www.cefin.unimore.it

ISSN 2282-8168

CEFIN Working Papers
No 55

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September 2015

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‘It’s a trap!’ The degree of poverty persistence in Italy and Europe

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Abstract

This paper analyses poverty persistence in Italy and compares it with France, Greece, Portugal, Spain and the United Kingdom, focusing on its dynamics through the analysis of transitions into and out of poverty and the econometric quantification of true state dependence. The analysis is performed on the longitudinal component of the EU-SILC for the period 2009-2012. Descriptive statistics and transition matrices reveal that households in Italy are characterised by a higher degree of poverty persistence than in other countries. This evidence is confirmed by the estimation of Heckman’s dynamic random effects probit model. Italy is the country with the highest level of true state dependence estimated at 0.26, after Greece (0.30), while the UK has the lowest value (0.07). Italy also shows an impact of individual characteristics on current poverty lower, in absolute terms, than the lagged dependent variable. This may explain the gap in the persistent to current poverty ratio between Italy and other countries.

JEL classification: I32, C23, C25

Keywords: poverty, dynamic probit models, state dependence, EU-SILC

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1. Introduction

One of the flagship initiatives of the Europe 2020 strategy for smart, sustainable and inclusive growth is the European platform against poverty and social exclusion, designed to help countries reach the target of lifting 20 million people out of poverty and social exclusion by 2020. The fight to poverty and social exclusion is one of the five ambitious goals of the Europe 2020 strategy which also targets employment, R&D, climate change and energy sustainability, and education. The platform, launched in 2010, will remain active until 2020 with the aim to ensure economic, social and territorial cohesion, to guarantee respect for the fundamental rights of people experiencing poverty and social exclusion, and to mobilize support to help people integrate in the communities where they live (i.e. get training and help to find a job and have access to social benefits). The European Commission recommends that a number of indicators be monitored. The 'current at-risk-of-poverty rate', defined as the proportion of individuals whose equivalised disposable income falls below the poverty line, is one of the indicators. However, since the existence of this risk can be only temporary - for instance due to a period of unemployment which causes annual income to fall below the poverty threshold - it is important to examine longer-term risk of poverty. The 'persistent at-risk-of-poverty rate' (PARPR) is the indicator suggested by Eurostat to achieve this purpose. It is defined as the percentage of persons living in households with equivalised disposable income below the poverty line in the current year and at least in two of the preceding three years. For both rates - current and persistent - the poverty line is conventionally fixed at the 60% of the national median equivalised disposable income.

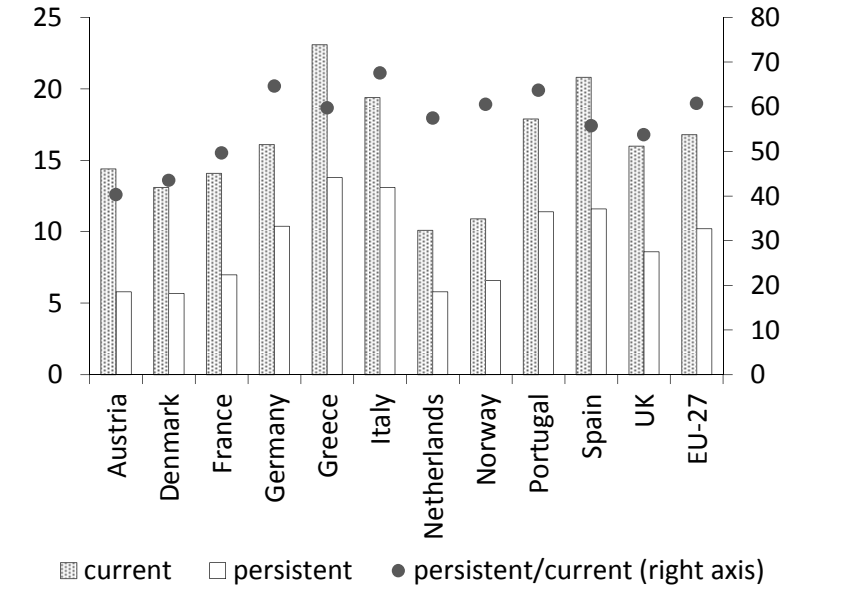
The attention of supranational political entities, international organizations and governments towards the fight against poverty is driven by an ideal of social - and economic - justice within our societies and by the concern that a large percentage of persons at risk of poverty may hinder economic growth. Low income - for instance arising from job loss - is the main determinant of social exclusion, that in turn causes human capital depletion, raises entry barriers to education, employment, credit, etc. After distinguishing between temporary and permanent social exclusion, it is crucial to tackle the issue in a serious and systematic way to help governments design appropriate and targeted policies.

To have a first insight of the size of the phenomenon, let us take a look at some simple, but emblematic figures. Already before the onset of the 2007 crisis, the number of people at risk of poverty was remarkably high, reaching about 81 million in 2006, with an at-risk-of-poverty rate of 16.5%. In 2012 around 83 million persons were at risk of poverty in the European Union (EU-27) countries, corresponding to an at-risk-of-poverty rate of 16.6%, of which 60.7% persistently poor.[1] The Mediterranean countries (Greece, Italy, Spain and Portugal) show current and persistent poverty rates higher than the European

[1] In the EU-27 the current poverty rate ranged between 16.6% in 2008 and 16.8% in 2011, of which 51.8% and 60.1% respectively were persistently poor, showing an increasing trend across the years of crisis.

average, while in Central and Northern Europe (Austria, Denmark, France, Germany, Netherlands, Norway and UK) rates are lower than the average (Figure 1). Specifically, Greece and Spain are the countries with the highest proportions of income poor (23.1% and 20.8% respectively), followed by Italy (19.4%), Portugal (17.9%), the UK (16%) and France (14%). In the same year, PARPR presents a slightly different picture: Greece continues to have the highest proportion of persons at risk of persistent poverty (13.8%), while Italy is ranked second (13.1%), followed by Spain (11.6%), Portugal (11.4%) and the UK (8.6%). France remains the country with the lowest incidence of persistent poverty (7.0%).

Figure 1 Current and persistent at-risk-of-poverty rates, 2012 (%)



Source: Eurostat

Two aspects are worth noting. A high PARPR indicates that a large fraction of the population may be trapped into long-term poverty. In addition, a high persistent to current poverty ratio (the dots in Figure 1) suggests that poverty affects a specific segment of the population for which escaping this condition may be difficult. In this respect, unlike almost all the other countries which are able to keep persistent poverty down to almost half of the at-risk-of poverty rate, Italy has the highest percentage of persistent poor among its poor (67.5%). This prompted us to investigating this further, with the ultimate purpose of understanding why Italy is less able to control its persistent risk of poverty than other countries. Jenkins and Van Kerm (2014) demonstrate the existence of an almost linear relationship between current and persistent poverty and that the former can be seen as a proxy of the latter. However, our analysis shows that there may be countries, such as Italy, for which this relationship does not hold. As we have just seen, Italy is characterized by an intermediate value of the at-risk-of-poverty rate and by a relatively high degree of poverty persistence. Is it a puzzle or is Italy an exception? What are the circumstances under which the near-linear relationship between the two rates breaks down?

This paper analyses poverty in Italy and compares it to France, Greece, Portugal, Spain and the UK, focusing on its dynamics through the analysis of transitions into and out of poverty, and econometric quantification of poverty state dependence. The majority of the economic literature on poverty stresses the importance of distinguishing the dynamic approach from the static approach. Persistent or long-term poverty (i.e. experienced repeatedly and over long periods of time) differs substantially from transitory or short-term poverty (i.e. experienced only once and for a short period of time) since it identifies a group of people who are potentially 'trapped' into this condition. Such distinction is important in a policy perspective, since the fight against poverty needs to be addressed by appropriate and well-designed policy interventions able to identify both types of poverty. We exploit the longitudinal component of the European Union Statistics on Income and Living Conditions (EU-SILC) which, as highlighted by Eiffe and Till (2013), is still underused. Our sample covers the years 2009-2012, in which the same individuals are followed for up to four years. We select those who stay in the sample for the full four-year period, leading to a balanced panel of 37,259 individuals observed in each of the four waves, and implying a sample size of 149,036 observations.

We start with a detailed analysis of the data following the poverty spells methodology introduced in Bane and Ellwood (1986) and implemented in Jenkins (2000), Andriopoulou and Tsakloglou (2011) and Demir Şeker and Dayioğlu (2014), with the purpose of analysing the degree of poverty recurrence in Italy and comparing it to other European countries. To our knowledge, this is the first study that uses the longitudinal component of the EU-SILC to provide evidence about the comparison of poverty dynamics in Europe using its most recent waves (2009-2012).[2] Descriptive and transition analysis consist of entry and exit poverty rates, number of years in poverty, poverty prevalence rates and non-parametric conditional exit and re-entry probabilities. Italy is one of countries with the most persistent poverty, with low probabilities of transition into and out of poverty, high proportion of individuals experiencing poverty for the entire period and low mobility index.

We then move to the estimation of a dynamic random effects probit model (Heckman, 1981a,b) to test the presence of *true* or *genuine* state dependence of poverty. That is, we investigate whether and to what extent the previous poverty state affects *in itself* the current probability of poverty, after accounting for the initial conditions problem and controlling for observed and unobserved individual heterogeneity. The model is estimated on individual data attributing to each individual the socio-economic characteristics of the household head. A specification in which characteristics refer to each person is used as robustness analysis. The Heckman model estimation confirms the findings of descriptive and transitions analyses. It shows that Italy is the country with the highest level of true state dependence estimated at 0.26, after

[2] Andriopoulou and Tsakloglou (2011) provide a similar analysis on the European Community Household Panel (ECHP) for the period 1994-2000.

Greece (0.30). Ranked next is Portugal, with an average partial effect of 0.24, followed by France (0.22), Spain (0.15) and finally the UK, the most mobile country, with a true state dependence value of 0.07.

Direct comparison of figures between Italy and all the other countries seems to imply that the puzzle emerged in Figure 1, for which Italy is not sufficiently able to control for the persistency of poverty, may be imputed to the difference among the countries' levels of true state dependence. Descriptive, transition and econometric analyses highlight the higher degree of persistence in Italy compared to the UK, France and Spain. In addition, the econometric analysis provides evidence of the relevance of individual characteristics for explaining poverty status: in France and Spain the magnitude of the average partial effects of socio-economic characteristics on current poverty is higher than Italy, and comparable in absolute terms with the APE of state dependence. In the UK the impact of individual characteristics is even greater than state dependence. This may indicate that in Italy, more than in the UK, France and Spain, true state dependence has a stronger impact (in absolute terms) on current poverty than current individual characteristics.

The remainder of the article is organised as follows. Section 2 briefly reviews the literature on poverty dynamics. Section 3 describes the dataset and presents descriptive statistics of the variables of interest. Section 4 offers a view on poverty persistence by means of transition matrices. The Heckman random effects dynamic probit model used to estimate poverty persistence is outlined in Section 5. Section 6 discusses the estimation results of the model and presents average partial effects and predicted probability ratios (Section 6.1), followed by a robustness analysis of results (Section 6.2). Section 7 concludes with a summary of the main findings.

2. Related literature

Different approaches have been applied to study poverty as a dynamic process, depending on the main focus of the research.[3] The most popular is perhaps the so-called individuals' spells approach aimed to identify characteristics and trigger events of poverty exit and re-entry as originally proposed by Bane and Ellwood (1986) and applied to US data for the period 1970-1982. Stevens (1994) extends this approach by allowing for multiple or repeated spells and applies it to US data for the period 1970-1987. A first comparative analysis is performed by Duncan et al. (1993) in the US, Canada, France, Germany, the Netherlands, Luxembourg, Ireland and Sweden. A similar analysis for Canada is proposed by Finnie (2000). In Europe, this class of models is initially applied to the UK using the British Household Panel Survey (BHPS) (i.e. Jarvis and Jenkins, 1997; Jenkins, 2000; Jenkins et al., 2001, Devicienti, 2002). The analysis is then extended to other countries, e.g. Spain (Cantó-Sánchez, 1996; Arranz and Cantó, 2010), Sweden (Hansen and Wahlberg, 2004), Germany (Biewen, 2006) and Turkey (Demir Şeker and Dayioğlu, 2014), while

[3] See also Aassve et al. (2006), Andriopoulou and Tsakloglou (2011) and Biewen (2014) for a review of the relevant literature.

Fouarge and Layte (2005) and Andriopoulou and Tsakloglou (2011) perform international comparisons.

Other approaches are income variance component models aimed to describe the longitudinal covariance structure of income following the original model of Lillard and Willis (1978) and then to derive results on poverty dynamics (e.g. Duncan, 1983; Duncan and Rodgers, 1991; Stevens, 1999); decomposition methods to evaluate the impact of socio-demographic and labour market country specific characteristics of poverty (e.g. Dickens and Ellwood, 2001; Biewen and Jenkins, 2005; Damioli, 2010; Demir Şeker and Jenkins, 2015); and structural models to analyse the underlying dynamic processes which determine earnings, such as marriage, fertility and labour force participation, and then the resulting earnings (e.g. Burgess and Propper, 1998; Aassve et al., 2006). The model of Cappellari and Jenkins (2004) is instead a complement to hazard and covariance structure models and consists of a first-order Markov model which controls for initial conditions effects and for attrition. It is applied to the British Household Panel Survey (BHPS) for the 1990s and its estimation reveals substantial state dependence in poverty, separate from persistence induced by heterogeneity.

Another class of models is that of dynamic discrete choice models which stem from the question originally asked by Heckman (1981a,b) of 'whether observed persistence in economic phenomena is due to underlying differences in individual characteristics or due to genuine causal effects of past on future outcomes' (Biewen, 2009, p. 1097). Initially empirical research was aimed to understand whether past unemployment was a determinant of future unemployment, that is whether unemployment was a persistent phenomenon. Heckman (1981a,b) proposed a model to solve the initial conditions problem and to account for unobserved heterogeneity to distinguish true state dependence from spurious state dependence. In later years, his approach and other related approaches, such as Wooldridge's (2005), were applied to study persistence of other phenomena, among which low-wage employment, social exclusion, and poverty. The recent related literature generally finds a sizable degree of state dependence of these conditions. An example is the study of Stewart (2007) who analyses the interrelated dynamics of unemployment and low-wage employment in the UK in the 1990s by means of dynamic probit models applied to the BHPS. Poggi (2007) studies the causes of social exclusion dynamics and persistence in Spain applying the Wooldridge's (2005) estimator to a dynamic logit model on the European Community Household Panel (ECHP) for the years 1994-2001. Biewen (2009) discusses the violation of strict exogeneity of employment status and household composition when studying the dynamics of poverty using data from the German Socio-Economic Panel (GSOEP). With a model of state dependence and feedback effects from past poverty to future employment and household composition outcomes, he establishes that there are remarkable feedback effects that should be taken into account in order to obtain unbiased estimates of poverty state dependence. Devicienti and Poggi (2011) apply a bivariate probit model to jointly model the dynamics of social exclusion and poverty in Italy. Our work can be included in the group of dynamic discrete choice models.

Cross-country empirical evidence can be found in Van Kerm and Pi Alperin (2010) who describe the inter-temporal distribution of income in 26 European countries using the longitudinal component of the EU-SILC for the period 2003-2007. They study the distribution of income gains and losses and examine their effects on inequality and progressivity, and then turn to the impact of these income changes on poverty dynamics assessing how much income variations reduce intertemporal inequality as compared to inequality of annual income. Duration analysis of poverty spells is employed in Fouarge and Layte (2005) to test how different country welfare regimes - corporatist, social democratic and liberal - impact on the distribution of poverty and its duration in Europe for the period 1994-1998 using the ECHP, while Andriopoulou and Tsakloglou (2011) use the same dataset for the period 1994-2001 to perform spell analysis of poverty transitions and to run multivariate hazard logistic regression of poverty exits and entries/re-entries. D'Ambrosio et al. (2011) introduce a decomposition procedure to determine the exact marginal impact of a set of explanatory variables (i.e. household size, age, gender, marital status and occupational status) on poverty, using the ECHP data for Belgium, France, Germany, Italy and Spain. Polin and Raitano (2012) provide a European comparison of mobility into and out of poverty using the EU-SILC longitudinal data up to 2007 and grouping EU countries in five geographical clusters. In describing the main determinants of poverty they establish that the impact on poverty transitions of events related to the labour market dominates demographic events. Jenkins and Van Kerm (2014) study the relationship between the EU's persistent and current poverty measures and find that it is almost linear, suggesting that the measure of persistent poverty adds relatively little additional information to that which is disclosed by the current poverty indicator. Duiella and Turrini (2014) focus instead on macro drivers of poverty - e.g. social expenditure - across EU countries after the crisis. They analyse the relationship between poverty, severe material deprivation and low work intensity, finding a positive relationship among them which becomes stronger after 2010 in countries that suffered more from the economic recession, such as Spain, Greece, Ireland and Italy. Finally, Ayllon (2014), following Biewen (2009), restricts the attention to youth poverty dynamics in Europe addressing the possibility of feedback effects among poverty, employment and residential emancipation, and her findings reveal considerable but heterogeneous genuine state dependence across countries. Despite the focus of her analysis on youth poverty, the general pattern across countries is consistent with our results especially when comparing northern and southern European countries. Furthermore, the strong persistence of youth poverty found in Italy supports our result that Italy is among the countries with the highest degree of poverty persistence.

Regarding Italy specifically, Devicienti and Poggi (2011) model jointly social exclusion and income poverty. They use a dynamic bivariate probit model, controlling for unobserved heterogeneity and initial conditions as in Wooldridge (2005) and apply it to the 1994-2001 ECHP data for Italy. They find not only a sizeable degree of state dependence in both processes, but also the presence of mutually reinforcing effects. Baldini and Ciani (2011) investigate the impact of changes in the employment rate on inequality

and poverty in Italy applying simulations methods to the Italian module of EU-SILC and the Italian Labour Force Survey. Devicenti et al. (2014) estimate poverty persistence using two definitions, income poverty and a multidimensional index of lifestyle deprivation. They estimate multiple-spell hazard rate models and the results highlight that the weaknesses of the Italian labour market, the insufficiencies of the existing social security system and the deep territorial dualism generate persistent poverty for certain groups of the population. More recently Coppola and Di Laurea (2014) investigate the persistent at-risk-of-poverty rate in Italy at the onset of the economic crisis using EU-SILC cross-sectional data by means of a static logistic model. They confirm Italy's weaknesses, such as frail labour market, inadequate social security system, territorial dualism and division of roles by gender, and their part in determining poverty.

3. Data and descriptive analysis

The dataset used in this paper is the longitudinal component of European Statistics on Income and Living Condition (EU-SILC) for the four-year period 2009-2012 (for details on the data see Eurostat, 2013). The countries analysed are France, Greece, Italy, Portugal, Spain and the United Kingdom.[4] EU-SILC is the reference source for comparative statistics on income distribution and social exclusion at the European level and is consistent with the Programme of Community action to encourage cooperation between Member States to combat social exclusion. It collects information on income, socio-economic characteristics of individuals and households, and qualitative non-monetary variables of deprivation, allowing harmonized analysis across countries on income distribution, poverty and other living conditions at the individual and household levels. 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. Individual and household level data of the longitudinal component are collected over a four-year period, with the purpose of tracking changes over time and identifying the incidence and the dynamics of poverty persistence and social exclusion among subgroups in the population. According to the Eurostat directives for the analysis of poverty persistence, we select only people who stay in the survey continuously for the entire four-year period. The dataset therefore becomes a balanced panel of 37,259 individuals observed in each of the four waves, implying a sample size of 149,036 observations. The number of observations for each country and the relative composition is detailed in Table 1.

An individual is considered at risk of poverty (or income poor) if his/her equivalised disposable income falls below the poverty threshold, conventionally fixed at the 60% of median national equivalised income.[5] The risk of poverty can be evaluated in the current year or over a longer time spell. In the former

[4] The version of the dataset is "EU-SILC Longitudinal UDB 2012 - version 1 of August 2014" and it does not contain data on Germany.

[5] 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-households payments. However, it excludes non-monetary income components such as imputed rents, the value of goods produced for own consumption and non-

case the conventional indicator is the current at-risk-of-poverty rate which defines the proportion of persons at risk of poverty in the current year. In the latter case, the indicator is the persistent at-risk-of-poverty rate (PARPR), which is defined as the percentage of persons living in households with equivalised disposable income below the poverty line in the current year and at least in two of the preceding three years. In our case, we define persistent poor those who are poor in 2012 and have been poor in two out of three of the years 2009-2011.

Table 1 Sample composition by country, 2009-2012

	No. of observations	% composition
Italy	30392	20.4
France	53780	36.1
Greece	13208	8.9
Portugal	13204	8.9
Spain	27400	18.4
UK	11052	7.4
Total	149036	100.0

Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

The first row of Table 2 reports the 2009-2012 average values of the current at-risk-of-poverty rates for each country.[6] Greece and Spain are the countries with the highest proportions of income poor (23% and 20% respectively), followed by Italy (18.8%), UK and Portugal (both at 17.5%) and France (11.9%). The PARPR instead refers to 2012, the last year of the sample, and draws a slightly different picture: Greece is still the country with the highest proportion of persons at risk of persistent poverty (13.8%), while Italy is the second highest (13.1%), followed by Spain (11.6%), Portugal (11.4%) and the UK (8.6%). France remains the country with the lowest incidence of persistent poverty (7.0%).

The remainder of Table 2 summarizes the composition of the sample by the socio-economic characteristics used in the econometric analysis of Section 6, that is: age, level of education, occupation, sex, health problems, number of children in the household, number of earners in the household and degree of urbanisation. Individual characteristics refer to the head of the household. Figures show that the Mediterranean countries (Italy, Greece, Spain and Portugal) have the highest proportion of individuals who live in households whose head is 45 to 65 years old. In particular, this share is considerably high in Italy (43.8%), and lower in France (38.3%) and the UK (37.8%), which instead show a higher proportion of younger heads of household. Italy also has the lowest proportion of individuals - after Portugal - living in households whose head is graduated, 10.9% compared to 34.0% in the UK. Turning to the occupational status, Italy and Portugal have the highest percentage of individuals living in households whose head is

cash employee income (with the exception of company cars). The equivalence scale used is the modified OECD scale which assigns value 1 to the first adult, 0.5 to each other adult and 0.3 to each child under the age of 14. Eurostat directives on poverty and social exclusion advise the use of the poverty line computed on the cross-sectional dataset also when performing poverty analysis on the longitudinal dataset.

[6] These values are in line with the current-at-risk of poverty rates of Figure 1 computed on 2012 cross-sectional data.

retired, 29.6% and 33.9% respectively. For health problems, the variable specifically refers to limitations on activities due to health problems, Italy is the country with the highest proportion of individuals (27.4%) after Portugal (31.9%) that record some limitations. For household composition, France and the UK are the nations with a higher average number of children, while Italy with the lowest. Portugal has the highest proportion of income earners within the household.

Table 2 Descriptive statistics, 2009-2012 (%)

		Italy	France	Greece	Portugal	Spain	UK
At-risk-of-poverty rate		18.8	11.9	23.0	17.5	20.0	17.5
Persistent at-risk-of-poverty rate (2012)		13.1	7.0	13.8	11.4	11.6	8.6
Sample size		30392	53780	13208	13204	27400	11052
Age class	<30	3.0	8.0	2.7	2.9	4.5	7.1
	30-44	27.0	33.3	30.0	28.0	34.4	32.6
	45-64	43.8	38.3	44.5	41.3	43.0	37.8
	>=65	26.2	20.4	22.8	27.8	18.1	22.5
Educational level (*)	low	54.4	28.2	44.2	69.5	50.3	18.5
	intermediate	33.6	41.0	31.8	9.6	19.2	42.2
	high	10.9	30.4	21.2	9.2	25.2	34.0
	not reported	1.0	0.4	2.7	11.7	5.3	5.3
Occupational status	employed	55.0	59.7	58.6	53.9	55.2	59.7
	pensioner	29.6	27.5	29.1	33.9	17.4	23.0
	non-employed	15.4	12.9	12.4	12.2	27.3	17.4
Health problems		27.4	24.0	20.0	31.9	21.8	22.9
No. of children in the household		0.68	0.85	0.73	0.77	0.78	0.86
No. of earners in the household		1.43	1.43	1.20	1.57	1.37	1.45

(*) Highest ISCED level attained. Low education = pre-primary, primary or lower secondary; Intermediate education=higher secondary, post secondary non tertiary; High education: tertiary education.

Individual characteristics refer to the head of the household.

Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

4. Poverty transitions

The number of years that individuals spend below the poverty threshold, with or without breaks, is an important indicator of poverty persistence. Table 3 shows for each country the total number of years in poverty. The fraction of persistently not poor, i.e. the proportion of individuals which are never poor in the period considered, ranges between 78.1% in France and 60.4% in Greece, with a value for Italy of 69.6%. The percentage of transient poor, those who have experienced poverty in only one out of the four years, is 16 in the UK, around 13 in Greece and Spain and 9.3 in Italy, the second lowest percentage after France. Moreover, individuals who were poor in all four years constitute 8.6% of the population in Italy, the highest proportion among the other countries after Greece (9.3%).

Table 3 also displays the poverty prevalence rate, i.e. the proportion of individuals that experienced poverty at least once over the period analysed. Greece, Spain and the UK have the highest poverty prevalence rates: over 34% of the population in these countries experienced poverty in at least one year.

This measure usually is compared to the at-risk-of-poverty rate to give some insight into the composition of the poor and provide an index of mobility: a poverty prevalence rate close to the at-risk-of-poverty rate suggests that that the same individual stays in poverty in all waves and therefore that income mobility is low. On the contrary, a poverty prevalence rate higher than the at-risk-of-poverty rate suggests that the composition of the poor changes year by year, signalling higher mobility (Andriopoulou and Tzakoglou, 2011). The smaller the ratio, the lower the mobility. The index shows the highest value for the UK (1.99), followed by France (1.85) and Spain (1.84), while Italy records the lowest value (1.62). This evidence supports the idea of lower mobility in Italy, where once an individual enters poverty, he/she finds it hard to escape it. These figures are in line with Andriopoulou and Tsakloglou (2011) for their sample of 14 EU countries in 1994-2000 and with Jenkins et al. (2001) for the UK in 1991-1999.

Table 3 Number of years in poverty, poverty prevalence rate and mobility

Years in poverty (%)	Italy	France	Greece	Portugal	Spain	UK
0	69.6	78.1	60.4	70.4	63.3	65.1
1	9.3	8.8	13.3	10.4	13.2	16.0
2	6.4	4.8	9.5	6.0	9.2	8.2
3	6.2	4.2	7.5	5.4	7.4	5.8
4	8.6	4.1	9.3	7.9	7.0	4.8
Poverty prevalence rate (%)	30.4	21.9	39.6	29.6	36.7	34.9
Index of mobility (*)	1.62	1.85	1.72	1.69	1.84	1.99

(*) The index of mobility is the ratio between the poverty prevalence rate and the at-risk-of-poverty rate.
Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

Transition matrices for mobility into and out of poverty provide further useful insights in this respect.[7] Table 4 illustrates entry and exit rates: they measure the probability of escaping/entering poverty at time t, conditioned on having been poor/non-poor at time t-1. The probability of transition from poverty in t-1 to non-poverty in t shows the highest values for the UK and France (47% and 37.8% respectively), while the highest probabilities of transition from non-poverty in t-1 to poverty in t are recorded for Spain (10.1%), the UK (9.3%) and Greece (8.7%). Not surprisingly, Italy has a relatively low probability of entering poverty (6.7%), combined with a low probability of exiting it (28.7%). It follows that the probability of remaining poor over subsequent years is 71.2%, the highest value amongst the countries selected.

Table 4 Raw transition probabilities (%)

	entry	exit	remaining
Italy	6.7	28.8	71.2
France	5.2	37.8	62.2
Greece	8.7	29.1	70.9
Portugal	5.9	30.9	69.1
Spain	10.1	35.7	64.3
UK	9.3	47.0	53.0

Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

[7] The same kind of analysis is provided for Turkey in Demir Şeker and Dayiouğlu (2014).

To complete the analysis of poverty dynamics we estimate non-parametric transitions into and out of poverty following the spell-based approach proposed in Bane and Ellwood (1986) and implemented in Andriopoulou and Tsakloglou (2011) and Demir Şeker and Dayioğlu (2014). Table 5 shows non-parametric transitions out of poverty, accounting for poverty spell lengths. This implies estimation of the probability of exiting poverty in t, while being poor in t-1 (column 1) or in t-1 and t-2 (column 2). Following the literature we exclude left-censored observations, that is persons who are poor in the first year, since we have no information on their pre-sample poverty status; right-censored observations, that is persons who are poor in the fourth year, are instead included. Specifically, we consider individuals that are non-poor in the first year (2009), poor in the second or third year (2010 or 2011), and who exit poverty after one or two years. Italians have a 51.9% probability of exiting poverty after one year of poverty. This probability drops by 21.4 percentage points reaching 30.6% if the spell length is two years. A similar, but weaker pattern is found for the other countries, with the UK appearing the most mobile.

Table 5 Transitions by spell length: non-parametric exit probabilities (%)

	spell length: 1 year	spell length: 2 years	absolute variation (pp)
Italy	51.9	30.6	-21.4
France	57.0	41.4	-15.6
Greece	42.3	15.5	-26.8
Portugal	55.2	29.4	-25.8
Spain	57.7	44.5	-13.2
UK	75.4	53.5	-21.9

Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

However, poverty is recurrent and this implies also that exiting poverty does not necessarily mean to exit poverty permanently. To complete the non-parametric analysis, Table 6 shows the re-entry rates computed following the same approach as for the exit rates. Specifically, the transition matrix considers individuals that are poor in the first year (2009), non-poor in the second (2010) or third year (2011) and then that re-enter poverty after one or two years. For Italy the probability of re-entry after one year is 36.3%, one of the highest values, which drops by 23.3 percentage points to 13% after another year out of poverty, the lowest value compared to the other countries: this supports the picture of immobility in both directions, into and out of poverty, with the probability of exiting/entering poverty decreasing as the number of years in poverty/non-poverty increases.

Poverty recurrence may become a trap because of human capital depletion of the poor, which in turn implies the reduction of their employment and social inclusion opportunities. Nonetheless, state dependence may indirectly reflect other drivers of poverty persistence. The descriptive and transition analyses provided so far suggest the use of an econometric model to quantify the degree of poverty state dependence and to distinguish it from the contribution of observable and unobservable individual effects.

The strategy we employ to disentangle these effects consists in applying Heckman's (1981a,b) dynamic random effects probit model to 2009-2012 EU-SILC data.

Table 6 Transitions by spell length: non-parametric re-entry probabilities (%)

	after 1 year out of poverty	after 2 years out of poverty	absolute variation (pp)
Italy	36.3	13.0	-23.3
France	35.1	21.2	-13.9
Greece	22.2	22.5	0.4
Portugal	30.6	18.7	-11.9
Spain	41.6	27.8	-13.8
UK	30.6	25.0	-5.7

Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

5. The econometric model

This paper applies a dynamic random effects probit model to estimate the degree of poverty state dependence. When estimating the degree of state dependence of a condition (i.e. unemployment, low-pay, poverty, etc.) distinguishing *true* or *genuine* state dependence captured by the impact of the lagged dependent variable from *spurious* state dependence caused by the presence of time-invariant unobserved heterogeneity is essential. This implies dealing with two issues, unobserved heterogeneity and initial conditions. Persistency may be partially due to individual observed and unobserved heterogeneity (people with adverse characteristics may be exposed to higher risk of poverty regardless of their previous state) rather than to genuine state dependence. Neglecting these factors makes the relationship between poverty at time t and poverty at time $t-1$ spurious, since the coefficient of the lagged dependent variable implicitly also captures other drivers of poverty. From an econometric point of view, if the unobserved heterogeneity is persistent over time, then ignoring it will cause overestimation of the true state dependence (Stewart, 2007). This distinction is also crucial to design appropriate policies to alleviate poverty. If the degree of genuine state dependence is high, then policies aimed to reduce poverty in the current period would be more effective, since they reduce the risk of poverty in the future and allow people to escape the poverty trap. On the contrary, if persistence is mainly due to individual heterogeneity, policies intervening on the current risk of poverty would not be able to reduce persistence and more structural policies would be needed (Poggi, 2007). The second issue - the so-called initial conditions problem - arises from the fact that the observed start of the stochastic process does not coincide with the true start of the process. As a consequence the dependent variable at period $t=1$ generally cannot be considered to be an exogenous variable giving rise to the process.

Heckman (1981a,b) proposed a solution to these issues that involves simultaneous estimation of two equations: the 'structural equation' and the 'reduced form equation'. The former estimates the

probability of being poor at t as a function of the poverty status at $t-1$ for the years subsequent to the first, while the latter accounts for initial conditions and estimates the probability of being poor in the first year of the sample.

The structural equation for each observation i in $t = 2, \dots, T$ is the following:

$$y_{it} = \mathbf{1}[y_{it}^* = \boldsymbol{x}_{it}'\boldsymbol{\beta} + \gamma y_{it-1} + \varepsilon_{it} = \boldsymbol{x}_{it}'\boldsymbol{\beta} + \gamma y_{it-1} + \alpha_i + u_{it} > 0] \quad (1)$$

where y_{it} is a binary variable taking the value 1 if the household is at risk of poverty at the time of the interview and zero otherwise, **1**[.] is the indicator variable, y_{it}^* the latent variable (the unobservable propensity to be at risk of poverty), x_{it} the explanatory variables, y_{it-1} the lagged dependent variable and ε_{it} is the error term. $\boldsymbol{\beta}$ is the vector of parameters associated with x_{it} and γ is the coefficient of state dependence. The error term ε_{it} is decomposed in α_i, unobservable individual heterogeneity, and u_{it}, the random term. The standard random effects specification implies $u_{it} \sim N(0,1)$, $\alpha_i \sim iidN(0, \sigma_\alpha^2)$, and $corr(\alpha_i, x_{it}) = 0$. In addition, we assume zero serial correlation in the idiosyncratic term u_{it}, and equi-correlation of the composite error term ε_{it} as in the mainstream literature.[8]

The reduced form equation is defined for each observation i in $t = 1$ as:

$$y_{i1} = \mathbf{1}[y_{i1}^* = \boldsymbol{z}_i'\boldsymbol{\pi} + \varepsilon_{i1} = \boldsymbol{z}_i'\boldsymbol{\pi} + \vartheta\alpha_i + u_{i1} > 0] \quad (2)$$

where $\boldsymbol{z}_i$ is a vector of exogenous variables which includes x_{i1} and additional instrumental variables, and where $\boldsymbol{\pi}$ is the vector of coefficients associated with $\boldsymbol{z}_i$. The composite error term is defined as $\varepsilon_{i1} = \vartheta\alpha_i + u_{i1}$, where ε_{i1} is correlated with α_i, but uncorrelated with u_{i1}, and u_{i1} is independent of α_i, with $u_{i1} \sim N(0,1)$ and $\alpha_i \sim iidN(0, \sigma_\alpha^2)$. Testing that $\vartheta = 0$ provides a test for exogeneity of the initial conditions.

The log-likelihood function of the system of Eqs. (1) and (2) is the following:

$$lnL = \sum_{i=1}^{N} ln \int_{-\infty}^{+\infty} \{\Phi[(\boldsymbol{\pi}'\boldsymbol{z}_i + \vartheta\alpha_i)(2y_{i1} - 1)] \prod_{t=2}^{T} \Phi[(\boldsymbol{x}_{it}'\boldsymbol{\beta} + \gamma y_{it-1} + \alpha_i)(2y_{it} - 1)]\} g(\alpha_i) d\alpha_i \quad (3)$$

where $g(\alpha)$ is the probability density of unobserved heterogeneity and Φ is the standard normal cumulative function. Estimation of Eq. (3) is performed by maximum likelihood.

6. Estimation results

The cross-country estimation results of Heckman's dynamic random-effects probit model (Eq. 3) are reported in Table 7. The model is estimated on individual data attributing to each individual the socio-economic characteristics of the household head. The structural equation covers the years 2010-2012, while the initial conditions equation refers to 2009. The vector of the explanatory variables in the structural

[8] See, for instance, Stewart (2007) and Arulampalam and Stewart (2009).

equation (see also Table 2) contains the lagged dependent variable to capture the dynamic component of poverty, plus age, occupational status, educational level, presence of health problems, number of children in the household, number of earners in the household and year dummies. Gender, macro-regional dummies and degree of urbanization are used as instruments in the initial conditions equation. In estimating the model, the reference head of the household is assumed to be female, in the age class 45-64, employed, with upper secondary education level, without any health problem, and living in a densely populated area.

Table 7 shows that in all countries, after controlling for individual heterogeneity and for initial conditions, the state dependence variable is highly significant and has a positive coefficient, indicating that being poor at time t-1 significantly raises *in itself* the probability of being poor at time t.[9] Italy is the country with the highest coefficient of true state dependence of the poverty risk (1.075) after Greece and Portugal (both at 1.106), while the UK has the lowest coefficient (0.279). France and Spain are in between with coefficients of 0.847 and 0.688 respectively. Note that these coefficients are indicative only of the direction of the impact of previous poverty on current poverty, not its size. To obtain these magnitudes, we compute average partial effects and predicted probability ratios in Section 6.1.

The proportion of the error variance contributed by the panel-level variance component *rho* is statistically significant in all countries, confirming the presence of unobserved individual effects. It ranges from 0.370 in Greece to 0.533 in Spain, with Italy having an intermediate value of 0.454. Moreover, the non-exogeneity of initial conditions, that corresponds to the null hypothesis that *theta* equals zero, is strongly rejected. This evidence supports the choice of the Heckman estimator and the existence of true state dependence of poverty.

In relation to the single explanatory variables, we observe that, in Italy, individuals in households headed by a young adult (age<30) have a higher probability of being at risk of poverty compared to individuals whose head of household is 45-64 (the base category), while if the head is older than 65 the probability of being poor decreases significantly. The same age pattern is confirmed in Spain and France, while there is no evidence of age effects in Greece, and only a slight significant positive effect of over-65 in Portugal. In the UK the negative effect of an elderly head is confirmed, while the other age classes are not statistically significant.

[9] Two variables, namely level of education and health problems, have some missing values in each country. Another variable, degree of urbanization, instead lacks pieces of information only in the UK. To avoid losing observations in the sample and spoiling the longitudinal structure of the dataset we keep all missing values in the sample and assign them an artificial value. Coefficients of the 'missing' categories are not displayed in the table of results (Table 7 and Table 10). For Portugal, due to estimation convergence problems possibly imputable to the large number of missing values of the variable health problems, we recoded them as zeros.

Table 7 Probability of being poor: Heckman dynamic random effects probit model

	Italy	France	Greece	Portugal	Spain	UK
Dependent variable						
Poor at (t)						
Structural equation						
Poor at (t-1)	1.075***	0.847***	1.106***	1.106***	0.688***	0.279***
	(0.059)	(0.048)	(0.066)	(0.075)	(0.046)	(0.081)
Age: <30	0.537***	0.385***	-0.204	-0.050	0.443***	0.166
	(0.117)	(0.060)	(0.150)	(0.208)	(0.110)	(0.137)
Age: 30-44	0.012	-0.050	-0.013	-0.128	-0.036	-0.101
	(0.048)	(0.040)	(0.064)	(0.081)	(0.048)	(0.087)
Age: >65	-0.291***	-0.199***	0.024	0.176*	-0.144**	-0.239**
	(0.060)	(0.064)	(0.081)	(0.097)	(0.061)	(0.100)
Occupation: non-employed	0.707***	0.788***	0.424***	0.887***	0.569***	0.950***
	(0.048)	(0.039)	(0.065)	(0.078)	(0.042)	(0.083)
Occupation: retired	0.196***	-0.150**	-0.147*	0.166*	0.155**	0.885***
	(0.059)	(0.062)	(0.079)	(0.097)	(0.065)	(0.105)
Education: low (*)	0.685***	0.390***	0.434***	0.698***	0.688***	0.408***
	(0.053)	(0.039)	(0.060)	(0.128)	(0.057)	(0.078)
Education: high (*)	-0.435***	-0.660***	-0.557***	-1.068***	-0.743***	-0.632***
	(0.083)	(0.049)	(0.085)	(0.256)	(0.070)	(0.078)
Health problems	0.114***	0.229***	-0.008	0.099*	0.043	-0.021
	(0.039)	(0.033)	(0.059)	(0.056)	(0.039)	(0.061)
No. of earners in household	-0.434***	-0.306***	-0.430***	-0.457***	-0.490***	-0.510***
	(0.024)	(0.017)	(0.031)	(0.034)	(0.019)	(0.040)
No. of children in household	0.161***	0.135***	0.038	0.159***	0.340***	-0.047
	(0.025)	(0.018)	(0.030)	(0.038)	(0.026)	(0.038)
Constant	-1.858***	-1.938***	-1.103***	-2.066***	-1.298***	-1.038***
	(0.065)	(0.054)	(0.072)	(0.145)	(0.065)	(0.098)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Initial conditions						
Age: <30	1.079***	0.930***	0.558**	-0.694*	0.038	-0.042
	(0.170)	(0.109)	(0.223)	(0.375)	(0.145)	(0.204)
Age: 30-44	0.131	-0.159**	0.048	-0.508***	-0.276***	-0.198
	(0.081)	(0.079)	(0.115)	(0.137)	(0.074)	(0.151)
Age: >65	0.078	-0.238*	0.079	0.150	0.231**	-0.148
	(0.101)	(0.126)	(0.163)	(0.162)	(0.099)	(0.158)
Occupation: non-employed	0.818***	1.110***	0.322**	0.673***	0.284***	1.640***
	(0.092)	(0.082)	(0.147)	(0.137)	(0.068)	(0.156)
Occupation: retired	0.325***	-0.110	-0.529***	-0.206	-0.107	1.367***
	(0.106)	(0.119)	(0.161)	(0.164)	(0.105)	(0.176)
Education: low (*)	0.586***	0.719***	0.552***	1.825***	0.889***	0.688***
	(0.077)	(0.075)	(0.115)	(0.311)	(0.088)	(0.129)
Education: high (*)	-0.744***	-1.249***	-0.720***	-0.517	-0.689***	-0.674***
	(0.141)	(0.105)	(0.154)	(0.450)	(0.105)	(0.137)
Health problems	0.301***	0.058	0.150	0.385***	0.190***	-0.295***
	(0.069)	(0.070)	(0.121)	(0.103)	(0.063)	(0.111)
No. of earners in household	-0.615***	-0.428***	-0.706***	-0.637***	-0.577***	-0.387***
	(0.040)	(0.033)	(0.064)	(0.055)	(0.031)	(0.062)
No. of children in household	0.270***	0.191***	-0.064	0.158**	0.340***	-0.074
	(0.042)	(0.035)	(0.055)	(0.064)	(0.037)	(0.066)
Male	-0.234***	-0.066	-0.093	-0.051	-0.234***	-0.025
	(0.074)	(0.057)	(0.124)	(0.108)	(0.059)	(0.095)
Low urbanisation	0.158**	0.397***	0.345***	0.147	0.289***	0.150
	(0.065)	(0.069)	(0.102)	(0.091)	(0.061)	(0.134)
Area of residence (**)	Yes	Yes	Yes	No	Yes	Yes
Constant	-2.050***	-2.137***	-0.641***	-2.547***	-0.980***	-1.515***
	(0.137)	(0.142)	(0.192)	(0.347)	(0.136)	(0.191)
Rho	0.454***	0.474***	0.370***	0.454***	0.533***	0.469***
	(0.036)	(0.025)	(0.045)	(0.047)	(0.023)	(0.039)
Theta	1.427***	1.713***	1.821***	1.557***	1.229***	1.311***
	(0.148)	(0.146)	(0.288)	(0.222)	(0.092)	(0.182)
Log-likelihood	-8629.54	-12376.58	-4984.42	-4007.78	-10484.37	-3712.42
Sample size	30,392	53,780	13,208	13,204	27,400	11,052

Notes: Standard errors in parentheses. Levels of significance: *p<0.1; ** p<0.05; ***p<0.01.

(*) Education: highest ISCED level attained. Low education = pre- primary, primary or lower secondary. High education = tertiary.

(**) Geographical area is at NUTS-1 level for all countries, with the exception of Portugal for which the variable is not available.

Source: own calculations on EU-SILC 2009-2012, balanced sample.

Living in a family whose head is non-employed has, not surprisingly, a positive effect on individual poverty risk. This effect is widespread in all countries, but is less straightforward for individuals living in households headed by pensioners. In Italy this characteristic has a positive effect on the poverty risk. The same is true in the UK and, with a weaker degree of significance, also in Spain and Portugal. By contrast, being in a family with a retired head decreases significantly the chances of being poor in France and in Greece.

The influence of education level is homogenous across all countries: a lower level of education in the household head increases the individual probability of being at risk of poverty, while tertiary education decreases it. Although the coefficients do not quantify the impact of the explanatory variables on the outcome variable, the relative magnitudes can be compared. The coefficients for Italy suggest that the positive effect on poverty risk of a low educated head dominates the negative effect of a graduated head. Italy is the only country where this pattern emerges and this may suggest that investment in human capital is less profitable in this country than in the others.[10] For health status, the effects are diversified across countries: living in a household whose head has some limitations on activity due to health problems increases the probability of being poor in Italy and in France, but has no explanatory power in determining poverty in the other countries.

Finally, we account for both household structure and household composition since they may affect the level of resources available to the household and the level of need and, consequently, the poverty outcome. Broadly speaking, the empirical findings indicate that the higher the number of income earners in the household, the lower the probability of being poor, and the higher the number of children in the household, the higher the probability of being poor. However, this pattern is not valid for Greece and the UK where the number of children in the household does not have a significant impact on the risk of poverty.

Turning to the initial conditions equation, the results for Italy establish that individuals living in households headed by a male face a lower risk of income poverty in the initial period. On the contrary, there is no evidence of this gender pattern in other countries. Furthermore, a lower degree of urbanization increases the probability of being poor in the initial period in Italy and in most of the other countries. Although not all instruments are individually significant in each country, the Wald test does not reject their joint significance at conventional confidence levels. Portugal is an exception but this may be due to the unavailability of the regional dummies. Moreover, the joint significance of all the coefficients is not rejected in each country. The results of the tests are available upon request.

Overall, the model seems best specified for Italy in terms of the explanatory power of the variables in both the structural and the initial condition equations. The relative size of the coefficients across countries suggests that, in Italy the household head's characteristics are more relevant for determining

[10] To support this interpretation, the average partial effects of educational levels are presented in Table 9.

poverty status than in the other countries. However, based on the relative size of the coefficients within countries, the UK is the country where these characteristics - in absolute terms - play a stronger role in determining poverty than the state dependence effect. This holds also, despite to a smaller extent, in France and Spain. In addition, in these countries the effects of some favourable characteristics (variables which negatively affect poverty, e.g. high education level) dominate some of the effects of adverse characteristics (variables which increase it, e.g. age effect of a young household head). This provides a possible answer to our initial puzzle on the gap in persistent at-risk-of-poverty rates between Italy and other countries.

6.1 Average partial effects and predicted probability ratios

To get at the magnitudes of the state dependence and allow the interpretation of the estimates and the comparison among countries, we compute average partial effects for poverty dependence, which show the impact of a change in the lagged dependent variable on current poverty. In addition, we compute predicted probability ratios as another measure of state dependence.

The method used to obtain the estimate of the extent of state dependence follows Wooldridge (2005) and Stewart (2007). It is based on estimates of counterfactual outcome probabilities taking the lagged dependent variable y_{t-1} of Eq. (1), that is being poor at time t-1, as fixed at 0 ($\hat{p}_0$) and at 1 ($\hat{p}_1$). The APE corresponds to the average of the differences between the two counterfactual probabilities ($\hat{p}_1 - \hat{p}_0$) of each individual in the sample, while the PPR corresponds to the average of the ratios of the two counterfactual probabilities ($\hat{p}_1/\hat{p}_0$).

Table 8 Average partial effects and predicted probability ratios for state dependence

	Italy	France	Greece	Portugal	Spain	UK
APE	0.26	0.22	0.30	0.24	0.15	0.07
PPR	1.71	1.64	1.98	1.64	1.43	1.25

Source: own calculations on EU-SILC, 2009-2012.

Table 8 depicts APEs and PPRs of state dependence in each country. For the former, the results reveal that, in Italy, being poor at t-1 increases the poverty risk in the next period by 26 percentage points (pp). Comparison of the estimates of the marginal effects across countries indicates that genuine state dependence of poverty ranges from 7 to 30 percentage points, the lowest being in the UK and the highest in Greece and Italy. Turning to the PPRs, in Italy the probability of being poor at t conditioned on being poor at t-1 is about 1.70 times the probability of being poor at t conditioned on not being poor at t-1. Greeks experiencing poverty in year t-1 have twice the probability to be poor in year t as those who were not poor in year t-1. Unsurprisingly, the country with the lowest predicted probability ratio is the UK, where the probability of being poor at t while being poor at t-1 is 1.25 times the probability of being poor at t conditioned on not being poor at t-1.

Table 9 provides the APEs of the other explanatory variables. Size and sign support the evidence obtained from estimated coefficients of Table 7. In Italy the age effect appears to be stronger than other countries, since living in a family headed by an adult younger than 30 increases the probability of being poor by 13 percentage points. For the occupational status it is worth noting that the UK is the country where the employment status of the household head has the strongest impact on being poor. In this country being non-employed or retired increases the probability of being poor by 23 and 21 percentage points respectively, suggesting that in the UK employment status is the characteristic that protects the most against poverty. In Italy, but also in Spain and Portugal, the effects are not as strong: being non-employed increases the probability of being poor by 17 pp whilst being retired only by 5 pp.

Table 9 Average partial effects: other variables

	Italy	France	Greece	Portugal	Spain	UK
Age: <30	0.13	0.10	-	-	0.09	-
Age: 30-45	-	-	-	-	-	-
Age: >= 65	-0.07	-0.05	-	0.04	-0.03	-0.05
Non-employed	0.17	0.20	0.11	0.19	0.12	0.23
Retired	0.05	-0.04	-0.04	0.04	0.03	0.21
Low education	0.17	0.10	0.11	0.16	0.15	0.10
High education	-0.11	-0.16	-0.14	-0.25	-0.17	-0.15
Disability	0.03	0.06	-	0.02	-	-
No. of earners: from 1 to 2	-0.11	-0.08	-0.12	-0.11	-0.11	-0.12
No. of children: from 0 to 1	0.04	0.03	-	0.04	0.07	-

Note: APEs are computed only when estimated coefficients are significant at least at the 90% significance level.
Source: own calculations on EU-SILC, 2009-2012.

A look at the marginal effects of education level highlights that in Italy - in absolute terms - having a high education level has the smallest impact on poverty, while having a low education level has the largest impact: living in a family whose head has a university degree decreases the probability of being poor by 11 pp, whilst living in a family with a low-educated head increases the probability of being poor by 17 pp. As already noticed when commenting estimated coefficients, this means that the positive effect on poverty of an adverse characteristic, i.e. the low educational profile, dominates the negative effect on poverty of a favourable characteristic, i.e. having a university degree. In all the other countries, the effect of a high education level prevails on lower education, suggesting not only that investment in further education effectively reduces the probability of being poor, but also that it more than compensates, on average, the effect of lower educational level on poverty. In addition, unlike in all other countries, in Italy having a household head with low-level education is the observable characteristic, together with non-employment, that mostly impacts on the risk of poverty (both with an APE of 0.17).

All the remaining marginal effects validate the intuition provided when discussing the estimated coefficients. In general, the effect of a head with health limitations - when significant - is consistent across countries, as well as family's structure and composition. On average, individuals who live in a family with

two earners have, across countries, a probability of being poor which is between 8 and 12 pp lower than individuals whose family has only one earner. Instead, the average partial effect of one additional child (from 0 to 1) ranges between 3 and 7 percentage points. In this respect, it is worth noting that the UK and Greece, possibly for opposite reasons, are the only countries where increasing by one the number of children does not statistically change the probability of being poor.

To conclude, the magnitude of the APEs suggests that in Italy current poverty status is determined mainly by poverty at t-1, and this is valid also for Portugal and Greece. On the contrary, given the lower degree of persistence and the stronger impact of the other explanatory variables on current poverty, Spain shows results which are more in line with the UK and France.

6.2 Robustness analysis

To validate our findings, we re-estimate the Heckman model where the explanatory variables refer to each individual rather than to the household head, restricting the sample to individuals over the age of 18.[11] The sample size drops from 149,036 to 117,400 observations, but its relative composition does not change substantially (Table 10).

Table 10 Descriptive statistics by personal characteristics (age≥18), 2009-2012 (%)

		Italy	France	Greece	Portugal	Spain	UK
Sample size		24556	40688	10752	10756	21828	8820
Age class	18-29	13.5	15.6	18.0	13.2	16.7	12.6
	30-44	27.5	25.6	29.0	26.0	32.1	26.5
	45-64	34.2	34.5	31.7	33.6	32.5	34.9
	>=65	24.8	24.2	21.3	27.2	18.7	26.1
Educational level (*)	low	51.2	31.7	40.4	62.0	48.5	20.7
	intermediate	35.4	38.8	35.8	13.6	20.3	38.8
	high	12.5	28.9	20.2	10.3	24.6	32.6
	not reported	1.0	0.6	3.7	14.2	6.6	8.0
Occupational status	employed	45.0	51.3	45.6	47.7	49.4	57.7
	pensioner	24.6	31.1	23.2	30.4	15.4	26.8
	non-employed	30.4	17.7	31.3	21.9	35.2	15.4
Health problems		25.6	25.8	19.2	32.8	21.8	23.1
No. of children in the household		0.46	0.52	0.48	0.53	0.51	0.54
No. of earners in the household		1.67	1.74	1.45	1.91	1.70	1.78

(*) Highest ISCED level attained. Low education = pre-primary, primary or lower secondary; Intermediate education=higher secondary, post secondary non tertiary; High education: tertiary education.
Figures are computed on the four-year balanced dataset, using longitudinal sample weights.

[11] To perform the analysis by individual characteristics we decided to select the sample of the over-18s to keep to a minimum the loss of observations due to the unavailability of some characteristics for children, since EU-SILC provides individual characteristics only for persons over the age of 16.

Table 11 Heckman dynamic random effects probit model: personal characteristics

	Italy	France	Greece	Portugal	Spain	UK
Dependent variable						
Poor at (t)						
Structural equation						
Poor at (t-1)	1.003***	0.781***	1.079***	1.016***	0.678***	0.375***
	(0.063)	(0.059)	(0.075)	(0.088)	(0.052)	(0.090)
Age: 18-29	0.502***	0.337***	0.018	0.014	0.321***	0.049
	(0.085)	(0.065)	(0.097)	(0.132)	(0.072)	(0.141)
Age: 30-44	0.126*	-0.035	-0.050	-0.303***	0.112**	-0.121
	(0.067)	(0.057)	(0.078)	(0.103)	(0.057)	(0.111)
Age: >65	-0.128*	-0.189**	-0.158*	0.200*	-0.184***	-0.291***
	(0.075)	(0.073)	(0.089)	(0.111)	(0.067)	(0.107)
Occupation: non-employed	0.355***	0.563***	0.025	0.200**	0.232***	0.680***
	(0.058)	(0.048)	(0.070)	(0.085)	(0.048)	(0.103)
Occupation: retired	0.119	-0.165**	0.062	0.024	0.056	0.851***
	(0.079)	(0.073)	(0.092)	(0.115)	(0.075)	(0.115)
Education: low (*)	0.745***	0.381***	0.447***	0.694***	0.642***	0.321***
	(0.065)	(0.049)	(0.073)	(0.138)	(0.062)	(0.085)
Education: high (*)	-0.337***	-0.566***	-0.338***	-0.609***	-0.485***	-0.543***
	(0.097)	(0.061)	(0.092)	(0.205)	(0.072)	(0.091)
Health problems	0.133***	0.184***	0.121*	0.117*	0.113**	0.068
	(0.050)	(0.041)	(0.067)	(0.065)	(0.044)	(0.068)
No. of earners in household	-0.542***	-0.465***	-0.524***	-0.606***	-0.545***	-0.617***
	(0.031)	(0.026)	(0.041)	(0.045)	(0.023)	(0.050)
No. of children in household	0.287***	0.250***	0.191***	0.369***	0.426***	0.062
	(0.034)	(0.025)	(0.039)	(0.052)	(0.031)	(0.048)
Constant	-1.933***	-1.784***	-1.020***	-1.631***	-1.107***	-0.838***
	(0.091)	(0.070)	(0.094)	(0.163)	(0.075)	(0.120)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Initial conditions						
Age: 18-29	0.402***	0.592***	0.322*	-0.493**	0.301***	-0.034
	(0.119)	(0.103)	(0.166)	(0.205)	(0.105)	(0.199)
Age: 30-44	0.156	-0.049	0.191	-0.447***	-0.010	-0.269
	(0.102)	(0.098)	(0.143)	(0.159)	(0.091)	(0.174)
Age: >65	0.289***	-0.107	0.028	0.193	0.197*	-0.187
	(0.112)	(0.132)	(0.173)	(0.176)	(0.108)	(0.153)
Occupation: non-employed	0.223**	0.518***	-0.258*	0.010	0.032	1.227***
	(0.095)	(0.084)	(0.139)	(0.143)	(0.082)	(0.166)
Occupation: retired	0.135	-0.298**	-0.264	-0.202	0.022	1.394***
	(0.122)	(0.132)	(0.177)	(0.184)	(0.124)	(0.178)
Education: low (*)	0.691***	0.727***	0.649***	0.830***	0.690***	0.602***
	(0.089)	(0.083)	(0.134)	(0.212)	(0.097)	(0.137)
Education: high (*)	-0.396***	-0.697***	-0.561***	-0.713**	-0.461***	-0.595***
	(0.154)	(0.107)	(0.180)	(0.351)	(0.116)	(0.154)
Health problems	0.304***	0.165**	0.215	0.467***	0.128*	-0.211*
	(0.079)	(0.077)	(0.134)	(0.113)	(0.074)	(0.118)
No. of earners in household	-0.737***	-0.550***	-0.928***	-0.847***	-0.698***	-0.441***
	(0.047)	(0.042)	(0.091)	(0.075)	(0.043)	(0.073)
No. of children in household	0.356***	0.286***	0.216***	0.344***	0.401***	0.078
	(0.049)	(0.041)	(0.068)	(0.077)	(0.047)	(0.076)
Male	0.076	0.002	0.291***	0.158	0.014	0.116
	(0.071)	(0.063)	(0.099)	(0.098)	(0.066)	(0.100)
Low urbanization	0.180**	0.341***	0.302***	0.204**	0.311***	0.105
	(0.072)	(0.077)	(0.114)	(0.097)	(0.070)	(0.143)
Area of residence (**)	Yes	Yes	Yes	No	Yes	Yes
Constant	-1.975***	-2.021***	-0.705***	-1.195***	-0.795***	-1.421***
	(0.147)	(0.151)	(0.201)	(0.263)	(0.157)	(0.211)
rho	0.561***	0.526***	0.394***	0.515***	0.527***	0.487 ***
	(0.030)	(0.027)	(0.052)	(0.053)	(0.027)	(0.043)
theta	1.169***	1.450***	1.704***	1.377**	1.291***	1.216 ***
	(0.104)	(0.122)	(0.306)	(0.209)	(0.123)	(0.182)
Log-likelihood	-6495.49	-8600.35	-3939.03	-3192.19	-8202.64	-2872.86
Sample size	24,556	40,688	10,752	10,756	21,828	8,820

Notes: Standard errors in parentheses. Levels of significance: *p<0.1; ** p<0.05; ***p<0.01.
(*) Education: highest ISCED level attained. Low education = pre- primary, primary or lower secondary. High education = tertiary.
(**) Geographical area is at NUTS-1 level for all countries, with the exception of Portugal for which the variable is not available.
Source: own calculations on EU-SILC 2009-2012, balanced sample.

Table 11 displays the estimation results. As before, the proportion of the error variance contributed by the panel-level variance component ρ is significant in all countries, ranging from 0.394 in Greece to 0.561 in Italy. Likewise, the non-exogeneity of the initial condition is strongly rejected in each country.[12] The country ranking in terms of the state dependence coefficient is confirmed, with Italy amongst the highest (1.003), after Greece (1.079) and Portugal (1.016), the UK with the smallest (0.375) and France (0.781) and Spain (0.678) in between.

In general, the signs of the coefficients confirm the direction of the effects of the previous analysis across countries. However, especially for Italy, the model provides lower levels of significance for several variables, such as the age profile and the occupational status, thus suggesting that the model loses, to a certain extent, its explanatory power. This implies that poverty persistence in Italy seems to be better described when the household head's characteristics rather that the personal ones are taken into account, meaning that in Italy the characteristics of the household head have a higher weight than in other countries in shaping the probability of falling into poverty.

In terms of the degree of state dependence, Table 12 shows the APEs and PPRs. In general, the estimates of state dependence varies only slightly when moving from household head's to personal characteristics. This has to be seen as a robustness check for the magnitude of poverty state dependence in all countries[13].

Table 12 Average partial effects and predicted probability ratios for state dependence (personal characteristics)

	Italy	France	Greece	Portugal	Spain	UK
APE	0.23	0.19	0.29	0.24	0.16	0.08
PPR	1.68	1.68	2.04	1.78	1.48	1.38

Source: own calculations on EU-SILC, 2009-2012.

7. Summary and conclusions

This paper studies the dynamics of poverty in six European countries, Italy, France, Greece, Portugal, Spain and the UK, exploiting information available in the longitudinal component of the EU-SILC for the period 2009-2012. We select those who stay in the sample for the full four-year period, leading to a balanced panel of 37,259 individuals observed in each of the four waves and implying a sample size of 149,036 observations.

The study of poverty is motivated by the launch in 2010 of the European platform against poverty and social exclusion, designed to help countries reach the target of lifting 20 million people out of poverty

[12] The Wald test of the joint significance of the instruments indicates that the instruments are jointly different from zero at conventional levels for each country.

[13] The APEs of other characteristics are comparable in magnitude with the APEs provided in Table 9 and are available upon request.

and social exclusion by 2020. The European Commission recommends that a number of indicators be monitored including the current at-risk-of-poverty rate and the persistent at-risk-of-poverty rate. The former is defined as the proportion of individuals whose equivalised disposable income falls below the poverty line in the current year, the latter is defined as the percentage of persons living in poor households in the current year and at least in two of the preceding three years.

In 2012, around 83 million persons in the European Union (EU-27) countries were at risk of poverty, corresponding to a current at-risk-of-poverty rate of 16.6%, of which 60.7% are persistently poor. These figures were of similar magnitude even before the onset of the 2007 crisis, meaning that poverty is a structural problem and not only transitory. The Mediterranean countries show current and persistent poverty rates higher than the European average, while in Central and Northern Europe rates are lower than the average. The persistent to current poverty ratio is the indicator that identifies the fraction of the poor in persistent poverty for which escaping poverty may be difficult. Some countries seem less able than others to keep this ratio under control: Italy has the highest percentage of persistent poor among its poor (67.5%), followed by Portugal (63.7%) and Greece (59.7%), while Spain, the UK and France have lower ratios (55.8%, 53.8% and 49.6% respectively). This prompted us to investigate this further, for the purpose of understanding why Italy is less able to control its persistent risk of poverty than other countries and of identifying who is potentially 'trapped' into this condition.

Descriptive analysis and transition matrices highlight that Italy is one of the countries with the most persistent poverty. Italy presents a low poverty entry probability (6.7%) along with a low exit probability (28.8%) compared to other countries; it is characterized by the highest proportion of individuals experiencing poverty over the entire period (28.4%); and has the lowest mobility index (1.62) where the mobility index is defined as the ratio between the poverty prevalence rate (the proportion of individuals that experienced poverty at least once over the period analysed) and the at-risk-of-poverty rate. Also, the conditional exit and re-entry probabilities for Italy are strongly affected by the number of spells in poverty. Non-parametric exit and re-entry probabilities accounting for poverty spell lengths are estimated following Bane and Ellwood (1986) and Andriopoulou and Tsakloglou (2011). We look at individuals that are non-poor during the first year (2009), poor in the second or third year (2010 or 2011), and who exit poverty after one or two years. Italians have a 51.9% probability of exiting poverty after one year of poverty. This probability drops by 21.4 percentage points reaching 30.6% if the spell length is two years. A similar, but weaker, pattern is found for the other countries, with the UK appearing the most mobile.

We then proceed to the implementation of Heckman's (1981a,b) dynamic random effects probit model to quantify the degree of true state dependence of poverty after accounting for initial conditions and contribution of time-invariant unobserved heterogeneity. The estimation of the model confirms the findings of descriptive and transition analyses. In all countries the state dependence coefficient is highly significant and positive, indicating that being poor at time t-1 significantly raises *in itself* the probability of

being poor at time t. The degree of poverty persistence is however very diversified among countries. Estimation of average partial effects shows that in Italy being poor at t-1 increases the poverty risk in the next period by 26 percentage points, while comparison of the estimates of the marginal effects across countries indicates that genuine state dependence of poverty ranges from 7 percentage points in the UK (the most mobile country) to 30 percentage points in Greece (the least mobile). In between we find Portugal, with an average partial effect of 0.24, followed by France (0.22) and Spain (0.15). The model also provides evidence of the relevance of individual characteristics for explaining poverty status: Italy, compared to France, Spain and even more the UK, shows an impact of individual characteristics on current poverty smaller, in absolute terms, than the lagged dependent variable. This may explain the gap in the persistent to current poverty ratio between Italy and other countries.

To conclude, the analysis provides evidence of a poverty trap in all countries, with Italy, Greece and Portugal having a much stronger poverty persistence. Policy, especially in these countries, should therefore aim to prevent people from falling into poverty because once poor the probability of being poor in the future increases (Biewen, 2014). In terms of policies to alleviate poverty, the results suggest that the Italian case, characterized by strong poverty persistence caused by the high degree of true state dependence, as well as by the dominance of adverse characteristics on favourable characteristics in their capability of determining the poverty status, is peculiar and needs a complex structure of policies to effectively reduce long-term poverty. On the one hand, policies aimed towards the reduction of poverty in the current period may reduce the degree of genuine state dependence. On the other hand, more structural policies designed to increase investment in human capital and to strengthen family and job stability are called for. The joint implementation of both types of policy can act from two directions towards the reduction of poverty persistence, by reducing the state dependence and accounting for, as much as possible, those individual characteristics capable of lowering the poverty risk.

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