Assessing poverty persistence in households with children

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Abstract

The analysis of poverty persistence received considerable attention in recent years. In this paper we explore the role of the adopted poverty measure in the analysis of its persistence. Specifically, we consider three measures: the risk of poverty, the severe material deprivation and subjective poverty, motivated by the understanding of poverty as a complex phenomenon and for which no single measure can effectively capture its several dimensions. The empirical analysis is based on the 2013-2016 longitudinal sample of the EU-SILC survey. We focus on Italian households with dependent children. We apply a correlated random effects probit models with endogenous initial conditions to assess genuine state dependence after controlling for structural household characteristics and variables related to participation in the labour market. A strong state dependence emerges, regardless of the considered poverty measure thus providing evidence of poverty and social exclusion persistence. We also find evidence of relevance of initial conditions for all measures in focus. Nonetheless, structural household characteristics and household level economic variables play roles that are often different in the three parallel models; these differences are consistent with the aims and nature of the alternative measures.

Keywords Correlated random effects probit models · Initial conditions · Risk of poverty · Severe material deprivation · Subjective poverty

1 Introduction

In recent years, many poverty studies focused on longitudinal poverty, analysing the characteristics of the households that are at risk of being permanently poor or socially excluded. Cappellari and Jenkins (2004), (Poggi 2007), (Biewen 2009), and (Addabbo et al. 2015), for example, analyse persistent poverty in Europe or in selected countries (Giarda and Moroni 2018).

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In this paper we are primarily interested in assessing the role of the adopted poverty measure in the analysis of its persistence. Specifically, we consider three alternative measures: the risk of poverty, the severe material deprivation and subjective poverty, motivated by the understanding of poverty as a complex phenomenon and for which no single measure can effectively capture its several dimensions. We define these indicators according to the European Union's standards as they are implemented in the EU-SILC survey (Marlier et al. 2012).

The at-risk-of-poverty (ARP) and severe material deprivation (SMD) rates are two prominent measures of poverty and social exclusion in the European Union. They are very different under many respects: the first is a relative headcount measure based on equivalised income and a national threshold, while the second relies on a score calculated on a given set of items assessing the ability / inability to afford goods considered as essential to reach an adequate standard of living; income is not directly involved in measurement and the threshold does not depend on a national median. Typically, the two measures do not identify the same set of households as poor (Ayala et al. 2011; Hick 2015). More in general, while at-risk-of-poverty rate makes reference to current income, the material deprivation rate is related to permanent income: Whelan and Maitre (2010) note how the difference between the two rates is highest among the elderly segment of the population.

We also consider the subjective poverty (SP) rate: its definition is based on a question about the ability of the household *to make ends meet* and thereby based on a subjective evaluation of the economic status made by the respondent. This evaluation will be influenced both by current and permanent income, but also by the social capital (Guagnano et al. 2016) and the social environment. The SP rate can be useful to overcome some of the problems involved by the adoption of a single threshold for the at-risk-of poverty rate in countries characterized by a large economic divide (Mogstad et al. 2007; Fabrizi et al. 2008; Whelan and Maitre 2010).

We consider data from the EU-SILC sample survey and specifically the longitudinal sample based on the overlaps of the waves from 2013 through 2016. In our empirical analysis we focus on Italy and specifically on Italian households with dependent children.

The reason for focusing on Italy is twofold. In the first place, the country is characterized by a high poverty incidence. In 2016 Eurostat estimates that 20.6% of the Italian population is at risk of poverty and 12.1% lives in condition of severe material deprivation. Both figures are above the EU-28 general average, respectively equal to 17.3% and 7.5%. About the second, we note how Italy is worse off with respect to the largest EU countries: the severe material deprivation rate attains 5.8% in Spain, 4.4% in France and 3.7% in Germany. Second, as other countries in the Mediterranean region of the EU (Greece, Spain, and Portugal), Italy is characterized by high poverty persistence. Papers focused on analyzing poverty persistence in Italy include (Addabbo 2000), (Baldini and Ciani 2011), (Devicienti et al. 2014), (Coppola and Di Laurea 2016), (Giarda and Moroni 2018). Works investigating poverty persistence in Europe include (Devicienti and Poggi 2011), (Gradin and Cantó 2012), (Fusco and Islam 2012), (Ayllón 2013), (Bárcena-Martín et al. 2017), (Ayllón and Gábos 2017).

Our motivations for working on households with dependent children are both general and specific to Italy. Child poverty is of special social concern as poverty experienced by children can compromise their outcomes in future adult life (Del Boca 2010); moreover there is sound evidence that during downturns (such as the one preceding the period we consider), the economic crises affect households with children excessively (Chzhen 2014). With reference to Italy, the burden of poverty differs widely across different household types (ISTAT 2014). Those with dependent children, especially if mono-parental or large, are characterized by much higher poverty incidence rates. Apart from the mono-parental

households, whose situation is difficult in most EU countries, the situation of households with two adults and dependent children is worse in Italy with respect to other EU countries: for instance, in 2016 the severe material deprivation incidence is 40% higher than the general average for families with at least three children, while it is lower than the average for Germany.[1] Italy is experiencing a persistent very low fertility rate that, despite immigration from many different countries is causing a rapid aging of the population (Billari 2008). Moreover, although before the economic downturn a debate started on the opportunity to reform the social welfare and tax-transfer regime to sustain people in poverty conditions (Aaberge et al. 2004), the current system of social transfers is still not well targeted neither on the poor nor on households with children (Fabrizi et al. 2014). A closer understanding of poverty and social exclusion among households with children can provide useful insights for the country's future social policies.

We analyse poverty and social exclusion with the aim of separating genuine state dependence from the impact of households structural characteristics, position on the job market of their adults and other economic variables. To do this, we apply a correlated random effects probit model with endogenous initial conditions according to the approach considered in (Wooldridge 2005), separately to the analysis of each poverty measure. ARP, SMD, SP are not persistent poverty measures. The econometric model is used to analyse persistent poverty as captured by the impact of lagged poverty status on current poverty status (for details, see Section 4).

Our main finding is that we have evidence of state dependence for all measures, extending previous results on ARP persistence (e.g. Addabbo et al. 2015, Giarda and Moroni 2018) to the other measures. Initial conditions are also significant in all estimated models. We can then infer that poverty and social exclusion trap Italian households with children regardless of the adopted measure. Nonetheless, structural household characteristics and household level economic variables play roles that are often different in the three parallel estimated models. These differences are consistent with the measures definitions and namely they pinpoint the roles of the incomes of references, either current or permanent.

The paper is organized as follows. Section 2 describes the poverty measures analysed. Section 3 presents the dataset, descriptive statistics and stylized facts. Correlated random effects probit models used for each poverty measure are presented in Section 4. Section 5 discusses the main findings and Section 6 concludes.

2 Alternative poverty measures

The ARP rate is defined as the fraction of people living with an equivalized income below a threshold defined to be 60% of the national median. Equivalised income is defined as the total disposable household income (after taxes and social transfers) divided by an equivalised household size calculated according to the modified OECD-scale.[2]

This measure of poverty has a long tradition, its calculation is based on a highly standardized methodology, it has a clear interpretation and strong policy relevance. Nonetheless it has been criticized under many respects, and, in the European Union, has been complemented by other measures (Marlier et al. 2012; Kis and Gábos 2015). Some criticisms,

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[1]Figures available at http://ec.europa.eu/eurostat/data/database.

[2]This is a standard equivalence scale to calculate the number of 'equivalent adults' in a household. Such a scale assigns weight 1.0 to the first adult; 0.5 to the second and each subsequent person aged 14 and over; 0.3 to each child under 14.

relevant to our analysis are those that follow. It is an unidimensional measure, that reduces poverty to the non-availability of an adequate income; moreover as the relevant income is that of the reference year, it neglects inter-temporal transfers and income smoothing. The definition of total disposable income has some limitations: for example, it includes the imputed rent of an owned house, but does not subtract the mortgage interests paid as a negative component (Maestri 2015), leading to an optimistic evaluation of the economic conditions of indebted households during the latest economic downturn. The equivalence scale can be questioned: for instance, Bishop et al. (2014) adopting a subjective equivalence scales approach present evidence that the modified OECD can underestimate economies of scale in households with two or more children. The threshold is based on the national median income; as a consequence comparisons are difficult over time as the threshold changes from year to year. The fact that the threshold is national makes the ARP rate unsuitable for cross-country comparison, but also for comparing regions within the same country, if characterized by large economic disparities.

In a country such as Italy, that experiences a large regional divide, considering a unique threshold can be misleading as fairly different levels of economic well being can be attained with the same income in different parts of the country. Regional poverty thresholds have already been considered in the past (Mogstad et al. 2007; Fabrizi et al. 2008). Nonetheless, this solution can be criticized as completely masking regional inequality and defining poverty exclusively in terms of distance from the centre of the distribution instead of deprivation (Spicker 2012).

To overcome these limitations we consider two other poverty measures: the (severe) material deprivation and the subjective poverty rates. Material deprivation is chosen as it is multidimensional and more oriented to the actual standard of living instead of the income levels, while the recourse to subjective poverty is mainly motivated by its being free from a unique threshold based on the distribution of income at the national level; moreover it reflects all factors influencing the perceived economic welfare of households.

As for the ARP, we take these indicators and related concepts as they are defined within the framework of the EU-SILC survey (Fusco et al. 2010).

Material deprivation is defined using a battery of nine household level questions with yes/no answer, each focused on measuring the ability/inability to afford items considered by most people to be desirable or even necessary to reach an adequate standard of living. The items are: 1) coping with unexpected expenses; 2) one week's annual holiday away from home; 3) avoiding arrears (in mortgage or rent, utility bills or hire purchase instalments); 4) a meal with meat, chicken, fish or vegetarian equivalent every second day; 5) keeping the home adequately warm; 6) a washing machine; 7) a colour TV; 8) a telephone; 9) a personal car. A deprivation score ranging from 0 to 9 is calculated counting the number of items a household cannot afford. A person is said to be severely materially deprived if he/she lives in a household with a score of $\geq$ 4. The SMD rate is defined as the fraction of people living in households with a score of at least four.

With respect to the ARP that is based on income of a given year, the SMD makes reference to a set of resources and functionings that are more naturally related to the concept of permanent income (Ayala et al. 2011); moreover the threshold does not vary from year to year, and accomodates naturally for differences in the price levels of different parts of a country. Although theoretical motivation of multidimensional poverty measures are sound, operationalization is difficult: the choice of the items, their face validity, the aggregation of the indexes and the reliability of the scale can be critical. The SMD currently adopted in the EU and that we consider here, suffers from some limitations related to small number of items considered and to the relevance of some of the items and namely the last three (see

European Commission 2012, Guio and Marlier 2013 for a discussion of these issues). The debate on the adequacy of the current material deprivation indicator is ongoing at the European Commission level. There is a new indicator of material and social deprivation, that might replace the currently used material deprivation indicator. The new indicator for material and social deprivation is based on 13 items whose selection results from a systematic item-by-item robustness analysis. Since 2014, these items are collected annually in each European Union country. The overall material and social deprivation indicator, adopted by the Indicators Sub-Group of the Social Protection Committee of Eurostat in April 2017, is henceforth defined as the proportion of people in the whole population who have an enforced lack of at least five out of 13 items (for details, see Guio et al. (2012), and Guio et al. (2017)). This is now used by individual Member States and the Commission to monitor material and social deprivation. In this work, we decided to adopt the definition of MD (and SMD) based on the nine items instead of the material and social deprivation one.

The subjective poverty rate is based on a single question about the ability of the household to make ends meet (*Thinking of your household's total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses?*). A person is classified as poor if she/he lives in a household that provides the answer *with great difficulty*, otherwise it is not. Other levels in the answer are *with difficulty, with some difficulty, fairly easily, easily, very easily*. In general, this evaluation of the economic status will be influenced by both the current and the permanent income (Whelan and Maitre 2010), but also the social capital (Guagnano et al. 2016) and social environment in which the household lives (Buttler 2013). This measure does not depend on a national or local threshold, although subjective evaluation will be influenced by social construction of *necessary expenses*.

3 The data and preliminary evidences

3.1 The EU-SILC data

We analyze data from the four successive waves of the EU-SILC survey that took place between 2013 and 2016, focusing on the Italian sample. The survey is conducted in most countries across the European Union by the relevant National Institutes of Statistics using harmonized questionnaires and survey methodologies. Although they follow common guidelines, sampling designs can differ from country to country. In Italy, the EU-SILC is a rotating panel survey with 75% overlap of samples in successive years. The fresh part of the sample is drawn according to a stratified two-stage sample design, where municipalities (LAU 2 level, partitions of the administrative regions) are the primary sampling units (PSUs), while households are the secondary sampling units (SSUs). The PSUs are divided into strata according to their population size and the SSUs are selected by systematic sampling in each PSU.

Our analysis considers the longitudinal sample of households interviewed in all the four successive waves that took place between 2013 and 2016. We are interested in households with dependent children. A dependent child is any person aged below 18 as well as aged 18 to 24 years and living with at least one parent and economically inactive. In our analysis we consider only those households where at least one dependent child is present at least once in the four successive interviews. Using this criterion the sample we analyze is of size $N = 1233$ households (each year).

We note that all the three measures are based on household level variables. For this reason in this paper we consider the household as the relevant statistical unit, despite

Table 1 Proportion of households classified as at-risk-of-poverty (ARP), subjectively poor (SP) and severely materially deprived (SMD) in our sample ($N = 1233$ each year)

Survey wave	ARP	SP	SMD
2013	16.7	21.4	11.8
2014	17.4	20.5	10.5
2015	17.5	16.2	10.4
2016	18.6	12.0	10.6

at-risk-of poverty, subjective poverty and severe material deprivation rates are defined as proportion of people living in a given condition of deprivation and thereby are headcount ratios.

3.2 Stylized facts

The proportion of households in our sample classified as at-risk-of-poverty, subjectively poor and severely materially deprived are shown in Table 1. Estimates are obtained by using household level longitudinal weights and ratio-type estimators (Hájek 1978). These figures are not directly comparable to national estimates of poverty rates, not only as they are restricted to a subset of the households, but also because they are calculated at the household level, while published rates are defined in terms of persons.

We note that at-risk-of-poverty and severe material deprivation rates do not change much over the period, especially when compared to subjective poverty. As for ARP rate, the two points increase over the four years highlights a post-downturn period characterized by the increase in income inequality especially between the North and the South of the country (Banca d'Italia 2018). SMD remains more stable and slightly decrease after the vigorous growth it registered during the downturn.[3] Subjective poverty marked decline is in line with national figures and reflects changes in the economic climate after the recession years that influences permanent income and perceptions from households.

In Table 2 we show how the three measures of poverty overlap in our sample. This overlap is quite low, especially as the poor are concerned. Less than half of the households classified as at-risk-of-poverty are also subjective poor, an effect that can be attributed to the impact of a single national threshold has on a country characterized by large divide but also to the role of permanent income and social capital (Buttler 2013). The influence of permanent income on determining deprivation (and to a lesser extent subjective poverty) can explain the low overlap between severe material deprivation and the risk-of poverty and the relatively high number of deprived families that perceive themselves as under economic stress. Measurement problems, difference in perceptions and expectation (McKnight 2013) can also contribute to the small overlap between ARP and SP.

For our sample of households with children, poverty persistence is, in general, very high. The probability of being at-risk-of-poverty in year t conditional on being at risk in year $t - 1$ is estimated at 0.784 on average over the period. The same figures are lower for the other two measures and namely 0.532 for subjective poverty, 0.511 for severe material deprivation. The probabilities of persistence in the non-poverty status are well above 0.9 in all cases. This high persistence can be attributed to observed and unobserved heterogeneity,

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[3]Figures available at https://ec.europa.eu/eurostat/web/products-datasets/-/tgs00104.

Table 2 Probability that a household is classified as not poor (or poor) according to the measure in column (at-risk-of-poverty rate, ARP, subjective-poverty rate, SP, and severe material deprivation, SMD), provided it is classified in the same way according to the measure indexing the row

	Overlap (non poor)			Overlap (poor)		
	ARP	SP	SMD	ARP	SP	SMD
ARP	100	90.1	93.4	100	38.2	30.6
SP	87.3	100	95.0	46.5	100	44.9
SMD	86.3	90.7	100	49.4	60.3	100

Average over the 2013-2016 waves

whose effect we will try to separate from that of genuine state dependence in the second part of this paper.

3.3 Variables used to model heterogeneity

The variables that we consider to model observed household heterogeneity can be grouped into structural household indicators and economic indicators. The first group includes the number of dependent children, the birth of a child, an indicator that separates households with a single adult from those with two or more, presence of person(s) aged 65 or more (elderly) in the household, and presence of member(s) with disability in the household. Among the economic variables, we consider two related to the labour market, along with household tenure, residence in an urbanized area, and geographical region of residence indicators that can be used as proxies for the various level of economic development experienced by the different parts of Italy.

As far as variables related to the labour market are concerned, we first consider the work intensity of the household defined as the ratio of the number of months that all working age household members have been working during the income reference year to the total number of months that could theoretically be worked in the same period by the household members. Working age is defined as 18-59, dependent children are excluded from the computation. Secondly, we classify the labour market status of individuals in working age in 1) employed (high skill job), 2) employed (low skill job), 3) unemployed, 4) inactive; we consider these statuses as ordered categories. Discrimination between high skill and low skill jobs are based on International Standard Classification of Occupations, ISCO-88. To obtain a household level variable we consider the highest level attained by a working age member of the household. We do not include specific control variables for education as for the high correlation between educational level and labour market status. Simple sample statistics for all these variables can be found in Table 3.

Hick (2015), comparing at-risk-of poverty and material deprivation rates notes that although the two measures show only a partial overlap at household level and have different time patterns, they are consistent in the sense that they identify the same groups as more exposed to poverty. His statement is in line with evidence provided, at least at the exploratory level, by our data. We cross-classified the sample (pooled over the four waves) by region of residence (North West, North East, Centre, South), number of dependent children in the household (0, 1, 2 or more) and work intensity level (below 0.5, between 0.5 and 0.99, exactly equal to 1) and then plotted the three poverty rates one against the other. The plots are reported in Fig. 1.

Table 3 Means and standard deviations of household and economic indicators used in the models to describe household heterogeneity

Variable	Mean	St.dev
No. of dependent children	1.318	0.661
Gender of the head: female	0.280	0.449
Age of the head	46.055	9.845
Presence of elderly person	0.064	0.245
Presence of disabled person	0.282	0.450
Single adult	0.148	0.355
Work intensity	0.695	0.333
Low skilled worker	0.446	0.497
High skilled worker	0.446	0.497
Not employed	0.108	0.310
No home ownership	0.416	0.493
Urban area indicator	0.334	0.472
North West	0.234	0.423
North East	0.267	0.442
Centre	0.217	0.412
South	0.283	0.451
Birth of a child	0.030	0.170
Average work intensity	0.688	0.307
Average presence disabled	0.274	0.341

Means and standard deviations are calculated on the sample *pooled* over the four waves
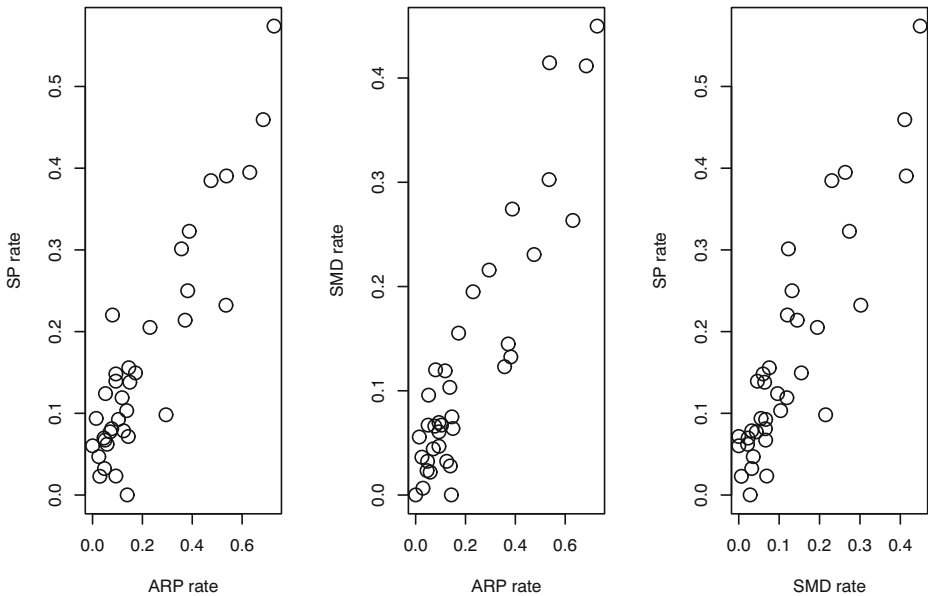

Fig. 1 ARP, SP and SMD rates calculated for groups of households obtained cross-classifying the pooled sample by region of residence, number of dependent children in the household and work intensity level

In all the three scatterplots of Fig. 1 the relationship appears to be approximately linear and strong, with a Pearson linear correlation between 0.8 and 0.85. The highest level is attained by the couple SP and SMD rates. When the at-risk-of-poverty is involved some of the points appear to be deviant: these pertain to groups of families residing the South of the country, where the threshold defined as the 60% of the national median tend to identify large portions, often a majority of households, as at risk of poverty. In many cases this measure of deprivation is in disagreement with the other two that are more consistent in this part of the population.

4 Econometric model

As explained in the Introduction, we consider and compare three sets of estimates for alternative measures of poverty: 'at risk of poverty', subjective poverty, and severe material deprivation. For all measures we consider a correlated random effects probit model with endogenous initial conditions. To simplify the model description in what follows we only refer generically to poverty, as the same model is applied to the study of each measure.

When estimating the degree of state dependence of a condition (e.g., poverty, unemployment, low-pay) it is essential to distinguish between true (or genuine) state dependence, captured by the impact of the lagged dependent variable, and spurious state dependence, caused by the presence of time-invariant unobserved heterogeneity. To achieve this we included the lagged poverty status on the right side of equations with the poverty status on the left.

Persistence may be partly due to household observed and unobserved heterogeneity (people with adverse characteristics may be exposed to a 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 can implicitly capture also other drivers of poverty. The adopted model controls for unobserved heterogeneity by introducing a household-specific random effect that is assumed to be normally distributed and independent of other covariates. The independence assumption has been relaxed by adopting the Mundlak's approach (Mundlak 1978), wherein unobserved heterogeneity term is decomposed into two parts: one correlated with (time-varying) explanatory variables and one uncorrelated.

The estimated state dependence parameter might be biased due to endogeneity between initial conditions and unobserved heterogeneity, that is the first/initial poverty status observed in the data is affected by underlying unobservable factors conditioning the distribution of poverty at *time* 1 Heckman (1981). We address the initial conditions problem by following (Wooldridge 2005) who suggested an alternative Conditional Maximum Likelihood estimator that considers the distribution conditional on the value in the initial period. One of the advantages of such model is that it includes Mundlak's specification, and thus, we estimate correlated random effects probit models[4] with endogenous initial conditions.[5] Finally, another source of bias is due to the fact that the Wooldridge method tends to produce

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[4]Random effects have more desirable properties than fixed effects if the assumptions underlying them are satisfied. For this reason we applied Hausman specification test Hausman (1978) and Woutersen and Hausman (2018) which confirmed that the random effect model is not biased and that this is the correct estimation procedure in comparison to the fixed effect model.

[5]The opportunity to specify a distribution of heterogeneity conditional on the initial conditions gives several advantages to Wooldridge's compared to alternative specifications, such as dynamic random effects probit

a biased estimation of state dependence for short panels as the one we use Akay (2012). We use the solution proposed by Rabe-Hesketh and Skrondal (2013) to include as additional covariates the initial values of the control variables to reduce the substantial finite sample bias.

The Wooldridge's model that we adopt is specified as:

$$y_{it}^* = \varphi y_{it-1} + z_i^T \delta + x_{it}^T \gamma + \alpha_i + u_{it} \tag{1}$$

with $i = 1, ..., N$ indicating the household and $t = 2, ..., T$ the time period. y_{it}^* is the latent dependent variable, y_{it} is the observed binary outcome variable, y_{it-1} is the lagged poverty status and φ the true state dependence parameter to be estimated. y_{it} can be defined as follows:

$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

Specifically, y_{it} takes value one if the household i is in a poverty status at time t, and value 0 if the household is not poor. On the right hand side of Eq. 1, z_i and x_{it} are the vectors of time-invariant and time-varying control variables, respectively; they include household structure and economic indicators. Among household structure variables, we include the number of dependent children, the birth of a child, dichotomous variables for the presence of elderly (individuals older than 65), disabled in the household, for the presence of only one adult in the household (mono-parental or single-parent household), as well as for the labour market status that requires the highest skills (based on the type of occupation we distinguish between high and low skilled workers, and the baseline category includes unemployed plus inactive). Economic indicators are the household work intensity, household home ownership (tenure status), whether the household lives in a densely populated area, intermediate or scarcely populated area, and the macro-area of residence. δ and γ are vectors of unknown parameters to be estimated.

Finally, α_i is the household-specific (and time-invariant) unobserved heterogeneity, and u_{it} is the idiosyncratic error term. We assume that both α_i and u_{it} are normally distributed and that there is no serial correlation in u_{it}. The individual-specific unobserved effect in Wooldridge's approach can be written as:[6]

$$\alpha_i = \theta_0 + \theta_1 y_{i1} + \delta x_{i1} + x_i^T \eta + \epsilon_i \tag{3}$$

where ϵ_i is another unobservable household-specific heterogeneity term that is uncorrelated with the initial poverty status y_{i1} or the time-varying explanatory variables. Conversely, correlation between α_i and the initial poverty status, the initial values of control variables, and the time-varying explanatory variables is captured by parameters θ_1, δ and η, where the latter is the vector of parameters of time-averaged time-varying explanatory variables calculated from periods 2 to T, as suggested by Mundlak (1978).

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model with autocorrelated errors following (Heckman 1981). First, we can choose the distribution to be flexible, while Heckman's implies approximating the conditional distribution of the initial condition. Second, the estimation is straightforward, while Heckman's is often computationally more burdensome than necessary. Third, the partial effects averaged across the distribution of unobservable are identified as well as estimated without much difficulty. We therefore rely on Wooldridge's approach. For the sake of completeness we also used the Heckman's approach. These estimates are available upon request.

[6]Caution is necessary for the specification of the auxiliary conditional distribution for the unobserved heterogeneity, because the possible misspecification of such distribution might result in inconsistent estimates (Wooldridge 2005).

According to Wooldridge's specification, the probability of being poor for household i at time t is specified as:

$$\mathbb{P}[y_{it} = 1|.] = \Phi(\varphi y_{it-1} + z_i^T \delta + x_{it}^T \gamma + \theta_1 y_{i1} + \delta x_{i1} + x_i^T \eta + \epsilon_i) \tag{4}$$

where Φ is the cumulative distribution function of a standard normal. Additionally, the panel-level covariance component (σ_v^2) (and the standard deviation σ_v), together with ρ parameter are defined as:

$$\rho = \frac{\sigma_v^2}{\sigma_v^2 + 1} \tag{5}$$

The estimated coefficients are indicative only of the direction of the impact, but not the size of previous poverty on current poverty. To understand the magnitudes of the state dependence and allow interpretation of the estimates, we also compute average partial effects (APE, for technical details see Wooldridge 2005).

In Section 3.1 we noted how the sample we analyze is the result of complex design. Published sampling weights account for the unequal inclusion probabilities along with the effect of non-response and panel attrition. We considered these weights when estimating population descriptors in Section 3.2, but we will not use them in regression analyses. In the first place, we do have access to all relevant sampling design information (stratum and cluster identifiers); moreover our implicit assumption that the sampling design is non-informative given the covariates has been tested according to procedure illustrated in (Pfeffermann and Sverchkov 1999), with the null hypothesis non-rejected. This procedure aims at testing whether powers of regression residuals are significantly correlated with weights.[7] In all cases, the correlations turned out to be very low and statistically non-significant.

5 Analysis of the results

The triplet composed by ARP, SP and SMD rates offers the opportunity to compare whether structural characteristics of the households, variables related to the labour market and other economic indicators, initial conditions and actual state dependence, act similarly or not on poverty measured in these three different ways.

Table 4 shows the estimates of the correlated random effects probit models with endogenous initial conditions for the poverty indicators. We also calculate the APE (see Section 4) to have measures of impacts easier to read.

In Section 3.2 we noted a relatively high permanence in the poverty or non poverty statuses for all the three measures considered. In what follows, we discuss the importance of (endogeneity of) initial conditions, the effects of household and economic indicators (as well as random effects), and the role of state dependence.

In the first place, we have a clear evidence of endogeneity of initial conditions,[8] meaning that the initial poverty status observed in the data is associated with unobservable factors suggesting the utility of controlling for it to avoid spurious estimates of state dependence. Interestingly, the initial conditions are quite important for all the poverty measures and for

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[7]Specifically, we consider the implementation of these test from the jtools package of R (Long 2019).

[8]The rho parameters and the LR tests for the null hypothesis of rho equals to 0 (bottom Table 4) confirm the importance of accounting for correlated random effects (see Section 4).

Table 4 Correlated random effects probit model with endogenous initial conditions

	ARP		SP		SMD	
	Coef.	*APE*	*Coef.*	*APE*	*Coef.*	*APE*
Lagged dependent variable	0.933***	0.085	0.870***	0.123	0.605***	0.069
	(0.173)		(0.139)		(0.166)	
Dependent variable *time* 0	1.803***	0.164	0.692***	0.098	0.896***	0.102
	(0.307)		(0.157)		(0.187)	
Household indicators						
Gender of the head: female	0.308*	0.028	0.154	0.022	0.184	0.021
	(0.152)		(0.105)		(0.123)	
Age of the head	0.011	0.001	−0.003	0.000	−0.003	0.000
	(0.008)		(0.005)		(0.006)	
No. of dependent children	0.300***	0.027	0.108*	0.015	−0.042	−0.005
	(0.104)		(0.051)		(0.078)	
Birth of a child	−0.034	−0.003	0.188	0.027	−0.031	−0.004
	(0.333)		(0.206)		(0.239)	
Presence elderly	−0.840**	−0.076	−0.237	−0.034	−0.231*	−0.026
	(0.446)		(0.296)		(0.328)	
Presence disabled	−0.254*	−0.023	0.185*	0.026	0.209*	0.024
	(0.142)		(0.106)		(0.115)	
Single adult	1.447***	0.131	0.275	0.039	0.153	0.017
	(0.313)		(0.212)		(0.223)	
Economic indicators						
Work intensity	−1.345***	−0.122	−0.607***	−0.086	−0.561*	−0.064
	(0.295)		(0.228)		(0.244)	
Low skilled worker	0.120	0.011	−0.171	−0.024	−0.332*	−0.038
	(0.201)		(0.137)		(0.150)	
High skilled worker	−0.084	−0.008	−0.243*	−0.034	−0.320***	−0.036
	(0.211)		(0.148)		(0.163)	
No home ownership	−0.072	−0.007	0.366***	0.052	0.281*	0.032
	(0.156)		(0.106)		(0.118)	
Urban area	−0.247*	−0.022	0.126	0.018	−0.038	−0.004
	(0.119)		(0.072)		(0.085)	
North-West	−0.631***	−0.057	−0.279***	−0.039	−0.269*	−0.031
	(0.176)		(0.096)		(0.118)	
North-East	−0.550***	−0.050	−0.492***	−0.070	−0.321***	−0.036
	(0.165)		(0.104)		(0.118)	
Centre	−0.400*	−0.036	−0.396***	−0.056	−0.202*	−0.023
	(0.161)		(0.102)		(0.116)	

their subsequent dynamics. Poverty is a structural phenomenon, as poor (or not poor) at the initial period are not randomly selected. Specifically, we find that being poor, subjective poor, and severely materially deprived in the initial period increase the current risks by 16.4

Table 4 (continued)

Initial values of the control variables						
Gender of the head: female *time* 0	−0.040	−0.004	−0.041	−0.006	−0.018	−0.002
	(0.173)		(0.111)		(0.129)	
Age of the head *time* 0	−0.007	−0.001	−0.006	−0.001	0.000	0.000
	(0.008)		(0.005)		(0.006)	
No. of dependent children *time* 0	−0.055	−0.005	0.155*	0.022	0.035	0.004
	(0.121)		(0.078)		(0.087)	
Presence elderly *time* 0	−0.129	−0.012	0.266	0.038	−0.124	−0.014
	(0.483)		(0.307)		(0.346)	
Presence disabled *time* 0	−0.242	−0.022	−0.033	−0.005	−0.246*	−0.028
	(0.200)		(0.086)		(0.140)	
Single adult *time* 0	1.291***	−0.117	−0.358	−0.051	−0.098	−0.011
	(0.338)		(0.226)		(0.241)	
Work intensity *time*0	0.537*	0.049	0.180	0.025	0.029	0.003
	(0.309)		(0.187)		(0.210)	
Low skilled worker *time*0	−0.417*	−0.038	0.048	0.007	−0.054	−0.006
	(0.248)		(0.147)		(0.167)	
High skilled worker *time*0	−0.433*	−0.039	−0.065	−0.009	−0.221	−0.025
	(0.249)		(0.153)		(0.175)	
No home ownership *time*0	0.165	0.015	0.003	0.000	0.274*	0.031
	(0.167)		(0.107)		(0.125)	
Time-averaged						
Average work intensity	−1.057*	−0.096	−0.366	−0.052	−0.276	−0.031
	(0.419)		(0.286)		(0.311)	
Average presence disabled	0.498	0.045	0.136	0.019	0.296	0.034
	(0.330)		(0.058)		(0.240)	
Constant	−0.910*		−0.880***		−0.920***	
	(0.424)		(0.246)		(0.287)	
σ_υ	0.992		0.298		0.475	
	(0.156)		(0.166)		(0.142)	
ρ	0.496***		0.081		0.184*	
	(0.079)		(0.083)		(0.090)	
LR test ρ=0	26.10 [0.000]		0.96 [0.163]		4.06 [0.022]	
Observations	4,932		4,932		4,932	

Coefficients and average partial effects (*APE*).*Significant at the 10% level;**significant at the 5% level;***significant at the 1% level. Standard errors with Delta–method in parentheses. Authors' calculations from EU-SILC 2013-2016 data

percentage points (pp), 9.8 pp, and 10.2 pp (Table 4), even conditionally on structural and economic variables.

As far household characteristics are concerned, while the age of the head of the household is not associated with the risks analysed, if the household head is a female the household has a higher risk of ARP. This is confirmed by the existing literature on Italy (Giarda and Moroni 2018). We find that the number of dependent children increases both

the risk of ARP (2.7 pp) and SP (1.5 pp), while it does not significantly affect SMD. The significant effect of the number of dependent children on the measures depending on current income is expected if transfers do not correct the reduction of the equivalised income caused by dependent children; the significance can then be explained in terms of the weak policies directed at backing families with children in Italy both at the fiscal and transfer levels (see Fabrizi et al. 2014). The significant effect on ARP can also be related to the dependence of this measure on the modified OECD equivalence in the definition of the equivalised income; there is evidence in the literature of a possible underestimation of economies of scale when adopting this scale (Bishop et al. 2014). The absence of a significant effect of the presence of children on SMD might be due to a stronger economy of scale effect with respect to the items involved in the severe material deprivation measurement (items do not include qualitative evaluations, so households conditions can deteriorate to some extent without changes in the answer to defining items); alternatively it can reflect the help households with a higher number of children receive from their network including grandparents/relatives, as well as non-profit institutions offering services and/or facilities focused on households with (many) dependent children. We note that the birth of a child is not associated with significantly higher poverty risks, likely because this event is relatively rare in our sample (see Table 3). More in general, it has been noted that life events, like the birth of a child, are poorly measured in the EU-SILC survey (Greulich and Dasré 2017).

Interestingly, the presence of elderly individuals significantly reduces the probability of being poor (-7.6 pp) and severely materially deprived (-2.6 pp). This might be due to the fact that elderly individuals provide a source of income, such as pensions, which represent a secure and valuable source against the risks of poverty. The Italian welfare system is comparatively generous for the elderly with respect to other segments of the population. The literature on poverty dynamics already pointed out the role of secondary earners (for instance grandparents) in lifting up poor households above the low-income cut-off (OECD 1998; Jenkins 2000), as well as the role of elderly's pensions for reducing poverty of cohabiting household members, especially if children (Diris et al. 2017). We thus provide further empirical support for this argument, by showing its relevance in Italy for both poverty and social exclusion.

The presence of disabled reduces ARP, while it increases both SP and SMD. The presence of a disabled has two fold effect. On the one hand it increases current income through disability related social transfers. On the other hand, indirect (long-term or permanent) impacts of the presence of disabled, related to the negative effect of caring activities on other household members labour market participation, as found by Marenzi and Pagani (2005), as well as by the more recent work by Parodi and Sciulli (2011) and Bratti and Staffolani (2012), are at work. In the effect on ARP the increase in current income apparently prevails over the negative effects, also because cost related to disability care are not accounted as negative income component. SP and SMD, instead, refer to permanent income in which the negative economic effects of the presence of disabled dominate. Moreover, we find that possible disability shocks, measured by the average number of disabled in the household, do not exert a role on poverty and social exclusion.

Single-parent (mono-parental) households suffer of higher poverty risk compared to household with dependent children. In general, single-parent households are characterized by much higher poverty incidence rates (OECD 2014). Additionally, this household type may have more constraints in reconciling work and family responsibilities than a couple with dependent children, which may contribute to decreasing their bargaining capacity in the labour market and the competition for better paid/quality job (Kahn 2012; Nieuwenhuis and Maldonado 2018). Interestingly, we note a non-significant effect of single parenthood

on SP. This might be partly explained by the fact that households in our sample are relatively young, as they are households with dependent children. The single parent in our sample, therefore, might benefit of the help of a network of relatives/informal network for childcare. The importance of such a form of social capital on SP perception is confirmed by the existing literature (see, for instance Guagnano et al. 2016).

As far labour market indicators are concerned, we find that higher work intensity significantly reduces the probabilities to fall into poverty and social exclusion regardless of the adopted poverty measure. Alternatively, we tried to use the number of employees in the household in the place of work intensity; we find that the impact of this indicator on the prediction of poverty is much weaker. Our finding for Italy is confirmed by Eurostat (also) at the EU level (Eurostat 2018). Having a job is not always enough to avoid poverty: in 2016, for instance, 7.8% of the working EU population were at risk of poverty even if they were working/employed. The spread of precarious contracts, low-paid jobs and underemployment in most countries especially during the crisis implies that the labour market has stopped being a stable source of prosperity for many people and their families. Specifically on Italy, as confirmed by data and the existing literature (see, for instance Eurofound 2010, Horemans et al. 2016), there was an important increase of vulnerable jobs and involuntary part-time jobs, which are notably countercyclical. When unemployment rises, people are more willing to accept part-time and even precarious jobs, despite preferring full-time working arrangements. Additionally, the countercyclical growth of these vulnerable jobs raises concerns about an increase of in-work poverty, because precarious workers are more likely to be poor (Marx and Nolan 2014).

For the labour market status, we find a negative association between the presence of high skilled worker in the household and both SP (-3.4 pp) and SMD (-3.6 pp), as well as between the presence of low skilled worker in the household and SMD (-3.8 pp), while the labour market status does not exert a role on ARP. The first evidence can receive alternative explanations: high skilled workers usually enjoy higher levels of income, so their permanent income is higher; secondly high skilled workers are better educated and more effective in the take-up of benefits their families have right to (see Hernanz et al. 2004 for a discussion). As for the second evidence, a possible explanation is related to the (current) income of reference for ARP which might be less affected by labour market status. This finding also confirm that having a job (either high-skilled or low-skilled one), as explained above, is not enough to overcome the risk of poverty (Eurostat 2018). Possible alternative explanation, such as the effect of unemployment benefits being more generous than low wages are not very likely for Italy (see Fabrizi et al. 2014 for a discussion and more references on this point.

The absence of home ownership (measured by a dummy for no tenure), has a significant impact on increasing both SP and SMD, while it does not affect ARP. This might be likely due to the fact that the indicator for ARP does not include imputed rents that instead affect SP and SMD measures. Geographical differentials in poverty and material deprivation risks and rates clearly emerge. Our results suggest that the diffusion of poverty and severe material deprivation in the South of Italy is larger than in the Centre-North even after controlling for all other variables. Living in the North-West(East) reduces the ARP and SP by -5.7 (-5) pp and -3.9 (-7) pp, and by -3.1 (-3.6) pp SMD with respect to residing in the South. Interestingly, our findings for ARP, which is based on current income, suggest that the situation is further deteriorated in the South. Italy is structurally afflicted by territorial differentials in the levels of economic development (measured by the GDP), in labour market indicators (notoriously the unemployment rate), as well as in infrastructure provisions. Similar results are found in the literature (Iuzzolino et al. 2011; Vecchi 2011; Giarda

and Moroni 2018). The initial values of the control variables introduced to reduce potential bias in the state dependence (see Section 4) do not exert an important role on the poverty measures explored.

Eventually, as far as poverty persistence is concerned, we find evidence of strong poverty persistence or poverty and social exclusion trap regardless of the poverty measure adopted. Our finding on the persistence of ARP is in line with the existing literature on Italy (Devicienti and Poggi 2011; Addabbo et al. 2015; Giarda and Moroni 2018), Spain (Gradin and Cantó 2012; Ayllón 2013), and, more in general, on Europe (Ayllón and Gábos 2017; Bárcena-Martín et al. 2017). The estimates of the APE of the lagged dependent variables suggest the presence of true or genuine state dependence in the status of poverty, that is the previous poverty state, in itself, influences the probability of someone experiencing the same state or condition of poverty in the future. We note that, in Italy, being poor at $t-1$ increases the poverty risk in the next period by 8.5 pp. A possible explanation is the raise in the use of precarious contracts as well as their acceptance by the individuals during and after the latest recession. These vulnerable workers are more likely to be poor; so unemployment, precarious and low-paid jobs tend to trap people into poverty, for instance through the so called *scarring effect* (see Arulampalam et al. (2001) for the *scarring effect* of unemployment).

We also find evidence of persistence into the statuses or conditions of SP and SMD. A first conclusion that we can draw is that poverty (and social exclusion) persistence is high, and this genuine state dependence remains even after accounting for (endogenous) initial conditions, and controlling for observed and unobserved individual heterogeneity. The observed state dependence might be due also to other time-varying unobserved characteristics/factors not captured by our measures (i.e. some variation in work intensity or wage income, family structure or benefit entitlement, direct scarring effect that leads to future poverty, depression or other illness) that are both correlated over time and influence poverty.

Nonetheless, the different role of structural and economic variables we observed in our models, suggest interventions specific to the poverty measure being targeted. If ARP is the main target, short run policies aimed at supporting current income can succeed in alleviating poverty; if SMD or SP are in focus, long run policies aimed at supporting permanent income, such as investment in education and training, can be more effective.

6 Conclusions

In this research, analyzing a four year panel sample, we focused on poverty experienced by households with dependent children in Italy. We wanted to identify structural characteristics and economic conditions that represent *risk factors* for poverty and to assess the degree of poverty persistence, i.e. how it is likely that an household fallen into poverty remains trapped in this condition. As poverty is a multi-dimensional complex phenomenon, and no single measure can be satisfactory, we decided to reproduce the same econometric analysis using three different popular poverty measures: at risk-of-poverty, subjective poverty and severe material deprivation rate.

We find evidence of endogeneity of initial conditions for all the poverty measures, meaning that the initial poverty status observed in the data is associated with unobservable factors suggesting the utility of controlling for it to avoid spurious estimates of state dependence. This also reassures both on the choice of the model specification and on robustness of our results.

Regardless of the adopted poverty measure, we find genuine state dependence, implying the existence of poverty and social exclusion traps for households with dependent children

in Italy. However, the role of structural characteristics and economic variables is different in the three models. Namely, variables influencing current income, such as the participation in the labour market, are key to the dynamics of ARP, while structural variables, more related to permanent income, such as education level of household adults, play an important role in the dynamics of SMD and SP. These differences are relevant to policy makers, as poverty contrasting policies may depend on the poverty measure being targeted.

Compliance with Ethical Standards

References

Aaberge, R., Colombino, U., Strøm S: Do more equal slices shrink the cake? an empirical investigation of tax-transfer reform proposals in Italy. J. Popul. Econ. **17**(4), 767–785 (2004)

Addabbo, T.: Poverty dynamics: analysis of household incomes in Italy. LABOUR **14**(1), 119–144 (2000)

Addabbo, T., García-Fernández, R., Llorca-Rodríguez, C., Maccagnan, A.: Poverty and material deprivation in the crisis: Italy and Spain. J. Appl. Econ. Sci. **10**(4), 514–533 (2015)

Akay, A.: Finite-sample comparison of alternative methods for estimating dynamic panel data models. J. Appl. Econom. **27**(7), 1189–1204 (2012)

Arulampalam, W., Gregg, P., Gregory, M.: Unemployment scarring. Econ. J. **111**(475), 577–584 (2001)

Ayala, L., Jurado, A., Perez-Mayo, J.: Income poverty and multidimensional deprivation: lessons from cross-regional analysis. Rev. Income Wealth **57**(1), 40–60 (2011)

Ayllón, S.: Understanding poverty persistence in Spain SERIEs. J. Span. Econ. Assoc. **42**(2), 201–233 (2013)

Ayllón, S., Gábos, A.: The interrelationships between the Europe 2020 poverty and social exclusion indicators. Soc. Indic. Res. **130**(3), 1025–1049 (2017)

Baldini, M., Ciani, E.: Inequality and poverty during the recession in Italy. Politica Economica **27**(3), 297–322 (2011)

Banca d'Italia: The annual report at a glance (2018)

Bárcena-Martín, E., Blanco-Arana, M.C., Pérez-Moreno, S.: Dynamics of child poverty in the european countries, working papers 437, ECINEQ, society for the study of economic inequality (2017)

Biewen, M.: Measuring state dependence in individual poverty histories when there is feedback to employment status and household composition. J. Appl. Econom. **24**(7), 1095–1116 (2009)

Billari, F.: Lowest-low fertility in Europe: exploring the causes and finding some surprises. Japanese J. Popul. **6**(1), 2–18 (2008)

Bishop, J.A., Grodner, A., Liu, H., Ahmandanech-Zarco, I.: Subjective poverty equivalence scales for euro zone countries. J. Inco. Inequal. **12**, 265–278 (2014)

Bratti, M., Staffolani, S.: A Microeconometric Analysis of Female Labour Force Participation in Italy. In: Addabbo, T., Solinas, G. (eds.) Non-Standard Employment and Quality of Work. AIEL Series in Labour Economics, Physica-Verlag HD (2012)

Buttler, F.: What Determines Subjective Poverty? An Evaluation of the Link between Relative Income Poverty Measures and Subjective Economic Stress within the EU Working Paper. DFG Research Unit Horizontal Europeanization Carl von Ossietzky Universität, Oldenburg (2013)

Cappellari, L., Jenkins, S.P.: Modelling low income transitions. J. Appl. Econ. **19**(5), 593–610 (2004)

Chzhen, Y.: Child Poverty and Material Deprivation in the European Union during the Great Recession. Innocenti Working Paper No.2014-06, UNICEF Office of Research, Florence (2014)

Coppola, L., Di Laurea, D.: Modelling low income transitions. Genus **72**(3), 1–17 (2016)

Del Boca, D.: Child Poverty and Child Well-Being in the European Union: Policy Overview and Policy Impact Analysis - A Case Study: Italy. In: Child poverty and child well-being in the European Union, Vol IV, TARKI-Applica,Budapest/Brussels (2010)

Devicienti, F., Gualtieri, V., Rossi, M.: The persistence of income poverty and lifestyle deprivation: evidence from Italy. Bull. Econ. Res. **66**(3), 246–278 (2014)

Devicienti, F., Poggi, A.: Poverty and social exclusion: two sides of the same coin or dynamically interrelated processes? Appl. Econ. **43**(25), 3549–3571 (2011)

Diris, R., Vandenbroucke, F., Verbist, G.: The impact of pensions, transfers and taxes on child poverty in europe: the role of size, pro-poorness and child orientation. Soc. Econ. Rev. **15**(1), 1–31 (2017)

Eurofound: Working poor in Europe, retrieved from www.eurofound.europa.eu (2010)

European Commission: Measuring Material Deprivation in the EU–Indicators for the Whole Population and Child-Specific Indicators Eurostat Methodologies and Working Papers. Publications Office of the European Union, Luxembourg (2012)

Eurostat: Statistics on income, social inclusion and living conditions, retrieved from http://ec.europa.eu/eurostat/web/income-and-living-conditions/overview (2018)

Fabrizi, E., Ferrante, M.R., Pacei, S.: Measuring sub-national income poverty by using a small area multivariate approach. Rev. Income and Wealth **54**(4), 597–615 (2008)

Fabrizi, E., Ferrante, M.R., Pacei, S.: A micro-econometric analysis of the antipoverty effect of social cash transfers in Italy. Rev. Income and Wealth **60**(2), 323–348 (2014)

Fusco, A., Guio, A.C., Marlier, E.: Characterizing the Income Poor and the Materially Deprived in European Countries. In: Atkinson, A.B., Marlier, E. (eds.) Eurostat Statistics Books: Income and Living Conditions in Europe. Publication Office of the European Union, Luxembourg (2010)

Fusco, A., Islam, N.: Understanding the drivers of low income transitions in Luxembourg. Res. Econ. Inequal. **20**, 367–391 (2012)

Giarda, E., Moroni, G.: The degree of poverty persistence and the role of regional disparities in Italy in comparison with france, Spain and the UK. Soc. Indic. Res. **136**(1), 163–202 (2018)

Gradin, N., Cantó, O.: Why are child poverty rates so persistently high in Spain. Manch. Sch. **80**(1), 117–143 (2012)

Greulich, A., Dasré, A.: The quality of periodic fertility measures in EUSILC. Demogr. Res. **36**, 525–556 (2017)

Guagnano, G., Santarelli, E., Santini, I.: Can social capital affect subjective poverty in europe? an empirical analysis based on a generalized ordered logit model. Soc. Indic. Res. **128**(2), 881–907 (2016)

Guio, C., Gordon, D., Marlier, E.: Measuring Material Deprivation in the EU: Indicators for the Whole Population and Child-Specific Indicators Eurostat Methodologies and Working Papers. Publications office of the European Union, Luxembourg (2012)

Guio, C., Gordon, D., Najera, H., Pomati, M.: Revising the EU material deprivation variables (analysis of the final 2014 EU-SILC data), final report of the Eurostat Grant "Action Plan for EU-SILC improvements (2017)

Guio, C., Marlier, E.: Alternative Vs. Current Measures of Material Deprivation at EU Level: What Differences Does It Make?. ImPRove Working Paper No.13/07, Herman Deleeck Centre for Social Policy – University of Antwerp, Antwerp (2013)

Hájek, J.A.: On the theory of ratio estimates. Aplik. Math. **3**, 384–398 (1978)

Hausman, J.A.: Specification tests in econometrics. Econometrica **46**(6), 1251–1271 (1978)

Heckman, J.J.: The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process. In: Manski, C.F., McFadden, D. (eds.) Structural Analysis of Discrete Data with Econometric Applications, pp. 179–195. MIT Press, Cambridge (1981)

Hernanz, V., Malherbet, F., Pellizzari, M.: Take-up of welfare benefits in OECD countries: a review of the evidence, OECD social, employment and migration working papers, DELSA/ ELSA/WD/SEM(2004)2 (2004)

Hick, R.: Three perspectives on the mismatch between measures of material poverty. Br. J. Sociol. **66**(1), 163–172 (2015)

Horemans, J., Marx, I., Nolan, B.: Hanging in, but only just: part-time employment and in-work poverty throughout the crisis. IZA J. Eur. Labor Stud. **5**(5), 1–19 (2016)

ISTAT: Poverty in Italy retrieved from https://www.istat.it/en/archivio/128451 (2014)

Iuzzolino, G., Pellegrini, G., Viesti, G.: Convergence among Italian Regions, 1861–2011. Economic History Working Papers 22, Bank of Italy, Rome (2011)

Jenkins, S.P.: Modelling household income dynamics. J. Popul. Econ. **13**(4), 529–567 (2000)

Kahn, L.: Labour market policy: a comparative view on the costs and benefits of labour market flexibility. J. Policy Anal. Manage. **31**(1), 94–110 (2012)

Kis, A.B., Gábos: Consistent Poverty across the EU. ImPRove Working Paper No.15/22, Herman Deleeck Centre for Social Policy – University of Antwerp, Antwerp (2015)

Long, J.A.: Jtools: analysis and presentation of social scientific data, R package version 2.0.1, https://cran.r-project.org/package=jtools (2019)

Maestri, V.: A measure of income poverty including housing: benefits and limitations for policy making. Soc. Indic. Res. **121**, 265–278 (2015)

Marenzi, A., Pagani, L.: The impact of elderly parents on labour market participation of Italian women. Riv. Polit. Econ. **95**(3-4), 155–189 (2005)

Marlier, E., Cantillon, B., Nolan, B., Van den Bosch, K., Van Rie, T.: Developing and learning from eu measures of social inclusion. In: Besharov, D.J., Couch, K.A. (eds.) Counting the poor. New Thinking about European Poverty Measures and Lessons for the United States, International Policy Exchange Series. Oxford University Press, New York (2012)

Marx, I., Nolan, B.: In-Work Poverty. In: Cantillon, B., Vandenbroucke, F. (eds.) Reconciling Work and Poverty Reduction. How Successful are European Welfare States. Oxford University Press, Oxford (2014)

McKnight, A.: Measuring material deprivation over the economic crisis: does a re-evaluation of need affect measures of material deprivation?. AIAS, GINI Policy Paper 4, Amsterdam (2013)

Mogstad, M., Langørgen, A., Aaberge, R.: Region-specific versus country-specific poverty lines in analysis of poverty. J. Econ. Inequal **5**(1), 115–122 (2007)

Mundlak, Y.: On the pooling of time-series and cross-section data. Econometrica **49**(1), 69–85 (1978)

Nieuwenhuis, R., Maldonado, L.C.: The triple bind of single-parent families: resources employment and policies to improve wellbeing, Policy Press, University of Bristol (2018)

OECD: Low-income dynamics in four OECD countries. OECD Economic Outlook, chapter VI pp 171–185 (1998)

OECD: Income inequality update (June 2014) retrieved from https://www.oecd.org/social/OECD2014-Income-Inequality-Update.pdf (2014)

Parodi, G., Sciulli, D.: Disability in Italian households: income, poverty and labour market participation. Appl. Econ. **40**(20), 2615–2630 (2011)

Pfeffermann, D., Sverchkov, M.: Parametric and Semi-Parametric estimation of regression models fitted to survey data. Sankhya B (1960-2002) **61**(1), 166–186 (1999)

Poggi, A.: Does persistence of social exclusion exist in Spain? J. Econ. Inequal. **5**(1), 53–72 (2007)

Rabe-Hesketh, S., Skrondal, A.: Avoiding biased versions of Wooldridge's simple solution to the initial conditions problem. Econ. Lett. **120**(2), 346–349 (2013)

Spicker, P.: Why refer to poverty as a proportion of median income? J. Poverty Soc. Justice **20**(2), 165–177 (2012)

Vecchi, G.: ricchezza e in povertà. Il benessere degli italiani dall'Unità a oggi, Bologna: Il Mulino (2011)

Whelan, C.T., Maitre, B.: Comparing poverty indicators in an enlarged european union. Eur. Sociol. Rev. **26**(6), 713–730 (2010)

Wooldridge, J.M.: Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. J. Appl. Econ. **20**(1), 39–54 (2005)

Woutersen, T., Hausman, J.A.: Increasing the power of specification tests. Journal of Econometrics, forthcoming (2018)