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RESEARCH

Low-pay work and the risk of poverty: a dynamic analysis for European countries

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Abstract
This paper explores how householders' and partners' low-pay conditions affect the risk of poverty of European households. We use 2016–2019 longitudinal European Union Statistics on Income and Living Conditions data, model poverty and labour market outcomes, and account for possible endogeneity of low-pay work in the poverty equation. Low-pay work is defined on gross hourly wage basis. We find that low-pay work increases the risk of poverty compared to high-pay conditions. Notably, when compared to non-employment, the effect of low-pay work on poverty differs between householders and partners. The effect tends to be stronger for the former and smaller for the latter, which stresses the leading role of householders in income formation and the added-worker role of partners in households. The risk of poverty for low-pay workers is even reinforced by their higher probability of being employed in job positions with fewer annual working hours, such as part-time and temporary contracts. The magnitude of low-pay effects on poverty appears to be associated with institutions capable of sustaining the wage floor, earnings and income inequalities, and the generosity of social transfers. We find evidence of feedback effects from poverty on future labour market outcomes, suggesting a self-reinforcing mechanism between poverty and poor labour conditions, which along with limited upward mobility in the labour markets, may lead societies toward persistent income segmentation.

Keywords Poverty · Low-pay work · Feedback effects · Panel data · Europe

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1 Introduction

The last decades have been characterized by important changes in the European labour markets. The process of flexibilization through the greater diffusion of temporary employment and the increasing use of part-time work, as well as the reform of labour market institutions and the role of technological change, have contributed to shaping earnings distribution. One of the consequences of these changes has been the rise of low-paying jobs.[1] According to Eurostat, 15.3% of EU employees were low-wage earners in 2018, with peaks among females, young workers, low-educated, and those in temporary employment. The proportion of low-pay workers is heterogeneous across countries (see Figure A1).

There has been debate about the role of this change in labour market prospects (Schnabel 2021). Some authors (e.g., Knabe and Plum 2013; Cai et al. 2018) have stressed that low-pay work may be better than unemployment, as it may serve as a stepping stone towards high-pay positions and may prevent skills obsolescence. Other studies (e.g., Stewart 2007; Clark and Kanellopoulos 2013; Fok et al. 2015) have emphasized the existence of sizeable persistence in low-pay work and the adverse signal it represents for potential employers.

The study of low-pay work has been associated with other economic aspects, such as earnings inequality, the role of public support, and household poverty. This latter issue has attracted a certain interest from economists in recent years, considering that income poverty represents a significant and persistent phenomenon, which recalls the design of specific contrasting measures from institutions and governments (e.g., the Europe 2020 Strategy and the 2030 Agenda for Sustainable Development). The literature has stressed the existence of a positive association between the widening of household poverty or in-work poverty, wage inequality, and the rise of low-pay work, both at the country and European levels (Nolan and Marx 2000; Brandolini et al. 2002; Lucifora et al. 2005; Maître et al. 2012; Barbieri et al. 2018; Mussida and Sciulli 2023).

Several mechanisms may explain the relationship between low-pay work and poverty, as well as how this relationship differs at the country level. In this regard, we provide a conceptual framework, which is resumed in Fig. 1. It allows us to synthetize the possible links between gross hourly wage and household disposable income and uncover some drivers of the relationship between low-pay work and poverty. We highlight the role of labour market institutions, welfare systems, market mechanisms, household characteristics, and the related intra-household interactions, up to the formation of labor and non-labor incomes and, then, the household disposable income. These factors may help to interpret our empirical findings including country differences in the link between low-pay and poverty.

This paper contributes to the literature on the association between low-pay work and household poverty by offering some novelties. First, we explore the issue from a dynamic perspective and model both income and low-pay processes. We study how low-pay work affects household poverty, allowing low-pay work to be endogenous in the poverty equation. We consider two possible sources of endogeneity, namely, selection because of common time-invariant unobservable factors jointly affecting the two processes and feedback

[1] Low-wage earners are defined as employees who earn two-thirds or less of national median gross hourly earnings (Eurostat, 2018).

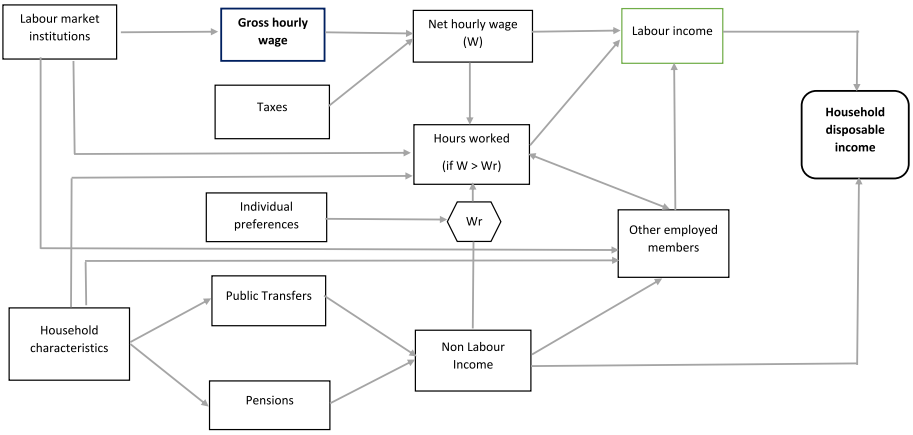

Fig. 1 Conceptual framework. Source: Authors' elaboration. Note: Pensions and Public transfers are net of taxes. Wr is the reservation wage

effects from past poverty to the current labour market state.[2] To the best of our knowledge, this is the first study emphasizing the dynamic link underlying the income poverty and low-pay work relationship. In addition, no previous studies have accounted for possible endogeneity in the aforementioned relationship. Our second contribution regards the way in which we model low-pay work in the poverty equation. In line with a strand of the literature (e.g., Uhlendorff 2006; Fok et al. 2015), we do not limit our study to the alternative low-pay/high-pay work. Rather, we extend our exploration to the entire spectrum of labour market outcomes (i.e., non-employment, low-pay, high-pay). This approach allows us to compare low-pay work to other available alternatives, which is particularly interesting considering that individuals should prefer, in turn, to take up a low-pay job or to remain not employed and wait for a high-pay job in the future (e.g., Schnabel 2021). Third, we study the relationship of interest for both householder/head of household, defined as the household component with the higher earnings, and partners. In detail, we explore whether and how a condition of low paid, either as householders or as partners, is associated with household poverty. This may help to identify their different roles in household income formation, and different propensity to accept low-pay work.

Finally, we study the situation of seventeen European countries, which enables us to compare the role of different institutions, labour market characteristics, and welfare systems in the link between low-pay work and poverty.

The analysis is carried out using longitudinal 2016–2019 EU-SILC data. We exploit the longitudinal dimensions of the dataset by assuming a dynamic bivariate framework, which enables us to estimate 'genuine' state dependence to account for the initial conditions problem and the endogeneity of low-pay work. Our results indicate that low-pay work increases the risk of poverty with respect to high-pay jobs. In several European countries, low-paid

[2] In principle, one may expect that poorer individuals would be more prone to accept low-pay jobs. For example, if we assume that poorer households have lower non-labour income, the reservation wages of household members would be lower too, and then they would have a higher probability of accepting lower market wages.

householders experience a higher risk of poverty than those who are not employed; however, the opposite is found for partners. This highlights the different roles in household income formation of the two-member typologies; the former represents the primary income source within the household, with a low-quality job crucially affecting the income condition of the entire household, and the latter a second-earner role in the household. However, some regularities emerge for both householders and partners; the relative impact of low pay with respect to non-employment is greater the higher the ratio between social transfers per inhabitant and average earnings is. In addition, the negative impact of low-pay work on poverty is greater in magnitude in countries where the earnings inequality is wider. Our results also stress the presence of sizeable genuine state dependence in both processes and the presence of feedback effects, for which being poor increases the probability of being employed in low-pay jobs in the future.

This suggests that household poverty and low-pay work are mutually reinforcing over time, thus contributing to a rise in income segmentation and increasing the risk of in-work poverty persistence (e.g. Barbieri et al. 2024).

The paper proceeds as follows. Section 2 reviews the literature. Section 3 describes the data used and offers a descriptive analysis. The empirical model is described in Sect. 4. Section 5 discusses the main findings and offers both additional and correlation analyses, and Sect. 6 concludes the paper.

2 Literature

The literature has primarily focused on the phenomena of either low-paid workers or household poverty, while only a few studies have explored the association between being a low-paid worker and living in a poor household.

There is a strand of literature that explores the characteristics of the phenomenon of low-paid employment by comparing this condition to the states of unemployment and higher-paid employment. In general, regarding the character of low-paid employment, the available empirical evidence for Europe is mixed, pointing to both serving as a stepping-stone to higher-paid jobs effects and the long-lasting detrimental effects of low-paid work (Schnabel 2021). However, there is some evidence for state dependence and/or trap effects regarding low-paid work in many countries. This tendency has also been confirmed for Italy by less recent evidence, such as Lucifora (1998), who suggests that for a significant number of workers, low pay may represent a permanent rather than a transitory condition. The abovementioned study by Lucifora (1998) explored the evolution and determinants of low-wage employment in Italy using data from the SHIW and INPS surveys for the 1975–1993 period. The findings suggest that being male, older, and highly skilled reduces the likelihood of being low paid. An analysis of the dynamics of wages showed that individuals who start working in low-pay jobs are less likely to move higher up in the wage distribution, as opposed to those who start in higher-paid positions.

In comparison with other labour market statuses, the works by McCormick (1990) and Stewart (2007) suggest that low-paid employment has the same detrimental effect on future employment outcomes as unemployment. In particular, employers use low-paid employment as a screening device to determine worker quality in the same manner as they do unemployment.

Fok et al. (2015) investigated the transitions between unemployment, low-paid employment, and higher-paid employment using a dynamic approach. The results suggest state dependence in both unemployment and low-paid employment and evidence of a low pay no-pay cycle. In other words, unemployment increases the likelihood of entering low-paid employment, and in turn, low-paid employment increases the likelihood of entering unemployment, with significant differences in effects across population subgroups.

In general, a feedback-effect between household poverty (and material deprivation) and labour market attachment was found in the literature (i.e., Fusco et al. 2010). More specifically, joblessness and/or or precarious work arrangements of a household's members may increase the risk of poverty (i.e., Ayllón and Gábos 2017).

Recently, also the phenomenon of low-pay work has been associated with other economic aspects, such as household income poverty. This latter issue has attracted a certain level of interest from economists, considering that income poverty represents a significant and persistent phenomenon. The literature has found a positive association between an increase in household poverty and the rise of low-pay work (i.e., Brandolini et al. 2002; Maître et al. 2012; Barbieri and Cutuli 2016). In addition, household living conditions play a critical role in protecting low-paid workers against poverty (Filandri and Struffolino 2019). In fact, low pay is defined as only one of the factors contributing to household poverty (Andreß and Lohmann 2008; Crettaz and Bonoli 2011; Peña-Casas and Latta 2004).

Specifically regarding the relationship between low pay and household poverty, a study from Brandolini et al. (2002) investigated the dispersion of earnings and the proportion of low-paid employees in Italy for twenty years (from the end of the 1970s to the end of the 1990s). The authors used data from the Bank of Italy's Survey of Household Income and Wealth (SHIW) to disentangle the differential impact of low wages and employment status on households' poverty. Their findings suggest that only the low paid status of the head of household was found to play an increasingly important role in the risk of poverty. In addition, the amount of employment in the household, particularly of members other than the head, matters more than low pay in influencing the probability of the household being in poverty. Some authors, for instance, have pinpointed that non-standard or atypical employment may be even more important than low-paying jobs as a determinant of the risk of income poverty (Barbieri et al. 2019; Maître et al. 2012). In particular, labour market deregulation and the spread of precarious employment are often not enough to ensure a decent income level (Lohmann and Crettaz 2018; Raitano et al. 2019).

Maître et al. (2012) investigated the phenomenon of low pay and its relationship to household poverty and vulnerability in some European countries by using EU-SILC data. Their results suggest that for employees who are not low-paid, income poverty is rare. Low-paid employees face a much higher risk of being in a household that is below the relative income poverty threshold than those who are not low paid; the risk level varies across countries.

Notably, there is a different role for women householders and women partners in household poverty, i.e. the so-called 'gender paradox'. The likelihood of being low paid is generally higher for women, those who are younger, and in the absence of other earners in the household, i.e., single households with a sole earner (Filandri and Struffolino 2019; Raitano et al. 2019) compared with multiple-earner households in all countries. When women are the second earner in the household, i.e. role of partner, instead, there is no disadvantage in terms of household poverty (see, for instance, Bavaro and Raitano 2024;

Broström and Jansson 2023; Ponthieux 2018; Ratti et al. 2022). This is related to the fact that when women are employed, they often play the second-earner role in the household, which, in principle, may be associated with a lower risk of poverty.

A recent stream of literature focused on in-work poverty. This identifies the specific condition of employed individuals living in a household that is below the poverty threshold. Low-pay work and in-work poverty are thus two distinct phenomena, the former an individual condition, and the latter depending on the employment status of all household members (Bavaro and Raitano 2024; Lohmann 2018). The literature investigating the relationship between low-pay work and in-work poverty highlights that low-pay work increases the risk of in-work poverty, but its contribution is less relevant than part-time and temporary employment (e.g. Raitano et al. 2019).

Inspired by the literature, we offer novel evidence on the dynamic relationship between low-pay conditions and household poverty in Europe, separately considering householders and partners.

3 Data

We investigate the period 2016–2019—immediately before COVID-19[3]—by using a longitudinal sample of the European Union Statistics on Income and Living Conditions (EU-SILC) survey. The survey is conducted in most countries across the European Union by the relevant National Institutes of Statistics using harmonized questionnaires and survey methodologies.

The EU-SILC is a rotating panel survey; the sample for any given year consists of four replications, which have been in the survey for 1–4 years. Any particular replication remains in the survey for four years; each year, one of the four replications from the previous year is dropped, and a new one is added. Between year T and T + 1, the sample overlap is 75%, while that between year T and year T + 2 is 50%; the sample overlap is reduced to 25% from year T to year T + 3 and to zero for longer intervals. We consider the fraction of the sample for which T ≥ 3, i.e. observations with at least three time points. In principle, one would obtain four observations for each individual. In practice, not all of the individuals present in the first sample year provide four years of income data, i.e. there is attrition, and some estimates, such as those for the persistent at risk of poverty, may therefore not be reliable. The attrition problem is well known in the EU-SILC data (for details see, for instance, Jenkins and Van Kerm 2017). As explained in Sect. 4, our empirical strategy, presents some advantages when dealing with attrition.

Furthermore, we explore separately a sample of households with a head[4] aged between 20 and 59 years, i.e. householders, and a sample of households with a partner aged between 20 and 59 years, i.e. partners. We started by selecting a sample of households with a head

[3] The analysis of the effect of the COVID-19 shock on the phenomena explored is out of the scope of this work.

[4] As explained in the Introduction, the head is defined as the household component with the highest earnings. As a robustness check, we also defined the head as the individual responsible for the accommodation as suggested by the EU-SILC survey (variable HB080). The overlap between the two definitions of the head was relatively high, i.e. around 70%. We also run all the estimates by using the alternative definitions of head of household and there were no significant changes. For the sake of brevity, we do not report these estimates in the paper. Results are available upon request.

aged between 20 and 59. We then separate into two samples, one with all householders both with and without partner (householders), and one only for householders with partner (partners). This definition of the samples enables us to explore the possible effect of a low-pay condition of head of household and partner on household poverty.

We analyse data for seventeen European countries: Austria, Belgium, Bulgaria, Czechia, Germany, Estonia, Greece, Spain, France, Croatia, Italy, Latvia, Poland, Portugal, Serbia, Slovenia, and the UK. The inclusion or exclusion of countries was based on data availability and other reasons.[5]

We focus on the relationships between the phenomena of low-paid work and at-risk-of-poverty. The dependent variables used in our investigation, which include two equations (see Sect. 4), are a dummy variable for (income) poverty and a categorical variable for the labour market/activity statuses of being not employed (unemployed and inactive), low-paid employees, and high-paid employees. We exclude self-employed workers because of the difficulties related to correctly measuring their labour market earnings (see Brandolini et al. 2002). This choice also helps reducing the possible bias across countries in the share of households with different labour income sources.

At-risk-of-poverty is defined as the fraction of people living in a household with an equivalized income below a threshold, which is defined to be 60% of the national median. Equivalized income is the total disposable household income (after taxes and social transfers) divided by an equivalence scale that gives weight to each person in the household, which is the modified OECD scale.[6]

We also consider the individual level of the analysis; i.e., low pay is conventionally measured in terms of gross individual hourly earnings,[7] with a distribution of earnings lower than two-thirds of the median. Being both the adopted indicators of poverty and low pay are relative measures, i.e. based on the use of relative thresholds, a possible issue is that they are sensitive to income inequality (Foster 1998).

Another possible limitation of thae low-pay indicator is that the thresholds tend to fit the fluctuation of the earning distribution. This restricts the ability of relative threshold to adequately capture the consequences of severe economic shocks affecting wages, unless of relevant changes in earnings inequality. An alternative to mitigate such problems would be the adoption of absolute and/or anchored thresholds or a mix of them (Bavaro and Raitano 2024). However, being the 2016–2019 period here investigated, not involved by severe economic fluctuations, the adoption of relative thresholds would be suitable.

[5] For instance, countries that base EU-SILC on administrative/register based data, i.e. Denmark, Finland, Netherlands, and Sweden, were excluded from our sample as individuals' working conditions could not be identified through self-respondent activity status (for details, see Barbieri et al. 2024). Other countries, instead, were excluded due to the relatively high number of missing information on employee cash/or near cash income used to build indicators for low/high pay work.

[6] Modified OECD scale: $1 + 0.5(N_A - 1) + 0.3N_{CH}$, where N_A, and N_{CH} are the number of adults, children. The scale implies that a weight is assigned to each household member as follows: a weight of 1.0 is assigned to the first adult, 0.5 to the second and each subsequent person aged 14 and over, and 0.3 to each child under 14.

[7] The hourly gross wage is calculated using the EU-SILC information on annual earnings (collected in the year before the interview, i.e. the income year) and those on months spent at work during the year and usual working hours per week (both collected at the moment of the interview, i.e. the survey year). The time lag between variables definition may determine a bias when calculating gross hourly wage. However, current and lagged months of work in our samples display a correlation of almost 90%. In addition, in around 85% of cases, the variation over a year of working hours per week ranges between -5 and +5 h. The high degree of persistence over time of both variables may suggest that the bias in hourly gross wage is quite limited.

We now briefly describe the covariates used, keeping in mind that due to the frameworks employed, we also include lagged dependent variables and initial conditions, as well as the average and initial values of time-varying covariates. Our control variables can be classified into individual and household characteristics. Individual characteristics refer to the characteristics of the head of the household, which is considered representative of the other household members. The variables include ages ranging from less than 25 years to 59 years of age, gender, education, and marital status. Household characteristics include controls for the number of disabled, the presence of elderly, the presence of children aged from 0 to 3 years and from 4 to 15 years, home ownership, and the number of other (other than the head of household) workers who are not employed, low paid, and high paid in the household. For identification purposes, in the labour market equation only, we include a dummy variable for the receipt of unemployment benefits and a variable for the relative change in the regional yearly unemployment rate. For the equation for the partner, we also consider age (a dummy variable for the age range 20–34), gender, and high education. Finally, as we work with longitudinal data, we control for the year.

Descriptive statistics of both dependent variables and covariates for the samples of head of household and partner by country are reported in the Appendix (Tables A1a and A1b).

At the top of these tables, we can see the distribution of our dependent variables. In general, the statistics differ importantly across countries, thereby reflecting different institutions and labour markets. The samples of partners, as expected, follow the same rankings as those of householders (see Tables A1a and A1b). We note that the at-risk-of-poverty in the sample of households with a head of household (partner) aged from 20 to 59 ranges from 5.65% (3.7%) in Czechia to 20.89% (22.02%) in Serbia. Regarding activity status, for householders, we see that the statistics for low-paid workers range from 5.68% in Belgium to approximately 15% in Estonia, while for partners, they range from 6.58% in Greece to 23.71% in Latvia. The distribution of not employed and high-pay workers, as expected, differs widely between householders and partners. For those not employed, it varies from 3.7% in Czechia to 15.2% in Serbia for the household head, while for the latter, it varies from 20.67% in Slovenia to 56.03% in Greece for partners. For those who receive high pay, it ranges from 74.4% in Bulgaria to 89.3% in Slovenia for householders and from 37% in Serbia to 63.34% in Belgium for partners.

Finally, in Fig. 2, we show the relationship between poverty and low-pay work for our samples in European countries (household head on the left panel, partners on the right panel). We see that across the countries explored, on average, low pay is more widespread among partners than householders. Looking at the correlation between the two phenomena, we note that it is positive for householders, while it is negative for partners. The former suggests the leading role of household heads in income formation, i.e., low-pay conditions for householders increase household poverty. In contrast, the latter reflects the added-worker role of partners in households.

4 The econometric approach

We adopt a bivariate discrete response approach to panel data to explore how low-pay work affects the risk of poverty. We model both processes in a dynamic way and relax the hypothesis of strict exogeneity of the labour market state in the poverty equation. We consider two possible sources of endogeneity of low-pay work, i.e., selection because of common time-invariant unobservable factors jointly affecting the two processes and feedback

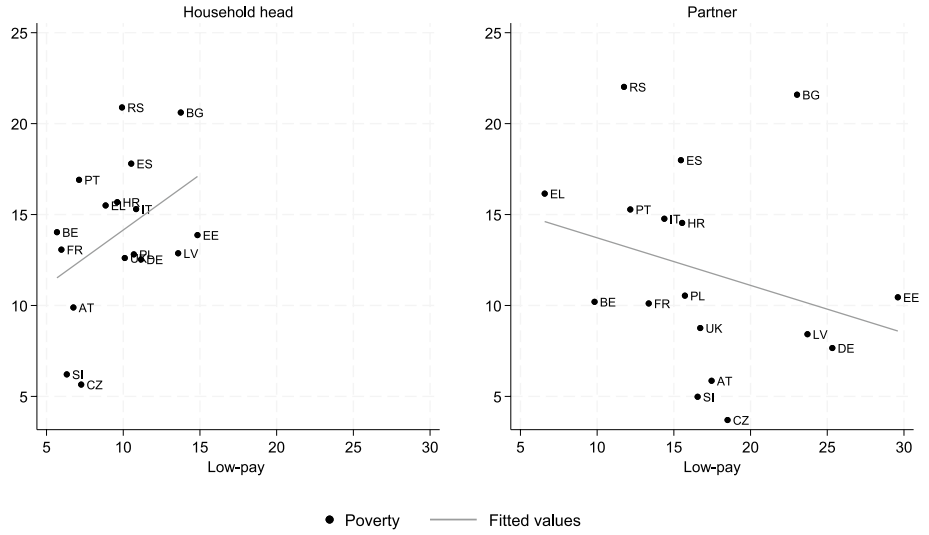

Fig. 2 Poverty and low-pay work in European countries: Householders and Partners. Source: Authors' calculations from 2016–2019 EU-SILC data

effects from past poverty to the current labour market state. The latter tests the hypothesis that labour market outcomes are not randomly determined but are possibly guided by previous income conditions.

The extant literature stresses the importance of comparing low-pay work with alternative labour market outcomes, i.e., unemployment (e.g., Schnabel 2021), to determine if an individual prefers to take up a low-pay job or to remain not employed and wait for a better job offer in the future. For this reason, we consider the entire spectrum of labour market outcomes (i.e., non-employment, low-pay work, and high-pay work) and assume that the utility associated with each alternative is not intrinsically ordered.

Let us define p_{it} as the individual poverty status of individual $i = 1 \ldots n$ at time $t = 1 \ldots T$. Specifically, we assume the latent poverty propensity p^*_{it} reads as follows:

$$p^*_{it} = \alpha_1 p_{it-1} + \alpha_2 l_{ijt} + \alpha_3 l_{ijt-1} + \alpha_4 x_{it} + \alpha_5 z_i + h_i + u_{it}, \tag{1}$$

Starting from the abovementioned unobserved latent propensity variable, we can identify a corresponding observable binary variable that identifies the poverty outcome as follows:

$$p_{it} = \begin{cases} 1 \text{if } p^*_{it} \geq 0 \\ 0 \text{otherwise} \end{cases} \tag{2}$$

We model the observed labour market status as the result of a utility maximization process. We assume that analysed individuals evaluate their labour market status each period and choose that which guarantee the maximization of their utility in that period. We define the unobserved latent utility l^*_{ijt} associated with each labour market state j as follows:

$$l^*_{ijt} = \beta_{1j} l_{ijt-1} + \beta_2 p_{it-1} + \beta_3 w_{it} + \beta_4 z_i + \beta_5 r_{it} + g_i + v_{ijt}. \tag{3}$$

The connection between the latent and the observed labour market state can be derived by the assumption that the observed state has maximal propensity:

$$l_{it} = jif l^*_{ijt} = \max_l \left(l^*_{ikt}\right) \text{ for } j,k = 0,1,2; j \neq k; i = 1 \ldots N; t = 2 \ldots T \tag{4}$$

where $l_{ijt} = \left(l_{i0t}, l_{i1t}, l_{i2t}\right)$ is a column vector that contains value j in correspondence to the labour market state employed by individuals at time t and zero otherwise. $p_{it\text{-}1}$ is the lagged poverty status, and $l_{ijt\text{-}1}$ is the lagged labour market status variable; x_{it} and w_{it} are vectors of strictly exogenous time-variant individual and household characteristics,[8] respectively, while z_i is a vector of time-invariant characteristics. Finally, r_{it} is a vector of controls added to the labour market equation (i.e., the receipt of unemployment benefits and the local unemployment rate). α_1 and β_{1j} are vectors of state dependence parameters for poverty and labour market status, respectively. The vectors of parameters α_2 and α_3 identify the effect of current and past labour market state on poverty, respectively, while the parameter β_2 identifies the presence of feedback effects from past poverty to the current labour market state. α_4, α_5, β_3, β_4 and β_5 are sets of parameters to be estimated. The terms h_i and g_i represent the unobserved time-invariant individual effects for the analysed processes, while u_{it} and v_{it} are identically and independently distributed error terms, which we assume to have been drawn from a Type-1 extreme value distribution. This implies that the poverty probabilities correspond to logit probabilities, while the labour market state probabilities correspond to the multinomial logit probability, both of which are conditional on past observed status, covariates, and unobserved heterogeneity terms.

Because of the dynamic structure of the model and the possibility that the start of the observed data does not coincide with the start of the analysed process, an initial conditions problem arises (Heckman 1981). We address this problem by adopting the Wooldridge method (2005), which involves the use of an alternative conditional maximum likelihood (CML) estimator that considers the distribution conditional on the value in the initial period. In addition, we incorporate the Mundlak method (1978) to relax the assumption that individual-specific random effects are independent of other covariates, thus assuming correlated random effects. Such modelling allows us to distinguish between spurious effects due to unobserved heterogeneity and genuine effects of lagged outcome variables, i.e., state dependence. Further, the use of the Wooldridge's method presents some advantages when dealing with attrition problems that may arise when using unbalanced data. As stressed by Ayllón (2015), the CML estimator permits attrition to vary across the initial status of each outcome, thus individuals with different initial levels are allowed to have distinct missing-data probabilities. Therefore, the method allows handling attrition without explicitly modelling it, and reduces problems associated with the use of richer but unbalanced sets of data.

Formally, the auxiliary models for unobserved heterogeneity read as follows:

$$h_i = \gamma_0 + \gamma_1 p_{i1} + \gamma_2 l_{ij1} + \gamma_3 \bar{x}_i + \mu_i, \tag{5}$$

$$g_i = \delta_0 + \delta_1 p_{i1} + \delta_2 l_{ij1} + \delta_3 \overline{w}_i + \delta_4 \bar{r}_i + \epsilon_i, \tag{6}$$

where p_{i1} is the initial poverty status and l_{ij1} is the labour market state at time 1. $\bar{x}_i$, $\overline{w}_i$, and $\bar{r}_i$ are sets of time-averaged time-variant control variables calculated from periods 2 to T.

[8] w_{it} includes additional partners' variables (i.e., age, gender, and education) with respect to x_{it}.

γ_1, γ_2, γ_3, δ_1, δ_2, δ_3, and δ_4 are sets of parameters to be estimated. Finally, the terms μ_i and ε_i reflect the residual unobserved heterogeneity, which is assumed to be independent of the initial values, covariates, and error terms specified in Eqs. (1) and (3).

We assume that poverty and labour market equations are correlated via random effects, and this is captured by the correlation term $\rho = \text{corr}(\mu_i, \varepsilon_i)$. This allows both outcomes to be affected by common unobservable factors and helps to avoid related bias when estimating how low-pay work affects the risk of poverty.

Finally, because the estimated coefficients describe the sign of the relationship but are inappropriate for determining the magnitude of the impact between outcome and explanatory variables, we compute and report the average marginal effects (AMEs).

5 Results

This section illustrates the main results of the study. First, we focus on the poverty equation and describe how the low-pay work of householders and partners affects the risk of poverty compared with other labour market states and state dependence in poverty (subsection 5.1). Second, we describe the results related to the labour market equation, highlighting the possible role of feedback effects from past poverty on current labour market states and state dependence in the labour market (subsection 5.2). Third, we propose an additional analysis in which low-pay work is based on annual gross income rather than hourly gross income (subsection 5.3). We conclude by presenting a correlational analysis of how the low-pay effect on poverty at the country level is associated with selected macro variables (subsection 5.4).

5.1 Poverty equation

The main estimation results for the poverty equations are illustrated in Tables 1 and 2, which refer to the householders and partners, respectively. For each table, the first two AME columns report the role of past and initial poverty status on the risk of poverty, which allow us to explore poverty dynamics in the analysed countries. The remaining AME columns focus on the role of (current, past, and initial) labour market states, having high-pay work as the reference category. The last columns show the covariance between random effect terms, thus illustrating the degree of correlation between unobservable factors affecting, in turn, poverty and labour market states.

Looking at the householders (Table 1), we note that being employed in a low-pay job increases the risk of poverty in all seventeen European countries analysed herein. The AMEs, however, vary across countries, with minimum values being found for Czechia (+5.3 p.p.) and Slovenia (+5.9 p.p.) and peaks found for Bulgaria (+18.3 p.p.), Estonia (+15.9 p.p.) and Italy (+15.2 p.p.). The AMEs related to other countries are included in the abovementioned range (from +5.9 p.p. to +15.2 p.p.). The heterogeneous effect that low-pay work determines on the risk of poverty across countries is discussed in detail in Sect. 5.4.

Overall, our results highlight the detrimental role that low-pay work plays in household poverty, in line with evidence that emerged from previous studies (e.g., Brandolini et al. 2002; Maître et al. 2012; Barbieri et al. 2018).

Focusing on the role of the not-employed condition of the household heads, we find that it increases the risk of poverty. The AMEs range from +6.4 p.p. (Czechia and France)

Table 1 Poverty equation: Householders

	Poor time t-1		Poor time 1		NE time t		Low-pay time t		NE time t-1		Low-pay time t-1		NE time 1		Low-pay time 1		Cov[u1, u2]	
	AME		AME		AME		AME		AME		AME		AME		AME		Est	
Austria	0.053	***	0.067	***	0.083	***	0.089	***	0.033	**	−0.004		0.001		0.021		0.457	
Belgium	0.059	**	0.050	***	0.063	***	0.076	***	0.069	***	0.002		0.001		0.005		0.746	***
Bulgaria	0.021	**	0.092	***	0.123	***	0.183	***	0.009		0.007		0.046	***	0.002		0.022	
Czechia	0.031	***	0.052	***	0.064	***	0.053	***	0.071	***	−0.010	**	−0.016	***	0.010		0.511	
Germany	0.025	***	0.100	***	0.084	***	0.085	***	0.031	**	−0.019	**	0.057	***	0.032	**	0.791	***
Estonia	0.018	*	0.094	***	0.119	***	0.159	***	0.118	***	−0.006		−0.007		−0.008		0.795	***
Greece	0.097	***	0.097	***	0.114	***	0.085	***	0.017	*	−0.035	**	−0.002		0.020	*	0.745	***
Spain	0.074	***	0.090	***	0.102	***	0.116	***	0.067	***	0.029	***	−0.010		−0.014		0.063	
France	0.036	***	0.096	***	0.064	***	0.089	***	0.019	***	−0.012	**	0.016	*	−0.001		0.558	**
Croatia	0.085	***	0.068	***	0.106	***	0.105	***	0.065	***	−0.006		−0.007		0.019		0.190	
Italy	0.060	***	0.112	***	0.135	***	0.152	***	0.023	***	−0.004		−0.002		−0.002		0.383	**
Latvia	0.051	***	0.069	***	0.110	***	0.110	***	0.037	**	−0.019	*	0.048	***	0.050	***	0.948	
Poland	0.034	***	0.114	***	0.084	***	0.104	***	0.086	***	0.017	**	−0.027	***	−0.022	***	−0.115	
Portugal	0.059	***	0.122	***	0.100	***	0.118	***	0.026	***	0.018	**	0.033	***	−0.026	***		
Serbia	0.067	***	0.102	***	0.169	***	0.087	***	0.015		−0.001		0.009		−0.011		0.157	
Slovenia	0.017	***	0.060	***	0.172	***	0.059	***	0.026	***	0.020	***	−0.018	***	−0.008	*	−0.751	***
UK	0.010		0.100	***	0.121	***	0.067	***	−0.015	*	−0.008		0.053	***	0.062	***	1.624	***

Source: Authors' calculations from 2016–2019 EU-SILC data

We control for the set of covariates described in Sect. 3, including regional and year dummies. *$p < .10$, **$p < .05$, ***$p < .01$. NE refers to not employed

Table 2 Poverty equation: Partners

	Poor time t-1		Poor time 1		NE time t		Low-pay time t		NE time t-1		Low-pay time t-1		NE time 1		Low-pay time 1		Cov[u1, u2]	
	AME		AME		AME		AME		AME		AME		AME		AME		Est	
Austria	0.012		0.070	***	0.006		0.003		0.025	*	0.027	*	0.035	***	0.019	*	2.536	***
Belgium	0.049	***	0.032	***	0.050	***	0.049	***	0.064	***	−0.009		−0.030	***	−0.021	*		
Bulgaria	0.027	***	0.072	***	0.110	***	0.063	***	0.042	***	0.018	*	0.010		−0.026	***	0.666	**
Czechia	0.009	*	0.053	***	0.044	***	0.009		−0.019		−0.034	*	0.031	***	0.036	***	3.285	***
Germany	−0.001		0.084	***	0.085	***	0.071	***	0.005		0.002		0.013		−0.014		−0.086	
Estonia	0.018	*	0.071	***	0.104	***	0.056	***	−0.013		−0.038	***	0.009		0.007		−0.604	
Greece	0.062	***	0.123	***	0.168	***	0.030	***	0.008		0.062	***	−0.044	*	−0.065	***	−0.232	**
Spain	0.094	***	0.058	***	0.093	***	0.070	***	0.025	*	0.015		0.011		0.001		0.196	
France	0.023	***	0.075	***	0.080	***	0.037	***	0.044	***	0.027	**	−0.005		0.000		0.609	
Croatia	0.062	***	0.071	***	0.127	***	0.020		0.057	***	0.042	**	−0.040	*	−0.028		0.136	
Italy	0.050	***	0.095	***	0.135	***	0.050	***	0.003	***	−0.003	***	0.070		0.056		−0.424	
Latvia	0.083	***	0.030	***	0.088	***	0.017	**	0.052	***	0.036	***	−0.011	***	0.014	***	−1.035	***
Poland	0.046	***	0.080	***	0.130	***	0.083	***	0.032	***	0.014		−0.051	***	−0.034	**	−0.657	*
Portugal	0.068	***	0.076	***	0.130	***	0.099	***	0.041	***	0.032	***	0.006		−0.033	***	−0.098	
Serbia	0.062	***	0.094	***	0.217	***	0.064	***	0.058	***	0.052	***	−0.013		0.001		−1.127	***
Slovenia	0.013	***	0.048	***	0.115	***	0.027	***	0.020	*	0.006		−0.016		−0.014		−2.255	***
UK	−0.010		0.103	***	0.089	***	0.042	***	−0.016	*	0.005		0.031	*	0.013		0.732	*

Source: Authors' calculations from 2016–2019 EU-SILC data

We control for the set of covariates described in Sect. 3, including regional and year dummies. *$p < .10$, **$p < .05$, ***$p < .01$. NE refers to not employed

to + 16.9 p.p. (Serbia) and 17.2 p.p. (Slovenia). Quite interestingly, if one compares the AMEs associated with low-pay work and unemployment, it emerges that the former increases the risk of poverty more than the latter in the majority of analysed countries. The absolute difference between the two AMEs is the greatest in Bulgaria (+ 6 p.p.) and Estonia (+ 4 p.p.). Other countries, however, show a similar pattern, with the mentioned difference equal to + 2.5 p.p. in France, + 2 p.p. in Poland, + 1.8 p.p. in Portugal, + 1.7 p.p. in Italy, + 1.4 p.p. in Spain, + 1.3 p.p. in Belgium, and + 0.6 p.p. in Austria. In some other countries, such as Germany, Croatia, and Latvia, the effects associated with low-pay work and unemployment are similar. In relatively few countries (i.e., Czechia, Greece, Serbia, Slovenia, and the UK), the detrimental effect of unemployment on the risk of poverty overtakes that which is associated with low-pay workers.

This finding is in line with evidence that emerged from Brandolini et al. (2002) for Italian householders and possibly indicates the scarce competitiveness of wages earned by low-pay workers relative to non-labour income sources, particularly social transfers, such as unemployment benefits and social support for individuals and households (for a detailed analysis see subsection 5.4).

Other possible channels, such as a possible assortative mating mechanism, which would cause low-pay household heads to marry/cohabit with low-wage partners, may be reasonably set aside, as we control for the number of other employed types in the household.

Turning our attention to the partners (Table 2), our estimates confirm the detrimental role of low-pay work in the risk of poverty. The AMEs range between + 0.3 p.p. (Austria) to + 9.9 p.p. (Portugal). Quite interestingly, such a detrimental effect is smaller for each analysed country than that which we found associated with the household heads. In addition, when comparing the effects associated with low-pay work to those associated with being not employed, we note that the former is always smaller in magnitude than those associated with the latter. The gap is usually relevant, with peaks in Serbia and Greece.[9]

This result countervails which emerged across the householders and possibly highlights that partners play the classical added-worker role in the households. Thus, in relative terms, the partners' choice of participating in the labour market, including being employed in a low-pay job, may be helpful for reducing the probability of being poor for members living in those households. In contrast, our results confirm the leading role of household heads in the income formation of European households. Their low-pay condition is particularly detrimental to the living conditions of related households.

We now briefly comment on the poverty of state dependence. First, we note the existence of moderate genuine state dependence and a certain degree of heterogeneity across countries and between the samples of household heads and partners. Focusing on the former group, state dependence ranges from + 1 p.p. in the UK and + 9.7 p.p. in Greece. Evidence of state dependence is indicative that experiencing poverty may determine a poverty-trapping effect, possibly because of the disincentivizing role of access to social programmes, an increase in demoralization, the depreciation of human capital, and the unfavourable attitudes usually associated with experiencing poverty, which may affect the

[9] As a robustness check, we run our models without controlling for the number of workers other than the householders and partners, respectively. On average, we note an increase in the detrimental effect to poverty in both low-pay and non-employment (see Appendix Tables A8 and A9). These results are consistent with a selection of both householders/partners and other workers, in non-employment and low-pay conditions. This may be due to an assortative mating mechanism within the household in terms of labor market outcomes.

Table 3 Labour market equation: Low pay outcome—Householders

	Poor time t-1		Poor time 1		NE time t-1		Low-pay time t-1		NE time 1		Low-pay time 1	
	AME		AME		AME		AME		AME		AME	
Austria	0.009		0.031	***	0.009		0.050	***	0.016		0.071	***
Belgium	0.000		0.031	***	−0.024	**	0.031	***	0.039	***	0.105	***
Bulgaria	−0.001		0.015		−0.006		0.089	***	0.039	***	0.073	***
Czechia	0.029	***	0.012		−0.020	**	0.032	***	0.042	***	0.146	***
Germany	−0.012		0,027	***	−0.046	***	0.096	***	0.191	***	0.178	***
Estonia	−0.018	*	0.037	***	0.023		0.107	***	0.085	***	0.149	***
Greece	0.026	***	0.013	**	−0.020	**	0.135	***	0.050	***	0.099	***
Spain	0.016	*	0.015	*	−0.015		0.065	***	0.095	***	0.090	***
France	0.002		0.029	***	−0.031	***	0.055	**	0.105	***	0.072	***
Croatia	0.008		0.007		0.022		0.113	***	0.040	**	0.082	***
Italy	0.031	***	0.019	***	0.005		0.077	***	0.069	***	0.144	***
Latvia	−0.030	**	0.043	***	0.041	**	0.158	***	0.010		0.120	***
Poland	0.020	***	0.005		0.009		0.090	***	0.048	***	0.125	***
Portugal	0.009	*	0.013	**	−0.011	*	0.036	***	0.086	***	0.107	***
Serbia	−0.002		0.011	***	0.010		0.068	***	0.021		0.057	***
Slovenia	0.045	***	−0.008		0.022	*	0.046	***	0.026	**	0.085	***
UK	0.014	*	0.018	**	−0.065	***	0.028	***	0.103	***	0.150	***

Source: Authors' calculations from 2016–2019 EU-SILC data

We control for the set of covariates described in Sect. 3, including regional and year dummies. *$p < .10$, **$p < .05$, ***$p < .01$. NE refers to not employed

probability of escaping this condition (e.g., Biewen 2009). In addition, the significance of the starting values of poverty status stresses the existence of a correlation between initial conditions and confounding factors, thus highlighting the importance of accounting for endogenous initial conditions and unobservable heterogeneity to avoid estimation bias in state-dependence parameters. Finally, we stress that the estimated covariances of unobservable factors of both equations, are statistically significant in around half of the cases (last column of Tables 1 and 2), thus indicating that confounding factors affecting poverty and labour market states may be correlated. The sign of the covariance is predominantly positive among householders and more mixed among partners.

5.2 Labour equation: low pay work

Tables 3 and 4 report the results related to the low-pay outcome of the labour market equation for the householders and partners, respectively.[10] The first two AME columns refer to past and initial poverty, while the remaining ones refer to the role of past labour market state. The first column, in particular, allows us to identify possible feedback effects from

[10] For the sake of brevity, results for the other labour market outcomes, i.e., non-employment and high-pay work, for householders and partners are reported in Appendix Tables A2-A5.

Table 4 Labour market equation: Low pay outcome – Partners

	Poor time t-1		Poor time 1		NE time t-1		Low-pay time t-1		NE time 1		Low-pay time 1	
	AME		AME		AME		AME		AME		AME	
Austria	−0.120	***	0.259	***	−0.040	*	0.121	***	0.118	***	0.229	***
Belgium	−0.003		−0.022		0.052	*	0.062	***	−0.006		0.152	***
Bulgaria	−0.025		0.021		−0.184	***	0.021		0.062	***	0.109	***
Czechia	−0.001	***	0.080	**	−0.066	***	0.117	***	0.104	***	0.273	***
Germany	−0.011		0.018		−0.066	***	0.209	***	0.122	***	0.294	***
Estonia	−0.014		0.041		0.095	***	0.320	***	0.046	*	0.145	***
Greece	0.000		0.011		−0.020	*	0.264	***	−0.011		0.056	***
Spain	−0.063	***	0.080	***	−0.149	***	−0.005		0.103	***	0.202	***
France	0.061	***	0.053	***	−0.111	***	0.126	**	0.138	***	0.219	***
Croatia	0.058	***	−0.011		−0.258	***	0.096	**	0.138	***	0.158	***
Italy	0.024	*	0.028	**	−0.152	***	0.051	***	0.127	***	0.209	***
Latvia	−0.072	**	0.183	***	−0.066	***	0.285	***	−0.026		0.092	***
Poland	−0.027	***	0.060	***	−0.218	***	0.035	*	0.120	***	0.226	***
Portugal	0.006		−0.003		−0.084	***	0.177	***	0.071	***	0.081	***
Serbia	−0.026		0.053	***	−0.115	***	0.090	***	0.020		0.092	***
Slovenia	−0.026		0.024		−0.007		0.053	***	0.046	**	0.122	***
UK	0.008		−0.007		−0.161	***	0.082	***	0.140	***	0.203	***

Source: Authors' calculations from 2016–2019 EU-SILC data

We control for the set of covariates described in Sect. 3, including regional and year dummies. *$p < .10$, **$p < .05$, ***$p < .01$. NE refers to not employed

past poverty to low-pay work. Economically, this means the possibility of considering that individuals operate their labour market choices conditional on their income conditions. For example, this possibly links our empirical approach with labour supply theory, according to which non-labour income affects reservation wages and thus labour market participation decisions. More generally, one may consider poor individuals to be more prone to accept low-pay jobs to remove/mitigate their liquidity constraints and/or improve their living conditions.

The sign, significance, and magnitude of this relation differ widely across countries. For the householders (Table 3), we note the presence of a positive association between past poverty and low-pay work in Czechia, Greece, Spain, Italy, Poland, Portugal, Slovenia, and the UK, while lagged poverty reduces the probability of being low-pay work in Estonia and Latvia (−1.8 pp. and −3 pp., respectively). These findings suggest that in some countries (eight out of seventeen countries explored), individuals/householders with poor income conditions are more prone to experience disadvantaged positions in the labour market. Even when entering employment positions, poor individuals are more likely to be selected for low-paying jobs. Notably, the effect for partners is not found in the same countries as householders, and the signs of AMEs partly differ. From Table 4, we note a positive association between past poverty and low-pay work only in three countries, i.e. France, Croatia, and Italy, and a negative association in four

countries, i.e. Austria, Czechia, Spain, and Latvia. These discrepancies possibly reflect the secondary earner role of partners (see Table 4).

In the central part/middle of Tables 3 and 4, we see that non-employed individuals are more likely to be trapped out of employment positions (the association between past unemployment state and low-pay work is negative and significant in all countries with few partial exceptions: Latvia and Slovenia for head of household, Belgium and Estonia for partner).

Looking at both Tables 3 and 4, we also find evidence of genuine state dependence in low-paid work in all the countries explored for both the householders and partners. For the former, state dependence in the condition of low-pay work ranges from 2.8 pp. in the UK to 15.8 pp. in Latvia (Table 3). For the latter, we see that state dependence is relatively higher compared to householders; it ranges from 2.1 pp. in Bulgaria up to 32 pp. in Estonia (Table 4). The relatively high trap effect for partners possibly highlights their added worker role in the household.

For the other labour market states explored, which are reported in Appendix Tables A2-A5 for householders and partners, we see that there is a link between disadvantaged income conditions and poor labour market outcomes. From Table A2, for instance, we can see that past poverty, when significant, is positively associated with non-employment (significant in seven out of seventeen countries explored, and significant in six countries). From Table A5, we also see that past poverty reduces the probability of engaging in high-paying work. Finally, we note that in general, low-pay work reduces labour market opportunities, as a past low-pay work status is negatively associated with both non-employment and high-pay outcome status. We do not find evidence of a stepping-stone role of low-pay jobs towards high-pay positions (see Tables A3 and A5 for householders and partners, respectively).

In sum, our results are indicative that in most countries, disadvantaged positions trap individuals in a vicious circle that links the labour market and income conditions. Removing factors that determine poverty conditions would be helpful to mitigate the abovementioned disadvantages.

5.3 Additional analysis based on annual wages

We provide an additional analysis of low-pay work's effect on poverty, adopting an alternative definition, which is based on annual gross wage rather than an hourly gross wage. Although the hourly-based definition is the official definition of low-pay work, it does not allow for a direct analysis of the role of inequality in working hours and job duration over the year when relating wage conditions and poverty status. While hourly wages associated with part-time jobs and temporary employment may not necessarily be positioned at the bottom of the wage distribution, their yearly counterparts are more likely to determine low annual wage levels because they have the least number of hours worked over the year. This is important, considering that the definition of poverty is based on annual disposable income.

The results from the robustness analysis are reported in the Appendix (Tables A6 and A7). They confirm evidence of the benchmark analysis. First, the detrimental effect of low-pay work on poverty is stronger than that associated with non-employment in the case of householders, while the opposite occurs for partners. Second, the relative impact of low pay over non-employment depends on the relative magnitude of social transfers to earnings.

The magnitude of the AMEs associated with low-pay work, however, is greater when considering annual gross wages rather than hourly gross wages, with the only exception of Bulgaria for householders and Belgium for partners. Among countries experiencing a strong increase in the detrimental effect of low-pay work on poverty when using the annual definition of wages, we note Greece, Spain, and Italy for both householders and partners.

These findings suggest that the use of the annual-based definition amplifies the gap between high-pay and low-pay effects on poverty, possibly because of the contribution of part-time and temporary employment to the inequality in annual working hours, and consequently in annual labour income. In this regard, Bavaro and Raitano (2024) stressed that low-paid workers experienced a reduction in the number of hours worked during the year because of the increasing spread of part-time contracts. Our results, indeed, are consistent with such evidence and suggest that low-paid individuals are prone to a double disadvantaging selection into low wages and few annual hours of work, because of part-time contracts or temporary employment. The transmission from working to poverty condition, therefore, goes through multiple channels dealing with market inequalities, including hourly wages and working hours. As a consequence, among others, policies aimed at preventing poverty among employed people may be based on different approaches, such as the raising of the wage floor through minimum wage, or raising the number of working hours both at individual and family levels.

5.4 Low-pay work and poverty: Some interpretations

This section offers some interpretations of the effect of low-pay work on the risk of poverty, in the light of the conceptual framework presented in Fig. 1. We pay special attention to the mechanisms associated with labour market institutions and social protection, as they play a crucial role in establishing country differences in the investigated phenomenon. In particular, we provide correlational analyses between the estimated AMEs of low-pay variables, i.e. the effect of low pay work on poverty compared with high pay work, and indicators of labour market institutions and social protection.

We are conscious that we cannot assume a causal interpretation of such results and even being exhaustive in providing a complete set of explanations for the phenomenon under investigation. Despite this, our exercise may help to better understand it and to characterize country differences in the low-pay/poverty relationship. Another limitation is that the definitions of both the phenomena investigated are based on relative thresholds (see Sect. 3) and, thus, it is important to acknowledge they are sensitive to inequality (Foster 1998).[11] Nonetheless, as mentioned above, the fact that the period explored was not characterized by relevant economic changes also because relatively shorter, strongly reduces the mentioned risk.

First, we consider indicators for labour markets and income distribution: the employment protection legislation (EPL) index, the expenditure (relative to GDP) for active labour market policies (ALMP), income inequality as measured by the Gini index, the amount of minimum wage relative to average wage (Kaitz index), trade union density, and a measure of earnings inequality, that is the decile dispersion ratio (i.e., the ratio between the ninth

[11] If income inequality increases, for instance, a larger portion of the population should be classified as poor/low-pay because the (relative) thresholds used in the definition are based on median income/wage. On the other hand, if income inequality decreases, relative poverty/low paid might reduce even if the overall income (wage does not rise significantly).

decile earnings and the first decile earnings, both of which are expressed in PPS). Results are reported in Fig. 3 (householders) and Fig. 4 (partners).

We note a negligible association of (low-pay) AMEs with EPL and ALMP, suggesting they are ineffective in explaining country differences in the low-pay effects on poverty. On the contrary, institutions promoting earnings equality appear to have a more significant role.

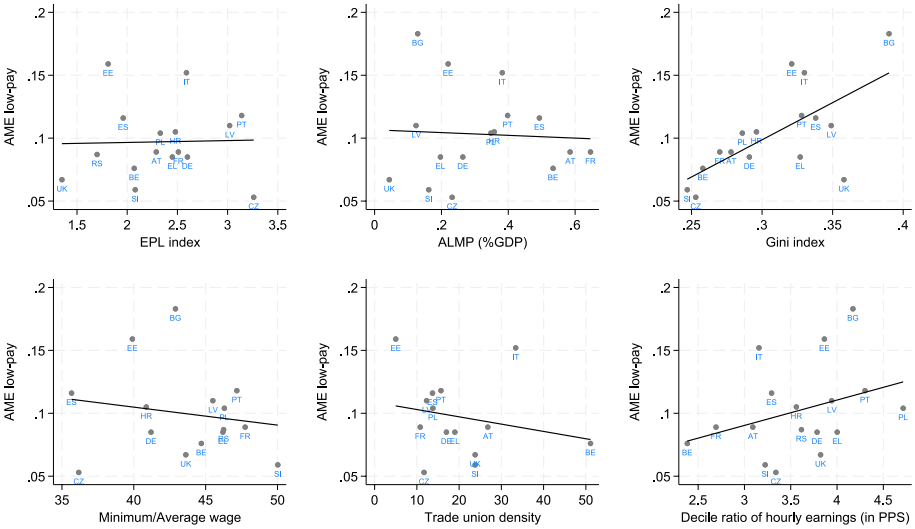

Fig. 3 Correlation between (AMEs) low-pay and macro indicators: Householders. Source: Authors' calculations from 2016–2019 EU-SILC data and Eurostat indicators (2023)

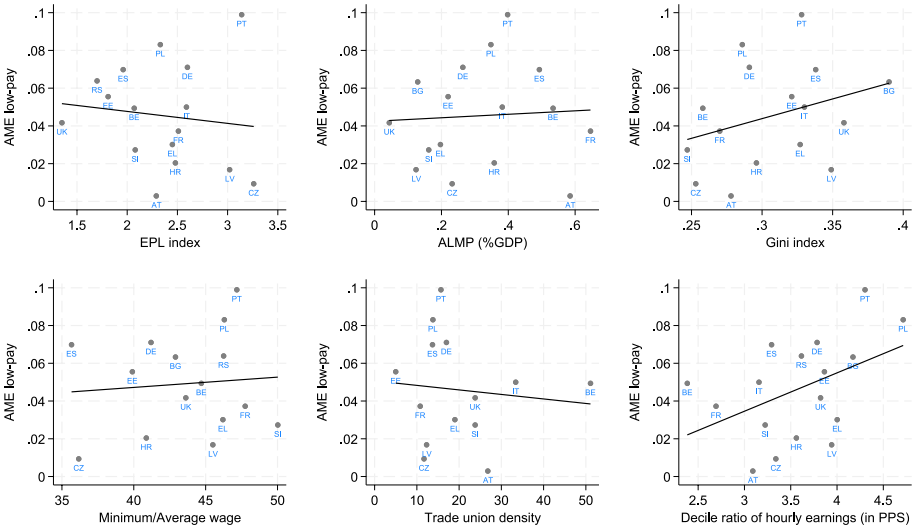

Fig. 4 Correlation between AMEs low-pay and labour market indicators: Partners. Source: Authors' calculations from 2016–2019 EU-SILC data and Eurostat indicators (2023)

Countries with higher minimum wage (relative to average wage) and higher trade union density are characterized by a weaker transmission from low-pay conditions to poverty. On average, 10 percentage points (p.p.) more in the minimum/average wage ratio decreases by 1.5 p.p. the low-pay AME for householder (Fig. 2). The role of trade union density is confirmed for partners, while minimum wage does not exert a protecting role (Fig. 3). Consequently, countries with greater earnings and income inequality, prevalently Eastern European countries and partly the Southern ones, are characterized by stronger detrimental effects of low-pay work to the risk of poverty. On average, one point more in the decile dispersion ratio is associated with an approximate + 2 p.p. increase in the low-pay AME, while one point more in the Gini index is associated with an approximate + 0.6 p.p. increase in the low-pay AME.

These results confirm the hypothesis that labour market institutions mitigating wage dispersion are quite effective in lessening the effect of low-pay work on the risk of poverty. Thus, in countries where the support of wages is more adequate, the negative impact of low pay on poverty would be smaller. A possible explanation is that the mentioned institutions set aside (very) low wages from the wage distribution, In principle, this would determine an increase of the average pay under the low-pay threshold which, in turn, may give rise to the increase of both the low-pay threshold and the poverty lines. However, because the labor income of the analyzed individual is only one of the components of the disposable income, the rise of the former should be relatively stronger than that of the latter. If such a mechanism is at work, the association of low-pay conditions with poverty should be weaker.

We analyse the role of social protection for low-pay effects on poverty by associating the expenditure for overall social protection and unemployment benefits (both expressed in Euro per inhabitant, at constant 2010 prices) with the (low-pay) AMEs at the country level (Fig. 5).

The analysis reveals a (slight) negative association between the expenditure for overall social protection and the low-pay AMEs of householders, while the association is

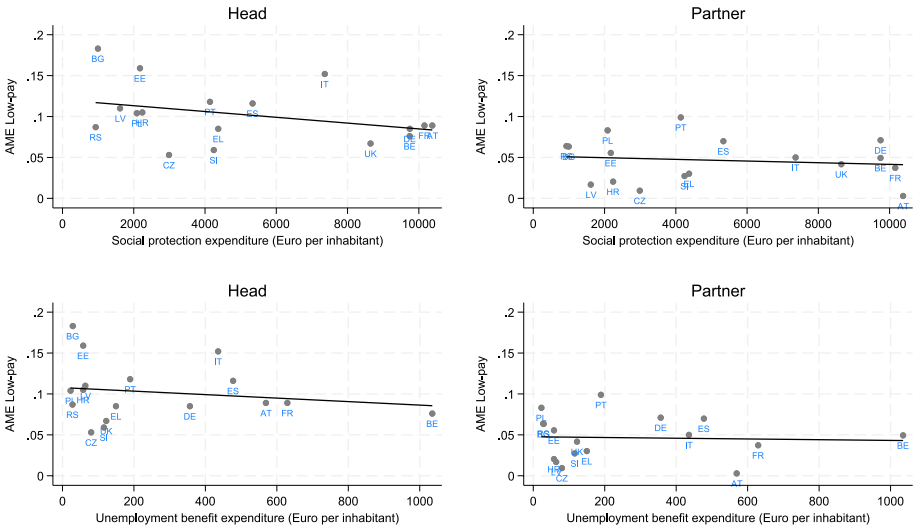

Fig. 5 Correlation between AMEs low-pay and social protection expenditure. Source: Authors' calculations from 2016–2019 EU-SILC data and Eurostat indicators (2023)

negative but weaker for partners. Similar findings emerge for unemployment benefits. These results support the hypothesis that more generous welfare systems may mitigate the negative impact of low pay on poverty. Higher non-labour incomes, *ceteris paribus*, is associated with higher reservation wages, thus reducing the probability individuals may accept wages at the bottom of the wage distribution. Similarly to the mechanisms described above, this may weaken the link between low pay and poverty.

We provide an additional analysis to examine closely why in some cases low-pay work is detrimental to poverty more than non-employment. With this aim, we associate the impact of low-pay work relative to non-employment (as measured by the difference between the AMEs of low-pay and non-employment, respectively) with the expenditure for social expenditure relative to the average earnings. Results are shown in the Appendix (Figure A2).

We find that, on average, higher the level of public expenditure (both overall social protection and unemployment benefits) on average earnings is, more that low-pay work is detrimental to poverty relative to non-employment.[12] The effect is heterogeneous at the country level. Some Eastern European countries (such as Estonia, Bulgaria, and Poland), despite the scarce generosity of social transfers relative to earnings, display a comparatively great detrimental effect of low pay (relative to non-employment) on the risk of poverty. This may signal that the low-pay state in the labour market is penalizing in terms of income formation. Therefore, the generosity of market wages to public transfers may contribute to explaining how low-pay work affects the risk of poverty. In countries characterized by high levels of social protection expenditure and/or low wages, low-pay work may be worse than being not employed in terms of the risk of poverty.

Evidence emerged from Figs. 5 and A2 can be rationalized concluding that more generous expenditure for overall social protection mitigates the negative impact of both low-pay work and non-employment on poverty. Such mitigation, however, is greater for the latter, thus suggesting that the direct effects that social protection exerts on non-employed is more effective than the indirect effects it produces on low-pay work.

6 Conclusions

We investigate the impact of low-pay work of householders and partners on household poverty in European countries.

First, our results suggest that low pay and poverty are dynamically interrelated. In several countries, being low-paid householders is associated with an increased risk of being poor relatively more than among not employed householders. The contrary happens among partners. On the one hand, this matches the leading role of householders in income formation. On the other hand, this signals the disadvantaging conditions determined by low-pay work. Notably, given that low-pay conditions increase household poverty, we should reasonably expect that these also raise the phenomenon of working poor.

Second, we find evidence of feedback effects from past poverty to low-pay work, both for household heads and partners. This suggests that possibly disadvantaged positions trap

[12] Notably, such a relationship holds when considering the first earning decile level instead of the average earnings.

individuals in a self-reinforcing mechanism that links poor labour market outcomes and poor income conditions.

Third, we find evidence of genuine state dependence in labour market states, especially for not employed individuals who are more likely to be trapped out of employment positions. Fourth, our results do not show a particular stepping-stone role of low-pay jobs towards high-pay positions for either householders or partners. Thus, the poverty/low-pay dynamic relationship and the limited upward mobility in the labour markets might drive societies towards persistent income segmentation.

We also highlight that low-paid workers are more likely to be selected for job positions characterized by fewer annual working hours, such as part-time and temporary employment. This may strengthen their risk of poverty.

Finally, the correlational analysis helps to characterize country differences in low-pay effects on poverty. Where institutions (e.g., minimum wage and union density) offer stronger support to the wage floor, the low-pay impact on poverty is cushioned, especially among householders. On the other hand, low-pay effects are stronger in countries characterized by higher earnings and income inequalities, thus singling out a mechanism of persistence in disadvantaged positions. Similarly, in countries where public transfers are less generous, we note the effect of low-pay work on poverty is more detrimental.

These results stress that employment creation may be an insufficient condition to lead individuals and households out of poverty, especially whether poor jobs are held by householders. On the contrary, they may help to contrast poverty when playing an additional role for household income, i.e. among multiple earners households. The presence of effective social support is crucial to mitigate the negative effects of low-pay work on poverty. In addition, factors limiting earnings inequality and boosting the wage floors, such as minimum wage and union density, might be helpful, especially for the weakest segments of the workforce who are employed in marginal and low-paid positions. Indeed, one of the purposes of such measures is to protect workers against the risk of being low-paid; thus, such a minimum should be one of the elements included in policies aimed at overcoming poverty, reducing inequality, and mitigating income segmentation over time.

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Author contributions The authors confirm contribution to the paper as follows:

First author: Literature, Data, Results: poverty equation, Conclusions.

Second author: Introduction, The Econometric Approach, Results: Labour equation: low-pay, Additional analysis based on annual wages, Low-pay work and poverty: Some interpretations.

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Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

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