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Evidence from across Europe

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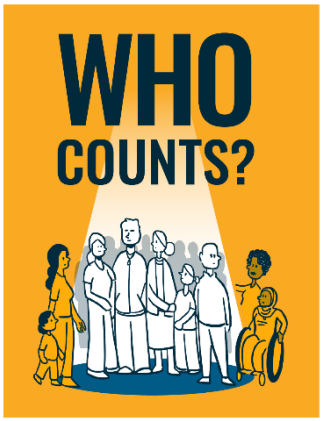

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Exploring the Relationship between Poverty Depth and Persistence: Evidence from across Europe

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Abstract

This paper examines whether being in persistent income poverty contributes to deepening poverty in subsequent periods across five European countries. The analysis conducted with pooled EU-SILC longitudinal waves covering 2012-2020 years shows that there is a significant relationship between being persistently poor in previous periods and deep poverty risk, and the relationship is robust to the inclusion of observed heterogeneity. The results highlight the protective role of labour market participation against deep poverty risk among those subject to persistent poverty in the past. There is also considerable variation across household types in selected countries with some types being at higher risk of deep poverty, especially after experiencing persistent poverty in the past. The results suggest varying effectiveness of anti-poverty policies across selected countries with important implications for the targeting and timing of social security transfers.

Keywords— poverty persistence, deep poverty risk, social security, household heterogeneity, labour market attachment, EU-SILC

1 Introduction

Poverty is not static; individuals may fall in and out of poverty throughout their lifetime. The recent literature on poverty measurement has largely recognised the dynamic nature of poverty by attempting

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to measure and estimate the persistence of poverty (Cappellari and Jenkins, 2004), its relationship with subjective poverty and material deprivation (Fabrizi and Mussida, 2020), financial hardships (Fusco and Islam, 2012), as well as the risk factors associated with it (Fusco and Van Kerm (2023) and Gradín et al. (2018) for an extensive review). However, existing research is not without shortcomings. In many of these studies, transitions from and into poverty are assumed to be a "short-memory process" (Fusco and Van Kerm, 2023), i.e., only considered from one period to another, and cumulative experiences of poverty and its bearing on transition probabilities are not fully accounted for. Moreover, many do not consider the depth of poverty while analysing poverty persistence. The "scarring effect" of poverty, that is, how entering and staying in poverty can lead to a vicious circle of persistent poverty, is recognised by many of these studies (Ayllón and Fusco, 2017, Mussida and Sciulli, 2022); however, analyses rarely explore the potential intensification of poverty among those who stay poor for a prolonged period.

There are reasonable grounds to assume a relationship between the time spent in poverty and the intensity of hardship experienced. Households that spend more time in income poverty may be forced to use up resources such as savings or assets available to them to stay afloat and sustain a decent level of welfare (Cantó, 2002). The longer the duration of poverty or the more often households fall below the poverty line, the faster the possible depletion of resources may be that would otherwise allow them to bounce back. This impact may go beyond material resources; for example, there is a well-elaborated feedback effect from poverty status to employment (Biewen, 2009) that suggests past poverty status is negatively and significantly correlated with current labour market participation (Mussida and Sciulli, 2024). The latter may lead to a vicious circle of unemployment and poverty, and further loss of welfare. As a result, households may become trapped in deeper forms of income poverty which is harder to escape (Ayllón, 2013).

The recent trends provide some evidence regarding the strengthening persistence of income poverty in Europe. The share of the long-term, i.e., persistent poor has increased in at least half of European countries (Franzen and Bahr, 2024) with only four countries experiencing a decrease in their share. Recent findings (Mussida and Sciulli, 2022) also show that the persistence of poverty, on average, slightly increased after the global recession compared to the pre-crisis period, implying that individuals and household are more likely to be trapped in income poverty solely due to being in income poverty in the past. This increase is more pronounced in some countries, such as Spain and Ireland. On the other hand, some evidence (Vaalavuo, 2015) suggests an increasing severity of income poverty during the global economic crisis with all median incomes decreased during this period, but the poor being hit more severely by the crisis than the nonpoor. Moreover, recent trends exhibit an increase in poverty depth with some European countries showing larger median shortfalls from the poverty threshold during the global recession and following years (Figure A1, Appendix A). Given these findings, surprisingly scarce attention is paid to the potential relationship between these two phenomena. The paper is an attempt to fill this gap.

This study aims to contribute to the literature on poverty persistence by addressing the above-mentioned shortcomings. We utilise pooled four-year longitudinal waves of EU-SILC covering 2012-2020 years to consider the poverty status of respondents for all observed years and explore not only the

persistence of income poverty but also whether its scarring effect becomes deeper, i.e., shallow poverty persistence contributes to deepening poverty. To address our research question, five European countries with distinct levels of economic development and social security regimes (Marx et al., 2015) are chosen for the analysis: Austria, Hungary, Finland, Ireland, and Spain. It is well established that poverty trajectories and persistence of poverty vary considerably between depending on the welfare regime analysed (Layte and Whelan, 2003, Fouarge and Layte, 2005, Vandecasteele, 2010, Ayllón, 2015). This can be due to the nature of anti-poverty policies in place in each country that differ by the generosity of social assistance, priority given to specific segments of population or type of households, due to the existing labour market conditions and policies or the combination of these factors that can directly affect the welfare of households (Saraceno et al., 2020, p.4-9). The analysis is conducted separately for each country in order to delineate the poverty trajectories and associated risk factors under diverse welfare regimes and establish the extent to which the relationships observed are generalisable across distinct socio-economic and policy contexts.

Accurate measurement of the impact of past poverty experience on current poverty status necessitates distinguishing the genuine impact of the latter from observed as well as unobserved heterogeneity. The vicious cycle of poverty may not be due to past experiences of deprivation, but rather some individual characteristics adversely affecting their welfare. This is also important in terms of designing tailored public policies with the right target on potential factors leading to persistent poverty. A strong relationship between past and current poverty episodes would imply that the target of social policies should be to lift households out of poverty via appropriate social transfers, whereas a prevalent role of individual heterogeneity would signal the importance of targeting these characteristics through, for example, active labour market policies. To distinguish between these two factors, the study controls for observed heterogeneity. Moreover, as a second part of the analysis, we aim to evaluate deep poverty risk of individuals by their past persistent poverty experience and selected household characteristics.

The findings show a significant relationship between the experience of persistent poverty and deep poverty risk. The relationship is robust to the inclusion of observed heterogeneity. Further analysis of the risk factors associated with the deep poverty reveal the importance of the labour market attachment of households, especially if those have been persistently poor in previous years. Depending on the country considered, some household types appear to be more vulnerable to deep poverty conditional on their experience of persistent poverty, which also points to the features of the social security regime implemented in these countries.

The paper is organised as follows. Section 2 presents existing evidence on poverty persistence in selected European countries. Section 3 and 4 provide insight into the dataset and selected variables, and methodological choices for the empirical analysis. Section 5 descriptive analysis of poverty transitions, and estimation results. Section 6 discusses the findings and concludes.

2 Poverty persistence in Europe: empirical evidence

A large strand of empirical literature has focused on poverty persistence in European countries in recent decades. These studies have employed a dynamic approach to study chronic poverty, entries, re-entries into and exits from poverty. Evidence has shown significant levels of poverty persistence, genuine state dependence, i.e., the dependence of current poverty status on past poverty status, as well as duration dependence, i.e., the dependence of poverty entries and exits on the duration of past poverty spells (Gradín et al., 2018, Fusco and Van Kerm, 2023). Some studies have conducted a multi-country analysis, whereas others focused on a specific country. This section primarily presents the existing empirical evidence for the countries selected for the analysis which represents a diversity of cases and conditions under which the relationship between poverty persistence and depth might be observed.

Existing research points to a substantial level of poverty persistence in these countries. Analysing the data for Spain between 1985-1992 years, Cantó (2002) shows that, around a quarter of households return to poverty shortly after exiting it, whereas households maintaining their income level above the poverty line for a year are likely to stay out of poverty for longer. Arranz and Cantó (2012) show that, in Spain, the likelihood of entering poverty depends positively on past poverty experience, i.e., the duration of past poverty spells, alongside personal and household characteristics. Similarly, Ayllón (2013) analyses persistent poverty in Spain and finds consistent levels of dependence of current poverty status on poverty status in the previous period by controlling for initial conditions and attrition. Ayllón and Gábos (2017) analyses the interrelationship between income poverty, social exclusion and low work intensity by considering feedback effects of each variable in several European countries, including Hungary, Ireland, and Spain, and find evidence of genuine state dependence for all countries analysed. Mussida and Sciulli (2022) analyse poverty persistence in the pre- and post-global financial crisis period, including twenty European countries that also include Austria, Finland, Hungary, Ireland, and Spain. They observe slightly higher persistence of poverty in the periods following the global crisis and increasing scarring effects of poverty over time. The increase is found to be more pronounced in the case of Ireland and Spain.

In an attempt to quantify the role of observed heterogeneity, studies have explored potential risk factors associated with the risk of falling or re-entering into income poverty. Focusing on the poverty entries and exits among different households, Cantó et al. (2007) show that the presence of children in the household reduces the chances of households to exit poverty. The latter results are also confirmed by Gradín and Cantó (2012). Analysing potential risk factors in European countries, Andriopoulou and Tsakloglou (2011) show that households with dependent children have higher chances of exiting poverty in Austria, Finland and Ireland, whereas households headed by individuals with lower educational attainment are less likely to do so. Cantó et al. (2012) show that recurrent transitory and chronic poverty affects different sociodemographic groups in Spain - households with self-employed breadwinners, and low qualifications are more likely to experience chronic poverty. Focusing on young people in several European countries, including Ireland and Spain, Mendola et al. (2008) define poverty permanence in terms of the past poverty experience and length of poverty spells, and find that past educational attainment and labour market participation play an important role in avoiding longer poverty spells. Ayllón (2015) analyses

poverty persistence among young people in Finland, Ireland and Spain, among other countries in relation to leaving parental home. The author shows that poverty lasts longer among Spanish and Irish youth, whereas young Finns are less exposed with longer poverty spells.

Despite the extent of empirical research on poverty persistence, some key gaps remain. First, studies tend not to distinguish between varying degrees of poverty. Hence, existing analysis does not consider movement below the poverty line that may occur for those experiencing persistent poverty. The current paper addresses this by looking at the full poverty experience of individuals: assessing low-income poverty status and transitions from shallower to deeper forms of poverty, that are conditional on past experiences of poverty. Second, existing research tends to focus on poverty transitions from one period to another. However, this study seeks to capture cumulative experiences over a longer period, that more fully captures the nature and depth of poverty persistence.

3 Dataset and variables

3.1 The dataset and sample

This study utilises recent longitudinal waves of the European Statistics of Income and Living Conditions (EU-SILC) survey for five European countries with distinct socio-economic and policy contexts: Austria, Finland, Hungary, Ireland and Spain. This survey collects cross-sectional and longitudinal data on European countries and provides rich information on the income, social exclusion and living conditions at individual and household level. The time frame for the analysis is 2012-2020, that is, sequential four-year longitudinal waves are pooled for each country. This period corresponds to the 2011-2019 income reference years which is the basis for determining the poverty status of households. This period covers the time interval right after the peak of the global economic crisis characterised by poverty trends distinct from the pre-crisis period (Mussida and Sciulli, 2022, Franzen and Bahr, 2024) and excludes the global pandemic period, during which European states were forced to enact bold emergency programs to stabilize incomes (Béland et al., 2021), hence, poverty trajectories might be different. Although poverty is a household-level characteristic, the unit of analysis is individuals as is common in much poverty research (Mussida and Sciulli, 2024). The sample is restricted to the 24–60-year-old adult population who have not changed their households in the observed period [1]. The aim of choosing this age interval is to eliminate the impact of some transitory states in the life cycle, such as being in education/training, as well as the impact of (early) retirement decisions.

The longitudinal waves of EU-SILC have a rotational panel design. Each year, four independent subsamples (rotational sample) are surveyed, and each subsample stays in the survey for four years and is replaced with a new subsample after that. Hence, a quarter of the total sample is replaced every year (for more information, see Wirth and Pforr (2022)). In order to obtain a complete four-year information

[1] Individuals that have recently moved out or moved into the household have been excluded from the analysis, so that their experience can be matched with household characteristics.

on each rotational group, the dataset is built from the file of the final year where the rotational group features. There is non-trivial attrition among the sampled individuals, hence, not all respondents are observed for the full four years (see Table A5 in Appendix G). Among those, we have chosen individuals who have been observed for at least three years, including the final year of observation. The reason is to keep as much of the sample as possible while being able to define poverty persistence appropriately, partially account for attrition bias (as the latter can be due to the welfare status of individuals or other characteristics affecting their poverty status), and retain the characteristics of initial sample via applying appropriate sampling weights.

Using this dataset to study the persistence of poverty is not without shortcomings. The main disadvantage of this panel is that it only lasts four years, which can be considered rather short for poverty persistence analysis [2]. This potential shortcoming is compensated for by a rich set of variables, translating into better estimation and prediction.

3.2 Dependent variable

The dependent variable is individual poverty status in the 4^{th}, i.e., final year of observation categorised into three possible outcomes: no poverty, shallow poverty, and deep poverty. This categorisation of income poverty allows us to evaluate the effect of past poverty experience on deepening poverty in the final period. Shallow poverty is defined as being below 60% of the median equivalised household disposable income[3], an official poverty threshold widely adopted in poverty analysis in European countries (Decancq et al., 2014), and above 40% of the median equivalised household disposable income. The latter threshold is adopted for measuring deep poverty. At present, the discussions about the methodological choices for measuring deep poverty have not been conclusive, the relative nature of deep poverty has been questioned (Bradshaw and Mayhew, 2010, Bradshaw and Movshuk, 2019), and no official measures have been adopted for this purpose. However, to maintain consistency with the official poverty threshold, we decided to construct the deep poverty threshold relatively, i.e., as a percentage of median household disposable income. 40% has already been applied in the recent economic literature (Garza-Rodriguez et al., 2021, Peng et al., 2019) and helps ensure sufficient sample size for the group of deep poor in the sample.

3.3 A measure of persistent poverty and variables to model heterogeneity

The main variable of interest is a binary indicator of persistent shallow poverty. It is defined as being in shallow poverty for at least two of the first three years of observation. The construction of this measure is consistent with the official definition of persistent poverty in the European Union (Jenkins and Van Kerm,

[2]This dataset has been used for studying poverty persistence in several studies(Fabrizi and Mussida, 2020, Mussida and Sciulli, 2022, Bosco and Poggi, 2020, Ayllón and Gábos, 2017), but the methods employed for such analysis differs from our approach.

[3]The dataset uses OECD-modified equivalence scales to compute equivalised household incomes.

2014), which defines persistent poverty as being in poverty for at least two years during the past three years and in the final year.

We include several household-level characteristics to model the observed heterogeneity based on the existing literature on poverty persistence[4] (Giarda and Moroni, 2018, Fabrizi and Mussida, 2020): age and gender of the household head[5], educational attainment of household head, employment status of the household head, labour market attachment expressed as the share of employed in the household, and household type (See Table A1 in Appendix C and A2 in Appendix D for a detailed description of included variables and descriptive statistics of sample characteristics, respectively).

To further explore the deep poverty risk, we look at how the relationship between persistent shallow poverty and deep poverty risk changes conditional on selected household characteristics. Household-level employment characteristics, i.e., household head's employment status and share of employed in household, and household type are chosen for this purpose. The redistributive roles of the household, on the one hand, and of employment, on the other hand, have been recognised regarding both individual and national poverty risks (Saraceno et al., 2020), and these two factors can be crucial in affecting poverty risk (Azzollini et al., 2025). Labour market participation is paramount for shielding against the risk of poverty; households with sole breadwinners or low work intensity are more vulnerable to poverty and being trapped in it (Barbieri et al., 2024, Vandenbroucke et al., 2014). Moreover, in recent decades, social security policy has become increasingly employment-orientated in European countries (Vandenbroucke et al., 2014), hence, potential shielding role of labour market participation has been emphasised by appropriate social policies as well. On the other hand, family remains one of the central pillars of social security policy (Bradshaw and Nieuwenhuis, 2021), where some household types such as single-parent households or households with many dependent children have been at particular risk of poverty, while single-person households have increasingly been recognised as a vulnerable group (Alm et al., 2020). Such policies are capable of reducing income poverty rates substantially (Bradshaw and Nieuwenhuis, 2021), but the focus or target of such assistance differs depending on the social welfare regime analysed. Hence, it is also interesting to explore the vulnerability to deep poverty among different household types in countries with distinct social security regimes that prioritise different household types.

4 Econometric strategy

Country-level multinomial probit models are used to estimate the impact of poverty persistence on falling into deep poverty. The country-level analysis allows for comparing the magnitude of relationship between shallow poverty persistence and deep poverty under distinct social policy regimes. The chosen model

[4]Individual characteristics such as age and educational attainment are highly correlated with same characteristics of household heads, hence, are not included in the estimations.

[5]A household head refers to an individual in the household whose four-year mean of the sum of gross employee cash or near-cash income and cash profits or losses from self-employment is the highest in the household. The calculation of mean earnings and assignment of household head status includes only the household members who have been present in the household for at least three years and have been observed in the final year of observation.

enables us to take into account the categorical nature of the dependent variable, explore the relationship between shallow poverty persistence and transitions into deep poverty in an explicit manner and compare this relationship with the link between persistent shallow poverty experience in the past and shallow poverty in the current period. The proposed model is a static model and does not take into account the dynamic nature of the dataset, which is the usual approach to studying poverty persistence, such as first-order Markov models (Fusco and Van Kerm, 2023). However, these models treat poverty as a "short-term" process and do not take into account full poverty experience of individuals. On the other hand, the shortness of the panel dataset is not suitable for applying duration models, another widely used approach, that allow for the consideration of poverty and non-poverty spells as well as individual time-varying factors (Arranz and Cantó, 2012). Nevertheless, as the primary aim of the study is to account for the full poverty history of individuals and preserve the categorical structure of poverty status, the chosen model is more appropriate.

Formally, the empirical model is as follows. The dependent variable p_i has three categories, that is, an individual i can be in one of j states, $j \in J$, $J = \{\text{no poverty, shallow poverty, deep poverty}\}$. Individuals are characterised with latent poverty propensities p^*_{ij}; the latent propensity for alternative j is given as:

$$p^*_{ij} = \beta_{0j} + \beta_{1j} sd_i + \sum_{k=2}^{K} \beta_{jk} X_{ik} + \sum_{t=2016}^{2020} \eta_{jt} D_{it} + \epsilon_{ij} \tag{1}$$

Here, sd_i is the persistent shallow poverty indicator constructed as above, X_i are household characteristics and number of deep poverty episodes, D_{it} are year fixed effects, ϵ_{ij}, $[\epsilon_{i1}, \epsilon_{i2}, \epsilon_{i3}] \sim N[0, \sum]$, are state-specific idiosyncratic error terms, and β_0, β_{1j}, β_j, α_j and η_{jt} are parameters to be estimated.

Individuals end up in the state $q \in J$ with the highest probability if $p^*_{iq} > p^*_{ik}, q \neq k, k \in J$. That is:

$$Prob[p_i = q] = Prob[\epsilon_{ik} - \epsilon_{iq} < (\beta_{0q} - \beta_{0k)} + (\alpha_q - \alpha_k) sd_i + (\beta_q - \beta_k) X_i, q \neq k] \tag{2}$$

As explained in Section 3.1, Spain has sizable attrition rates. In order to account for it, the binary probit attrition model is estimated for the Spanish sample simultaneously with the poverty transitions model[6]:

$$\begin{aligned} a^*_i &= a_0 + a_1 E_i + \lambda_i \\ A_i &= I(a^*_i > 0) \end{aligned} \tag{3}$$

Here, a^*_i is the latent probability of individuals to attrit, and $I(a^*_i > 0)$ is the indicator function taking value of zero if individuals have participated in the survey for four years, and one otherwise. E_i is the vector of individual characteristics and interview-related variables as detailed in Appendix G, λ_i is the idiosyncratic error term, a_0 and a_1 are parameters to be estimated. The error terms in this case are

[6] A user-written Stata command cmp developed by Roodman (2011) is used for the simultaneous estimation of attrition and poverty models in case of Spain. This command is also used for other countries to maintain consistency in estimation methods. The estimations are carried out with Geweke–Hajivassiliou–Keane (GHK) multivariate normal simulator with 101 draws.

allowed to be freely correlated with the errors of multinomial probit poverty equations:

$$\rho_j = corr(\epsilon_{ij}, \lambda_i) \tag{4}$$

Here, j denotes the alternatives for which poverty propensities are estimated. The results of attrition equation are presented in Appendix G.

To further explore the relationship between shallow poverty persistence and risk of deep poverty, Model 1 is expanded by adding interaction terms with the shallow poverty persistence indicator and household characteristics mentioned above. The extended model allows for evaluating groups which may be at particular risk of deep poverty after experiencing persistent shallow poverty in the past three years:

$$p^*_{ij} = \beta_{0j} + \beta_{1j} sd_i + \beta_j X_i + \gamma_j X_i \times sd_i + \sum_{t=2016}^{2020} \eta_{jt} D_{it} + \epsilon_{ij} \tag{5}$$

Throughout our analysis, cluster–robust standard errors are estimated at the household level. This is done firstly because poverty status is determined at the household level and does not vary within households. Second, household-level variables are included in estimations which, again, do not vary within households.

5 Results

5.1 Poverty transitions

We start this section with the descriptive analysis of the past poverty experience of individuals, i.e., the extent of poverty persistence. Figure 1 and Figure A2 in Appendix B provide insight into the poverty episodes of individuals in past three years by their poverty status in the final year - the latter refers to the fourth year of observation. We can see that the vast majority of the nonpoor in the final year of observation have not experienced shallow or deep poverty in the past three years. This share is highest in Finland and smallest in Spain. Another common trend is that those who have been in persistent shallow poverty mostly stay in shallow poverty, and those with two or three deep poverty episodes mostly stay in deep poverty. In fact, around 60% of those with three shallow poverty episodes (i.e., in chronic shallow poor) stay in shallow poverty with this share reaching almost 80% in Ireland. On the other hand, the share of chronic deep poor reaches almost 80% in the case of Austria and Spain suggesting stronger persistence of deep poverty in these countries. In other words, for both shallow and deep poverty, the more time spent in poverty, the less likely that individuals will escape it.

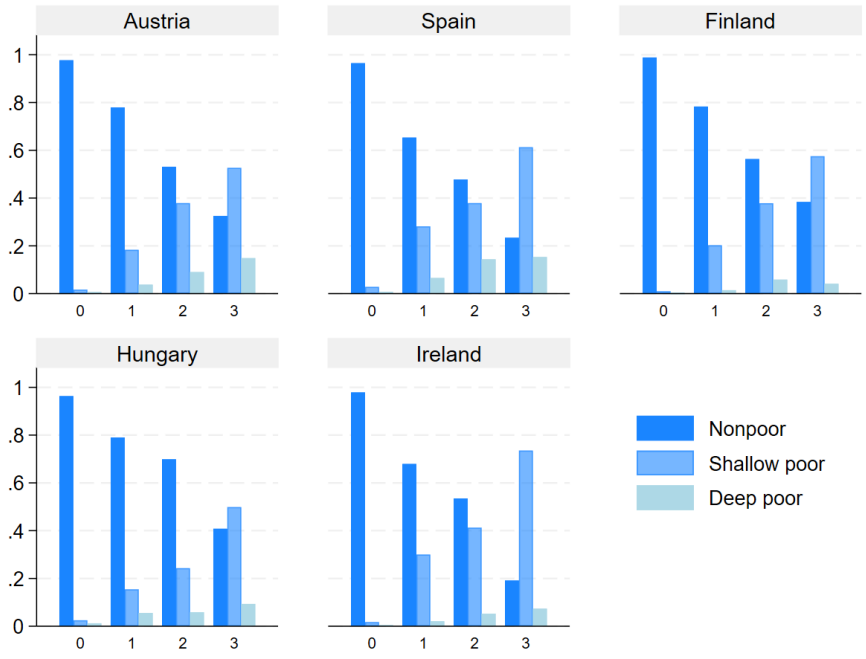
Figure 1: Latest poverty status by past shallow poverty experience in number of years (proportion)

Note: The figure shows the proportion of individuals with specific number of past shallow poverty episodes in years and their corresponding poverty status in the final year of observation. For example, in Austria, around 15% of individuals with three shallow poverty episodes in the past three years have transitioned to deep poverty in the final years, whereas around 55% of those with three past shallow poverty episodes have stayed in shallow poverty.

The figures also provide important information regarding the transitions below the poverty line. Figure 1 shows that non-negligible proportion of those who were persistent shallow poor in previous periods have transitioned into deep poverty. This latter group is the principal subject of interest for this study. Their share among the persistent shallow poor is almost 20% in case of Spain, and the smallest in Finland and Ireland. However, the group with two past episodes of shallow poverty may also include those with one deep poverty episode, which can have a stronger link with deep poverty risk. Figure 2 shows a clearer picture of the relationship between the shallow poverty persistence and transition into deep poverty among individuals who have not experienced any deep poverty episode in the past three years. We can that, except for Finland, the general trends shows that the more the number of shallow poverty episodes, the higher the rates of transition to deep poverty.

Preliminary descriptive analysis shows that, non-negligible share of chronic shallow poor fall into deep poverty in all observed countries included in the analysis. The following section presents the results of the econometric analysis that tests the preliminary findings.

Figure 2: Latest poverty status by past shallow poverty experience in number of years: no deep poverty episodes (proportion)

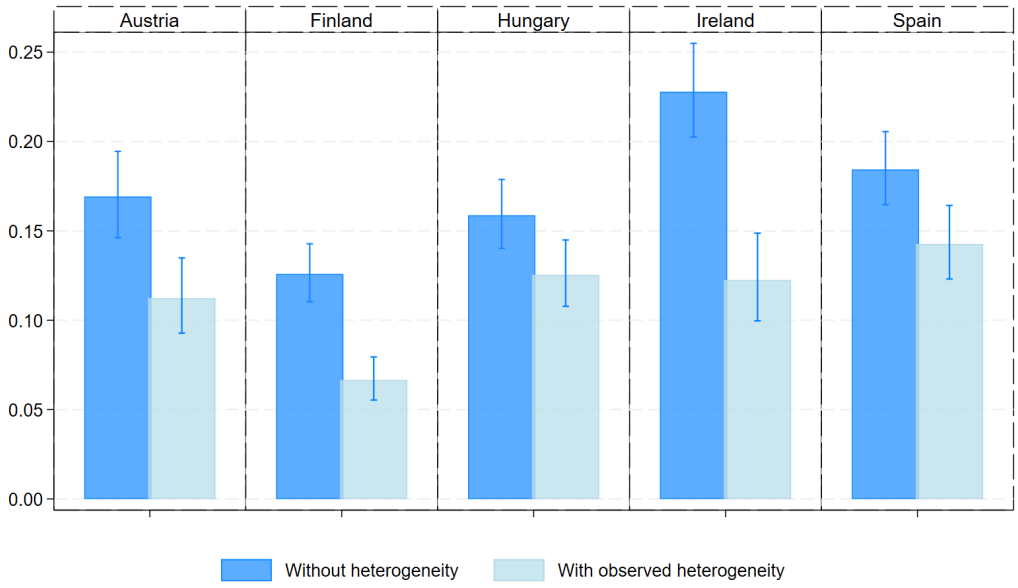


Note: The figure shows the proportion of individuals with specific number of past shallow poverty episodes and their corresponding poverty status in the final year of observation. For example, in Austria, around 15% of individuals with three shallow poverty episodes in the past three years have transitioned to deep poverty in the final years, whereas around 55% of those with three past shallow poverty episodes have stayed in shallow poverty.

5.2 Estimation results: Shallow poverty persistence and deep poverty transition

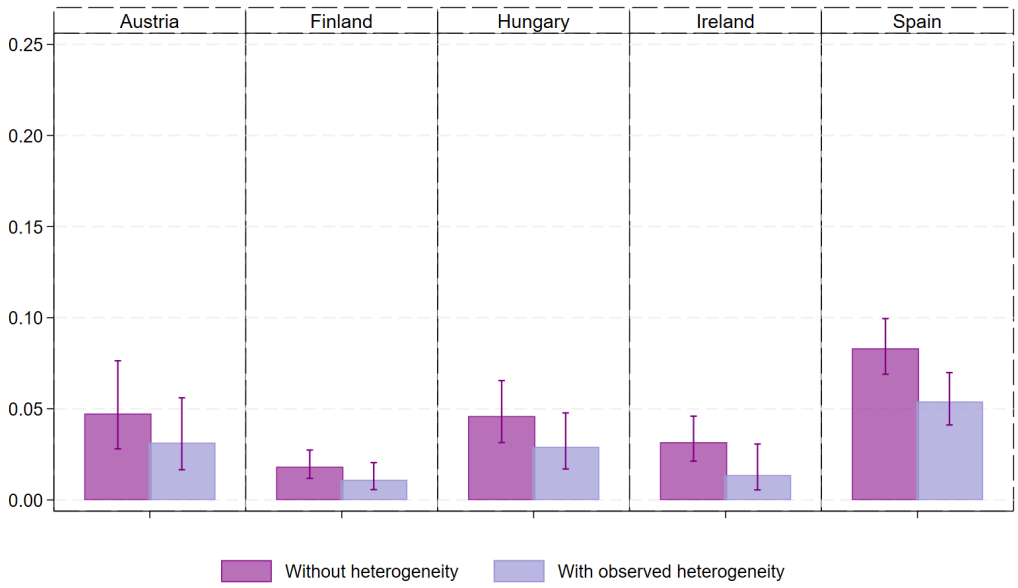
The estimation results of multinomial probit models are presented in Table A3 in Appendix E. All estimations control for year effects and deep poverty episodes experienced in the past 3 years. Figures 3 and 4 present the average marginal effects of past persistent shallow poverty on the risk of falling into shallow and deep poverty, respectively, with and without observed heterogeneity. First, we can see that there is a significant effect of past persistent shallow poverty on the risk of falling into shallow and deep poverty. This effect is much smaller in the case of deep poverty; the likelihood of transitioning to deep poverty after prolonged shallow poverty is small, but significant. The effect is larger in the case of Spain, and smallest in case of Finland. Second, the marginal effect of persistent shallow poverty becomes smaller when household characteristics are controlled for. When we look at deep poverty risk specifically, we see that the change in the marginal effect of persistent shallow poverty is smaller. This result suggests that the deepening "scarring" effect of persistent poverty may occur regardless of the socioeconomic characteristics of individuals and households; the longer the poverty experience, the deeper poverty may become.

Figure 3: Shallow poverty persistence and risk of shallow poverty: Average marginal effects



Note: Bars represent the confidence intervals with 95% confidence level.

Figure 4: Shallow poverty persistence and risk of deep poverty: Average marginal effects



Note: Bars represent the confidence intervals with 95% confidence level.

Table A3 in Appendix E also presents the relationship between observed heterogeneity and shallow/deep poverty risk. The marginal effects of household characteristics are mostly as expected. The age of the household head is not related to the risk of either shallow or deep poverty, so is the gender of the household head. Ireland is an exception in this case, as female-headed households face lower risk of

deep poverty in this country. Living in households with more educated heads significantly reduces the risk of shallow poverty, but only in case of Hungary and Spain, the deep poverty risk is lower for these households. Households with full-time employed heads are significantly less likely to fall into both shallow and deep poverty. Similarly, households with higher labour market attachment are at lower risk of falling into deep poverty, except for Finland. Regarding household type, couples with dependent children are better shielded from deep poverty in the case of Hungary and Ireland, and at higher risk of deep poverty in the case of Spain. Single parents are also at higher risk of shallow poverty in Austria and deep poverty in Spain, but no significant differences are observed in other countries. Single-person households are more likely to fall into shallow poverty in all countries except in Spain, and into deep poverty in all countries except for Austria and Spain.

Appendix F presents robustness results, where we exclude individuals with one episode of past deep poverty and two episodes of past shallow poverty from the estimation sample. In this manner, persistent shallow poor are only those with two or three episodes of shallow poverty and no deep poverty in the past three years. We can see that, the results are essentially the same with small changes in the magnitude of coefficients in some cases. Figures A3-A4 show that the marginal effect of shallow poverty persistence on shallow/deep poverty risk is similar to that of reported above.

5.3 Shallow poverty persistence and deep poverty risk: household employment and type

For the second part of the analysis, we further explore the risk of falling into deep poverty after experiencing prolonged shallow poverty among specific groups. As discussed in Section 3, we look at the risk of deep poverty by the labour market characteristics of households and household type. Table A7 in Appendix H reports the results of the multinomial probit model with interaction effects between persistent shallow poverty and selected household characteristics. Based on these estimations, Figures 5-7 present predicted probabilities of being in deep poverty conditional on past persistent shallow poverty and above-mentioned household characteristics.

We start with the employment status of household heads in Figure 5. Several observations are noteworthy. First, there are visible differences in deep poverty risk between individuals living in households with and without full-time employed household heads. These differences are observed regardless of the past shallow poverty experience of households. Individuals living in households with full-time heads are significantly less likely to fall into deep poverty, especially if they haven't experienced persistent shallow poverty in the past three years (Appendix I, Table A8, Panel B). Although the differences in deep poverty risk between these households become larger if they have been persistently shallow poor, these are only significant in case of Spain. This points to the fact that full labour market participation of the household breadwinner can be effective in protecting against deep poverty risk, but its effectiveness weakens if households have been in persistent shallow poverty in most countries. Those with full-time employed household heads and shallow poverty persistence still face significant deep poverty risks in

analysed countries. The increase in deep poverty risk may be due to the fact that the heads of these households are already subject to in-work poverty due to inadequate wages or low-skilled/low-pay jobs or large household size (Marx and Nolan, 2014, Saraceno et al., 2020) or unobserved factors that make them more prone to income poverty. Spain is an exception in this case. Although deep poverty risk increases significantly among individuals living in households with full-time employed breadwinners after experiencing persistent shallow poverty, it is much smaller than that of individuals living in households without full-time employed breadwinners. This finding may point to the effectiveness of full-time participation in the labour market, and to stronger labour market segmentation (Barbieri and Cutuli, 2016) in this country. In this case, the full-time employed are mainly those enjoying stable labour contracts and better pay, whereas self-employed or part-time employed individuals are more exposed to temporary labour contracts. Moreover, Spanish social safety nets appear to be less effective at shielding unemployed and inactive individuals from deep poverty risk. Ireland is an exception, as members of households with full-time heads face higher deep poverty risk compared to those living in households without full-time employed heads.

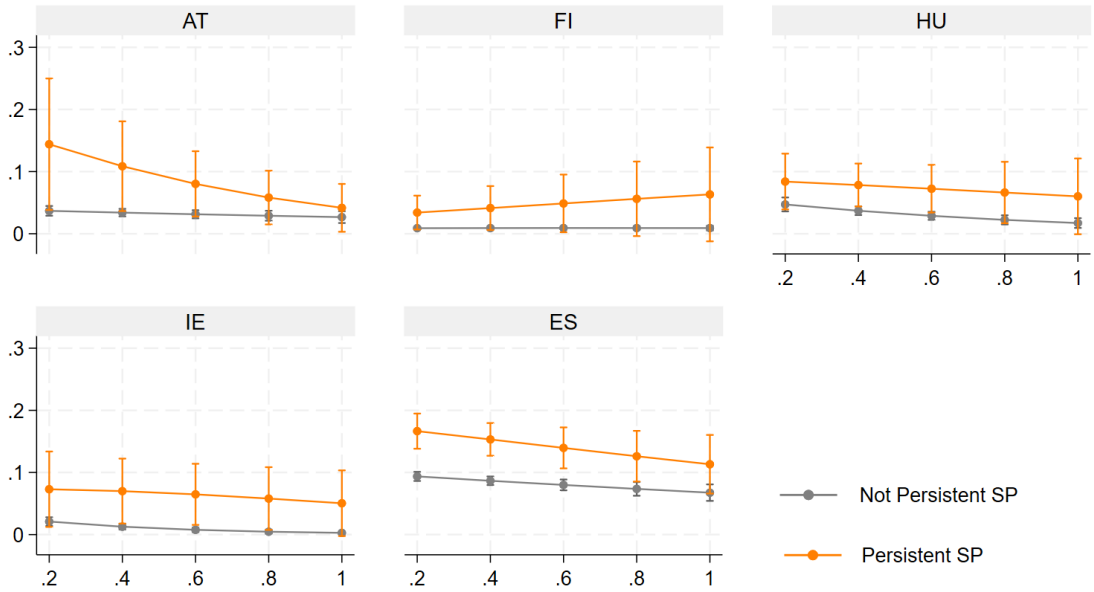
Second, the risk of deep poverty increases if a household has been persistently shallow poor in the past years, irrespective of whether the household head is full-time employed. The change is significant in Ireland and Spain for households with full-time employed heads, and in Austria, Finland and Spain for households without full-time employed heads (Table A8, Panel A). In Spain, the increase in the risk of deep poverty in households without full-time employed heads is four times higher, whereas in Ireland, households with full-time employed heads experience larger increase in deep poverty risk after being in persistent shallow poverty.

Figure 5: Predicted probabilities of falling into deep poverty: employment status of household head and persistent shallow poverty experience

Note: Bars represent the confidence interval with 95% confidence level.

Figures 6 presents the predicted risk of deep poverty conditional on the share of employed in the household. We observe marked differences in the risk of deep poverty between households with and without the experience of persistent shallow poverty among those with a low share of employed, and these differences are statistically significant for all countries (Table A9, Appendix I). As labour market attachment of a household increases, the differences in the risk become smaller and insignificant (except for Spain, where the differences are still significant at 10% level). That is, regardless of the persistent shallow poverty experience of households, if a greater share of household members is employed (full-time or part-time), the risk of falling into deep poverty decreases consistently. This again emphasises the role of household labour market participation in avoiding deep poverty. Somewhat different results are observed in Finland regarding the risk of deep poverty and labour market attachment of the household among those with persistent shallow poverty experience. The risk of deep poverty of the latter increases slightly when household's labour market attachment increases. This may be due to the higher risk of deep poverty among single-person households - although these individuals do not have any dependants to take care of, they may not be prioritised by social welfare regime in poverty alleviation efforts, hence, are at higher risk of deep poverty, especially those who have been persistently shallow poor.

Figure 6: Predicted probabilities of falling into deep poverty: share of employed and persistent shallow poverty experience

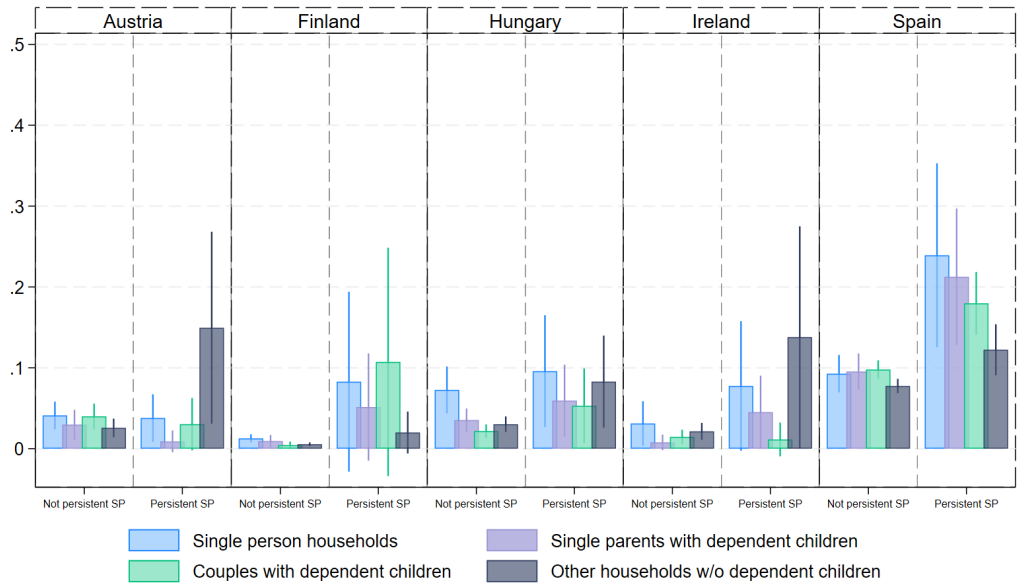


Note: Bars represent the confidence interval with 95% confidence level.

Figure 7 presents predicted probabilities of falling into deep poverty by household type and persistent shallow poverty persistence. We observe that the risk of deep poverty increases in almost all countries but at varying magnitudes if households have been persistently shallow poor in previous periods (Appendix G, Table A10). For instance, in Austria, Hungary and Ireland, households with no dependent children experience the highest increase in the risk of deep poverty, whereas in Spain, it is single-person households

and single parents with dependent children who are at greatest risk of deep poverty. No significant differences are observed in the case of Finland, and deep poverty risk is not significantly different from zero for all types of households. This may also be due to the very small number of observations (Table A2) that are in deep poverty and have experienced persistent shallow poverty in the past three years.

Figure 7: Predicted probabilities of falling into deep poverty: household type and persistent shallow poverty experience



Note: Bars represent the confidence interval with 95% confidence level.

6 Discussion and Conclusion

This study investigates whether experiencing persistent poverty is associated with deepening poverty in the following periods. Five European countries with distinct socioeconomic conditions and social security policy regimes are selected for this purpose. The results show that, although of small magnitude, there is a significant association between past persistent poverty experience and a deeper form of poverty in subsequent periods in all countries analysed, and this finding is robust to the inclusion of observed household heterogeneity. Overall, the results align with the findings of existing research on poverty persistence. There is a strong link between the past poverty experience, in our case, shallow poverty experience and poverty status in the final year, be it shallow or deep poverty risk. Of course, most of the persistently shallow poor will remain in shallow poverty, but there is a significant likelihood that some will transition into a deeper form of income poverty. The persistence of poverty is a well-established finding in the literature regardless of the methods employed or countries analysed (Cantó, 2002, Biewen, 2009, Arranz and Cantó, 2012, Ayllón, 2013). What is novel about the results presented here is that poverty not only persists, it also may leave deeper "scars"; the longer the time spent in poverty, the deeper the shortfall might become from the poverty line. Such findings emphasise the importance of

timely, well-targeted policy interventions that target people in the poverty trap to prevent them falling deeper into financial hardship. With some evidence suggesting that deeper forms of poverty are harder to escape (Ayllón, 2013), the importance of these interventions become even clearer.

The results also highlight the protective role of labour market participation against deep poverty risk. The relationship between poverty risk and labour market attachment and households' high work intensity has been widely discussed (Vandenbroucke et al., 2014, Marx and Nolan, 2014). Our findings show that the full-time employment of a household breadwinner is mostly not sufficient for reducing deep poverty risk in most countries. Greater labour market attachment of households and an increase in the number of households with dual or multiple earners appears more crucial to reducing deep poverty risk, especially among households with persistent poverty experience. The findings emphasise the importance of appropriately tailored activation policies in combating deep poverty risk coupled with the improvement of work conditions. Increasing employment as such may not automatically lead to poverty reduction (Seikel and Spannagel, 2018) and should be accompanied with more stable work arrangements such as stable work contracts with high intensity, i.e., full-time jobs. On the other hand, the results also point to the importance of tackling persistent in-work poverty (Barbieri et al., 2024), as those in persistent poverty face much higher risk of deep poverty, even among individuals who live in households with high labour market attachment. That is, the provision of better employment opportunities should not be confined to more stable and longer work hours, but also better-paying jobs, as well as more flexible work arrangements (McKnight et al., 2016).

The results show significant heterogeneity in deep poverty risk among different household types with or without persistent shallow poverty experience in the past. Single-person households and households with dependent children, including single-parent households, exhibit higher deep poverty risk, particularly after going through persistent shallow poverty in previous years. The risk is higher in the case of Spain. This implies that children in Spain are at particular risk of deep poverty (Gradín and Cantó, 2012), and family policies are not sufficiently well designed to tackle the problem of child poverty. Although the above-mentioned measures to boost decent employment among adults would also alleviate poverty in these households, such measures need to be coupled with policies that better account for changing household composition across Europe, whilst improving the adequacy of social transfers and high-quality public childcare provision. Such measures could increase the labour supply of households and decrease economic barriers to labour market participation, especially among females and fight child poverty in a more effective manner (Bosch, 2009, Daly, 2019, Scherer and Pavolini, 2023).

Accounting for differences across the five selected countries, the results also provide an insight into the effectiveness of distinctive social security policy regimes in tackling deep poverty and breaking the link between poverty persistence and deepening poverty. The findings also illustrate how distinctive anti-poverty approaches can yield similar results in terms of the relationship between persistent poverty, deep poverty and the risk factors associated with it. For example, Finland, typically known for higher levels of welfare coverage and adequacy, and Ireland, characterised by liberal-leaning targeted social transfers both exhibit a weaker link between poverty persistence and deepening poverty, whereas the link is much larger in magnitude in other countries, especially in Spain. Spain is associated with poor

levels of decommodification of the social welfare system alongside Hungary that has carried out several reforms aiming at creating a "work-based society" in the period analysed (Tausz, 2019). This is seen from significant differences in the risk of deep poverty by labour market status of household heads and share of employed in the household. Higher labour market attachment in these countries is associated with a significantly lower risk of deep poverty, especially if households have experienced persistent shallow poverty in the past in the case of Spain. That the same trend is not observed in the case of Finland points to the more universal nature of the social security regime in terms of social transfers, on the one hand, and possible effectiveness of employment-oriented policies against deep poverty risk on the other (Saari and Tynkkynen, 2019). This is evident from the negligible deep poverty risk in households with higher labour market participation even after experiencing persistent shallow poverty in the past.

Higher deep poverty risk among households with dependent children suggests weaker familisation of social policies in Spain. The country is known for a modest institutionalisation of family protection policies and relies on family networks as safety nets (Saraceno et al., 2020), and family support policies are insufficient (de Villota and Vázquez-Cupeiro, 2019). In the case of other countries, although not significant, Austria and Ireland show decreasing risk of deep poverty among households with dependent children, especially after having experienced persistent poverty. This may be indicative of a greater focus on family- and child-oriented social policies that gives priority to fighting child poverty Ireland (Daly, 2019). In the case of Austria, the conclusions are less straightforward. Some recent evidence points to the higher prevalence and risk of poverty among families with dependent children and that the adequacy of family benefits has been decreasing in recent years (Heitzmann and Pennerstorfer, 2025). Against this backdrop, the family policies in Austria seem effective in shielding these families against deep poverty risk, but not shallow poverty risk.

Finally, the shortcomings of the study must be kept in mind while interpreting the results. First, the analysis might be viewed as a short-term analysis, as the panel provided by the EU-SILC dataset only covers four years for selected countries. Second, estimations do not take into account unobserved heterogeneity at individual or household level; this does not allow for accounting unobserved factors that make individuals more prone to falling and staying into poverty and may overstate the role of poverty persistence in deep poverty risk. Last but not least, the study examines cumulative experiences of poverty but does not consider the consecutiveness of poverty experience. Nevertheless, the findings of the study suggest a broader, more pluralistic approach to exploring poverty persistence and its role in deeper forms of privation.

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Appendices

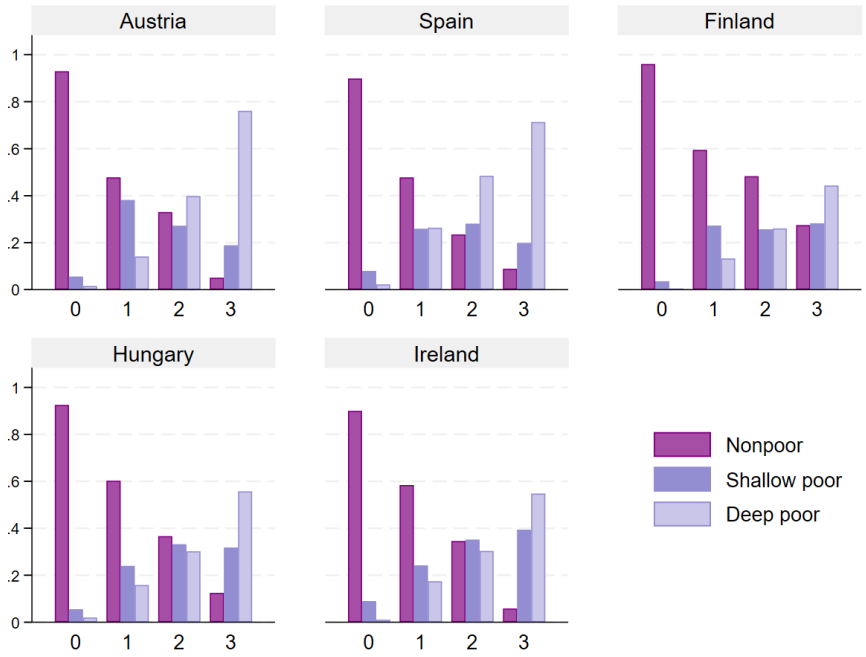
A Median Poverty gap in in European countries, 2009-2019

Figure A1: Relative median poverty gap in European countries during and after the global recession

Note: Relative poverty threshold is set at 60% of the national median equivalised disposable income of all people in a country and not for the EU as a whole.

B Past deep poverty experience and current poverty status

Figure A2: Latest poverty status by past shallow poverty experience in number of years (proportion)



Note: Note: The figure shows the proportion of individuals with specific number of past shallow poverty episodes in years and their corresponding poverty status in the final year of observation. For example, in Austria, around 20% of individuals with three deep poverty episodes in the past three years have transitioned to shallow poverty in the final year, whereas around 80% of those with three past shallow poverty episodes have stayed in deep poverty.

C Description of variables

Table A1: Description of variables

Variables	Description
Dependent variable	
Poverty status	A categorical variable with three possible outcomes: nonpoor, shallow poor, and deep poor. Poverty status is measured based on the median equivalised household disposable income. Shallow poverty is defined as being below 60% and above 40% of the median household disposable income. Deep poverty is defined as being below 40% of the median household disposable income.
Independent variables	
Persistent shallow poverty indicator	This dummy indicator is constructed based on the number of past shallow poverty episodes. If a household has been shallow poor for at least two years in the past three years, it is deemed persistent shallow poor.
Age of household head[a]	A continuous variable constructed based on the age of a household head. The variable refers to household head's age in income reference period.
Female household head	A dummy variable indicating whether the household head is female.
Education attainment of household head	A dummy variable equal to 1 if a household head has at least upper secondary education, and 0 otherwise.
Employment status of household head	A dummy variable that takes the value of 1 if a household head is full-time employed and 0 otherwise. Full-time employment includes only waged employees[b]. The employment status is based on the labour market status of in each month in the income reference period and follows the EU definition. According to the latter, if an individual has been full-time employed for at least 7 months in the income reference period, they are defined as full-time employed (Lohmann, 2018). For register countries like Finland, this information is only available for selected respondents; in this case, individuals with missing monthly labour status are assigned the labour market status at the time of interview in the income reference period.
Share of employed in the household	The share of employed is the ratio of the number of actively working individuals (full- or part-time, waged or self-employed) to the number of household members. The latter includes all households members, counting dependent children below 24 years old and elderly as well. The reason for including all household members is to account for economic dependency factor in the household (Vandenbroucke et al., 2014), that is, the size of the household that breadwinners must sustain with their market earnings.
Household type	A categorical variable with four categories: couples with dependent children, single parents with dependent children, single person households and other type, which includes couples without dependent children and other households with no dependent children. Dependent children are defined as children younger than 18 years old.

[a] A household head refers to an individual in the household whose four-year mean of gross employee cash or near-cash income and cash profits or losses from self-employment is the highest in the household. The calculation of mean earnings and assignment of household head status includes only the household members who have been present in the household for at least three years and have been observed in the final year of observation.

[b] This group does not include full-time self-employed, given the distinctive nature of self-employment and less stable and reliable income stream (Marx and Nolan, 2014), hence, higher exposure to poverty risk.

D Sample characteristics

As an initial analysis, we look at household-head and household characteristics of the sample for each country by individuals' poverty status in the final year of observation (Table A2). We see that poor (shallow or deep) individuals make up a larger share of the sample in Hungary and Spain compared to other countries. The share of persistent shallow poor is the highest in Ireland, and lowest in Finland; those individuals also constitute the larger share of shallow poor compared to the deep poor in the last year of observation - around 33-55% of shallow poor have had at least two episodes of shallow poverty in past three years. This share is smaller among deep poor, but not negligible. Such that, 17-32% of currently deep poor have been persistent shallow poor in past three years (this share also include those who may have experienced one episode of deep poverty combined with two episodes of shallow poverty in the past three years). Regarding household head characteristics, no significant age differences are observed among nonpoor and poor (shallow or deep). Individuals living in female-headed households are slightly overrepresented among shallow poor in Austria and Ireland, and among deep poor in Finland, but no gender differences are observed in other countries. Poor individuals main live in households with household heads who have lower educational attainment or are not full-time employed in all countries considered. In non-poor households, on average, more than half of household residents are employed (full-time or part-time), and this share becomes smaller as we look at poorer households. This observation points to the poverty-reducing capacity of labour market participation, as well as the increasing priority given to work-related social security policies in these countries. Regarding the household type, couples with dependent children below 18 years old are underrepresented among shallow and deep poor in the above-mentioned countries, except in Spain; this may be indicative of the prevalence of pro-family public policies in operation. Single-parent households are more prevalent among shallow and deep poor in Hungary and Spain, but underrepresented among deep poor in Austria and Finland. The latter can be indicative of the fact that, public policies are effective in shielding this group from deep poverty, but may not be effective in lifting them from poverty overall. Another observation is the overrepresentation of single-person households among those below the relative poverty line, except in Spain.

Table A2: Sample characteristics

	Nonpoor	Shallow poor	Deep poor	Total
		Austria		
N	6,236 (91.7%)	395 (5.8%)	171 (2.5%)	6,802 (100.0%)
Persistent shallow poor	3%	45%	22%	7%
		Household head characteristics		
Age	45.9 (9.8)	45.1 (10)	44.7 (9.8)	45.8 (9.9)
Female	26%	38%	34%	27%
Upper secondary or higher education	41%	23%	36%	39%
Full-time employed	75%	23%	23%	69%
		Household characteristics		
Share of employed in the household	0.627 (0.307)	0.325 (0.332)	0.292 (0.334)	0.591 (0.326)
Household type				
Couples with children <18	31%	31%	33%	31%
Single parents with dependent children	10%	17%	9%	11%
Single person households	14%	31%	29%	16%
Other	45%	21%	29%	42%
		Finland		
N	11,689 (95.7%)	407 (3.3%)	121 (1.0%)	12,217 (100.0%)
Persistent shallow poor	2%	46%	26%	4%
		Household head characteristics		
Age	44.6 (10.1)	43.8 (11.5)	43.2 (13.3)	44.6 (10.2)
Female	33%	35%	42%	33%
Upper secondary or higher education	52%	25%	28%	51%
Full-time employed	78%	10%	9%	74%
		Household characteristics		
Share of employed in the household	0.611 (0.317)	0.162 (162)	0.287 (0.287)	0.588 (0.331)
Household type				
Couples with children <18	35%	22%	13%	34%
Single parents with dependent children	12%	12%	7%	12%
Single person households	14%	44%	61%	16%
Other	39%	22%	19%	38%
		Hungary		
N	7,129 (87%)	750 (9.2%)	309 (3.8%)	8,188 (100.0%)
Persistent shallow poor	3%	33%	17%	6%
		Household head characteristics		
Age	45.5 (10)	47.5 (10)	46.4 (10)	45.7 (10)
Female	35%	37%	36%	35%
Upper secondary or higher education	39%	11%	17%	36%
Full-time employed	85%	62%	39%	82%
		Household characteristics		
Share of employed in the household	0.605 (0.292)	0.386 (0.343)	0.293 (0.62)	0.577 (0.310)
Couples with dependent children	29%	21%	14%	28%
Single parents with dependent children	10%	16%	16%	10%
Single person households	8%	15%	26%	9%
Other	53%	48%	44%	53%

Table A2. Sample characteristics (cont-d)

	Nonpoor	Shallow poor	Deep poor	Total
	Ireland			
N	3,652 (87.1%)	450 (10.7%)	93 (2.2%)	4,195 (100.0%)
Persistent shallow poor	4%	55%	32%	10%
	Household head characteristics			
Age	45.7 (9.7)	46.2 (9.7)	47.3 (11.8)	45.8 (9.8)
Female	34.5%	43.9%	36.4%	35.5%
Upper secondary or higher education	66%	34%	52%	62%
Full-time employed	70%	9%	7%	63%
	Household characteristics			
Share of employed in the household	0.518 (0.298)	0.150 (0.269)	0.143 (0.259)	0.473 (0.318)
Household type				
Couples with dependent children	49%	32%	21%	46%
Single parents with dependent children	11%	23%	15%	12%
Single person households	6%	23%	26%	8%
Other	34%	22%	38%	34%
	Spain			
N	12,679 (80.1%)	1,704 (10.8%)	1,446 (9.1%)	15,824 (100.0%)
Persistent shallow poor	4%	31%	17%	8%
	Household head characteristics			
Age	46.4 (9.5)	46.2 (10.5)	45.4 (9.9)	46.3 (9.6)
Female	33%	35%	37%	34%
Upper secondary or higher education	46%	15%	15%	40%
Full-time employed	75%	43%	15%	66%
	Household characteristics			
Share of employed in the household	0.558 (0.292)	0.312 (0.278)	0.240 (0.288)	0.501 (0.312)
Household type				
Couples with dependent children	35%	36%	38%	35%
Single parents with dependent children	6%	11%	13%	8%
Single person households	8%	6%	10%	8%
Other	51%	47%	39%	49%

E Multinomial probit results with observed heterogeneity

Table A3: Multinomial probit results

Dependent variable: In shallow poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-1.34	***	-2.17	***	-1.52	***	-0.86	*	-0.94	***
	(0.44)		(0.37)		(0.35)		(0.46)		(0.23)	
Persistent shallow poverty indicator	1.97	***	1.97	***	1.79	***	1.93	***	1.76	***
	(0.17)		(0.18)		(0.12)		(0.20)		(0.11)	
Household head characteristics										
Age	-0.01		0.00		0.01		-0.00		-0.01	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.15		0.05		0.10		-0.24		0.10	
	(0.14)		(0.14)		(0.10)		(0.18)		(0.08)	
Upper secondary or higher education	-0.54	***	-0.41	***	-0.65	***	-0.48	***	-0.60	***
	(0.14)		(0.15)		(0.15)		(0.16)		(0.09)	
Full-time employed	-1.16	***	-1.27	***	-0.26		-1.10	***	-0.40	***
	(0.16)		(0.19)		(0.17)		(0.23)		(0.09)	
Household characteristics										
Share of employed	-0.87	***	-1.32	***	-1.09	***	-1.95	***	-1.16	***
	(0.19)		(0.24)		(0.22)		(0.30)		(0.14)	
Household type										
Couples with dependent children	0.38	**	0.25		-0.22		0.14		0.06	
	(0.19)		(0.20)		(0.16)		(0.21)		(0.08)	
Single parents with dependent children	0.39	*	0.27		0.08		0.31		0.17	
	(0.20)		(0.20)		(0.14)		(0.24)		(0.14)	
Single-person households	0.66	***	0.55	***	0.51	***	1.37	***	-0.06	
	(0.17)		(0.16)		(0.15)		(0.26)		(0.15)	

Table A3. Multinomial probit results (cont-d)

Dependent variable: In deep poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-2.12	***	-3.61	***	-1.49	***	-2.03	***	-1.51	***
	(0.55)		(0.47)		(0.37)		(0.68)		(0.29)	
Persistent shallow poverty indicator	1.63	***	1.70	***	1.23	***	1.44	***	1.63	***
	(0.25)		(0.28)		(0.19)		(0.27)		(0.12)	
Household head characteristics										
Age	-0.01		0.00		-0.01		0.00		-0.00	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.24		0.21		0.08		-0.41	*	0.05	
	(0.20)		(0.19)		(0.15)		(0.24)		(0.10)	
Upper secondary or higher education	-0.18		-0.32		-0.31	*	0.24		-0.40	***
	(0.17)		(0.22)		(0.17)		(0.22)		(0.11)	
Full-time employed	-0.96	***	-1.61	***	-0.62	***	-0.97	***	-1.20	***
	(0.21)		(0.34)		(0.15)		(0.31)		(0.11)	
Household characteristics										
Share of employed	-0.97	***	-0.23		-1.19	***	-2.01	***	-1.12	***
	(0.27)		(0.25)		(0.26)		(0.37)		(0.17)	
Couples with dependent children	0.11		0.20		-0.45	***	-0.59	**	0.33	***
	(0.28)		(0.37)		(0.17)		(0.28)		(0.10)	
Single parents with dependent children	-0.35		0.21		0.06		-0.42		0.30	*
	(0.31)		(0.37)		(0.19)		(0.33)		(0.17)	
Single-person households	0.30		0.85	***	0.84	***	0.85	**	0.21	
	(0.25)		(0.21)		(0.20)		(0.34)		(0.19)	
Year effects	YES		YES		YES		YES		YES	
Deep poverty episodes	YES		YES		YES		YES		YES	
N	6802		12217		8188		4195		15816	
chi2	741.75	***	847.99	***	898.14	***	641.96	***	1775.02	***

Note: Standard errors are clustered at household level; *** p<.01, ** p<.05, * p<.1.

F Robustness results

Table A4: Multinomial probit results with persistent shallow poor without prior deep poverty episodes

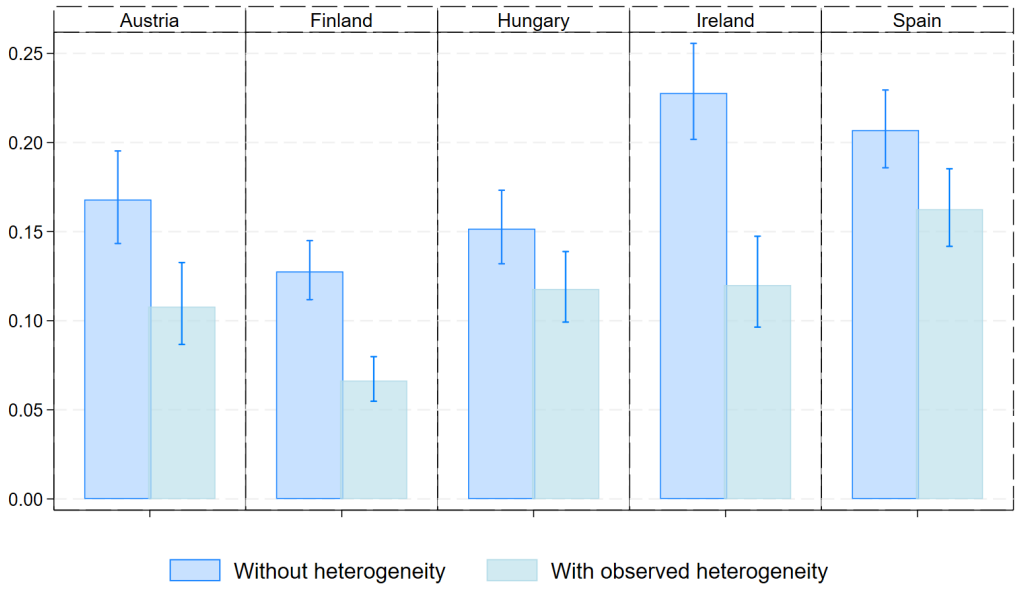
Dependent variable: In shallow poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-1.38	***	-2.21	***	-1.42	***	-0.88	*	-0.91	***
	(0.46)		(0.38)		(0.35)		(0.46)		(0.24)	
Persistent shallow poverty indicator	1.99	***	2.00	***	1.72	***	1.95	***	2.10	***
	(0.17)		(0.19)		(0.14)		(0.21)		(0.12)	
Household head characteristics										
Age	-0.01		0.01		0.00		-0.00		-0.01	*
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.16		0.08		0.11		-0.21		0.06	
	(0.15)		(0.14)		(0.10)		(0.18)		(0.08)	
Upper secondary or higher education	-0.57	***	-0.43	***	-0.67	***	-0.48	***	-0.58	***
	(0.14)		(0.15)		(0.16)		(0.17)		(0.09)	
Full-time employed	-1.20	***	-1.26	***	-0.32	*	-1.10	***	-0.41	***
	(0.16)		(0.20)		(0.17)		(0.23)		(0.09)	
Household characteristics										
Share of employed	-0.92	***	-1.30	***	-1.10	***	-1.97	***	-1.19	***
	(0.20)		(0.24)		(0.22)		(0.30)		(0.15)	
Household type										
Couples with dependent children	0.38	*	0.26		-0.18		0.14		0.05	
	(0.20)		(0.21)		(0.16)		(0.21)		(0.08)	
Single parents with dependent children	0.48	**	0.28		0.07		0.28		0.18	
	(0.20)		(0.20)		(0.14)		(0.24)		(0.14)	
Single-person households	0.65	***	0.55	***	0.48	***	1.37	***	-0.11	
	(0.17)		(0.17)		(0.15)		(0.26)		(0.16)	

Table A4. Multinomial probit results with persistent shallow poor without prior deep poverty episodes (cont-d)

Dependent variable: In deep poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-2.19	***	-3.52	***	-1.54	***	-2.06	***	-1.48	***
	(0.58)		(0.46)		(0.37)		(0.71)		(0.30)	
Persistent shallow poverty indicator	1.84	***	1.76	***	1.16	***	1.65	***	1.98	***
	(0.29)		(0.32)		(0.23)		(0.30)		(0.14)	
Household head characteristics										
Age	-0.01		0.00		-0.01		-0.00		-0.01	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.22		0.20		0.07		-0.35		-0.02	
	(0.21)		(0.19)		(0.15)		(0.25)		(0.10)	
Upper secondary or higher education	-0.17		-0.21		-0.28	*	0.29		-0.38	***
	(0.17)		(0.22)		(0.16)		(0.23)		(0.12)	
Full-time employed	-0.96	***	-1.52	***	-0.60	***	-0.92	***	-1.19	***
	(0.22)		(0.33)		(0.16)		(0.32)		(0.12)	
Household characteristics										
Share of employed	-0.99	***	-0.29		-1.19	***	-2.14	***	-1.12	***
	(0.28)		(0.27)		(0.26)		(0.38)		(0.18)	
Couples with dependent children	0.15		0.11		-0.48	***	-0.62	**	0.33	***
	(0.29)		(0.37)		(0.17)		(0.29)		(0.11)	
Single parents with dependent children	-0.37		0.25		0.10		-0.53		0.35	**
	(0.32)		(0.35)		(0.19)		(0.34)		(0.17)	
Single-person households	0.27		0.80	***	0.82	***	0.86	**	0.17	
	(0.27)		(0.22)		(0.20)		(0.35)		(0.20)	
Year effects	YES		YES		YES		YES		YES	
Deep poverty episodes	YES		YES		YES		YES		YES	
N	6741		12170		8055		4160		15808	
chi2	780.11	***	800.80	***	770.82	***	626.01	***	1770.18	***

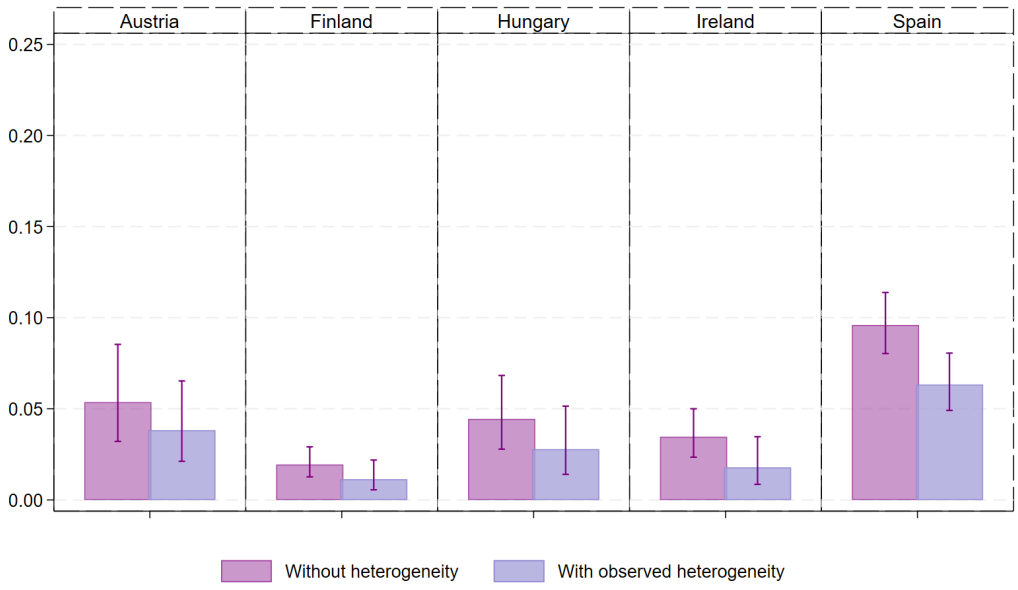
Note: Standard errors are clustered at household level; *** p<.01, ** p<.05, * p<.1.

Figure A3: Shallow poverty persistence and risk of shallow poverty: Average marginal effects



Note: Bars represent the confidence intervals with 95% confidence level.

Figure A4: Shallow poverty persistence and risk of deep poverty: Average marginal effects



Note: Bars represent the confidence intervals with 95% confidence level.

G Attrition in the dataset and attrition modelling

As mentioned in the Section 3, there is a sizable attrition in the dataset. Table A5 shows the share of non-attritted and attritted individuals per country. The highest retention rate is observed for Austria and Finland (almost 80%), while Ireland exhibits the lowest retention rate, slightly above 57%. This inevitably implies biased results, hence, should be accounted for. In EU-SILC longitudinal waves, individuals that are followed for 4 years and observed in 4th year is assigned longitudinal weights (RB064) that adjust the distribution of sample characteristics so that the features of initial sample is retained. However, it must be kept in mind that the application of such weights may not fully account for the effects of attrition (Jenkins and Van Kerm, 2017). According to the sampling frame of the study, only the individuals from "No attrition" and "Missing in previous year(s), observed in 4^{th} year" will be included, the latter with the condition of being observed for at least three years. The share of the last group is below 1% in Austria, Finland, Hungary, and Ireland. Hence, the attrition is not simultaneously modeled for these countries. In case of Spain, the share of this group is non-negligible, hence, the attrition equation is simultaneously estimated for these countries for the selected sample. The results are presented in Table A6. The variables are chosen based on the existing literature (for an extensive review, see Vandecasteele and Debels (2007)), and the availability of information in the EU-SILC datasets. All variables refer to the first year of observation where individuals and households are interviewed. Included characteristics are mostly insignificantly related to attrition likelihood except for age. The results also present the correlation coefficients, ρ_{sp} and ρ_{dp}, between unobserved factors related to shallow poverty and deep poverty outcomes, respectively, and attrition propensity. The correlation is only significant for unobserved factors related to deep poverty outcome and attrition propensity, emphasizing the importance of accounting for the correlation between unobserved heterogeneity.

Table A5: Attrition rates per country (%, weighted)

	Austria	Finland	Hungary	Ireland	Spain
No attrition	78.8	79.2	72.4	57.3	73.7
Missing in 4th year, observed in previous 3 years	5.8	6.8	11.1	18.5	9.4
Missing in previous year(s), observed in 4th year	0.1	0.0	0.5	0.3	4.4
Missing in 4th year and previous year(s)	15.3	14.0	15.9	24.0	12.5
Total	100.0	100.0	100.0	100.0	100.0

Table A6: Probit model of attrition

	Spain	
Intercept	-1.02	***
	(0.14)	
Mode of interview (ref.category: Face-to-face CAPI)		
CATI	0.09	
	(0.06)	
Face-to-face CAPI with proxy	0.03	
	(0.06)	
CATI with proxy	0.20	
	(0.14)	
Age	-0.01	**
	(0.00)	
Female	-0.04	
	(0.03)	
Upper secondary education or higher	0.03	
	(0.05)	
Minutes to complete the interview	-0.00	
	(0.01)	
Home owner	-0.10	
	(0.06)	
ρ_{24}	0.08	
	(0.07)	
ρ_{34}	0.24	***
	(0.08)	

Note: Standard errors are clustered at household level; *** p<.01, ** p<.05, * p<.1. CATI - computer-assisted telephone interview, CAPI - computer-assisted personal interview.

H Multinomial probit model results with interaction effects

Table A7: Multinomial probit results with interaction effects

Dependent variable: In shallow poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-1.24	***	-2.18	***	-1.44	***	-0.92	**	-0.93	***
	(0.44)		(0.37)		(0.36)		(0.46)		(0.23)	
Persistent shallow poverty indicator	1.69	***	2.04	***	1.60	***	1.87	***	1.63	***
	(0.35)		(0.27)		(0.25)		(0.37)		(0.19)	
Household head characteristics										
Age	-0.01		0.01		0.01		-0.00		-0.01	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.16		0.05		0.10		-0.23		0.11	
	(0.14)		(0.14)		(0.10)		(0.17)		(0.08)	
Upper secondary or higher education	-0.54	***	-0.41	***	-0.64	***	-0.49	***	-0.59	***
	(0.14)		(0.15)		(0.15)		(0.16)		(0.09)	
Full-time employed	-1.17	***	-1.35	***	-0.36	*	-1.17	***	-0.55	***
	(0.17)		(0.21)		(0.19)		(0.22)		(0.10)	
Household characteristics										
Share of employed	-0.92	***	-1.36	***	-1.13	***	-1.68	***	-1.06	***
	(0.22)		(0.27)		(0.24)		(0.34)		(0.15)	
Household type (ref. group: households with no dependent children										
Couples with dependent children	0.26		0.33		-0.11		0.02		0.08	
	(0.21)		(0.22)		(0.18)		(0.24)		(0.09)	
Single parents with dependent children	0.37	*	0.30		0.12		0.50	*	0.23	
	(0.22)		(0.21)		(0.16)		(0.26)		(0.16)	
Single-person households	0.54	***	0.60	***	0.45	***	1.16	***	-0.09	
	(0.19)		(0.19)		(0.17)		(0.32)		(0.16)	
Interaction effects										
Persistent shallow poverty indicator x										
Full-time employed household head	0.02		0.55		0.62	*	0.34		0.82	***
	(0.41)		(0.55)		(0.35)		(0.65)		(0.22)	
Share of employed	0.05		0.10		0.01		-0.79		-0.52	
	(0.44)		(0.58)		(0.52)		(0.64)		(0.39)	
Couples with dependent children	0.42		-0.37		-0.81	**	0.60		-0.15	
	(0.46)		(0.51)		(0.32)		(0.51)		(0.21)	
Single parents with dependent children	-0.00		- [a]		-0.38		-0.42		-0.32	
	(0.48)				(0.31)		(0.46)		(0.33)	
Single-person households	0.42		-0.28		0.19		0.48		0.26	
	(0.39)		(0.34)		(0.38)		(0.55)		(0.42)	

[a] The interaction term for Finland is not estimable, as there are no single parents with dependent children who are persistent shallow poor and are deep poverty.

Table A5: Multinomial probit results with interaction effects (cont-d)

Dependent variable: In deep poverty	Austria		Finland		Hungary		Ireland		Spain	
Intercept	-2.39	***	-3.59	***	-1.53	***	-2.16	***	-1.52	***
	(0.59)		(0.46)		(0.37)		(0.70)		(0.28)	
Persistent shallow poverty indicator	2.80	***	1.32	***	1.30	***	1.25	***	1.55	***
	(0.64)		(0.47)		(0.35)		(0.43)		(0.21)	
Household head characteristics										
Age	-0.01		0.00		-0.01		0.00		-0.00	
	(0.01)		(0.01)		(0.01)		(0.01)		(0.00)	
Female	-0.23		0.26		0.08		-0.42	*	0.06	
	(0.19)		(0.22)		(0.15)		(0.24)		(0.10)	
Upper secondary education or higher	-0.18		-0.34		-0.30	*	0.32		-0.40	***
	(0.17)		(0.22)		(0.17)		(0.23)		(0.11)	
Full-time employed	-0.95	***	-1.78	***	-0.58	***	-1.44	***	-1.24	***
	(0.23)		(0.42)		(0.16)		(0.43)		(0.13)	
Household characteristics										
Share of employed	-0.64	**	-0.38		-1.25	***	-2.54	***	-1.03	***
	(0.29)		(0.28)		(0.29)		(0.46)		(0.19)	
Household type (ref group: households with no dependent children										
Couples with dependent children	0.45		-0.42		-0.42	**	-0.34		0.33	***
	(0.30)		(0.39)		(0.18)		(0.32)		(0.12)	
Single parents with dependent children	0.07		0.22		0.12		-0.64		0.26	
	(0.35)		(0.35)		(0.21)		(0.53)		(0.19)	
Single-person households	0.51	*	0.90	***	0.89	***	0.99	**	0.09	
	(0.28)		(0.22)		(0.22)		(0.46)		(0.21)	
Interaction effects										
Persistent shallow poverty indicator x										
Full-time employed household head	-0.17		0.57		-0.23		1.50	**	0.34	
	(0.61)		(0.74)		(0.55)		(0.72)		(0.27)	
Share of employed in the household	-1.01		0.54		0.61		1.26		-0.54	
	(0.67)		(0.57)		(0.73)		(0.77)		(0.46)	
Couples with dependent children	-1.26	*	1.51	*	-0.30		-1.14	*	0.01	
	(0.68)		(0.80)		(0.45)		(0.69)		(0.25)	
Single parents with dependent children	-1.81	**	- [a]		-0.43		0.30		0.20	
	(0.81)				(0.42)		(0.69)		(0.41)	
Single-person households	-0.82		-0.20		-0.36		-0.17		0.69	
	(0.62)		(0.53)		(0.49)		(0.69)		(0.49)	
Year effects	YES		YES		YES		YES		YES	
Deep poverty episodes	YES		YES		YES		YES		YES	
N	6802		12217		8188		4195		15829	
χ^2	836.67	***	820.36	***	930.46	***	617.71	***	1823.70	***

Note: Standard errors clustered at the household level are given in parentheses; *** p<.01, ** p<.05, * p<.1.

[a] The interaction term for Finland is not estimable, as there are no single parents with dependent children who are persistent shallow poor and are deep poverty.

I Z-test of significance of differences in predicted probabilities of deep poverty risk

Table A8: Z-test of significant of differences: employment status of household head

	Austria	Finland	Hungary	Ireland	Spain
Panel A					
Not full-time employed					
Persistent vs. not-persistent shallow poor	0.074*	0.085*	0.116	0.031	0.113***
	(0.042)	(0.048)	(0.080)	(0.020)	(0.028)
Full-time employed					
Persistent vs. not-persistent shallow poor	0.036	0.026	0.025	0.077*	0.038**
	(0.031)	(0.023)	(0.017)	(0.045)	(0.016)
Panel B					
Not persistent shallow poor					
Full-time vs. not full-time employed	−0.022**	−0.011***	−0.023***	−0.016***	−0.066***
	(0.0099)	(0.0027)	(0.0084)	(0.0052)	(0.0093)
Persistent shallow poor					
Full-time vs. not full-time employed	−0.060	-0.074	-0.114	0.029	−0.144***
	(0.05)	(0.049)	(0.081)	(0.046)	(0.031)

Note: The table presents the differences in probabilities of deep poverty risk between persistent and not-persistent shallow poor. Robust standard errors of differences are given in parentheses.

Table A9: Z-test of significant of differences: share of employed in the household

Persistent vs. non-persistent shallow poor	Austria	Finland	Hungary	Ireland	Spain
Share of employed = 0.2	0.094*	0.027**	0.033	0.065*	0.080***
	(0.059)	(0.011)	(0.022)	(0.035)	(0.016)
Share of employed = 0.4	0.065*	0.035*	0.041**	0.068**	0.071***
	(0.033)	(0.018)	(0.017)	(0.032)	(0.014)
Share of employed = 0.6	0.043*	0.042*	0.047**	0.064**	0.062***
	(0.025)	(0.025)	(0.021)	(0.031)	(0.018)
Share of employed = 0.8	0.0293	0.025	0.051*	0.057*	0.053***
	(0.023)	(0.032)	(0.028)	(0.031)	(0.026)
Share of employed = 1.0	0.013	0.059	0.052	0.048	0.045*
	(0.018)	(0.041)	(0.036)	(0.031)	(0.031)

Note: The table presents the differences in probabilities of deep poverty risk between persistent and not-persistent shallow poor. Robust standard errors of differences are given in parentheses.

Table A10: Z-test of significant of differences: household type

Persistent vs. not-persistent shallow poor	Austria	Finland	Hungary	Ireland	Spain
Couples with dependent children	−0.009	0.103	0.031	−0.003	0.082***
	(0.018)	(0.072)	(0.024)	(0.011)	(0.021)
Single parents with dependent children	−0.021*	0.042	0.024	0.037	0.117***
	(0.012)	(0.032)	(0.023)	(0.024)	(0.044)
Single-person households	−0.003	0.07	0.023	0.046	0.146**
	(0.017)	(0.057)	(0.039)	(0.043)	(0.053)
Households with no dependent children	0.124**	0.015	0.053*	0.117*	0.046***
	(0.061)	(0.029)	(0.029)	(0.075)	(0.020)

Note: The table presents the differences in probabilities of deep poverty risk between persistent and not-persistent shallow poor by the type of household. Robust standard errors of differences are given in parentheses.