (the difference between log income at time *t* and log income at time *t*-1), a measure of income mobility.[6] Mobility is modelled as a function of lagged income and three sets of control variables (all lagged) with different degrees of aggregation: head of household-level, household-level and variables at the country-level.[7] The variables for the household head (attributed to each household member) are: age, sex and education levels (no title or primary, lower secondary, upper secondary and tertiary). The household-level controls, attributed to each household member, are: the number of components, the share of children on the total of household components, the share of working members, the share of unemployed and the share of pensioners. Table 2 tells us that average income mobility drops between the two periods, from 0.014 in 2005-2008 to 0.011 in 2011-2014 and that average log equivalised income decreases from 9.856 to 9.807. The other variables show that the sample composition with respect to individual characteristics does not change across time.

TABLE 2 ABOUT HERE

[6] Equivalised income is household disposable income divided by an equivalence scale and attributed to each household component. Disposable income is measured as the sum of net earnings from work, including company cars, social benefits received in cash, income from investment and property and inter-household payments, but excludes non-monetary income components such as imputed rents, the value of goods produced for own consumption and non-cash employee income (with the exception of company cars). The equivalence scale used is the modified OECD scale which assigns the value 1 to the first adult, 0.5 to each other adult and 0.3 to each child under the age of 14. Monetary variables are converted to 2014 prices using the consumption deflator.

[7] Table 2 displays descriptive statistics of the variables used in the econometric analysis in levels or in logs and not in lags or in first differences as in the econometric model of the next sections.

3. Mobility indexes and transition matrices

At the outset, we make use of mobility measures to provide a preliminary description of the degree of income mobility observed in our data. Although the literature supplies a myriad of alternative indexes, we settle for the Fields-Ok (*FO*) and Shorrocks' (*M*) indexes as they have been widely used in the related literature thus allowing us to make comparisons between our results and those obtained by similar studies.

The *FO* index, proposed by Fields and Ok (1999), is calculated as follows:

$$FO_n(x,y) = \frac{1}{n}\sum_{i=1}^{n}|\ln x_i - \ln y_i| = \frac{1}{n}\sum_{i=1}^{n} d(x_i, y_i) \quad (1)$$

where n is the number of individuals, x and y are the vectors of the initial (t) and final distributions of income ($t + 3$), respectively. $d(x_i, y_i)$ is the "non-directional" growth of individual incomes. As such, the *FO* summarises the degree of variation in individual incomes regardless of their direction and, by definition, it takes up a minimum value of 0 in the extreme case of perfect immobility.

Alternatively, we consider the *M* index put forward by Shorrocks (1978a,b) as follows:

$$M(T) = 1 - I[Y(T)]/\sum_{t=1}^{T}\frac{\mu_t}{\mu} I(Y_t) \quad (2)$$

where $I[Y(T)]$ and $I(Y_t)$ indicate inequality calculated on the average income over period T and in each period t, respectively, μ and μ_t are the corresponding income averages. An *M* index equal to 0 indicates a situation of perfect immobility, and an *M* index of 1 a case of perfect mobility. The *M* index allows us to associate mobility to the evolution of inequality: the main idea is that income mobility rises (decreases) due to the reduction (increase) of inequality over time due to the movement (immobility) of individuals through the income distribution.[8] The *M* index can be computed using a wide variety of mean-independent inequality measures, thereby allowing us to put more weight on specific parts of the income distribution. **Table 3** reports mobility measures by country and period of analysis. On average, in the years prior to the crisis (period 1 = 2005-2008), Spain enjoys the highest levels of income mobility followed by the UK, France and Italy. This ranking is comparable to that found in Aristei and Perugini (2015) for the period 2004-2006. It is worth noting that the *M* index varies according to the type of inequality measure employed. When using the Gini coefficient, which puts more weight on the middle of the income distribution, income mobility is lower than when using the class of General Entropy (GE) indexes, namely Mean log deviation (GE(0)), Theil (GE(1)) and the squared of the Coefficient of Variation (GE(2)), which put more weight on

[8] To be more precise, the *M* index reflects the proportional contribution of permanent ($I[Y(T)]$) to total income inequality ($I(Y_t)$): if the former is smoothed out in the long-run, the income distribution is more mobile.

the tails of the distribution. In other words, income mobility at the tails of the income distribution is greater compared to that in the middle. This finding is consistent with that of Sologon and O'Donogue (2009) who find that in Europe people at the top of the distribution are more mobile than people at the bottom, which in turn are more mobile than people in the middle. Turning to the post-crisis period (period 2 = 2011-2014), while we can observe the same patterns as before, mobility decreases for all countries, except for the UK when calculated using the *FO* index.

TABLE 3 ABOUT HERE

There is a wealth of literature analysing the relationship between income inequality and intra-generational mobility (see, among others, Garnero, 2016, Van Kerm and Pi Alperin, 2013, and Gardiner and Hills, 1999). Although we do not intend to contribute to this line of research, we provide some insight on the relationship between income inequality and income mobility by plotting initial income inequality against our preferred measures of income mobility in Figures 1a and 1b. Figure 1a shows a positive relationship between income inequality and income mobility, measured according to the *FO* index. Countries with higher levels of income inequality in the initial year of analysis (2005 or 2011) have greater levels of income mobility. This result is consistent to that found in Aristei and Perugini (2015), which, however, becomes less clear when we measure mobility using Shorrocks' index (Figure 1b). One possible explanation is that the *FO* index can also be interpreted as a measure of income instability, i.e. how erratic incomes over the period of analysis are, which is higher in countries where the welfare state is less effective in ensuring a more equal distribution of income, most notably Spain (Cantò and Ruiz, 2014). While income inequality can exert its affect on income mobility, the reverse is also true, thus making it challenging to correctly identify the relationship of causality between the two. Simplifying, higher income mobility may be viewed as a path to reduce inequalities since individuals in more income mobile societies experience more opportunities to move up the income ladder, even if they have previously moved downwards. Furthermore, individuals in more mobile economies are less likely to be stuck at the bottom of the income distribution for a long time. From this point of view, a society with higher income mobility can perceive income inequalities as more acceptable (Garnero, 2016). On the other hand, higher income mobility may exacerbate income inequalities as it translates into incomes that are more volatile and thus increasing economic insecurity.

FIGURE 1A AND 1B ABOUT HERE

Despite their informative value, mobility indexes can provide only an aggregate overview of income changes and they are not designed to inform on what actually happens along the income distribution, i.e. where do individuals move from and to where. To gauge movements along the income distribution we exploit transition matrices, which associate income group destinations with income group origins. In our case, income groups are represented by quintiles. Tables 4a to 4h show annual transition matrices for each country and period of analysis. Each cell represents the number of times (in percentage) that individuals stay in the same quintile (main diagonal), move upwards (upper triangle of the matrix) or downwards (lower triangle of the matrix).

A number of general considerations emerge. First, over the pre-crisis period we observe a high concentration of individuals staying in the same quintile, especially at the tails of the distribution. Similar considerations apply in the post-crisis period, although the percentages are slightly higher. This evidence of lower mobility at the tails of the distribution is in contrast to the indications provided by the *M* index above and deserves closer scrutiny in future developments of this work.[9] However, the fact that income mobility appears to be lower in the second period perfectly reflects a reduction in both the *FO* and *M* indexes seen earlier on. Second, short-distance mobility is more common than long-distance mobility. Table 4e, for example, shows that in Spain over the period 2005-2008 half of the poorest fifth in one year are no longer in the poorest fifth (23.60 + 10.11 + 5.96 + 1.47) in the next year, although more than half of these leavers move only to the next two quintiles (23.6 + 10.11).

TABLE 4A – 4B ABOUT HERE

We re-elaborate and summarise the information provided by the income matrices in Figure 2, where we report the percentage of individuals staying in the same quintile, moving upward or downward across quintiles. It emerges that, overall, income mobility decreases from period 1 to period 2 as the percentages of individuals staying in the same quintile increase, with the exception of the UK. Accordingly, both downward and upward mobility are lower over the period 2011-2014 with upward mobility decreasing much more than downward mobility.

FIGURE 2 ABOUT HERE

[9] Notwithstanding, there is evidence of the high persistence of incomes at the lower end of the income distribution. See, for example, Bigard et al. (1995) and Cappellari and Jenkins (2014).

All in all, the main takeaways from this descriptive analysis are the following. First, there are systematic differences in income mobility between France, Italy, Spain and the UK in the pre-crisis period, with Italy enjoying the lowest level of all. In the aftermath of the crisis, income distribution turns out to be less mobile for all countries, especially in Spain which experiences the greatest reduction in income mobility. Second, there is some preliminary evidence of the high persistence of incomes at the tails of the income distribution, both across space and time. Third, short-distance mobility is much more common than long-distance mobility. Last, but not least, there is some preliminary indication of a greater reduction in upward mobility with respect to the reduction in downward mobility over the period 2011 - 2014.

It is worth stressing that, so far, we have employed an aggregate-level approach to provide an analysis of income mobility. In Section 5 we assess whether the same income mobility patterns are confirmed when estimating a micro-level based econometric model.

4. An econometric framework of income mobility

This paper implements a two-stage least square (2SLS) regression model to estimate annual income mobility on the pooling of the two four-year balanced panel datasets, 2005-2008 and 2011-2014, of EU-SILC data for France, Italy, Spain and the UK.

Given our aim of estimating a dynamic model to compare countries and time spans, finding the appropriate framework is not straightforward. First, we have to tackle endogeneity problems arising from the presence of lagged income among the regressors. Second, we have to find a way of comparing results among countries and periods. Endogeneity can be solved in two ways: one is to estimate the model in a dynamic framework *à la* Blundell and Bond (1998) by using a GMM (Generalised Method of Moments) estimator, the other is to use instrumental variables (IV). However, the former – even in its system formulation – suffers from the drawback that explicit fixed-effects dummies cannot be included among the regressors especially if T is very small, as in our case (Roodman, 2009). This makes the model unsuitable for our purposes given that we wish to compare the determinants of income mobility across countries and time. We plan to come back to this specification in further developments of the analysis.

An alternative route is to apply a panel IV estimator, ideally with random effects. However, preliminary estimates of a two-stage least square regression (2SLS) with random effects do not provide satisfactory results, since the individual-level variance component of the error term is not significant. The reasons behind this result need to be further investigated, but one is possibly related to the restrictive hypothesis of null correlation between the error term and the regressors, which is assumed in any random effects panel specification. The non-acceptance of the zero-correlation null hypothesis suggests a repeated-cross section analysis be appropriate.

We build our model by taking from Fields et al. (2003) and Aristei and Perugini (2015). In both papers the authors define income mobility as the percentage variation of income between the last and the first year of their samples, 1998 and 1993 in the former, and 2006 and 2004 in the latter. According to their approach, the longitudinal component of the datasets employed is not fully exploited and the estimation is carried out on a single cross-section of data. In contrast to this setting, we estimate income mobility on an annual basis on the two four-year balanced panel datasets, which cover the periods 2005-2008 and 2011-2014 (see Table 1 and Table 2 for details on the data and variables). For individuals $i = (1, \dots, N_1; 1, \dots, N_2)$ and for years $t = (2005, \dots, 2008; 2011, \dots, 2014)$, we model annual income mobility as follows:[10]

$$\Delta \ln y_i = f\left[\ln y_{i(t-1)}, X_{i(t-1)}, \Delta W_i, T_i, C_i, \varepsilon_{i(t-1)}, \Delta\varepsilon_i\right] \quad (3)$$

In equation (3), $\Delta \ln y_{i(t,t-1)}$ is a measure of annual income mobility calculated as the percentage variation in real terms of the equivalised income between t and $t-1$ and $\ln y_{i(t-1)}$ is the first lag of the logarithm of equivalised income. $X_{i(t-1)}$ is a set of household head (age, age-squared, sex, education) and household level characteristics (the log of number of components, the share of children on the total of household components, the share of working members, the share of unemployed and the share of pensioners) at time $t-1$. $\Delta W_{i(t,t-1)}$ includes the above household-level characteristics in first difference. Finally, to gain some insight on the effects of the crisis on income mobility and to disentangle the country effects, the model also contains period-specific T_i and country-specific C_i dummy variables.

To account for the potential endogeneity bias deriving from the inclusion of lagged income among the covariates, we estimate equation (3) through an IV estimator, since ignoring the endogeneity issue causes the estimate of the lagged variable to be upward biased. We run a first-stage regression which predicts the value of $\ln y_{i(t-1)}$ by using financial asset ownership as identifying instrument (Fields et al., 2003; Aristei and Perugini, 2015):

$$\ln y_{i(t-1)} = f\left[X_{i(t-1)}, \Delta W_i, T_i, C_i, \varepsilon_{i(t-1)}, \Delta\varepsilon_i\right] \quad (4)$$

where all the variables are those defined in equation (3) with the exception of $Z_{i(t-1)}$ which includes the IV.[11] We estimate the model (equations 3 and 4) with cluster-robust standard errors at the household level.

[10] A formal derivation of the model can be found in Aristei and Perugini (2015).

[11] In contrast to Fields et al. (2003) and Aristei and Perugini (2015), our first-stage regression (Equation 4) includes also variables in first difference (the deltas) since we model annual mobility and not overall period mobility, a setting in which, by construction, first differences are not computable.

This is done because the outcome variable does not vary within the household since, for each household member, income mobility is defined according to the equivalised household income, and because the regressors set includes variables at the household head and household levels, which do not have within-household variability.

5. Empirical results: the determinants of short-term income mobility

Mobility indexes and transition matrices (Section 3) suggest that differences exist in short-term income mobility among countries and through time. We take this preliminary evidence as the basis for the econometric analysis of this section. The aim is to unravel the effects of past income, time factors, countries' specificities, as well as individual/household socio-economic characteristics on income mobility. We estimate income mobility by applying the 2SLS specification of equations (3) and (4) to the two four-year longitudinal samples 2005-2008 and 2011-2014 of EU-SILC data for France, Italy, Spain and the UK. The dataset structure and the variables employed in the analysis are those described in the previous section and in Table 1 and Table 2.

Table 5 displays the estimation results of the IV regression (column b) in comparison to an ordinary least square (OLS) regression (column a). The validity of the 2SLS model is confirmed by the tests reported at the bottom of the table. The Wu-Hausman endogeneity test does not accept the null hypothesis of exogeneity of lagged income, thus supporting the use of an IV approach. Additionally, we do not accept the null of the Kleibergen-Paap weak identification test, thus supporting the use of financial asset ownership as an appropriate instrument for lagged income.[12]

The estimate of one of the main parameters of interest – the coefficient of the lagged income variable – is significantly different from zero and negatively related to income growth, thus implying that income follows a convergence trend. This result is in line with that of other studies, such as Fields et al. (2003) for Indonesia, South Africa, Spain and Venezuela as well as Aristei and Perugini (2015) for Europe. The value of the coefficient, -0.137, is lower, in absolute value, than that obtained from the OLS regression which equals -0.326. This upward bias is standard in the literature and reflects the fact that OLS overlooks the endogeneity issue arising from the inclusion of the lagged outcome variable among the regressors.

Estimation of the model reveals significant time and country effects. The dummy variable which identifies period 2011-2014 is negative (-0.006), and points towards a decrease in the degree of income mobility in a period of higher economic uncertainty, accordingly with mobility indexes and transition matrices. Also the country effects are significant, confirming former empirical results (see, for instance,

[12] The first-stage regression results are displayed in Table A.1 of the Appendix.

Ayala and Sastre, 2008, and Aristei and Perugini, 2015). The coefficients of all country dummies are positive, signalling higher mobility in France, Spain and the UK with respect to Italy. Specifically, incomes in France and the UK have the highest relative mobility as previously found in the literature (e.g. Bigard et al., 1995, for France, and Chen, 2009, for the UK). However, the estimated country effects are not directly comparable with the evidence presented in Section 3, because, here, we are evaluating average effects over the entire period (2005-2008 & 2011-2014). The analysis in Section 3, instead, was carried out for each period separately. Table 5 also displays an augmented version of the IV model, in which we interact the country effects with time (column c) to evaluate the dynamics of income mobility both across time and space. The joint impact of the time dummy and its interaction with the country dummies tells us that in France and in the UK income mobility decreased to a lesser extent than in Italy. Conversely, in Spain income mobility decreased at a faster pace.[13] Again, there are few discrepancies between these results and the evidence provided by the descriptive statistics of Section 3. These may be explained by the fact that mobility and transition matrices are purged from the effects of individual characteristics which capture some of the drivers of income mobility otherwise disregarded. For instance, in the econometric analysis France experienced a fall in mobility smaller than that of Italy, in contrast to the indications provided by the mobility indexes.

As for the household head characteristics, income mobility decreases with age at a greater speed as the individual gets older (the coefficient of age is negative and that of age-squared is positive, despite not being significant). Ayala and Sastre (2008) suggest that this may be the result of higher stability of older workers' incomes in comparison to those of younger workers'. Educational attainment positively affects income mobility at an increasing pace for higher education levels. This may be interpreted as a sign of greater opportunities for more highly educated workers to climb the income ladder – in case of positive income changes – but also to allow them to smooth income changes in case of negative income growth. When the household is headed by a female, we observe a positive impact on mobility. This result is counterintuitive in the light of what is generally found in the literature about discrimination against women in the labour market and lower levels of pay associated to women's work. For the interpretation of this result we rely on Aristei and Perugini (2015) who argue that there are various factors which may help understand it. One reason lies in the fact that in their sample, women who are household heads, despite being relatively less represented than men, have higher incomes than male heads. However, in our sample we do not find this evidence. Another reason may be "the generalised decline of the gender earnings gap

[13] The coefficient of the time dummy equals -0.033, while those of the interaction terms with France and the UK are 0.008 and 0.027, respectively, and point to a reduction in mobility in period 2. For Spain, instead, the interaction term is -0.007, which reinforces the reduction in mobility in period 2.

and that the positive effect of female headship may have led to a permanent shift towards upper income levels" (p. 210). In our analysis further investigation is needed on the subject.

Among the household-level variables, the positive – and significant – coefficient of the number of household components on income mobility is a comparable result with similar studies (e.g. Castellano et al., 2004) and is possibly a consequence of the fact that we are controlling for other household composition variables (Aristei and Perugini, 2015). As expected, a larger share of children and a larger share of unemployed transmit a negative impulse to income mobility, i.e. a household with a larger share of members who are not income earners curbs income growth. At the opposite, a larger share of workers within the family unit boosts income growth and – similarly to higher education – prevents equivalised income from experiencing negative swings. The share of pensioners is instead not significant and this may be because retirement income is not subject to fluctuations through time.

Finally, household-level variables in first difference grasp the impact of variations in household composition on income mobility. Their signs and significance are in line with those of the corresponding lagged variables: increases in the household size and in the share of workers bring about greater mobility, while an increase in the share of children and of unemployed household members causes income mobility to decrease. Again, variations in the share of retirees is not significant.

To sum up, the econometric analysis provides evidence of (i) systematic differences in income mobility between the countries analysed, with Italy experiencing the lowest level of income mobility of all, and (ii) lower mobility in the aftermath of the crisis. Regarding socio-economic characteristics, income mobility is positively related to education and the share of workers within the household, while it is negatively affected by income of the previous period, age and the presence of household members who are not income earners.

6. Conclusions

We exploit the longitudinal sample of the EU-SILC for the periods 2005-2008 and 2011-2014 to study the degree of short-term intra-generational income mobility both across European countries (France, Italy, Spain and the UK) and across time. Specifically, our aim is to, first, capture any heterogeneities across countries and, second, discover how income mobility has changed in the aftermath of the Great Recession. Additionally, the econometric analysis allows us to dissect the drivers of income mobility at the individual level.

For our purpose, we follow Aristei and Perugini (2015), but we differ from them in a number of ways. First, we exploit the longitudinal dimension of the datasets employed by estimating income mobility on an annual basis on the two four-year balanced panel datasets rather than considering a single cross-

section to estimate period-related mobility. Second, we add a comparative analysis of income mobility patterns in a period of relative economic stability (2005-2008) with that of a period of relative economic instability (2011-2014), which, to the best of our knowledge, has not been done so far. By doing so, we supplement the related literature by providing further evidence of income mobility across Europe.

Taken together, the descriptive and econometric analysis suggest that there are systematic differences in income mobility between the countries analysed, in line with previous work. We also find that Italy, at least in the first period, enjoys the lowest level of income mobility. In the aftermath of the crisis, income distribution turns out to be less mobile in all countries, especially in Spain, which experiences the greatest reduction in income mobility. Moreover, there is evidence that over the period 2011-2014 upward mobility decreases much more than downward mobility. Regarding the drivers of income mobility, our results are in line with those of Aristei and Perugini (2015). Specifically, we find that mobility is positively related to education and the share of workers within the household, while it is negatively affected by age and the presence of household members who are not income earners. Furthermore, we find evidence of a convergence process, whereby income of the previous period is negatively associated with income mobility.

In terms of policy implications, we have some interesting insights. First, the crisis reduced the ability of individuals to move upwards on the income ladder. Second, it appears that the employment status of individuals is an important determinant of mobility.

These results motivate further developments of our analysis. In relation to the first point, one has to keep in mind that income mobility is a double-edged sword. It can be an opportunity for individuals to climb the income ladder, but at the same time, it can translate into greater economic insecurity. Therefore, we plan to find a more sophisticated econometric approach to fully exploit both the longitudinal structure of the dataset and the heterogeneities among countries. With regards to the second point, it is important to understand whether and how the performance of each country's labour market has influenced income mobility and to what extent.

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TABLES

Table 1 Sample composition (%)

	2005-2008	2011-2014	Overall sample
France	27.5	26.0	26.8
Italy	27.2	25.5	26.4
Spain	19.0	20.3	19.6
UK	26.3	28.2	27.2
Total	100.0	100.0	100.0

Source: own calculations on EU-SILC data. Weighted statistics.

Table 2 Descriptive statistics

	period 1 = 2005-2008					**period 2 = 2011-2014**				
	mean	sd	min	max	N	mean	sd	min	max	N
Individual-level variables										
Delta log equivalised income	0.014	0.366	-2.676	3.058	54006	0.011	0.327	-2.482	2.330	47409
Log equivalised income	9.856	0.540	6.781	11.765	72008	9.807	0.537	7.195	11.387	63212
Household head-level variables										
age	44.291	10.897	16	64	72008	45.011	10.699	16	64	63212
education: lower secondary	0.207	0.405	0	1	72008	0.238	0.426	0	1	63212
education: upper secondary	0.380	0.485	0	1	72008	0.371	0.483	0	1	63212
education: tertiary	0.311	0.463	0	1	72008	0.325	0.468	0	1	63212
female	0.292	0.455	0	1	72008	0.327	0.469	0	1	63212
Household-level variables										
log no. of components	1.067	0.463	0	2.485	72008	1.075	0.468	0	2.485	63212
share of children	0.129	0.194	0	0.800	72008	0.129	0.194	0	0.833	63212
share of workers	0.397	0.357	0	1	72008	0.383	0.354	0	1	63212
share of unemployed	0.023	0.111	0	1	72008	0.042	0.151	0	1	63212
share of pensioners	0.035	0.163	0	1	72008	0.027	0.146	0	1	63212

Source: own calculations on EU-SILC data. Weighted statistics.

Table 3 Income mobility indexes

	France	Italy	Spain	UK
		period 1 = 2005-2008		
Fields and Ok index (t, t+3) (*)	0.267	0.298	0.379	0.322
Shorrocks index: all transitions (**)				
Mean log deviation - GE(0)	0.210	0.212	0.270	0.228
Theil - GE(1)	0.208	0.202	0.228	0.211
Sq. coefficient of variation - GE(2)	0.222	0.218	0.221	0.219
Gini	0.104	0.099	0.115	0.105
		period 2 = 2011-2014		
Fields and Ok index (t, t+3) (*)	0.221	0.284	0.302	0.340
Shorrocks index: all transitions (**)				
Mean log deviation - GE(0)	0.164	0.184	0.160	0.203
Theil - GE(1)	0.162	0.168	0.137	0.184
Sq. coefficient of variation - GE(2)	0.178	0.180	0.140	0.187
Gini	0.079	0.080	0.066	0.092

Source: own calculations on EU-SILC data. (*) Fields and Ok (1999). (**) Shorrocks (1978).

Table 4 Transition matrices (%)

(a) France: 2005-2008

	quintile					
quintile	1	2	3	4	5	Total
1	66.2	20.6	6.7	3.5	3.0	100
2	22.1	46.5	21.2	6.6	3.7	100
3	6.4	24.0	45.2	19.2	5.2	100
4	2.7	6.1	20.8	53.3	17.1	100
5	2.6	3.0	6.1	17.4	71.0	100
Total	20.1	20.0	20.0	20.0	20.0	100

(b) France: 2011-2014

	quintile					
quintile	1	2	3	4	5	Total
1	71.3	18.6	6.2	2.4	1.5	100
2	19.1	53.2	18.6	5.6	3.5	100
3	5.4	20.7	52.5	17.4	4.0	100
4	2.8	5.1	17.6	57.1	17.4	100
5	1.4	2.5	5.1	17.4	73.6	100
Total	20.0	20.0	20.0	20.0	20.0	100

(c) Italy: 2005-2008

	quintile					
quintile	1	2	3	4	5	Total
1	69.3	21.5	6.2	1.9	1.1	100
2	19.7	49.5	20.9	7.1	2.9	100
3	6.7	18.7	45.4	21.1	8.0	100
4	2.3	7.1	20.3	49.6	20.8	100
5	2.1	3.2	7.2	20.4	67.1	100
Total	20.0	20.0	20.0	20.0	20.0	100

(d) Italy: 2011-2014

	quintile					
quintile	1	2	3	4	5	Total
1	73.3	19.4	4.9	1.2	1.1	100
2	18.8	53.1	19.5	6.7	2.0	100
3	4.2	19.3	51.1	20.1	5.4	100
4	2.6	5.7	19.3	53.1	19.4	100
5	1.2	2.5	5.3	18.9	72.1	100
Total	20.0	20.0	20.0	20.0	20.0	100

(e) Spain: 2005-2008

	quintile					
quintile	1	2	3	4	5	Total
1	58.9	23.6	10.1	6.0	1.5	100
2	27.1	37.1	24.2	8.6	3.0	100
3	8.9	27.6	35.2	22.5	5.8	100
4	3.7	9.1	24.3	41.7	21.1	100
5	1.5	2.5	6.1	21.3	68.6	100
Total	20.1	20.0	20.0	20.0	20.0	100

(f) Spain: 2011-2014

	quintile					
quintile	1	2	3	4	5	Total
1	73.1	18.7	4.9	2.3	1.0	100
2	19.6	53.1	22.7	3.7	1.0	100
3	4.4	22.2	53.1	17.0	3.3	100
4	2.3	4.8	15.7	60.4	16.7	100
5	0.7	1.2	3.4	16.7	78.1	100
Total	20.0	20.0	20.0	20.0	20.0	100

Table 4 Transition matrices (%) (cont.)

(g) UK: 2005-2008

	quintile					
quintile	1	2	3	4	5	Total
1	64.8	19.7	8.7	4.6	2.2	100
2	21.8	45.2	22.4	8.1	2.5	100
3	7.5	23.1	40.8	22.0	6.6	100
4	3.8	9.2	23.2	49.0	14.9	100
5	2.2	2.8	4.9	16.3	73.8	100
Total	20.0	20.0	20.0	20.0	20.0	100

(h) UK: 2011-2014

	quintile					
quintile	1	2	3	4	5	Total
1	63.7	25.4	6.5	3.2	1.3	100
2	23.3	49.2	19.2	5.6	2.7	100
3	8.2	17.9	42.4	25.7	5.8	100
4	3.6	4.8	26.9	48.4	16.3	100
5	1.2	2.9	4.9	17.4	73.7	100
Total	20.1	20.1	19.9	20.0	19.9	100

Source: own calculations on EU-SILC data.

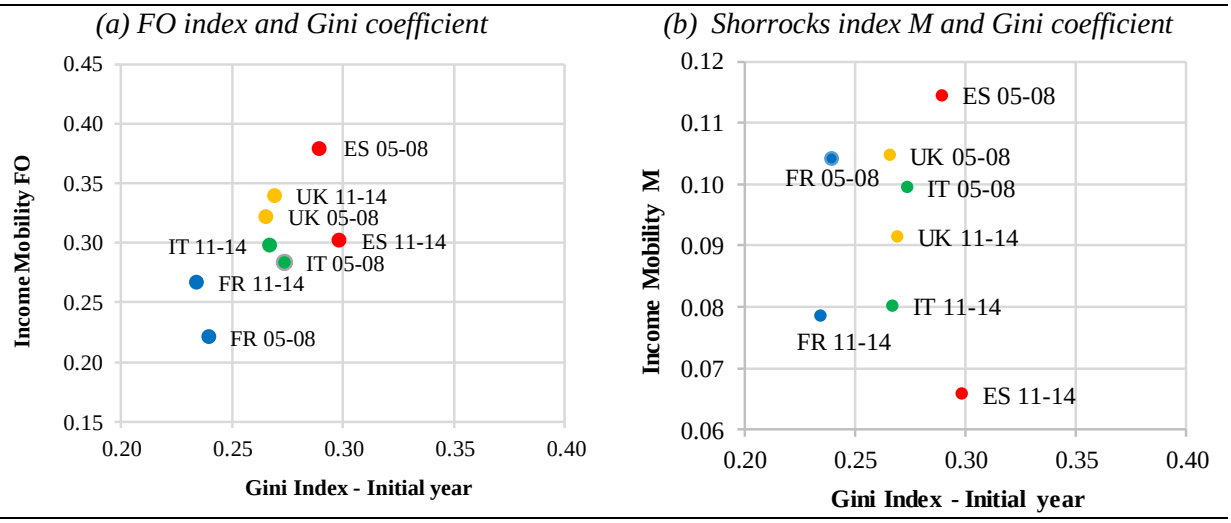
Table 5 Estimation of income mobility: 2005-2008 and 2011-2014

	OLS (a)		IV (b)		augmented IV (c)	
	coef.	robust s.e.	coef.	robust s.e.	coef.	robust s.e.
Individual-level variables (lag)						
log equivalised income	-0.326	0.006 ***	-0.137	0.017 ***	-0.090	0.020 ***
Household head-level variables (lag)						
age	0.000	0.002	-0.001	0.002	-0.001	0.002
age-squared	0.000	0.000	0.000	0.000	0.000	0.000
education: lower secondary	0.025	0.008 ***	0.005	0.007	0.003	0.007
education: upper secondary	0.074	0.007 ***	0.022	0.008 ***	0.015	0.008 *
education: tertiary	0.156	0.008 ***	0.062	0.011 ***	0.044	0.012 ***
female	0.002	0.004	0.013	0.004 ***	0.016	0.004 ***
Household-level variables (lag)						
log no. of components	0.048	0.005 ***	0.031	0.005 ***	0.024	0.005 ***
share of children	-0.118	0.012 ***	-0.074	0.011 ***	-0.060	0.011 ***
share of workers	0.172	0.007 ***	0.082	0.010 ***	0.057	0.011 ***
share of unemployed	-0.211	0.016 ***	-0.155	0.016 ***	-0.136	0.016 ***
share of pensioners	0.080	0.011 ***	0.016	0.012	-0.004	0.012
Household-level variables (delta)						
log no. of components	0.099	0.015 ***	0.097	0.016 ***	0.096	0.017 ***
share of children	0.006	0.035	-0.075	0.038 **	-0.090	0.039 **
share of workers	0.178	0.013 ***	0.158	0.014 ***	0.152	0.014 ***
share of unemployed	-0.084	0.025 ***	-0.058	0.027 **	-0.048	0.028 *
share of pensioners	0.070	0.020 ***	0.031	0.022	0.019	0.023
Country and period dummies						
France	0.114	0.005 ***	0.065	0.006 ***	0.031	0.008 ***
Spain	0.064	0.006 ***	0.028	0.006 ***	0.006	0.008
UK	0.134	0.007 ***	0.063	0.009 ***	-0.023	0.013 *
period 2 = 2011-2014	-0.013	0.004 ***	-0.006	0.003 *	-0.033	0.005 ***
France*period2	-		-		0.008	0.003 **
Spain*period2	-		-		-0.007	0.003 ***
UK*period2	-		-		0.027	0.002 ***
constant	2.895	0.065 ***	1.229	0.158 ***	0.843	0.177 ***
Number of observations	101,415		101,415		101,415	
F(21, 17211) / F(24, 17211)	146.8		21.7		31.5	
Prob > F	0.000		0.000		0.000	
R-squared	0.184		-		-	
Centered R2	-		0.126		0.099	
Kleibergen-Paap weak identification test (F)	-		951.207		824.156	
Wu-Hausman endogeneity test	-		108.69		130.791	
Chi-sq(1) P-val			0.000		0.000	

*Standard errors are clustered at the household level. Estimates are weighted. *** p<0.01, ** p<0.05, * p<0.1*

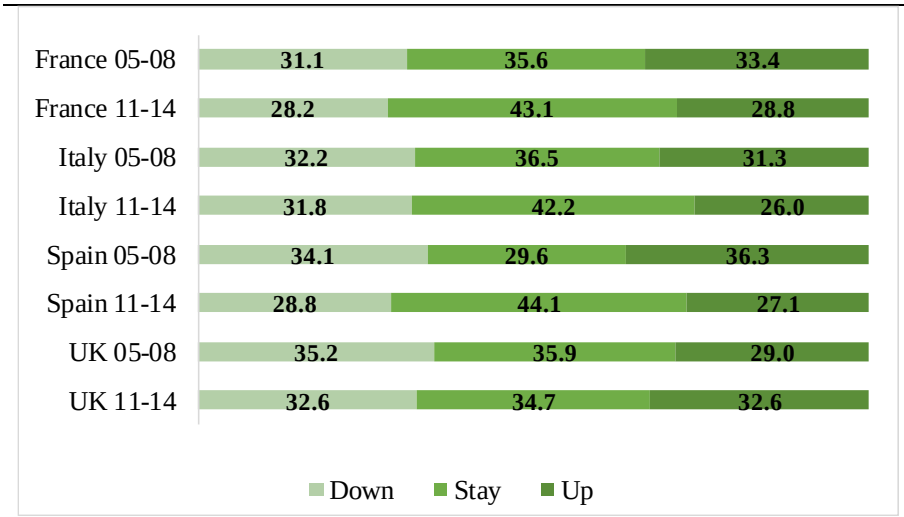
FIGURES

Figure 2 Upward and downward mobility



Source: own calculations on EU-SILC data.

Figure 2 Upward and downward mobility



Source: own calculations on EU-SILC data.

APPENDIX A

Table A.1 IV regressions: first-stage

Dependent variable: log of equivalised income, lagged

	IV		augmented IV	
	coef.	robust s.e.	coef.	robust s.e.
Instrument				
financial asset ownership (lag)	0.231	0.007 ***	0.208	0.007 ***
Household head-level variables (lag)				
age	0.007	0.003 **	0.008	0.003 **
age-squared	0.000	0.000	0.000	0.000
education: lower secondary	0.090	0.017 ***	0.091	0.017 ***
education: upper secondary	0.236	0.016 ***	0.232	0.016 ***
education: tertiary	0.434	0.017 ***	0.433	0.017 ***
female	-0.048	0.008 ***	-0.050	0.008 ***
Household-level variables (lag)				
log no. of components	0.083	0.012 ***	0.090	0.012 ***
share of children	-0.206	0.025 ***	-0.214	0.025 ***
share of workers	0.450	0.013 ***	0.459	0.013 ***
share of unemployed	-0.262	0.032 ***	-0.269	0.031 ***
share of pensioners	0.300	0.024 ***	0.317	0.024 ***
Household-level variables (delta)				
log no. of components	0.017	0.017	0.018	0.017
share of children	0.406	0.050 ***	0.397	0.049 ***
share of workers	0.093	0.014 ***	0.097	0.014 ***
share of unemployed	-0.119	0.025 ***	-0.127	0.025 ***
share of pensioners	0.192	0.023 ***	0.200	0.023 ***
Country and period dummies				
France	0.177	0.012 ***	0.159	0.015 ***
Spain	0.178	0.013 ***	0.225	0.018 ***
UK	0.409	0.014 ***	0.517	0.018 ***
period 2011-2014	-0.040	0.008 ***	-0.065	0.016 ***
France*period2	-		0.076	0.009 ***
Spain*period2	-		0.030	0.009 ***
UK*period2	-		-0.030	0.006 ***
constant	8.807	0.067 ***	8.759	0.067 ***
Number of observations	101,415		101,415	
F(21, 17211) / F(24, 17211)	343.21		313.48	
Prob > F	0.000		0.000	
Centered R2	0.372		0.381	

*Standard errors are clustered at the household level. Estimates are weighted. *** p<0.01, ** p<0.05, * p<0.1*