

Exploring the Relationship between Poverty Depth and Persistence Across Europe

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Abstract

This paper examines whether persistent income poverty increases the risk of transitioning into deep poverty across European countries. Spending lengthy time in poverty can deplete material and human resources and create demoralisation, thus increasing potential risk of deeper income poverty. This study seeks to explore this potential relationship. For this purpose, we analyse pooled longitudinal EU-SILC data covering 2012–2020 years and several European countries with distinct socio-economic development and social welfare regimes. The results show that, although most persistent poor are immune to deep poverty risk, a nontrivial share of them transitions to deeper forms of poverty in subsequent periods. This association is robust to controlling for observed heterogeneity. The results highlight the protective role of labour market participation in reducing deep poverty risk among individuals who have experienced persistent poverty in the past. Moreover, substantial variation across household types is observed, with certain groups facing a higher risk of deep poverty, particularly following episodes of persistent poverty. Overall, the findings suggest the effectiveness of anti-poverty policies across countries, with important implications for the targeting and timing of social policy interventions and variation in the effectiveness of labour market participation in protecting against (deepening) poverty. Taken together, results emphasise the importance of stable and better-paying jobs with flexible work arrangements that would also benefit households with particularly high deep poverty risk.

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1. Introduction

Poverty is not static; individuals may fall into and out of poverty over the course of their lives. The recent literature on poverty measurement has increasingly recognised the dynamic nature of poverty, seeking to measure and estimate poverty “stickiness”, i.e., its persistence (Cappellari and Jenkins, 2004), its relationship with subjective poverty and material deprivation (Fabrizi and Mussida, 2020), financial hardship (Fusco and Islam, 2012), and the risk factors associated with it (see Fusco and Van Kerm, 2023, and Gradin et al., 2018, for extensive reviews). However, this body of research is not without shortcomings. In many studies, transitions into and out of poverty are treated as a “short-memory process” (Fusco and Van Kerm, 2023) with few exceptions (Cantó, 2002; Biewen, 2003; Fouarge and Layte, 2005), meaning that transitions are analysed only between adjacent periods, while cumulative poverty experiences and their implications for future transition probabilities are less commonly examined. Moreover, many studies do not consider the *depth* of poverty when analysing income poverty persistence (see Suppa (2025) for the analysis of deepening material deprivation in Europe). Although it is widely acknowledged that entering and remaining in poverty may lead to a vicious circle of persistent disadvantage (Ayllón and Fusco, 2017; Mussida and Sciulli, 2022), empirical analyses rarely examines whether this “scarring effect” of poverty leads to an *intensification* of poverty among those who remain poor over extended periods.

Recent trends indicate increased poverty persistence across Europe. The share of long-term, or persistently poor individuals, has risen in at least half of European countries, with only four countries experiencing a decline (Franzen and Bahr, 2024). Mussida and Sciulli (2022) show that poverty persistence increased slightly on average after the 2007-08 global financial crisis, suggesting prior poverty exposure increases the likelihood of remaining poor. At the same time, there is evidence to suggest the poor were hit harder after the 2007-08 global economic crisis (Vaalavuo, 2015) in some countries. More recent trends also indicate a deepening of poverty, with several European countries exhibiting larger median income shortfalls from the poverty threshold (Figure A1.1 in the supplementary materials). Despite these developments, surprisingly little attention has been paid to the potential link between poverty persistence and poverty depth.

Using pooled four-year longitudinal waves of EU-SILC covering the period 2012–2020, we examine whether persistent shallow income poverty increases the risk of transitioning into deep income poverty. Our analysis focuses on thirteen European countries to capture context-specific poverty dynamics, diverse levels of economic development and social protection regimes (Marx et al., 2015). It is well established that poverty trajectories and persistence vary substantially across welfare regimes (Layte and Whelan, 2003; Fouarge and Layte, 2005; Vandecasteele, 2010; Ayllón, 2015), reflecting differences in social protection, labour market institutions, childcare and family policies (Saraceno et al., 2020, pp. 4–9). However, there is also evidence that policy configurations and outcomes can vary substantially among countries within the same regime cluster and that conventional welfare typologies often mask policy-specific divergences (Arts and Gelissen, 2002; Nygen, et al., 2018). Given considerable heterogeneity both across and within “ideal” types, we do not rely on single case countries as representative of “distinct” welfare regimes. Instead, we structure our analysis to explore the relationship between poverty persistence and poverty depth across a diverse range of contexts and conditions and to identify whether similar patterns emerge across European countries. We control for an extensive set of individual- and household-level characteristics to disentangle the effect of persistent shallow poverty from observed heterogeneity.

To further explore deep poverty risk in relation to the persistent shallow poverty experience, we look at how the relationship between persistent shallow poverty and deep poverty risk changes conditional on selected risk factors. We focus on household-level employment characteristics (household head's employment status and household's labour market attachment i.e., share of eligible employed people) and household type. Both household structure and employment are recognised as key factors shaping individual and national poverty risks (Saraceno et al., 2020; Azzollini et al., 2025). Labour market participation plays a central role in protecting against poverty, while households with sole breadwinners or low work intensity face higher risks of persistent poverty (Barbieri et al., 2024; Vandenbroucke et al., 2014). In recent decades, European social security policies have become increasingly employment-oriented, reinforcing this protective role. At the same time, the family remains a core pillar of social policy (Bradshaw and Nieuwenhuis, 2021). Certain household types – such as single-parent households, those with many dependent children, and increasingly single-person households – are particularly vulnerable to poverty (Alm et al., 2020). Although such policies can substantially reduce income poverty (Bradshaw and Nieuwenhuis, 2021), their focus varies across welfare regimes, making it important to examine deep poverty risks between household types across different institutional contexts.

The findings reveal a strong and statistically significant relationship between past experiences of persistent poverty and the risk of deep poverty. Although most of the income poor with small shortfall from poverty line will continue to stay so, a non-negligible share of those will transition into deeper income poverty. This relationship remains robust after accounting for observed heterogeneity. Further analysis highlights the central role of labour market participation of households in mitigating deep poverty risk, particularly among households with a history of persistent poverty. In addition, vulnerability to deep poverty varies considerably across household types and countries, conditional on prior persistent poverty exposure, underscoring the importance of institutional and policy differences across contexts. These findings emphasise the importance of timely interventions to tackle persistent poverty that would prevent households falling into deep poverty that is harder to escape and the relevance of better-paying and stable jobs with flexible arrangements alongside provision of affordable childcare to fight deep poverty and increase labour market participation among groups vulnerable to poverty such as single parents.

Summarising the above said, the study contributes to the empirical poverty literature mainly in two ways. First, by evaluating the relationship between poverty persistence and deep poverty, we identify *a new risk group* – individuals at the risk of deep poverty after prolonged experience of less severe income poverty. Second, we assess the risk factors associated with deep poverty risk and conducts a detailed analysis of deep poverty risk by key household-level characteristics – labour market participation and type. Overall, deep poverty is an underexplored topic and poverty literature provides little evidence on risk factors (Kyzyma, 2020; Cutuli, 2025) and trajectories of poverty depth in the post-crisis period; this study aims to address this issue.

The remainder of the paper is structured as follows. Section 2 reviews existing evidence on poverty persistence in the selected European countries. Sections 3 describes the data, variables, and methodological approach. Section 4 presents the descriptive analysis of poverty prevalence and transitions as well as the estimation results. Section 5 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 (Gradin et al., 2018, Fusco and Van Kerm, 2023). Some studies have conducted multi-country analyses, whereas others have focused on a specific country. This section presents cross-national evidence whilst highlighting existing empirical findings for some of the countries selected for analysis.

Existing research points to a substantial level of poverty persistence across European countries. Analysing the data for Spain from 1985 to 1992, 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. Devicienti (2011) adopts a similar approach for the UK and finds negative dependence of poverty exit changes on duration of past poverty experience. Ayllón (2013) analyses persistent poverty in Spain and finds consistent levels of dependence of current poverty status on past poverty status. Ayllón and Gabós (2017) analyse the interrelationship between income poverty, social exclusion and low work intensity by considering feedback effects of each variable in Austria, Belgium, Spain, Hungary, Ireland and the UK 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 for twenty European countries. They observe slightly higher persistence of poverty in the periods following the 2007-08 global financial crisis and increasing scarring effects of poverty over time. The increase is found to be more pronounced in the case of Ireland and Spain.

To assess the role of observed heterogeneity, several studies examine potential risk factors associated with transitions into and out of poverty. Focusing on poverty dynamics in Spain, Cantó et al. (2007) show that the presence of children in the household reduces the chances of households exiting poverty, a result corroborated by Gradin and Cantó (2012). Extending the analysis to a wider range of European countries, Andriopoulou and Tsakloglou (2011) show that households with dependent children have and those headed by individuals with lower educational attainment face significantly lower chances of exiting poverty. Cantó et al. (2012) show that recurrent transitory and chronic poverty affects distinct groups in Spain – households with self-employed breadwinners, and low qualifications are more likely to experience chronic poverty. Focusing on young people across Europe, 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. In the case of Germany, Biewen (2003) finds that, the biggest poverty risk is unemployment and presence of dependent children in the household. Analysing poverty persistence and the depth of income poverty among households with children in fourteen European countries, Cutuli (2025) finds that poverty persistence and poverty depth is strongly patterned according to household type and size with lone parents and larger family households at disproportionately higher risk.

There are reasonable theoretical and empirical grounds to explore the relationship between poverty persistence and the severity of hardship experienced. Households that spend longer periods in income poverty may be compelled to draw on available resources – such as savings or assets – or fall into debt to maintain an acceptable standard of living (Cantó, 2002; Ayllón and Gabós, 2017). These actions may reduce disposable income or deprive households of capability to earn income. The longer the duration of poverty or the more frequently households fall below the poverty line, the more rapidly such resources may be depleted, reducing households' capacity to recover. These effects may extend beyond material resources. Evidence of feedback effects from poverty to employment also suggests that past poverty status is negatively and significantly associated with current labour market participation and work intensity (Biewen, 2009; Mussida and Sciulli, 2024). This dynamic may generate a vicious cycle of unemployment and poverty, further exacerbating welfare losses. As a result, households may become trapped in deeper forms of income poverty that are increasingly difficult to escape (Ayllón, 2013).

Despite the extent of empirical research on poverty persistence and depth, 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 exploring varying degrees of poverty: 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 over time.

3. Data and Methods

3.1. Dataset and sample

This study utilises recent longitudinal waves of the European Statistics of Income and Living Conditions (EU-SILC) survey for thirteen European countries: Austria, Belgium, Denmark, Estonia, France, Germany, Hungary, Ireland, Norway, Poland, Portugal, Spain, and the United Kingdom.¹ These countries were selected to capture a diverse range of socioeconomic conditions, social protection regimes and poverty dynamics. Table A2.1 in the supplementary materials summarises public social expenditure, net replacement rates² for different household types, the unemployment rate, minimum wage protections and hours of work needed to escape poverty across each of the selected countries for the mid-point of the years under observation (2016). As noted in the introduction, there is often as much variation within, as there is between welfare regime typologies. For example, public social expenditure was 14.8% of GDP in Ireland and 22.9% of GDP in United Kingdom – two countries typically classified as “liberal”. Similarly, the net replacement rate 12 months after being employed is 70 for lone parents in Portugal and 58 for those in Spain – two countries characterised as “Southern European” or familialistic. Due to this substantial variation within and across welfare regimes, we avoid treating single countries as

¹ The sample does not include some register-based countries – Finland, Netherlands, and Sweden. These countries collect information from a “selected respondent”, i.e., a household member chosen for the interview. As a result, crucial information is not reported for non-selected respondents such as month-by-month employment status in the income reference period which is used to build employment status of individuals and household heads for estimations. Although Denmark and Norway also employ this data collection method, item non-response rate for some questions regarding non-selected respondents is quite low in these countries.

² Net replacement rates in unemployment indicate the extent to which unemployment benefits replace a claimant's previous net earnings, after taxes and social contributions, thereby capturing the level of income protection during periods out of work.

representative and instead examine how poverty persistence and depth manifest across diverse contexts.

EU-SILC survey collects cross-sectional and longitudinal data on European countries and provides rich information on income, social exclusion and living conditions at individual and household level. The longitudinal waves of EU-SILC have a rotational panel design. Each year, four independent subsamples (rotational groups) are surveyed, and each subsample stays in the survey for four years with some exceptions³ and is replaced with a new subsample after that. Hence, a quarter of the total sample is replaced every year (for more details, see Wirth and Pforr (2022)). To obtain a complete four-year period of information on each rotational group, the dataset is built from the file of the final year where the rotational group features (see Section A3 of the supplementary materials for sampling design).

The time frame for the analysis is 2012-2020, that is, sequential four-year longitudinal waves are pooled for each country with some exceptions.⁴ 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 enacted expansive emergency programs to stabilize incomes (Beland et al., 2021), and hence, poverty trajectories might be different. Although poverty is a household-level characteristic, the unit of analysis is individuals, a common approach in poverty studies (Mussida and Sciulli, 2024). The sample is the adult population aged 18 or higher⁵ who have not changed their households in the observed period.⁶

There is non-trivial attrition among the sampled individuals in four out of the thirteen selected countries, hence, not all respondents are observed for the full four years (see Table A4.1 in the supplementary materials). 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 the initial sample via applying appropriate sampling weights (see section A4 in the supplementary materials for more details).

3.2. Variables

Dependent variable. The dependent variable is individual poverty status in the 4th, 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 deep poverty status in the final period. Shallow poverty is defined as being

³ France and the UK constitute an exception, where each rotational group stayed in the sample for nine years (until 2020 wave) and six years (starting from 2018 wave), respectively.

⁴ The time frame is shorter for some countries due to the unavailability of data (Germany), sampling design (France and the UK) or issues for data quality (Denmark). See section A3 of the supplementary materials for a more detailed description.

⁵ The upper bound of age variable is censored at 80 years old.

⁶ Individuals that have recently moved out or moved into a household have been excluded from the analysis, as their poverty experience in first three years of observation cannot be correctly matched with household characteristics in the final year of observation.

below 60% of the median equivalised household disposable income⁷, 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. Discussions about the methodological choices for defining and measuring deep poverty are far from conclusive; some characterise it as an absolute condition whilst others argue it is a ‘relative condition: experienced and defined in reference to a higher material standard of privation’ (Bradshaw and Mayhew, 2010, Bradshaw and Movshuk, 2019, Edmiston, 2024: 239). To maintain consistency with the official poverty threshold and ensure sufficient sample sizes, we construct the deep poverty threshold relatively, i.e., 40% (as has already been applied in the recent literature) of median equivalised household disposable income (Garza-Rodriguez et al., 2021, Peng et al., 2019). As a robustness check, we also report results for alternative deep poverty thresholds – 45% and 35% of median equivalised household disposable income in the section A13 in the supplementary materials.

Independent variables. The main variable of interest is a binary indicator of persistent shallow poverty (0 = No, 1 = Yes). 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, but somewhat different from the official definition of persistent poverty in the European Union which defines persistent poverty as being in poverty for at least two years during the past three years and in the final year.⁸ Our persistence measure is based on the first three years of observation and does not include the final year.

To correctly estimate the relationship between persistent shallow poverty and deep poverty risk, several control variables are included in analyses. Based on the existing economic literature on poverty persistence (Giarda and Moroni, 2018; Mussida and Sciulli, 2020, etc), these variables include individual characteristics (age⁹, gender, education level and labour market status of individuals), household head characteristics (age, gender, education level and labour market status of household heads), and household-level characteristics (share of employed in the household and household type categorised into four categories). Tables A5.1, and Tables A6.1-A6.7 in the supplementary materials present a detailed description of included variables and descriptive statistics of the sample, respectively. All variables refer to the income reference period, when the final poverty status of individuals is evaluated.

3.3. Estimation Strategy

To explore the relationship between the persistent shallow poverty experience and deep poverty risk, country-level generalised ordered logit models are employed. Despite the static nature of the model, it allows us to estimate transitions below the poverty line and indirectly capture the dynamics of poverty during the period observed. Given the ordinal nature of the dependent variable, this model is deemed the most appropriate. Typically, poverty persistence is better analysed with duration models when cumulative poverty experience is being evaluated (Arranz and Cantó, 2012; Biewen, 2003); this was not feasible in our case due to the short panel length.

We define an ordinal poverty status, p_i , with three categories, $j = \{1, 2, 3\}$, where $i = 1, \dots, n$

⁷ The dataset uses OECD-modified equivalence scales to compute equivalised household incomes.

⁸ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At-risk-of-poverty_rate

⁹ We have explored potential multicollinearity between the variables included in the analysis; the results show that only age variable in the case of Denmark, France, Norway and the UK present a problem of multicollinearity, and individual age was excluded from the analysis (Table A10.1 in the supplementary materials).

are individuals in the sample.

$$p_i = \begin{cases} 1 & \text{if } y_i \geq z_s \\ 2 & \text{if } z_d \leq y_i < z_s \\ 3 & \text{if } y_i < z_d \end{cases} \quad (1)$$

Here, $p_i = 1$ indicates no poverty, $p_i = 2$ indicates shallow poverty status, and $p_i = 3$ indicates deep poverty status. y_i denotes equivalised household disposable income, and z_s and z_d indicate shallow and deep poverty thresholds, respectively.

Generalised ordered logit model can be presented as follows:

$$P(p_i > j) = g(d_i^{sp}, X_i) = \frac{\exp(\alpha_j + d_i^{sp}\gamma_j + X_i\beta_j)}{1 + \exp(\alpha_j + d_i^{sp}\gamma_j + X_i\beta_j)}, \quad j = 1, 2 \quad (2)$$

Here, d_i^{sp} is the number of shallow poverty episodes in the past years of observation, X_i is the vector of selected control variables, as well as prior deep poverty episodes and year effects; $\alpha_j, \beta_j, \gamma_j$ are parameters to be estimated. γ_j is the main parameter of interest – $\exp(\gamma_j)$ represents the odds ratio of being in a higher poverty category associated with persistent shallow poverty.

Generalised logit models relax the parallel lines or proportional odds assumption inherent in ordered logit – this assumption implies that coefficients γ and β do not vary with the threshold j . This assumption is particularly restrictive for our main variable of interest, as it would imply that the effect of persistent shallow poverty on the odds of transitioning into shallow poverty is identical to its effect on the odds of entering deep poverty. By allowing parameters γ_j and β_j to vary across cutpoints, the model permits differential effects on the risks of shallow and deep poverty. Section A11 in the Supplementary Materials provides further details on the estimation procedure and diagnostic tests.

4. Results

4.1. Shallow and deep poverty: trends and prevalence

Before presenting the estimation results, we look at the prevalence of different forms of poverty in our sample. Figure A7.1 in the supplementary materials presents the share of shallow poor, deep poor, and persistent shallow poor within the sample according to the final year of observation per country. In all analysed countries, the share of shallow poor is higher than that of deep poor at all periods – that is, the large part of the poor experienced an income shortfall of less than 40% of poverty line. The difference is especially large in case of Belgium, Denmark, Estonia and Ireland. In case of Spain and partly in Portugal, the differences are much smaller, implying that deep poor constitute an important share of those below the poverty line. Looking at persistent shallow poverty rates, we see that, the share of persistent poor is lower than shallow poor, in most of the countries, but higher than that of deep poor with some exceptions (Norway, Portugal and Spain). This is in line what is usually observed – persistent/chronic poor are usually a fraction of the poor observed at a given point, and we can see it in terms of shallow poverty. Overall, the differences in the prevalence of poverty between different cohorts is not significant and does not follow a clear pattern, with few exceptions. For instance, Estonia shows that earlier cohorts show

lower rates of persistent shallow poverty, whereas in Poland, the opposite is the case. But it must be kept in mind that, these observations are not representative of the countries' populations due to the selection of the sample for the study.

4.2. Poverty Transitions

We continue with a descriptive analysis of individual past poverty experiences, focusing on the extent of poverty persistence. Figure 1 and Figure A9.2 in the supplementary materials illustrate the poverty status of individuals in the final year of observation (the fourth year of observation) conditional on their persistent shallow and deep poverty experience, respectively. We observe that those who have not experienced persistent shallow or deep poverty in the previous three years mostly end up being not poor in the final year of observation. Their share is highest in the Nordic countries (almost 94% in Denmark) and lowest in Southern European countries (around 85% in Spain); these differences highlight the protective role of strong labour market with low unemployment rates and generous benefits (both in amount and duration) as we observe in Table A2.1. The overall difference across countries is relatively small, however. Another common finding is that individuals who have experienced persistent (shallow or deep) poverty are more likely to remain in poverty (either shallow or deep) than those without such experience. That is to say, the longer the people stay in poverty, the less likely they seem to be able to escape it. This pattern is particularly pronounced in Estonia, Ireland, and Norway: at least 60% of persistently shallow-poor individuals (72.6% in Estonia) are in shallow poverty in the final year of observation. These countries (except Ireland for which the data is not available) are also characterised by the high number of hours of work needed to escape poverty – this fact may explain the “stickiness” of shallow poverty that is concentrated among individuals and households with lower work intensity. These results are robust to the choice of the deep poverty threshold (see Figures A8.1 and A8.2 and Figures A9.1 and A9.3 in the supplementary materials).

[FIGURE 1 HERE]

Figure 1 provides important information on transitions below the poverty line. We observe that a non-negligible proportion of individuals who were persistently shallow poor in previous periods have transitioned into deep poverty. This latter group is the focus of this study. Their share among the persistently shallow poor is almost 15% in Portugal and Spain, and lowest in Norway (approximately 5.2%) and Denmark (approximately 0.5%). This observation regarding Denmark is not surprising given high generosity of social benefits such as net replacement rates both in the short and long period (Table A2.1 in the supplementary materials) and high public expenditure that better shields individuals from falling into deep poverty compared to Spain and Portugal. In Germany, Hungary, and the UK, over 10% of persistently shallow-poor individuals transition into deep poverty. The results are consistent at alternative deep poverty thresholds (Figures A9.1 and A9.3 in the supplementary materials). As expected, with higher deep poverty thresholds (45% of median equivalised disposable household income), transition rates are higher across all countries, as falling below the deep poverty threshold becomes more likely. Overall, the raw transition probabilities indicate that, although persistently shallow-poor and persistently deep-poor individuals tend to remain in shallow and deep poverty respectively, greater persistence in shallow poverty may also increase the risk of transitioning into deep poverty. The following subsection examines this tendency in a more robust manner and presents the corresponding results.

4.3. Estimation results: Shallow poverty persistence and deep poverty transition

The estimation results of the generalised ordered logit models are presented in Table A12.1 in the supplementary materials. All estimations control for year effects and for deep poverty episodes experienced in the first three years of observation. Controlling for deep poverty episodes allows us to isolate chronic deep poor from those with no/little past deep poverty experience and deep poverty status. In this manner, we are able to focus on the risk group we are interested in – persistent shallow poor at risk of deeper income poverty. Figure 2 illustrates the average marginal effects of past persistent shallow poverty on the risk of falling into shallow and deep poverty, and there are several noteworthy observations.

First, there is a statistically significant effect of past persistent shallow poverty on the risk of falling into shallow or deep poverty. These marginal effects are smaller in Denmark and Norway (below 0.10 points) and largest in Germany, Portugal, and the UK (around 0.20 points). The marginal effects are smaller for deep poverty but remain statistically significant. This finding supports the descriptive results presented in the previous section: persistently shallow-poor individuals mostly remain in shallow poverty, while a small—and in some cases non-negligible—proportion transition to deeper forms of income poverty. The effect is negligible in the Nordic countries, followed by Estonia. In Denmark and Norway, the marginal effects are below 0.01 points and are not statistically significant in Denmark. This result is expected, as the share of the deep poor, as well as the proportion of persistently shallow-poor individuals transitioning into deep poverty, is negligible in the Danish sample. The largest marginal effects are observed in Poland, Portugal, and Spain, where being persistently shallow poor increases the likelihood of falling into deep poverty by 0.05–0.06 points, all else equal. These differences confirm the descriptive results and once again point to the differences in social support system and benefit generosity clearly observed in Table A2.1, particularly net replacement rates for different household types. In all cases, the marginal effects are statistically significant at the 1% level after controlling for observed heterogeneity (except for Denmark), confirming the robustness of the relationship between persistent shallow poverty and the risk of deep poverty.

Although these results are not directly comparable to the findings of empirical literature on poverty persistence due to the methodologies adopted and reference period of these studies, some similarities can be found. Few studies that take into account the duration of poverty spell/episodes have similar findings (Arranz and Cantó (2012) for Spain, Biewen (2003) for Germany, Devicienti (2011) for the UK, Fouarge and Layte (2005) for multi-country analysis) – the longer the time spent in poverty, the lower are the chances of escaping it. Despite analysing shorter period, we find similar results and identify a new risk – longer poverty experience can increase the severity of poverty for some people.

[FIGURE 2 HERE]

In the supplementary materials, Table A8.1 presents marginal effects of observed heterogeneity on shallow and deep poverty risk. We will focus on the main variables we are interested in – household employment and type. The marginal effects of household characteristics are generally as expected (Bosco and Poggi, 2020; Mussida and Sciulli, 2022; Fabrizi and Mussida, 2024). In all cases, household members with full-time employed heads are less likely to fall into poverty,

including deep poverty. Households with stronger labour market attachment are also at lower risk of falling into shallow or deep poverty. Denmark is an exception: a higher share of employed members is associated with higher deep poverty risk. The reason for this effect might be the heterogeneity within the group of employed in terms of poverty risk with self-employed being particularly at higher risk of poverty (Halleröd et al, 2015) and relatively high net replacement rates (presented in Table A2.1 in the supplementary materials), on one hand, and, the composition of households with low or zero share employed that are mainly retired elderly benefitting from generous old-age benefits (Eurostat, 2025a) and facing lower poverty risk (Eurostat, 2025b). Poland shows a similar pattern, although the effect is not statistically significant. Regarding household type, couples with dependent children, single parents with dependent children, and single-person households are more likely to experience shallow or deep poverty compared to households without dependent children with heterogeneous deep poverty risk across countries. For instance, couples with dependent children face a significantly higher deep poverty risk in only half of the countries analysed – Belgium, Estonia, Spain, Norway, Poland, and Portugal. Similarly, single parents with dependent children face higher deep poverty risk in some countries—Belgium, Estonia, Spain, Norway, and Portugal. Likewise, single-person households are at higher risk of deep poverty in most countries, except France, Ireland, and Portugal.

4.4. 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 persistent shallow poverty among specific groups. Figures 3-5 present predicted probabilities of being in deep poverty conditional on past persistent shallow poverty and selected household characteristics.

[FIGURE 3 HERE]

We start with the employment status of household heads in Figure 3. Several observations are noteworthy. First, deep poverty risk is significantly higher for households without full-time employed heads compared to those with full-time employed heads in all countries. Second, the risk of deep poverty increases if a household has previously been persistently shallow poor, irrespective of whether the household head is full-time employed. The increase is larger and significant in Germany, Estonia, Hungary, Poland, Portugal and Spain, and smallest in Denmark and Norway (see Table A14.1, Panel A in the supplementary materials). Third, increased deep poverty risk after experiencing persistent shallow poverty is smaller for individuals living in households with full-time employed heads of households (Table A14.1, Panel A). Fourth, the differences in deep poverty risk faced by households with full-time employed heads vs. without full-time employed heads become larger after experiencing persistent shallow poverty (Table A14.1, Panel B). That is, the relative disadvantage of households without full-time employed household heads becomes more pronounced.

These findings indicate that full labour market participation of the household breadwinner can help protect against deep poverty risk and stronger labour market segmentation in some of the analysed countries (Barbieri and Cutuli, 2016). Full-time employees 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. However, the protective effects of labour market

attachment weaken when households experience persistent shallow poverty in almost all analysed countries. The risk may be due to the heads of these households being in in-work poverty due to inadequate wages or low-skilled/low-pay jobs or large household sizes (Marx and Nolan, 2014, Saraceno et al., 2020) or because the impact of unobserved factors that labour market participation does not mitigate. Hence, the combination of persistent shallow poverty experience and inadequate work conditions of household breadwinners may put households at a particular risk of deep poverty.

[FIGURE 4 HERE]

Figure 4 presents the predicted risk of deep poverty conditional on the share of eligible employed people in the household. We observe marked differences in deep poverty risk between households with and without persistent shallow poverty experience at lower shares of employed people, and these differences are statistically significant for all countries (Table A14.2 in the supplementary materials), except for Denmark and Norway. As labour market attachment of a household increases, the differences in deep poverty risk by past persistent shallow poverty experience become smaller and, in the case of Denmark, insignificant. Namely, greater labour market attachment generally reduces deep poverty risk regardless of prior shallow poverty experience, underscoring the protective role of household labour market participation. Denmark and Poland are exceptions as mentioned above – among households with persistent shallow poverty, deep poverty risk increases with higher employment shares, while it varies little among those without such experience.¹⁰

[FIGURE 5 HERE]

Figure 5 presents predicted probabilities of falling into deep poverty by household type and persistent shallow poverty experience. We observe that the risk of deep poverty increases in all countries but at varying magnitudes if households have experienced persistent shallow poverty in previous periods (Table A14.3 in the supplementary materials). Denmark, Estonia, Ireland, and Norway show the most modest increases in deep poverty risk, whereas Poland, Spain, and Portugal show markedly larger increases. Some household types appear to be at higher deep poverty risk depending on the country analysed. In Germany, Hungary, Poland and the UK, single-person households face the highest deep poverty risk after experiencing persistent shallow poverty, followed by single-parent households. This pattern may be related to the comparatively low policy priority accorded to these groups, as reflected in the net replacement rates reported in Table A2.1 – higher rates are provided for couple households with dependent children, while single-person households are the most disadvantaged in this respect. In contrast, in Portugal, couples with dependent children face the highest risk of deep poverty, whereas in Spain, it is single parents with dependent children. Nevertheless, households without dependent children (mainly couples without dependent children) exhibit a smaller deep poverty risk with or without experiencing persistent shallow poverty in most countries.

¹⁰ We repeated estimations for Denmark and Poland with alternative definitions of the share of employed in the household, i.e., counting only full-time (self- or waged-) employed individuals or only full-time waged-employed individuals. The results have not changed (these models are not presented here but are available upon request).

5. Discussion and Conclusion

This study investigates whether experiencing persistent shallow poverty increases the likelihood of falling into deep poverty. Several 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 deep poverty risk in all countries analysed, and this finding is robust to the inclusion of observed individual and 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 from 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 becomes even clearer.

The findings also present the relationship between potential risk factors of shallow or deep poverty. The results show heterogeneous patterns, but some commonalities are observed. Both individual and household head's full-time employment is associated with the lower shallow or deep poverty risk, but only household head's education level is negatively correlated with being in shallow or deep poverty. Households with dependent children, single-parent households and single-person households are more exposed to deep poverty risk compared to households with no dependent children, with single-person households standing out in almost all countries analysed.

The results highlight the protective role of labour market participation against deep poverty risk. Consistent with prior research (Vandenbroucke et al., 2014; Marx and Nolan, 2014), our findings show that the full-time employment of a household breadwinner is effective in reducing deep poverty risk, but also that there is a probable risk of deep poverty for these households. Greater labour market attachment of households and an increase in the number of households with dual or multiple earners appear as crucial in reducing deep poverty risk, especially among households with persistent poverty experience. The findings stress the importance of well-designed activation policies combined with improved pay and work conditions. Increasing employment alone may not reduce poverty (Seikel and Spannagel, 2018) and should be accompanied by more stable, high-intensity and better-paying jobs (Mussida and Sciulli, 2025) to fight poverty risk, as well as more flexible work arrangements (McKnight et al., 2016). The latter would boost female labour market participation and support individuals in certain household types such as single parents to escape poverty.

We also observe 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, face a higher deep poverty risk, particularly after going through persistent shallow poverty in previous years. The risk is higher in the case of Spain and Portugal, implying that children in these countries 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 measures to boost decent employment among adults would 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 household and decrease 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).

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 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, Norway and Denmark, typically known for higher levels of welfare coverage and adequacy, and Estonia, characterised by relatively more 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 Portugal and Spain.

The deep poverty risk faced by different household types may also be indicative of the nature and orientation of family policies in analysed countries. In Spain and Portugal, households with dependent children face increased poverty risk, suggesting weaker familisation of social policies, at least for low-income families. These countries are known for relying on family networks as safety nets (Saraceno et al., 2020), often with family support policies recognised as insufficient (de Villota and Vázquez-Cupeiro, 2019). In contrast, Germany, Hungary, Estonia and Poland show lower deep poverty risk among couples with dependent children and higher risk among single-person households. This may point to a tendency to provide more institutionalised support for families with children (Blank, 2019; Siemienska and Domaradzka 2019) but weaker social safety nets for single adults, especially if they have low work intensity in case of Hungary (Tausz, 2019).

Whilst we recognise (and observe) considerable variation within welfare regime types, our paper does demonstrate some noteworthy tendencies regarding the effect of social protection regimes on poverty persistence, depth and the relationship between them. High net replacement rates that are maintained despite extended periods of unemployment appear more effective at reducing poverty persistence, poverty depth and the relationship between them as evident from the net replacement rates prioritising distinct household types in the analysed countries. Likewise, the protective effects of employment and labour market regulation prove most effective in context with a higher employment rate and better minimum wage protection schemes.

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 the selected countries. Second, estimations do not consider unobserved heterogeneity at the individual or household level that make individuals more prone to falling into and staying in poverty and may overstate the role of poverty persistence in affecting deep poverty risk. Third, study does not control for the trigger events (marriage dissolution, employment loss, etc) that can increase the risk of falling into shallow or deep poverty. Finally, 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 and new avenues for exploring possible mechanisms linking poverty persistence and increased deep poverty risk.

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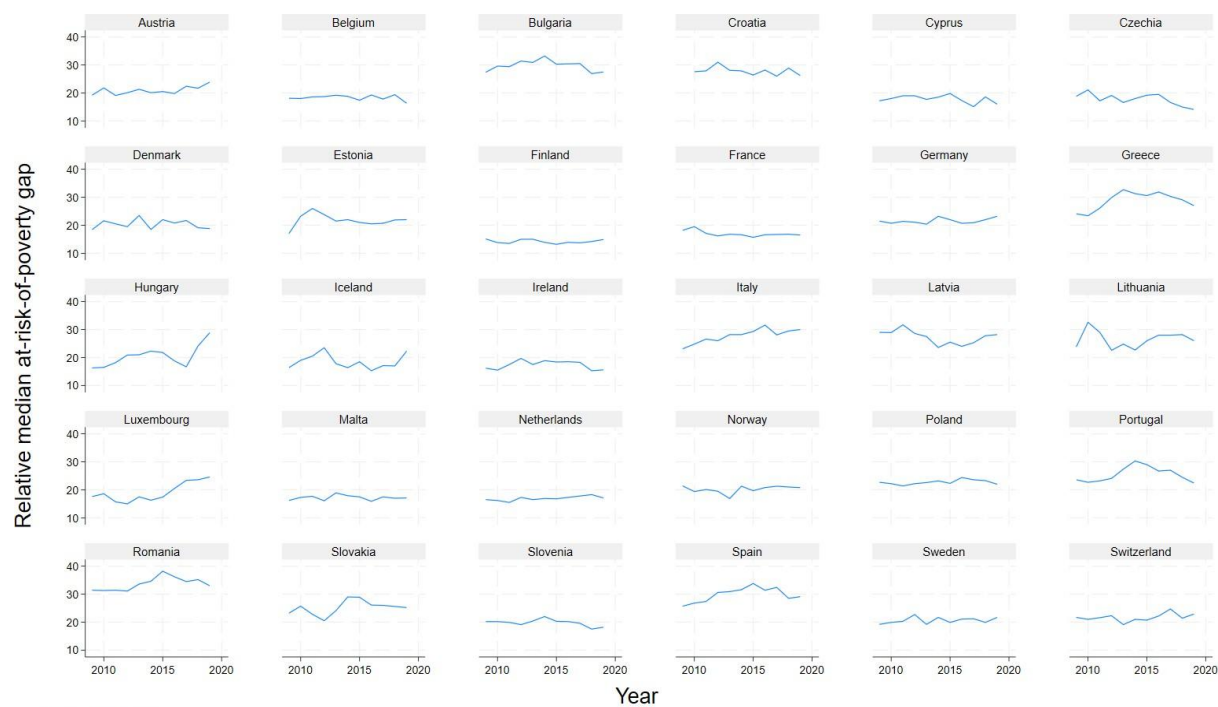
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A1. Median Poverty Gap in European Countries

Figure A1. Relative median poverty gap in European countries, 2009-2019



Source: Eurostat
Note: Relative poverty threshold is set at 60% of the national median equivalised disposable income of all people in a given country and year.

Appendix 2. Country characteristics: social indicators

Table A2.1. Social indicators per country, 2016 year

Net replacement rates in unemployment (% of disposable household income before job loss)							Public social expenditure (% GDP)	Unemployment rate (%)	Minimum wage (% average earnings)	Weekly hours of work needed to escape poverty
	Single person, no children		Single person, 2 children		Couple, 2 children					
	12 months	36 months	12 months	36 months	12 months	36 months				
Austria	51	51	68	68	61	61	28,4	6,5	n/a	18
Belgium	62	48	66	61	77	69	28,5	7,9	39,4	16
Denmark	61	56	75	70	80	61	29,5	6,0	n/a	-
Estonia	44	27	59	58	74	55	17,5	6,8	36,2	27
France	68	35	75	47	85	57	31,8	10,1	50,0	8
Germany	59	35	71	56	90	60	25,9	3,9	41,9	2
Hungary	12	12	23	23	56	56	20,1	4,9	39,0	24
Ireland	48	48	60	60	59	59	14,8	8,4	35,0	-
Norway	65	37	76	57	84	52	25,8	4,9	n/a	25
Poland	41	22	79	71	66	67	21,2	6,3	42,6	16
Portugal	68	33	70	43	92	59	23,5	11,5	41,8	22
Spain	55	23	58	32	78	53	24,0	19,7	31,8	19
United Kingdom	40	40	63	63	52	52	22,9	4,9	43,8	-

Source: OECD

A3. Data structure and sample design

EU-SILC presents official statistics of living conditions of the European Union. The panel component of this dataset follows individuals for four years in most countries. There are some exceptions to this rule; Norway has followed households and individuals for eight years until 2012 and switched to four-year rotational panel design, whereas France has followed them for nine years until 2020. Starting from 2021, the countries have given a choice to follow households/individuals for six years. The UK started doing so in 2017; some rotational groups are followed up for 6 years (the UK SILC has been discontinued in 2019 because of Brexit). This has introduced some challenges in terms of appropriately selecting rotational groups so that there is no overlap – that is, the same groups are not included in the sample repeatedly, and the weights applied in estimations are representative.

The period for most countries is 2012-2020 corresponding to 2011-2019 income reference years. Table A11.1 presents the number of rotational groups chosen for each country and the period they are followed up. Except for France and the UK, only one rotational group is chosen for each four-year period due to the reasons explained above. Although being followed for four years, it was not possible to choose the same number of rotational groups in case of Germany and Denmark as in other countries. In the Danish sample, one rotational group from 2017-2020 years has been left out due to large number of missing values in one of the main variables (employment status in the reference period). The German EU-SILC, on the other hand, has only provided panel datasets for 2018 and 2019 years, which allows to follow only two rotation groups for 2015-2018 and 2016-2019 years, respectively. Note that, the numbers assigned to rotational groups are the same as group identifiers available in the dataset (DB075 variable).

The data collection methods vary between the countries. Some countries have been characterised as “old” register-based countries since the inception of the survey – these include Nordic countries (Denmark, Finland, Norway and Sweden), Netherlands and Slovenia (Törmälehto et al, 2013; Törmälehto and Jäntti, 2013). These countries collect data from a “selected respondent”, i.e., a designated household member, all household members are included in the dataset (household information is collected from a household respondent and they might be different from selected respondents). Most of the information is collected from registers and complemented by survey questions. This helps to reduce respondent burden and attrition rates. Potential disadvantages of this method non-comparability of data collected in EU-SILC questionnaires and available in administrative records, differences in time frame, as well as non-collection of crucial information on non-selected or non-household respondents. In the longitudinal datasets, only selected respondents are followed up; members that have moved out are not followed. The drawback of this approach is that some crucial information on non-selected respondent members of households is not collected. Recently, other member countries have been increasingly collecting information from administrative sources as well, but do not employ “selected respondent” approach – Austria, France, Latvia, Spain and Switzerland. Other countries still collect data primarily via questionnaires.

Table A3.1 Selected rotational groups by period and country

Period	Country												
	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
2012-15	4	4	-	1	4	4	3,4,5,6,7,8	3	1	2	3	4	3
2013-16	1	1	-	2	1	1	-	4	4	3	4	1	-
2014-17	2	2	-	3	2	2	-	1	3	4	1	2	-
2015-18	3	3	2	4	3	3	-	2	2	1	2	3	1,2,4
2016-19	4	4	3	1	4	4	-	3	1	2	3	4	-
2017-20	1	1	-	-	1	1	10	4	4	3	4	1	-

This table presents the identifiers of rotational groups chosen per period and country. The identifiers correspond to those provided in the dataset by DB075 variable. Note: The repetition in identifiers is due to the recycled use of same identifiers, but not due to repeated inclusion of the same sample of individuals.

A4. Attrition in the dataset

The panel dataset of the EU-SILC follows households and household members for four years in most countries with few exceptions. As mentioned in the Section 3, there is a sizable attrition in the dataset which is one of the major problems using panel data. Table A12.1 shows the share of non-attritted and attritted individuals per country. The lowest retention rate is observed in Ireland and the UK, whereas in Denmark and Portugal, most of individuals are fully followed for four years. This may imply biased results, hence, should be accounted for. In EU-SILC longitudinal waves, individuals that are followed for four years and observed in fourth year are assigned longitudinal weights (RB064) that adjust the distribution of sample characteristics so that the features of the representative sample are retained. The use of these weights accounts for attrition of those (groups b and c, Table A12.1) who are not observed in the final year of observation.

However, it must be kept in mind that the application of such weights may not fully account for the effects of attrition (Vandecasteele and Debels, 2007; 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 4th year” (groups a and b in Table A12.1, respectively) are included, the latter with the condition of being observed for three years. The weighted proportion of these groups (Table A12.2) in the selected sample shows that most of the country have over 99% of retention that does not require for any control for attrition. France, Spain, Poland, and Portugal show a non-negligible level of attrition with the highest rate in France – 12%. This necessitates controlling for it, as unobserved heterogeneity in the propensity to attrit can be correlated with the propensity to fall into poverty, especially deep poverty. In order to estimate whether there is a correlation between unobserved heterogeneity of these propensities, we have conducted a multivariate probit analysis where we jointly estimated an ordered probit model exploring the relationship between persistent shallow poverty experience and poverty risk, and attrition equation controlling for several characteristics of individuals (age, gender, employment status, home ownership, education level and family type) and interview-related indicators (interview mode and minutes to complete the interview). We report the correlation coefficient between unobserved heterogeneity in deep poverty risk and that pertaining to attrition propensity in Panel B of Table A12.2. As we can see, the correlation is insignificant for France and Poland, and significant for Portugal and Spain. However, the magnitude of correlation is rather small (<0.2), hence, we did not include these findings in main estimations. Moreover, these estimations do not allow to relax parallel lines assumption that is crucial for correctly estimating the relationship between persistent shallow poverty and deep poverty risk, hence, are deemed less robust than generalised ordered logit results.

Table A4.1. Attrition rates in the dataset (% , unweighted)

Country	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
a. No attrition	61.8	59	59.8	91.3	70.9	58.7	58.2	58.6	43	48.6	68.6	80.7	32
b. Missing in the 4 th year, observed in previous years	5.9	8.4	9.8	4.3	6.1	10.2	10	11	16.1	7.3	8.5	7.9	9.9
c. Missing in previous year(s), observed in last year	<0.1	2.9	<0.1	0.3	2.2	4.5	5.9	0.5	0.3	10.7	1.3	2.1	0
d. Missing in 4 th and previous year(s)	32.2	29.7	30.4	4.1	20.8	26.6	25.9	29.8	40.6	33.4	21.6	9.3	58.1

Table A4.2. Attrition rates in the sample (% , weighted)

Panel A. Country	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
a. No attrition	100%	100%	99.9%	100%	99.1%	91.8%	88%	100%	100%	99.7%	97.9%	96.9%	100%
c. Missing in any year	0%	0%	<0.1%	0%	0.9%	8.2%	12%	0%	0%	<0.3%	2.1%	3.1%	0%
Panel B. Estimated coefficient of correlation													
	-	-	-	-	-	0.1429***	0.0821	-	-	-	0.061*	0.1899***	-

Note: Panel B of the table reports the correlation coefficient between unobserved heterogeneity in poverty risk and attrition propensity obtained from multivariate probit estimations; * - p-value < 0.01, ** p-value < 0.05, *** - p-value < 0.0.

A5. Description of variables

Table A5.1. Description of dependent variable, variable of interest, and variables to model heterogeneity

Variable	Description
<i>Dependent variable</i>	
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, whereas deep poverty is defined as being below 40% of the median household disposable income. Alternative deep poverty thresholds are defined as 45% and 35% of disposable income.
<i>Independent variables</i>	
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 during this period.
<i>Individual characteristics</i>	
Age	Continuous variable indicating the age of individuals. The variable refers to individuals' age in income reference period.
Female	A dummy variable indicating individuals' gender (1 = Female, 0 = Male).
Upper secondary or higher	A dummy variable equal to 1 if individuals have at least upper secondary education, and 0 otherwise.
Full-time (waged-) employed	A dummy variable that takes the value of 1 if individuals are full-time waged) employed and 0 otherwise. ¹ We employ the following definition: if an individual has been full-time waged employed for at least 7 months in the income reference period, they are defined as such.
<i>Household-head² characteristics</i>	
Age of household head	Continuous variable indicating the age of household heads. The variable refers to household heads' age in income reference period.
Female household head	A dummy variable indicating household head's gender (1 = Female, 0 = Male).
Upper secondary or higher	Defined in the same manner as for individuals
Full-time (waged-) employed	Defined in the same manner as for individuals.
<i>Household characteristics</i>	
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 all household members including dependent children (<18 years old) and elderly. It 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.

¹ This group does not include full-time self-employed, given the distinct nature of self-employment associated with less stable and reliable income stream (Marx and Nolan, 2014), hence, higher exposure to poverty risk.

² Household head is defined as a household member whose mean gross earnings during four years of observation was the highest in the household. Earnings include gross wage and self-employment earnings, as well as allowances and social benefits.

A6. Sample characteristics

Table A6.1. Sample characteristics: Austria and Belgium

	AT			BE		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	86.4%	9.6%	3.9%	86.4%	10.7%	2.9%
Persistent shallow poor	3.3%	55.7%	22.9%	3.9%	55.2%	30.9%
Individual characteristics						
Age	51.5 (16.6)	54.8 (17.6)	48.9 (16.6)	52.2 (16.9)	54.9 (17.7)	48.9 (15.7)
Female	50.6%	58.6%	52.4%	51.3%	55.7%	50.1%
Full-time waged employed	40.2%	11.9%	12.9%	36.1%	5.9%	5.0%
Upper secondary or higher	33.6%	17.4%	29.7%	41.6%	14.5%	24.6%
Household head characteristics						
Age	53.8 (14.6)	56.0 (16.7)	49.8 (15.7)	53.2 (15.0)	56.5 (16.0)	51.9 (13.8)
Female	26.7%	43.1%	37.1%	31.1%	39.7%	41.1%
Full-time (waged) employed	54.9%	16.2%	15.4%	48.9%	10.5%	6.2%
Upper secondary or higher education	37.7%	19.4%	29.9%	46.1%	15.6%	27.2%
Household characteristics						
Share of employed	0.49 (0.37)	0.22 (0.32)	0.22 (0.312)	0.43 (0.36)	0.09 (0.20)	0.17 (0.30)
Couples with dependent children	19.4%	16.7%	22.8%	18.2%	13.7%	20.2%
Single parents with dependent children	6.2%	9.7%	6.9%	8.9%	10.5%	9.7%
Single-person households	17.4%	39.4%	32.8%	16.6%	30.8%	20.3%
N	10515	959	349	10308	1235	304
% of valid observations	100%	100%	100%	97%	96%	92%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

Table A6.2 Sample characteristics: Germany and Denmark

	DE			DK		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	84.2%	11.1%	4.6%	90.5%	7.6%	1.9%
Persistent shallow poor	3.4%	53.6%	25.0%	4.2%	51.1%	9.1%
Individual characteristics						
Age	52.2 (15.6)	55.4 (16.1)	51.4 (16.8)	52.3 (16.7)	48.3 (22.0)	41.2 (17.0)
Female	51.1%	57.0%	55.2%	51.4%	50.0%	55.9%
Full-time waged employed	43.5%	12.9%	8.6%	50.6%	8.1%	11.0%
Upper secondary or higher	92.6%	78.9%	74.6%	31.5%	26.5%	40.8%
Household head characteristics						
Age	52.9(14.2)	55.869 (14.8)	50.836 (16.8)	53.2 (15.0)	56.5 (16.0)	51.9 (13.8)
Female	(29.8%)	(46.1%)	(49.9%)	37.7%	42.4%	63.6%
Full-time (waged) employed	(59.0%)	(16.7%)	(11.2%)	57.3%	11.8%	13.6%
Upper secondary or higher education	(95.4%)	(80.6%)	(74.8%)	33.4%	25.9%	41.0%
Household characteristics						
Share of employed	0.52 (0.39)	0.24 (0.35)	0.20 (0.36)	0.48 (0.40)	0.11 (0.26)	0.31 (0.41)
Couples with dependent children	19.7%	12.4%	5.5%	18.7%	6.8%	3.4%
Single parents with dependent children	4.4%	5.7%	6.5%	7.1%	5.0%	4.3%
Single-person households	21.8%	43.8%	64.0%	27.9%	57.3%	51.9%
N	7188	916	296	8711	312	65
% of valid observations	99%	99%	99%	91%	87%	91%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

Table A6.3 Sample characteristics: Estonia and Spain

	EE			ES		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	78.1%	15.8%	6.1%	80.7%	11.2%	8.1%
Persistent shallow poor	3.3%	57.1%	14.0%	3.7%	38.3%	15.7%
Individual characteristics						
Age	50.0 (16.5)	64.9 (16.8)	49.5 (15.2)	51.9 (16.7)	51.2 (17.5)	47.4 (15.0)
Female	52.8%	67.8%	43.1%	51.0%	53.5%	52.5%
Full-time waged employed	59.0%	13.0%	13.7%	40.8%	18.3%	8.2%
Upper secondary or higher	47.2%	27.8%	26.9%	35.2%	13.4%	15.1%
Household head characteristics						
Age	50.2 (14.7)	64.6 (16.3)	50.3 (14.6)	54.3 (14.3)	55.4 (15.7)	49.8 (14.0)
Female	40.7%	66.5%	43.8%	31.3%	31.9%	36.6%
Full-time (waged) employed	73.5%	17.2%	19.3%	54.1%	30.9%	13.2%
Upper secondary or higher education	49.8%	28.3%	27.8%	37.8%	11.6%	14.2%
Household characteristics						
Share of employed	0.57 (0.34)	0.16 (0.29)	0.25 (0.35)	0.43 (0.34)	0.24 (0.27)	0.21 (0.28)
Couples with dependent children	17.3%	7.3%	11.5%	22.5%	23.7%	29.2%
Single parents with dependent children	12.4%	7.3%	11.5%	3.9%	7.0%	9.0%
Single-person households	12.0%	56.2%	41.1%	11.2%	7.9%	13.4%
N	11415	2069	736	21937	2859	1881
% of valid observations	97%	94%	93%	94%	94%	87%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

Table A6.4 Sample characteristics: France and Hungary

	FR			HU		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	88.0%	8.9%	3.1%	87.5%	8.8%	3.8%
Persistent shallow poor				3.4%	33.7%	19.7%
Individual characteristics						
Age	54.2 (17.4)	51.9 (17.2)	51.0 (17.1)	52.0 (16.9)	51.7 (16.3)	50.5 (14.6)
Female	51.6%	55.9%	55.7%	53.6%	55.2%	50.6%
Full-time waged employed	39.3%	15.7%	7.7%	49.2%	32.6%	25.7%
Upper secondary or higher	30.7%	11.1%	27.5%	31.2%	8.7%	14.5%
Household head characteristics						
Age	55.2(15.8)	52.7 (16.2)	52.3 (16.1)	52.8 (15.0)	53.8 (14.4)	51.5 (12.5)
Female	34.4%	39.4%	42.3%	40.5%	44.3%	38.6%
Full-time (waged) employed	48.3%	23.7%	11.8%	61.2%	44.4%	29.5%
Upper secondary or higher education	35.0%	11.7%	28.8%	35.4%	11.0%	17.1%
Household characteristics						
Share of employed	0.40 (0.37)	0.21 (0.30)	0.31 (0.38)	0.46 (0.36)	0.29 (0.33)	0.25 (0.35)
Couples with dependent children	16.3%	19.9%	19.6%	16.6%	15.5%	10.0%
Single parents with dependent children	10.8%	16.6%	8.9%	5.8%	11.2%	11.4%
Single-person households	19.2%	31.5%	24.1%	15.6%	20.3%	32.8%
N	10370	885	271	14123	1653	540
% of valid observations	97%	90%	89%	97%	95%	85%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

Table A6.5 Sample characteristics: Ireland and Norway

	IE			NO		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	84.9%	12.1%	3.0%	90.2%	6.7%	3.1%
Persistent shallow poor	4.2%	57.0%	31.2%	1.7%	46.7%	8.1%
Individual characteristics						
Age	51.1 (16.0)	54.2 (16.2)	51.9 (15.8)	52.7 (16.2)	47.3 (20.5)	32.7(15.2)
Female	50.0%	54.5%	47.7%	52.6 (15.7)	47.0 (20.2)	31.8 (15.4)
Full-time waged employed	39.9%	4.5%	2.2%	57.0%	14.2%	8.2%
Upper secondary or higher	54.4%	26.5%	39.4%	41.8%	18.4%	31.7%
Household head characteristics						
Age	52.3 (14.5)	54.9 (15.4)	49.4 (17.0)	32.8%	56.4%	50.6%
Female	30.6%	41.0%	32.0%	32.8%	56.4%	50.6%
Full-time (waged) employed	54.0%	6.5%	2.6%	63.9%	15.3%	8.9%
Upper secondary or higher education	57.4%	25.0%	41.2%	43.6%	17.8%	31.9%
Household characteristics						
Share of employed	0.45 (0.34)	0.11 (0.24)	0.17 (0.28)	0.54 (0.39)	0.24 (0.38)	0.19 (0.37)
Couples with dependent children	30.8%	19.4%	16.6%	17.5%	6.3%	4.4%
Single parents with dependent children	6.9%	13.4%	10.6%	11.0%	10.8%	3.4%
Single-person households	9.2%	36.9%	27.6%	24.7%	62.6%	79.7%
N	6022	957	199	9694	365	188
% of valid observations	99%	98%	92%	93%	86%	93%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

Table A6.6 Sample characteristics: Poland and Portugal

	PL			PT		
	Not poor	Shallow poor	Deep poor	Not poor	Shallow poor	Deep poor
Share in the sample	85.1%	10.3%	4.6%	82.3%	11.5%	6.2%
Persistent shallow poor	5.1%	39.4%	19.9%	3.1%	40.2%	19.7%
Individual characteristics						
Age	51.1 (16.8)	53.5 (16.9)	48.8 (15.0)	54.0(16.7)	56.3 (17.6)	52.3 (15.4)
Female	52.7%	56.1%	48.0%	53.8%	57.4%	54.8%
Full-time waged employed	44.4%	14.8%	7.9%	47.1%	22.2%	9.4%
Upper secondary or higher	29.6%	8.2%	10.1%	20.6%	4.1%	5.9%
Household head characteristics						
Age	50.7 (15.2)	54.7 (16.4)	52.0 (14.4)	55.0 (14.9)	57.8 (16.2)	54.6 (13.9)
Female	33.2%	40.4%	34.3%	35.4%	43.1%	44.5%
Full-time (waged) employed	57.8%	26.8%	16.7%	57.5%	38.8%	16.8%
Upper secondary or higher education	32.3%	8.2%	8.7%	23.1%	3.2%	4.7%
Household characteristics						
Share of employed	0.40 (0.32)	0.22 (0.25)	0.28 (0.31)	0.44 (0.34)	0.24 (0.28)	0.22 (0.29)
Couples with dependent children	25.4%	24.1%	27.6%	19.1%	16.6%	21.0%
Single parents with dependent children	2.3%	3.7%	2.4%	5.1%	9.0%	8.9%
Single-person households	8.8%	18.2%	17.7%	9.0%	14.6%	12.1%
N	23419	3382	1433	21277	3293	1862
% of valid observations	84%	83%	80%	98%	96%	93%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

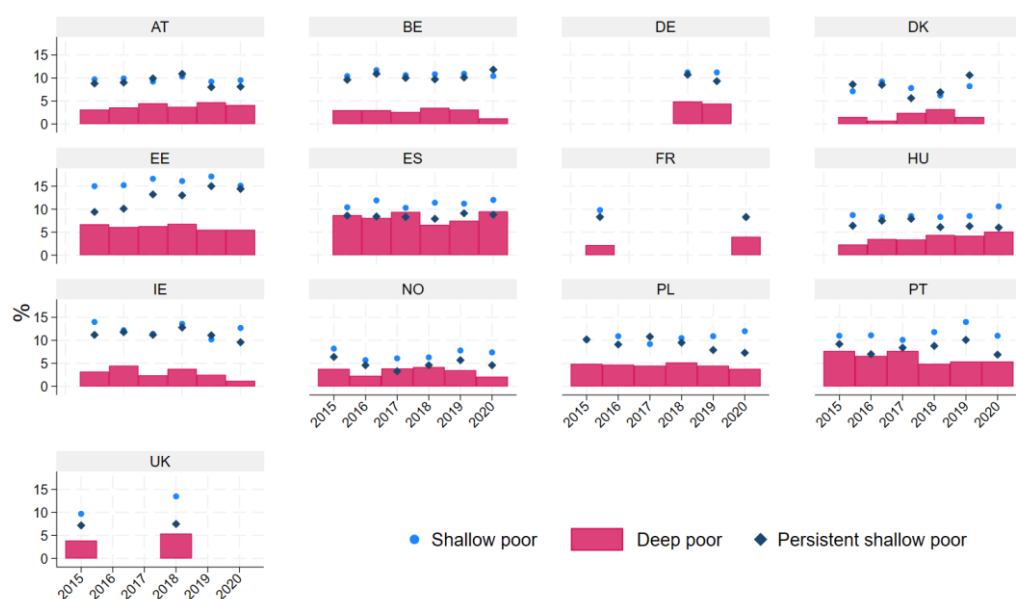
Table A6.7 Sample characteristics: United Kingdom

	UK		
	Not poor	Shallow poor	Deep poor
Share in the sample	83.9%	11.6%	4.5%
Persistent shallow poor	3.0%	32.9%	20.5%
Individual characteristics			
Age	52.0 (16.0)	56.7 (18.4)	56.0 (16.5)
Female	50.7%	56.3%	50.6%
Full-time waged employed	41.1%	13.1%	7.8%
Upper secondary or higher	46.0%	23.6%	24.8%
Household head characteristics			
Age	52.2 (16)	56.9 (17.8)	56.9 (15.1)
Female	28.1%	42.7%	34.7%
Full-time (waged) employed	54.1%	22.0%	11.2%
Upper secondary or higher education	48.3%	25.0%	26.0%
Household characteristics			
Share of employed	0.50 (0.37)	0.23 (0.32)	0.23 (0.33)
Couples with dependent children	24.2%	14.9%	13.4%
Single parents with dependent children	7.3%	12.5%	8.0%
Single-person households	15.0%	28.6%	36.0%
N	7298	1051	385
% of valid observations	99%	99%	96%

Note: Mean values (s.e.) are reported for age and share of employed; proportions are reported for other variables. All observations are weighted by personal weights (RB064) as explained in Appendix 4.

A7. Prevalence of shallow, deep, and persistent shallow poverty

Figure A7.1. Share of shallow poor, deep poor, and persistent shallow poor in the sample



The figure presents the prevalence (%) of shallow poverty, deep poverty, and persistent shallow poverty among the sample per year. Each year reports the poverty rates of a unique rotational group and corresponds to the last year of observation of that group. Shallow poverty and deep poverty rates pertain to the final year of observation, whereas persistent shallow poverty rates are reported for the first three year of observation. For example, reported shallow poverty rates in 2015 year corresponds to the prevalence of shallow poverty in 2015 year, whereas persistent shallow poverty is computed based on 2012-2014 years among rotational groups observed for 2012-2015 period. All observations are weighted by longitudinal personal weights (RB064 in EU SILC).

Appendix 8. Past shallow poverty experience and current poverty status at alternative deep poverty thresholds

Figure A8.1 Latest poverty status by persistent shallow poverty experience – deep poverty threshold: 35% of median equivalised disposable household income

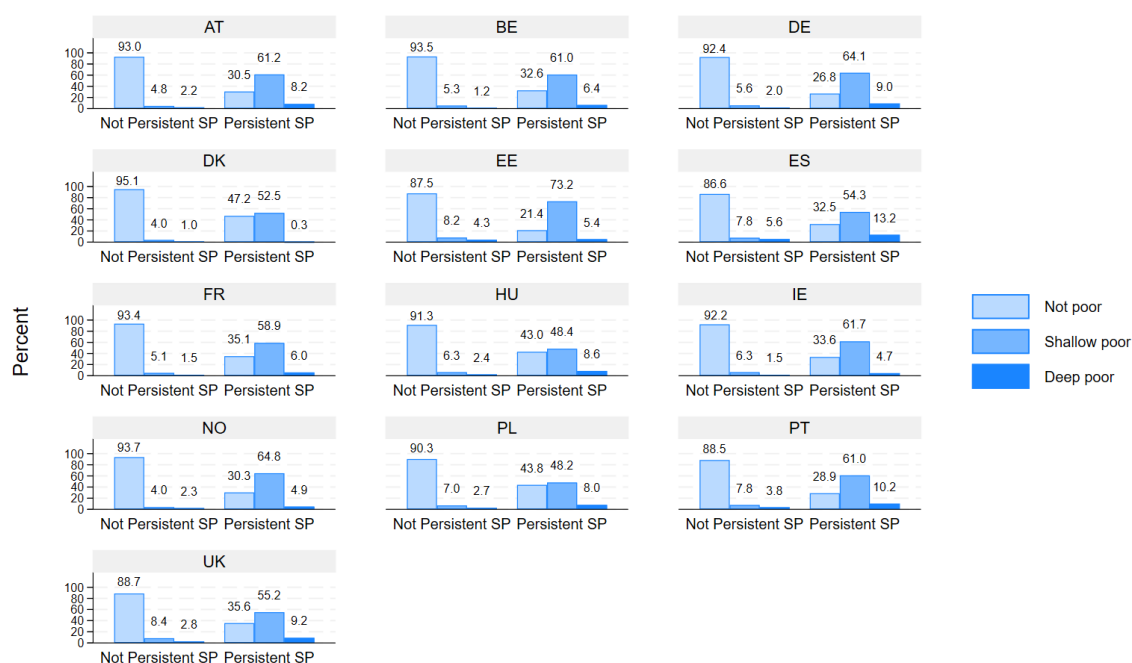


Figure A8.2 Latest poverty status by persistent shallow poverty experience – deep poverty threshold: 45% of median equivalised disposable household income



Appendix 9. Past deep poverty experience and current poverty status at main and alternative deep poverty thresholds

Figure A9.1 Latest poverty status by persistent deep poverty experience – deep poverty threshold: 35% of median equivalised disposable household income

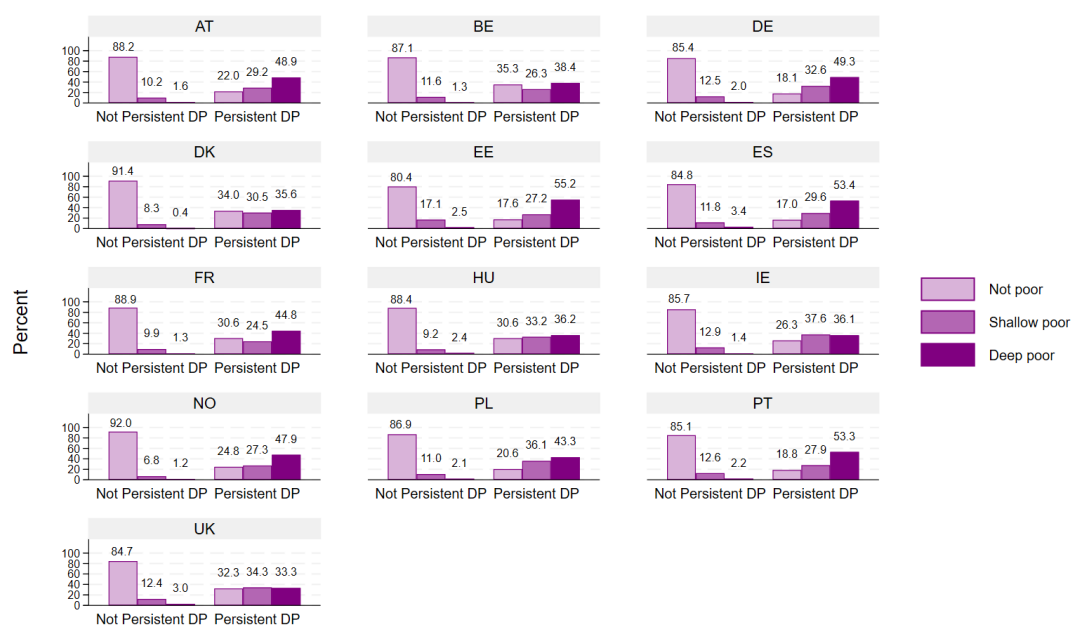


Figure A9.2 Latest poverty status by persistent deep poverty experience – deep poverty threshold: 40% of median equivalised disposable household income

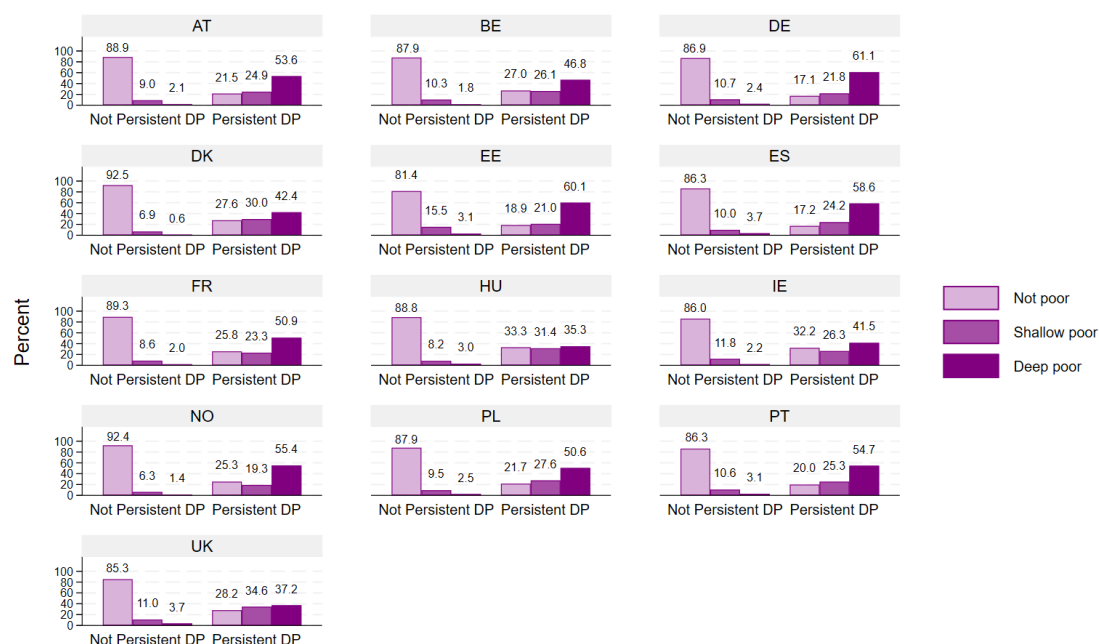
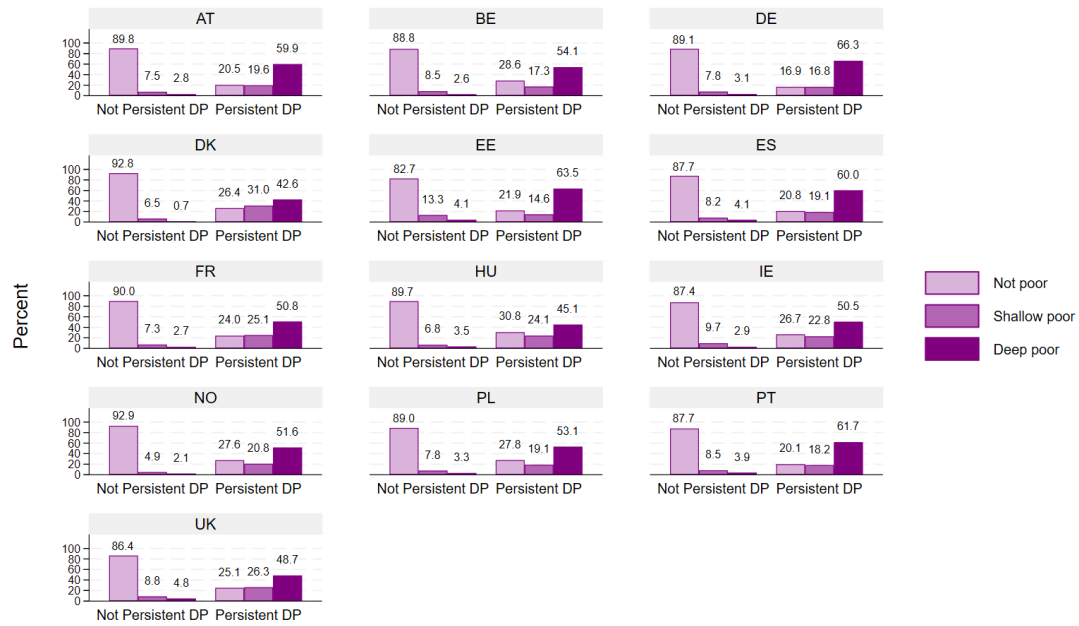


Figure A9.3 Latest poverty status by persistent deep poverty experience – deep poverty threshold: 45% of median equivalised disposable household income



A10. Multicollinearity test results

Table A10.1 Collinearity test: VIF values per country and variable

Variable/Country	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Persistent shallow poverty indicator	1.37	1.38	1.87	1.26	1.43	1.27	1.32	1.16	1.41	1.18	1.22	1.22	1.16
deep poverty episodes	1.52	1.30	1.39	1.18	1.52	1.70	1.29	1.19	1.28	1.63	1.51	1.72	1.18
<i>Individual-level characteristics</i>													
Age	4.10	3.27	3.68	8.20	2.44	1.95	4.19	2.45	2.97	7.56	2.39	2.18	5.18
Sex	1.38	1.20	1.29	1.14	1.14	1.09	1.15	1.15	1.15	1.14	1.14	1.08	1.21
Full-time waged employed	2.39	2.29	2.41	2.99	2.05	1.93	2.40	2.65	2.19	2.69	2.17	2.21	2.46
At least secondary education	2.31	1.60	1.90	2.53	1.90	2.01	2.66	2.24	2.30	2.42	2.25	2.16	2.41
<i>Household head characteristics</i>													
Age	4.82	4.17	4.30	8.95	2.82	2.62	5.38	3.03	3.56	8.52	2.71	2.87	5.80
Sex	1.44	1.24	1.35	1.17	1.21	1.13	1.23	1.23	1.22	1.19	1.24	1.17	1.29
Full-time waged employed	2.87	2.65	3.18	3.64	2.45	2.26	2.81	3.17	2.67	3.27	2.43	2.79	3.19
At least secondary education	2.28	2.55	1.38	2.51	1.90	2.00	2.67	2.25	2.32	2.38	2.29	2.18	2.41
<i>Household-level characteristics</i>													
Share of workers	2.29	2.20	2.36	2.42	2.20	1.94	2.36	2.75	1.77	2.39	1.87	2.43	2.07
Household type: couples with children (<18)	1.51	1.49	1.52	1.66	1.37	1.44	1.59	1.40	1.61	1.72	1.50	1.40	1.65
Single parents with children (<18)	1.27	1.37	1.16	1.26	1.38	1.14	1.53	1.24	1.32	1.48	1.11	1.19	1.38
Single-person households	1.27	1.19	1.27	1.13	1.33	1.13	1.23	1.29	1.36	1.27	1.21	1.16	1.24
Mean VIF	2.18	2.04	2.07	2.76	1.80	1.71	2.23	1.89	1.92	2.70	1.78	1.85	2.36

Note: The table presents the VIF values per country at the deep poverty threshold defined as 40% of median equivalised net household income. These values are similar to those when the deep poverty threshold is defined as 45% or 35% of median equivalised net household income. The results are not reported here but are available upon request.

A11. Estimation Strategy

We define an ordinal poverty status, p_i , with three categories, $j = \{1, 2, 3\}$, where $i = 1, \dots, n$ are individuals in the sample.

$$p_i = \begin{cases} 1 & \text{if } y_i \geq z_s \\ 2 & \text{if } z_d \leq y_i < z_s \\ 3 & \text{if } y_i < z_d \end{cases} \quad (1)$$

Here, $p_i = 1$ indicates no poverty, $p_i = 2$ indicates shallow poverty status, and $p_i = 3$ indicates deep poverty status. y_i denotes equivalised household disposable income, and z_s and z_d indicate shallow and deep poverty thresholds, respectively.

The model can be written as:

$$P(p_i > j) = g(d_i^{sp}, X_i) = \frac{\exp(\alpha_j + d_i^{sp}\gamma + X_i\beta)}{1 + \exp(\alpha_j + d_i^{sp}\gamma + X_i\beta)}, \quad j = 1, 2 \quad (2)$$

Here, d_i^{sp} is the number of shallow poverty episodes in the past years of observation, X_i is the vector of selected control variables, including prior deep poverty episodes and year effects, α_j, β, γ are parameters to be estimated. The main challenge in estimating this model lies in its strong assumption regarding the relationship between the explanatory variables and the ordinal outcome. In particular, the parallel lines or proportional odds assumption (Williams, 2006, 2016) inherent in the ordered logit model requires that the effects of the covariates are constant across outcome categories – that is, the parameters β and γ do not vary with the threshold j . This assumption is particularly restrictive for our main variable of interest, as it would imply that the effect of persistent shallow poverty on the odds of transitioning into shallow poverty is identical to its effect on the odds of entering deep poverty. As Figure 1 of the main text on raw transition probabilities shows, this assumption is clearly violated and may lead to inconsistent estimates.

To relax this restriction, we employ a generalised ordered logit/partial proportional odds model, which allows the effects of covariates to differ across poverty categories while preserving the ordinal nature of the outcome variable. To assess the validity of this assumption, we conduct a series of Wald tests to examine whether coefficients differ across cumulative logit equations, and we relax the parallel lines assumption for those variables that fail the tests. As presented in Table A11.1 below, our main variable of interest fails the parallel lines assumption test in all countries included in the analysis, while the set of variables violating the assumption varies across countries.

Generalised ordered logit model can be presented as follows, where separate β coefficients are estimated for cumulative logit models:

$$P(p_i > j) = g(d_i^{sp}, X_i) = \frac{\exp(\alpha_j + d_{sp}\gamma_j + X_i\beta_j)}{1 + \exp(\alpha_j + d_{sp}\gamma_j + X_i\beta_j)}, \quad j = 1, 2 \quad (3)$$

Here, γ_j is the main parameter of interest – $\exp(\gamma_j)$ represents the odds ratio of being in a higher poverty category associated with persistent shallow poverty, whereas $\exp(\beta_j)$ is the odds ratio for each control variable. β_j and γ_j indicate that the model will produce different odds of falling into shallow or deep poverty. The probability of being/falling in each (no) poverty category is given as:

$$P(p_i = 1) = 1 - g(d_i^{sp}, X_i | j = 1)$$

$$P(p_i = 2) = g(d_i^{sp}, X_i | j = 1) - g(d_i^{sp}, X_i | j = 2)$$

$$P(p_i = 3) = g(d_i^{sp}, X_i | j = 2)$$

When interpreting the results, it must be kept in mind that the marginal effects in shallow poverty equation are estimated for shallow or deep poverty risk and compared to no poverty risk, whereas marginal effects in deep poverty equation are estimated for deep poverty risk in comparison to shallow or no poverty risk. 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. All estimations are weighted with corresponding individual weights which corrects for attrition and preserves the representativeness of the initial sample (see section A4 for the discussion of weights used in estimations).⁹

We do not control for attrition propensity as is common in the poverty persistence literature. It is because, in most of selected countries, the weighted share of those included in the sample that drop out during the first three years of observation is either zero or negligibly small (Table A4.2, Panel A in the supplementary materials). In the countries with non-negligible attrition within the sample (France, Norway, Portugal and Spain), joint estimations of poverty risk and attrition propensity equations either don't show a significant relationship between unobserved heterogeneity in two equations or indicate only weak correlation (Table A4.2, Panel B).

Table A11.1 Ordered logit parallel lines assumption test results

Variable/Country	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Persistent shallow poverty indicator	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Deep poverty episodes	0.194	0.000	0.000	0.732	0.000	0.053	0.016	0.472	0.000	0.990	0.010	0.000	0.229
<i>Individual-level characteristics</i>													
Age	0.230	0.042	0.714	0.813	0.000	0.392	0.048	0.699	0.248	0.277	0.023	0.555	0.981
Female	0.717	0.944	0.296	0.240	0.129	0.562	0.869	0.877	0.599	0.776	0.351	0.435	0.365
Full-time waged employed	0.002	0.421	0.496	0.581	0.053	0.470	0.185	0.364	0.942	0.902	0.329	0.963	0.228
At least secondary education	0.195	0.954	0.877	0.018	0.000	0.114	0.000	0.000	0.355	0.810	0.278	0.000	0.022
<i>Household head characteristics</i>													
Age	0.611	0.023	0.342	0.035	0.429	0.001	0.969	0.000	0.595	0.189	0.602	0.049	0.066
Female	0.726	0.770	0.044	0.276	0.000	0.514	0.898	0.001	0.056	0.247	0.000	0.101	0.012
Full-time waged employed	0.958	0.176	0.001	0.111	0.000	0.000	0.475	0.010	0.926	0.160	0.000	0.000	0.000
At least secondary education	0.000	0.000	0.078	0.325	0.276	0.000	0.169	0.075	0.000	0.052	0.278	0.125	0.655
<i>Household-level characteristics</i>													
Share of workers	0.629	0.000	0.931	0.000	0.000	0.011	0.005	0.744	0.009	0.847	0.000	0.000	0.004
Couples with children (<18)	0.222	0.293	0.030	0.327	0.535	0.413	0.037	0.497	0.044	0.138	0.657	0.000	0.701
Single parents with children (<18)	0.397	0.818	0.913	0.329	0.444	0.201	0.006	0.299	0.000	0.181	0.062	0.400	0.309
Single-person households	0.512	0.303	0.974	0.047	0.000	0.000	0.001	0.000	0.000	0.052	0.099	0.000	0.113
Final model VIF	0.684	0.782	0.723	0.569	0.186	0.213	0.663	0.608	0.509	0.193	0.2032	0.338	0.255

Note: The table presents the p-values of the Wald tests conducted to test the parallel lines assumption for the ordered logit model. High p-values (>0.05) indicates that a variable meets the parallel lines assumption (for more information, see Williams (2016)). Estimations are carried out at the deep poverty threshold defined as 40% of median equivalised net household income.

A12. Generalised ordered logit results

Table A12.1. Generalised ordered logit results per country: average marginal effects

Shallow poverty risk	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Persistent shallow poverty indicator	0.15*** (0.01)	0.15*** (0.01)	0.19*** (0.01)	0.09*** (0.01)	0.17*** (0.01)	0.15*** (0.01)	0.15*** (0.01)	0.17*** (0.01)	0.15*** (0.01)	0.08*** (0.01)	0.16*** (0.01)	0.19*** (0.01)	0.19*** (0.01)
<i>Individual characteristics</i>													
Age	0.00* (0.00)	0.00 (0.00)	0.00*** (0.00)		0.00 (0.00)	0.00 (0.00)		0.00*** (0.00)	0.00 (0.00)		0.00 (0.00)	0.00*** (0.00)	
Age ²	-0.00* (0.00)	-0.00 (0.00)	-0.00*** (0.00)		-0.00 (0.00)	-0.00*** (0.00)		-0.00*** (0.00)	-0.00* (0.00)		-0.00** (0.00)	-0.00*** (0.00)	
Female	-0.00 (0.00)	-0.01*** (0.00)	-0.01** (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00* (0.00)	-0.00 (0.00)	-0.01 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00*** (0.00)	-0.00 (0.00)
Full-time (waged-) employed	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.01)	-0.02*** (0.00)	-0.02*** (0.01)	-0.02*** (0.00)	-0.03*** (0.00)	-0.01* (0.00)	-0.04*** (0.01)	-0.01* (0.00)	-0.04*** (0.00)	-0.04*** (0.00)	-0.03*** (0.01)
At least upper secondary education	-0.00 (0.00)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.00)	-0.02*** (0.01)	-0.01** (0.00)	-0.01 (0.01)	-0.06*** (0.01)	-0.01* (0.01)	-0.01** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)
<i>Household head characteristics</i>													
Age	-0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	-0.00*** (0.00)	0.00** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)
Age ²	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00*** (0.00)	-0.00*** (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00*** (0.00)	0.00 (0.00)
Female	0.00 (0.00)	-0.00 (0.01)	-0.00 (0.01)	0.00 (0.00)	0.03*** (0.01)	0.01* (0.00)	-0.00 (0.00)	0.02*** (0.01)	0.00 (0.01)	0.01** (0.00)	0.02*** (0.01)	0.01*** (0.00)	0.03*** (0.01)
Full-time (waged) employed	-0.03*** (0.01)	-0.03*** (0.01)	-0.05*** (0.01)	-0.01** (0.01)	-0.03*** (0.01)	-0.01 (0.01)	-0.03*** (0.01)	-0.02** (0.01)	-0.08*** (0.01)	-0.02*** (0.00)	-0.03*** (0.01)	0.03*** (0.01)	-0.00 (0.01)
A least upper secondary education	-0.03*** (0.01)	-0.04*** (0.01)	-0.02* (0.01)	-0.01 (0.00)	-0.02*** (0.01)	-0.04*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.06*** (0.01)	-0.01*** (0.00)	-0.04*** (0.01)	-0.06*** (0.01)	-0.03** (0.01)
<i>Household characteristics</i>													
Share of employed	-0.03*** (0.01)	-0.13*** (0.01)	-0.04*** (0.01)	-0.01* (0.01)	-0.13*** (0.01)	-0.06*** (0.01)	-0.03** (0.01)	-0.06*** (0.01)	-0.11*** (0.02)	-0.01*** (0.00)	-0.07*** (0.01)	-0.10*** (0.01)	-0.05*** (0.01)
Couples with dependent children	0.01*** (0.01)	0.01* (0.01)	-0.02* (0.01)	0.01 (0.01)	0.01 (0.01)	0.02*** (0.00)	0.03*** (0.01)	-0.01 (0.01)	0.03** (0.01)	0.01*** (0.00)	0.02*** (0.00)	0.02*** (0.01)	0.01 (0.01)
Single parents with dependent children	0.01 (0.01)	0.01* (0.01)	-0.00 (0.01)	0.01** (0.01)	0.02** (0.01)	0.02*** (0.01)	0.04*** (0.01)	0.01* (0.01)	0.05*** (0.02)	0.01* (0.00)	0.00 (0.01)	0.02*** (0.01)	0.02 (0.01)
Single-person households	0.02*** (0.00)	0.01*** (0.00)	0.02*** (0.01)	0.01*** (0.00)	0.10*** (0.01)	-0.02*** (0.01)	0.03*** (0.01)	0.01 (0.01)	0.12*** (0.01)	0.01*** (0.00)	0.03*** (0.00)	0.02*** (0.01)	0.03*** (0.01)
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Deep poverty episodes	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: The table presents average marginal effects of persistent shallow poverty experience and observed heterogeneity on shallow and deep poverty risk. Robust standard errors clustered at household level are given in parentheses; * - p-value < 0.10, ** - p-value < 0.05, *** - p-value < 0.01.

Table A12.1 Generalised ordered logit results per country: average marginal effects (cont-d)

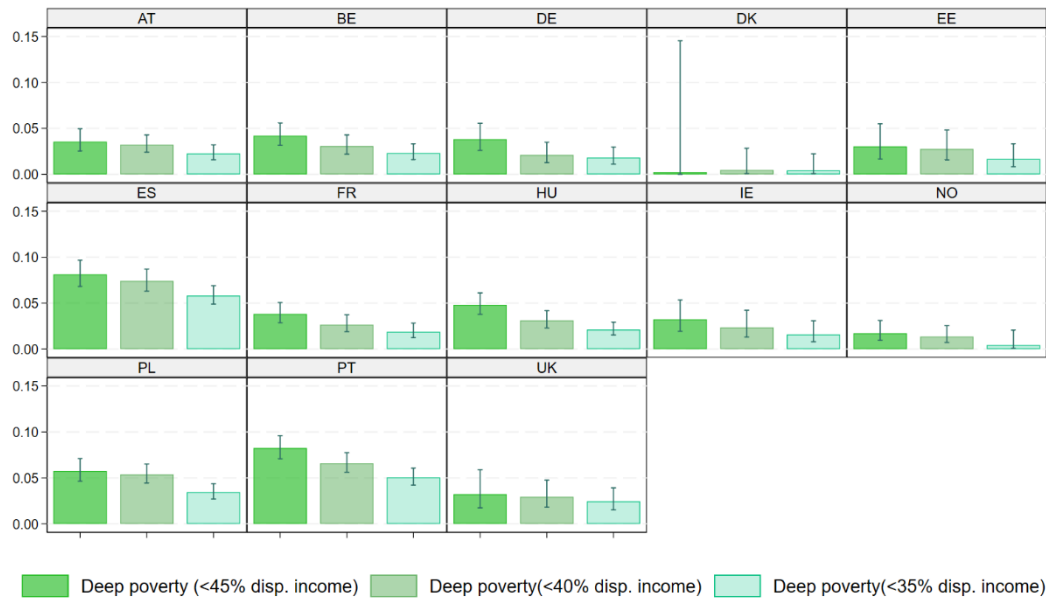
Deep poverty risk	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Persistent shallow poverty indicator	0.03*** (0.00)	0.03*** (0.00)	0.03*** (0.00)	0.01** (0.00)	0.02*** (0.01)	0.06*** (0.01)	0.03*** (0.00)	0.03*** (0.00)	0.03*** (0.01)	0.01** (0.00)	0.05*** (0.00)	0.06*** (0.00)	0.03*** (0.01)
<i>Individual characteristics</i>													
Age	0.00* (0.00)	0.00 (0.00)	0.00*** (0.00)		0.00*** (0.00)	0.00 (0.00)		0.00*** (0.00)	0.00 (0.00)		0.00*** (0.00)	0.00*** (0.00)	
Age ²	-0.00* (0.00)	-0.00 (0.00)	-0.00*** (0.00)		-0.00*** (0.00)	-0.00* (0.00)		-0.00*** (0.00)	-0.00 (0.00)		-0.00*** (0.00)	-0.00*** (0.00)	
Female	-0.00 (0.00)	-0.00*** (0.00)	-0.00** (0.00)	-0.00** (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00*** (0.00)	-0.00 (0.00)
Full-time (waged-) employed	0.00 (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	-0.00* (0.00)	-0.01*** (0.00)	-0.00* (0.00)	-0.03*** (0.00)	-0.03*** (0.00)	-0.02*** (0.00)
At least upper secondary education	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01** (0.00)	0.01*** (0.00)	0.01 (0.00)	-0.00* (0.00)	-0.00** (0.00)	-0.01 (0.00)	0.00 (0.01)	-0.00 (0.01)
<i>Household head characteristics</i>													
Age	-0.00* (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00** (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00*** (0.00)	0.00** (0.00)
Age ²	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00** (0.00)	-0.00*** (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Female	0.00 (0.00)	-0.00 (0.00)	0.01 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01* (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00** (0.00)	-0.00 (0.00)	0.01*** (0.00)	-0.00 (0.01)
Full-time (waged) employed	-0.02*** (0.00)	-0.01*** (0.00)	-0.02*** (0.01)	-0.00* (0.00)	-0.03*** (0.01)	-0.04*** (0.01)	-0.01*** (0.00)	-0.02*** (0.01)	-0.03*** (0.01)	-0.02*** (0.00)	-0.04*** (0.00)	-0.03*** (0.01)	-0.04*** (0.01)
A least upper secondary education	0.00 (0.00)	-0.00 (0.00)	-0.01* (0.01)	-0.00 (0.00)	-0.01*** (0.00)	-0.01* (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	0.01* (0.01)	-0.01*** (0.00)	-0.02*** (0.00)	-0.04*** (0.01)	-0.02*** (0.01)
<i>Household characteristics</i>													
Share of employed	-0.02*** (0.00)	-0.02*** (0.01)	-0.01* (0.01)	0.01** (0.00)	-0.03*** (0.01)	-0.05*** (0.01)	-0.00 (0.01)	-0.03*** (0.01)	-0.02** (0.01)	-0.01*** (0.00)	0.01 (0.01)	-0.04*** (0.01)	-0.02** (0.01)
Couples with dependent children	0.01*** (0.00)	0.01* (0.00)	-0.01* (0.01)	0.00 (0.00)	0.01 (0.00)	0.02*** (0.00)	0.00 (0.00)	-0.00 (0.00)	0.00 (0.01)	0.01*** (0.00)	0.01*** (0.00)	0.02*** (0.00)	0.01 (0.01)
Single parents with dependent children	0.00 (0.00)	0.01* (0.00)	-0.00 (0.01)	0.00* (0.00)	0.01** (0.00)	0.02*** (0.00)	0.00 (0.00)	0.01* (0.00)	-0.01 (0.01)	0.01* (0.00)	0.00 (0.00)	0.01*** (0.00)	0.01 (0.01)
Single-person households	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.00*** (0.00)	0.02*** (0.00)	0.01*** (0.00)	0.00 (0.00)	0.02*** (0.00)	-0.00 (0.01)	0.01*** (0.00)	0.02*** (0.00)	0.00 (0.00)	0.01*** (0.00)
Year effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Deep poverty episodes	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
N	11823	11847	8346	9088	14220	26677	11495	16316	7178	10247	28234	26432	8734
R-adjusted	0.4290	0.3903	0.4091	0.3664	0.4233	0.3855	0.3547	0.2487	0.4106	0.4649	0.3441	0.3708	0.2181
Wald statistic (χ^2 value)	1629***	1687***	1354***	668***	2547***	3633***	1343***	1443***	1208***	957***	4139***	3887***	1102***

Note: The table presents average marginal effects of persistent shallow poverty experience and observed heterogeneity on shallow and deep poverty risk. Robust standard errors clustered at household level are given in parentheses; * - p-value < 0.10, ** - p-value < 0.05, *** - p-value < 0.01.

A13. Robustness checks results: Average marginal effects of persistent shallow poverty on deep poverty risk

Two robustness tests are carried out to check the results presented above. First, we repeat estimations for alternative definition of deep poverty threshold as described in Subsection 3.2. Figure A13.1 presents the estimated marginal effects of persistent shallow poverty and deep poverty risk at all three deep poverty thresholds. As seen from the figure and tables, the relationship between shallow poverty persistence and deep poverty is significant at alternative poverty thresholds as well, again, except for Denmark. Moreover, as expected, the marginal effects of falling into deep poverty after experiencing persistent shallow poverty is slightly larger at higher deep poverty thresholds and become smaller as this threshold is more modestly defined. This is expected because it is more likely that the shortfall from the poverty line is smaller given the shortness of the period considered. The marginal effects of control variables are similar to those discussed in the previous section and are consistent with the findings above.

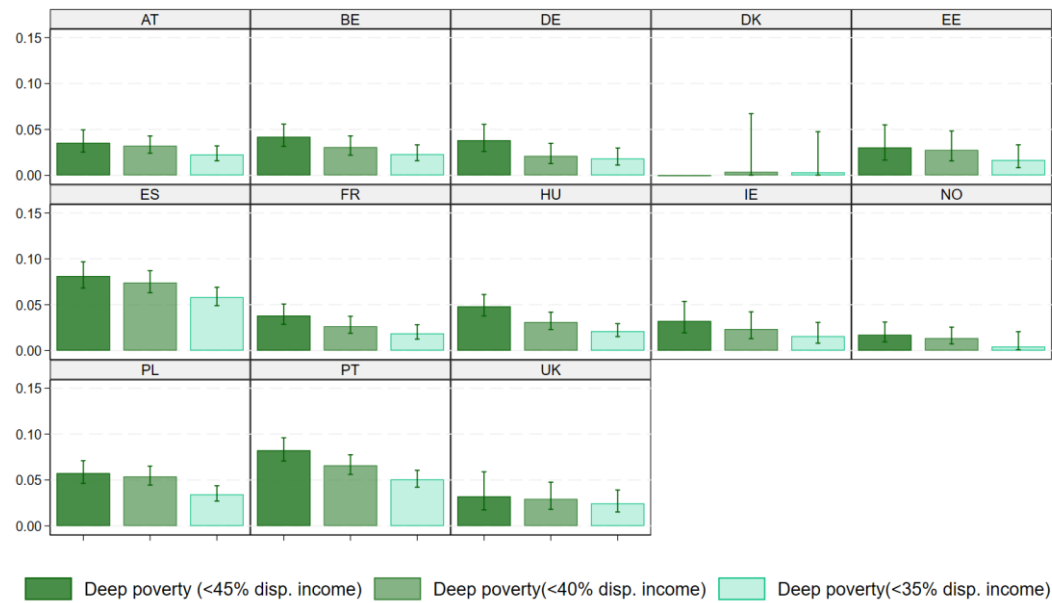
Table A13.1. Persistent shallow poverty and deep poverty risk: alternative deep poverty thresholds



The figure presents marginal effects of shallow poverty persistence on deep poverty risk at main and alternative deep poverty thresholds. Estimations include observed heterogeneity. Bars indicate 95% confidence intervals.

Second robustness check is carried out by restricting the sample of persistent shallow poor to those with no deep poverty experience. If these individuals have experienced a deep poverty episode during the period analysed, the significant relationship found between persistent shallow poverty and deep poverty risk may be driven by these observations, and this relationship may not be robust. Figure A13.2 presents the marginal effects of persistent shallow poverty on deep poverty risk at all three deep poverty thresholds. We can clearly see that the results merely change with the exclusion of this group, which indicates that the above-presented results are robust to past deep poverty episodes and are not driven by the experience of the excluded group.

Table A13.2. Persistent shallow poverty and deep poverty risk: persistent shallow poor with no deep poverty episodes and alternative deep poverty thresholds



The figure presents the marginal effects of persistent shallow poor on deep poverty risk at three alternative thresholds. Persistent shallow poverty is defined as those who have experienced at least two episodes of shallow poverty in first three years of observation and no deep poverty episodes. Bars indicate 95% confidence intervals. Note: Confidence intervals for Denmark (DK) at the deep poverty threshold as 45% disposable income failed to produce due to its very large values.

A14. Z-test of differences in deep poverty risk by household employment and type

Table A14.1. Change in deep poverty risk by household heads' employment status

	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Panel A													
<i>Persistent shallow poor vs. not persistent shallow poor</i>													
Not full-time employed	0.048*** (0.010)	0.039*** (0.005)	0.042*** (0.009)	0.012 (0.010)	0.028*** (0.011)	0.0806*** (0.009)	0.0483*** (0.012)	0.0544*** (0.010)	0.0388*** (0.012)	0.0180* (0.010)	0.0812*** (0.010)	0.0825*** (0.009)	0.0457*** (0.013)
Full-time employed	0.0239*** (0.005)	0.024*** (0.006)	0.0211*** (0.005)	0.006 (0.005)	0.0159*** (0.006)	0.0511*** (0.006)	0.0285*** (0.007)	0.0312*** (0.006)	0.0135*** (0.005)	0.0075* (0.004)	0.0414*** (0.005)	0.0566*** (0.006)	0.0181*** (0.006)
Panel B													
<i>Full-time employed vs. not full-time employed</i>													
Not persistent shallow poor	-0.016*** (0.003)	-0.009*** (0.003)	-0.018*** (0.004)	-0.004** (0.002)	-0.003*** (0.006)	-0.031*** (0.004)	-0.008*** (0.002)	-0.017*** (0.004)	-0.019*** (0.003)	-0.0146 (0.003)	-0.029*** (0.003)	-0.025*** (0.004)	-0.031*** (0.006)
Persistent shallow poor	-0.039*** (0.009)	-0.025*** (0.007)	-0.038*** (0.010)	-0.009 (0.006)	-0.042*** (0.009)	-0.061*** (0.008)	-0.028*** (0.009)	-0.040*** (0.011)	-0.044*** (0.008)	-0.0251 (0.007)	-0.068*** (0.009)	-0.050*** (0.009)	-0.058*** (0.012)

Note: Robust standard errors are given in parentheses; * - p-value < 0.10, ** - p-value < 0.05, *** - p-value < 0.01. The table presents the differences in deep poverty risk according to the employment status of household heads and past shallow poverty experience. Panel A shows how the risk of deep poverty changes if a household has experienced persistent shallow poverty for those with and without full-time employed household heads. Panel B shows the difference in deep poverty risk between individuals living in households with and without full-time employed heads conditional on their persistent shallow poverty experience.

Table A14.2 Change in deep poverty risk by share of employed in the household

Share of employed	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
= 0.2	0.041*** (0.008)	0.036*** (0.008)	0.034*** (0.007)	0.007 (0.006)	0.023*** (0.009)	0.072*** (0.008)	0.041*** (0.009)	0.047*** (0.009)	0.032*** (0.009)	0.015* (0.007)	0.061*** (0.007)	0.074*** (0.008)	0.038*** (0.010)
= 0.4	0.036*** (0.007)	0.032*** (0.008)	0.033*** (0.007)	0.009 (0.008)	0.021*** (0.008)	0.065*** (0.007)	0.039*** (0.009)	0.040*** (0.007)	0.029*** (0.009)	0.012* (0.006)	0.062*** (0.007)	0.067*** (0.007)	0.035*** (0.010)
= 0.6	0.031*** (0.007)	0.028*** (0.007)	0.031*** (0.007)	0.012 (0.010)	0.019*** (0.007)	0.058*** (0.007)	0.038*** (0.010)	0.034*** (0.006)	0.026*** (0.009)	0.011* (0.006)	0.064*** (0.008)	0.060*** (0.007)	0.033*** (0.010)
= 0.8	0.027*** (0.006)	0.025*** (0.007)	0.029*** (0.007)	0.015 (0.013)	0.017*** (0.007)	0.053*** (0.006)	0.037*** (0.011)	0.029*** (0.005)	0.023*** (0.008)	0.010* (0.005)	0.065*** (0.008)	0.054*** (0.006)	0.031*** (0.01)
= 1.0	0.024*** (0.005)	0.022*** (0.007)	0.028*** (0.007)	0.020 (0.018)	0.015** (0.006)	0.048*** (0.006)	0.036*** (0.012)	0.024*** (0.005)	0.0211*** (0.008)	0.009* (0.005)	0.067*** (0.009)	0.049*** (0.006)	0.028*** (0.01)

Note: Robust standard errors are given in parentheses; * - p-value < 0.10, ** - p-value < 0.05, *** - p-value < 0.01. The table illustrates the differences in deep poverty risk between individuals with and without persistent shallow poverty experience and conditional on the share of employed in their households.

Table A14.3. Change in deep poverty risk by household type

Persistent vs. non-persistent shallow poor	AT	BE	DE	DK	EE	ES	FR	HU	IE	NO	PL	PT	UK
Couples with dependent children	0.049*** (0.011)	0.044*** (0.010)	0.031*** (0.008)	0.012 (0.010)	0.025*** (0.010)	0.078*** (0.009)	0.047*** (0.013)	0.045*** (0.008)	0.031*** (0.010)	0.018* (0.010)	0.072*** (0.008)	0.090*** (0.011)	0.042*** (0.013)
Single parents with dependent children	0.0489*** (0.010)	0.041*** (0.009)	0.0451*** (0.009)	0.013 (0.011)	0.028*** (0.010)	0.076*** (0.010)	0.0402*** (0.009)	0.072*** (0.013)	0.030*** (0.008)	0.019* (0.010)	0.079*** (0.009)	0.070*** (0.008)	0.046*** (0.013)
Single-person households	0.043*** (0.011)	0.045*** (0.011)	0.037*** (0.010)	0.016 (0.014)	0.026*** (0.010)	0.081*** (0.010)	0.047*** (0.014)	0.052*** (0.010)	0.021*** (0.007)	0.017* (0.009)	0.066*** (0.009)	0.081*** (0.010)	0.045*** (0.014)
Other households	0.031*** (0.006)	0.031*** (0.007)	0.033*** (0.007)	0.007 (0.006)	0.020*** (0.008)	0.062*** (0.007)	0.040*** (0.010)	0.039*** (0.007)	0.031*** (0.010)	0.009 (0.005)	0.057*** (0.006)	0.064*** (0.007)	0.033*** (0.009)

Note: Robust standard errors are given in parentheses; * - p-value < 0.10, ** - p-value < 0.05, *** - p-value < 0.01. The table shows the change in deep poverty risk after experiencing persistent shallow poverty according to the type of household where individuals reside. Other households include those without dependent children, mainly couples with no children below 18 years of age.