RESEARCH PAPER

Towards a Better Understanding of Poverty in the Italian Labour Market

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Abstract

During the last century poverty was mainly associated with unemployment status. Over the years, changes like the globalization process and policies to increase labour market flexibility led to a weakening of labour market institutions and the consequent worsening of workers' socioeconomic conditions, to the naissance of the working poor class. The literature does not provide a unique definition of working poverty, but several definitions can be obtained by combining the labour market dimension with different poverty definitions. While "in-work poverty" is the EU indicator to detect working poverty in the labour market, it has several limitations because of its hybrid nature: it considers both the sphere of work of the individual and the family dimension. Relying on an advanced version of the 2019 IT-SILC survey dataset, the objective of this study is twofold. First, we propose an alternative measure considering territorial and sectoral disparities to have a better understanding of the low-wage employment in the Italian labour market. Second, we investigate the determinants of each type of working poverty explored and their potential coexistence.

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1 Introduction

Poverty among workers, albeit always existing in different forms, started to become a relevant issue in Europe, at least from a methodological point of view, at the beginning of the century. The European employment guidelines established by the European Council in 2003 explicitly recall the need to reduce the number of working poor, thus opening the floor to formal recognition of working poverty through the definition of relevant indicators (Bardone and Guio 2005). Following this indication, different formulations have been proposed but became operative only in 2015 regarding the in-work poverty indicator. Following this indication, different formulations have been proposed but became operative only in 2015 regarding the in-work poverty indicator.

In this regard, the literature does not provide a unique definition of working poverty, but several definitions can be constructed by combining the labour market dimension with various poverty standards. As a consequence, both academic studies and institutional works tend to adopt different definitions to assess the working poverty issue. Adopting the traditional framework of poverty to mirror the absence of "(enough) work", the "in-work poverty" (IWP) indicator conceptualizes the relationship between poverty and the labour market after the intervention of the potential household compensation effect. Contrary, other definitions, such as the "low wage employment" (LWE), which are strictly focused on the workers' economic conditions in the labour market, provide a more de-familiarized interpretation of this phenomenon, emphasizing the absence of "(good) work" at the individual level. Thus, the assumptions behind these two different approaches to measuring the working poverty issues lead not only to varying interpretations of the same phenomenon but also, more importantly, to identifying different dimensions of poverty. Indeed, being a low-paid worker does not imply necessary living in a poor household because the sharing of other incomes and tax redistribution could compensate for a poverty condition in the labour market. Similarly, earning more than a low-paid job does not avoid the risk of living in a household at-risk-of poverty if the latter is large and fully economically dependent on the worker's income. These conditions can coexist, reaffirming the traditional relationship between labour market conditions and poverty in contemporary terms. Therefore, depending on which setting is adopted to analyze the working poverty issue, i.e. preferring the individual within the labour market or the worker within the household, the understanding of the phenomenon is changeable.

In the literature, the prevalent approach is usually the latter, and low-paid work is studied as a determinant of in-work poverty, representing a relevant factor, with low work intensity and demographic drivers (Lohmann and Crettaz 2018). To the best of

our knowledge, the coexistence of these conditions—especially IWP and LWE—has only been partially explored, and the studies mainly focused on the causal relationship between the two conditions (Horemans 2018; Maître et al. 2018), rather than on their complementarity. Furthermore, evidence suggests that poverty and working poverty present a high level of heterogeneity among populations belonging to different social groups (Saraceno et al. 2020). The geographical area of residence and the economic sectors of activity are two dimensions contributing to explaining this heterogeneity. On the latter, the literature on dualization and segregation (Rueda 2005) of the labour market has highlighted that the insider–outsider divide and the "precarisation" process have impacted the industrial sectors in a different way resulting in a diverse erosion of labour market institutions, which in turn has led to differentiated "room" for low-paid jobs. On the other hand, the territorial dimension, especially for the Italian case, is a primary traditional determinant in poverty and labour market inequality, as Bilocati-Rinaldi and Podestà (2008) and Ascoli and Pavolini (2015) highlighted concerning IWP. However, studies focused on the role of industrial sectors, or the joint combination of the industrial sectors and territorial areas, have not been developed yet.

This reasoning, meaning whether measuring poverty among workers needs to be conceptualized adopting a household or an individual framework, is crucial under several perspectives. Limiting the attention to an "applicative" dimension, without undermining the importance of the philosophical or cultural perspective, we believe that there are two primary questions at stake. First, which indicators, or a combination of indicators, provide a better understanding of the phenomena? Subsequently, does this potential better understanding can improve the policy-making process? In other terms, the literature suggests that poverty among workers, as poverty in general, is a heterogeneous phenomenon (Saraceno et al. 2020). The recent growth of European countries that have implemented minimum income scheme measures characterized by policy design in between active labour market policy and social inclusion policy (Raitano et al. 2021) is a clear indicator of the rising of in-work poverty but also its heterogeneity. The ability to differentiate the root causes of the individual condition of labour market poverty between the household dimension and the labour market dimension can constitute an important tool to address the related policy better. We are aware that these causes are highly connected (Saraceno 2020) and that anti-poverty policies must have a multidimensional approach, but a more precise picture of poverty among workers could, within this multidimensional framework, lead to a more efficient policy-making process (as the fundamental Tinbergen Rule indicates).

The aim of this study is twofold. First, we propose an alternative version of the LWE indicator that takes into account territorial and sectoral disparities to better understanding the LWE phenomenon in the labour market. Second, we identify different subgroups of workers according to their poverty status based on a combination of the indicators adopted and, for each of them, we investigate the prevalent characteristics at individual and household level. The analysis is based on Italy and relies on data from an advanced version of the 2019 IT-SILC survey dataset provided by

INAPP.[1] Italy poses as an interesting case study under several aspects. On the normative side of the labour market, Italy (like Denmark, Finland, Sweden and Austria) has not yet introduced a national minimum wage and has only recently implemented a minimum income scheme already reformed twice. Moreover, Italy is affected by the potential drivers highlighted above: significant, territorial divides at the national level (Acciari and Mocetti 2013; Bertolini et al. 2008; Gallo and Pagliacci 2020); and high wage inequalities within the labour market (Albanese and Gallo 2020; Busilacchi et al. 2021) partially driven by the workers' economic sector of activity. Moreover, Italy is an advanced economy with a relatively high level of poverty with respect to the European level (Raitano et al. 2021).

To the best of our knowledge, this paper provides the first attempt of investigating, at a regional (NUTS-2) level, the income working poverty in the Italian labour market by means of different definitions and their possible intersections. We also contribute to the socio-economic literature by presenting a new poverty measurement that accounts for territorial and sectoral differences. Moreover, we study how the profile of poverty changes according to the working poverty definition adopted across the population, stressing potential limitations of the IWP and LWE indicators in particular. Finally, we explore for the first time the determinants of different types of poverty resulting from the intersection of the adopted indicators in the labour market context.

The remainder of the paper is organized as follows. Section 2 presents a review of the socio-economic literature on the topic and its definitions. Section 3 illustrates the sample of analysis based on the IT-SILC data and the econometric strategy. Section 4 aims to explore wage heterogeneity while Sect. 5 presents the descriptive analysis. Section 6 shows the results of the econometric analysis and in Sect. 7 we present some robustness checks. Section 8 concludes.

2 Literature Review

2.1 Working Poverty Definitions

Socio-economic literature has a remarkable lack of consensus on the definition of working poverty (Crettaz 2013; Lohmann 2018) even if the IWP indicator has been introduced in the Portfolio of EU social indicator since 2015 to monitor poverty among workers (European Commission 2015). The "eligible" population of the IWP indicator is composed of those who declare themselves to have employment status for more than half the period for which the information is available (i.e. people who declare main activities carried out in a 12-month period are considered "workers" if they are employed for at least 7 months). Whereas the economic dimension is measured at the household level by means of equivalized disposable income, with a threshold set at 60 per cent of the median values of the national distribution. Particularly, this relative measure pools together all income sources of each family member. In short, the

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[1] This advanced version contains additional information with respect to the standard one, because it adds variables linked to extra questions collected by the Italian National Institute of Statistics (ISTAT) to those related to the EU-SILC questionnaire. INAPP has access to this advanced version as it belongs to the Italian National Statistic System (SISTAN).

IWP indicator is developed on the assumption of the safety-net function of the family through the redistribution of resources and thus combines the individual working conditions with the household dimension. In other words, the IWP indicator emphasizes household dimensions over individual labour market outcomes.

The limits of the IWP indicator involve some relevant distortions in relation to both spheres. First, through his approach only individuals with at least 7 months of working activity are considered in the labour market resulting in the exclusion from the "eligible" population of more marginal workers. Second, the relevance of the household dimension in driving the IWP makes the indicator sensitive to an increase in labour market participation even if it implies an increase in poor-quality jobs, provided that the work activity improves income household conditions (Raitano et al. 2019). As matter of fact, the IWP indicator is not able to detect the gender gap issue in the labour market, leading to the well-known "gender paradox" (Ponthieux 2018). This implies that, even if women have lower wages and are more subject to temporary or part-time jobs, they are less affected by IWP than men, because in most cases they are the second earner of the household after their partner (Barbieri et al. 2018b; Maître et al. 2018).

In relation to the individual poverty condition of workers indicator regularly monitored by Eurostat[2] is the "low wage earners" or "low wage employment" (LWE) rate, which measures the incidence of workers with gross hourly earnings equal to or below the two-thirds of the median (Salverda 2018). This indicator has no constraints for what concerns the definition of the "eligible" population of workers. All people whose main activity is working are considered for the analysis, and workers with hourly wages below the threshold are defined as low-paid or poor workers. Similarly, some studies define low-pay workers as those who have annual earnings lower than 60% of the median earnings (Ciucciovino et al. 2021; Maître et al. 2018).

In short, IWP and LWE indicators are different tools that represent distinct phenomena. While the IWP is a complex indicator that involves several dimensions, the LWE indicator simply measures a labour market outcome of individuals. Salverda (2018), making an international comparison, observes that for most countries the incidence of the LWE scale is considerably higher than the IWP one, moreover, from a cross-country perspective LWE does not seem to be correlated with IWP. These results are justified considering that income redistribution and the household combination of individual earnings affect (household) disposable income (Salverda 2018). In summary, being a low-paid worker does not necessarily imply living in a poor household. However, despite the overlap between LWE and IWP is not so sharp, there are some relevant social factors, changing over time, that could lead to the joint presence of these two conditions, such as family patterns (e.g. single-income households, gendered division of labour) or labour market characteristics.

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[2] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Earnings_statistics#Low-wage_ea rners.

2.2 Evidence on Determinants of Working Poverty

Working poverty is a complex phenomenon that can be explained by factors related to different dimensions, which can range from demographic characteristics to the production structure of a country. These factors change also according to the definition adopted in the analysis.

Concerning demographic characteristics gender is the most debated factor in this field. If we look at the gender gap through the lenses of the IWP indicator, being a woman reduces the risk of being a poor worker (Barbieri et al. 2018b) as a result of the "gender paradox" highlighted before. Contrarily, the adoption of the LWE indicator potentially leads to opposite results (Christofides et al. 2013). The intergenerational dimension, especially concerning young cohorts, is a further element of differentiation. Albeit LWE in young cohorts is often considered a temporary "stepping stone" in the labour market (Booth 2002), its persistence could become a poverty trap in the medium or long terms. On the other hand, through the IWP indicator, the buffering effect of the family cleanses from this temporary exposition of the young generation. Still, it can potentially hide international differences related to cultural orientation (Maître et al. 2018). Indeed, assuming a constant LWE exposition among young cohorts, in countries where young people are eager to leave the parental house, the risk of IWP can be higher than in contexts where independence from the parental house happens later in life (Lohmann et al. 2018).

The individual or household nature of these indicators results in different readings of the phenomenon, even concerning two important determinants for working poverty: low work intensity and low hourly wage. Low-paid workers in one-earner families are more likely to suffer from IWP than non-poor workers (Barbieri et al. 2018a). On the contrary, LWE, due to its focus on hourly earnings, can potentially lead to underestimating the role played by work intensity and the participation of household adult components in the labour market. Indeed, the difference in the IWP risk between permanent and temporary workers is mainly due to the incomplete labour market attachment of the latter, but this factor is as relevant as low wages in Italy and Luxembourg (Horemans 2018). Moreover, IWP risk is lower for workers living in households with multiple earners (Maître et al. 2018; Barbieri et al. 2018a).

Similarly, the relevant importance of institutional characteristics of the labour market in influencing low-paid employment tends to be more prominent for individual-based indicators such as LWE. Lucifora et al. (2005) detected a negative effect of unionization of the labour market on low-pay incidence. Contrary, some aspects of labour market flexibility could affect workers' wages, for example, considering the hourly wage, part-time employment led to a higher low-wage risk (Aaronson and French 2004; Fernández-Kranz and Rodríguez-Planas 2011). Moreover, other characteristics of the production system, like industry composition and plant size, are also relevant for determining wages (Bachmann and Frings 2017; Kwoka 1983). In general, evidence indicates that individual characteristics, as age, gender but also the position in the labour market, including work intensity, profession and skill (Brülle et al. 2019), lead to different interpretation of working poverty depending on which indicators is used.

According to the literature presented, the joint consideration of the two main indicators presented, IWP and LWE, allows the identification of three distinct groups of "poor workers": (i) those who live in a household at risk of poverty but not experiencing an individual "poverty" in the labour market; (ii) those who experience "poverty" in the labour market but live in a household not at risk of poverty; (iii) those who experience "poverty" in the labour market and live in a household at risk of poverty. Considering the different effects of the individual labour market characteristics related to the indicators presented above, we believe that further disentangling the poverty condition among workers is needed.

The different profiles generated by the intersection of the two prevalent indicators, IWP and LWE, inform interventions and policies aimed at limiting or fighting this social phenomenon. Workers not directly exposed to poverty within the labour market but living in households at risk of poverty potentially require a package of interventions of a social inclusion nature primarily directed to the household members. Contrary, low-pay workers living in households not at risk of poverty imply a different kind of intervention more directed toward (active) labour market policy. Moreover, the joint presence of poverty within the labour market and within the family requires further intervention to address the household and the individual necessities. Furthermore, since the literature indicates a significant sensibility, especially for individual-based indicators, to territorial and labour market characteristics to further inform the reasoning of different profiles of workers in the labour market context, we included these dimensions in the definition of our indicator.

2.3 The Italian Case

In an international comparison, Italy has a moderate problem related to low wages, but its level of IWP is higher than the European average (Raitano et al. 2019). Across European countries, IWP seems mainly related to unemployment, but Italy differs in this regard as the IWP risk among the "core labour force", meaning full-time employees, is particularly high compared to the other EU members (Hallerod et al. 2015). Considering that, by construction, this indicator excludes workers with low working intensity; this consideration suggests that in Italy, IWP lies at the intersection between the number of earners in the family and the job quality, especially regarding hourly wage. Furthermore, as highlighted, IWP in Italy is structurally influenced by the North–South divide. According to Bilocati-Rinaldi and Podestà (2008), the South rate is seven times higher than in the North-centre area. However, but territorial inequalities go beyond the historical Nord–South dualism: Gallo and Pagliacci (2020) show that inner areas play an overall increasing factor at the poverty and inequality levels, whereas Addario and Patacchini (2008) detect a positive effect of the urban scale on wages.

An important root of this territorial inequality lies in the productive structure which is an important dimension of inequality across Italian regions. Indeed, the economic structure of South Italy is historically characterized by the significant presence of the agricultural sector and technological underdevelopment, while North Italy has a

stronger manufacturing structure. The process of tertiarization has taken on different dynamics in the two areas, bringing the service sector in Southern Italy to be predominantly characterized by public administration (Ferrucci and Picciotti 2017). Differences in the productive structure between Nord and South, considering the relative difference in the incidence of low-wage workers among sectors (Lucifora 1997), could be another dimension that exacerbates the overall wage inequalities in the country.

This context highlights the need to develop measurements able to control for different kinds of inequalities. In line with the ISTAT 2009 absolute poverty indicator,[3] the consideration of territorial inequalities in the analysis of relative poverty seems to have relevant implications for assessing of the phenomenon at a local level, considering the different costs of living and consumption possibilities (Ayala et al. 2014; Biggeri et al. 2018; Fabrizi et al. 2020).

As the literature review shows, the exclusive use of IWP or LWE indicators to observe working poverty could lead to inaccurate remarks, since these indicators offer only a partial point of view. Moreover, the high heterogeneity that characterizes Italy requires to consider territorial inequality in the poverty definition. Starting from this main point the aim of this study is twofold. First, we want to propose an alternative measure to assess the poverty condition of workers in the labour market. To achieve this purpose, we improve the LWE indicator by taking into account both geographical and sectoral disparities. We exploit the most detailed territorial information available to assess poverty according to the standards of living of societies where people live (Sen 1983). Moreover, we study how the profile of poverty changes according to the working poverty definition adopted across the population and, finally, we explore for the first time the determinants of the coexistence of different types of poverty in the labour market context. Rather than proposing a unique indicator for assessing the poverty condition in the labour market, our will goes in the opposite direction. A plurality of points of view is needed to properly detect and govern a complex and multidimensional phenomenon such as that under analysis. Notably, the intersection of IWP and LWE allows to inform on the main driver of the poverty differentiating between the individual and household "root". Including territorial and sectoral thresholds highlights areas where policymakers can intervene to reduce (or prevent) inequality.

3 Data and Methods

The analysis relies on the Italian component of the European Union Statistics on Income and Living Conditions (IT-SILC) survey data. Specifically, we focus on the last IT-SILC wave not affected by the pandemic among those available to date, thus the 2019 one.[4] The standard SILC dataset provides detailed micro-data on income, labour, and demographic and socio-economic characteristics at both individual and

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[3] In 2009, ISTAT adopted a new methodology for the detection of absolute poverty, assuming homogeneous needs on the territory but different price levels for geographical areas and thus generating differentiated poverty thresholds in the territory.

[4] To be noted, in SILC survey data, all information about incomes, living conditions, and occupational characteristics of household members refer to the year before the interview, i.e. the year 2018 in this case.

household level. To develop this study, we however have access to an advanced version of the IT-SILC dataset, which contains additional information on several aspects, such as the municipality of residence, the household wealth and savings, and the receipt of specific social transfers existing in the Italian welfare system.

In line with the existing literature on the topic, we made some restrictions to the whole IT-SILC sample to define our sample of analysis. First, similarly to Ciucciovino et al. (2021), we consider people between the ages of 18 and 64 to have positive gross earnings (both employee and self-employed incomes) only. Also, still in line with the definition recently adopted by Garnero's Commission to analyse the working poverty in the Italian labour market (Ciucciovino et al. 2021), we further drop from our sample those individuals who worked less than 7 months in the reference year (3.1% of individuals who work at least 1 month) to make a clearer comparison between the different poverty conditions among workers, so our final sample counts 16.238 workers. The main characteristics of the sample are presented in Table 4 in the Appendix A. To be noted, we decided not to exclude either part-time workers or self-employed workers to have an as raw as possible representation of the Italian labour market in the comparison between poverty definitions.

In the main analysis we focus on gross hourly earnings, in doing so our results are not affected by the different work intensity of individuals in the reference period. Since IT-SILC does not provide this kind of information we computed the gross hourly earnings by dividing the annual gross earnings by the number of hours worked in the reference period, exploiting the information on worked hours in a week. Robustness checks based on gross annual earnings and net hourly earnings are presented in the Appendix B.

As mentioned in Sect. 2, while the IWP threshold depends on the distribution of household equivalized disposable income, we calculate LWE on the distribution of gross hourly earnings. In both cases, however, poverty thresholds are defined at the national level, so that such threshold is the same for all individuals living in the country. To be in line with the standards defined by the European Commission as regard the analysis of the IWP and a better understanding of poverty conditions, the poverty threshold is set at 60% of the median for both indicators.[5] To better assess territorial and sectoral inequalities, the LWE indicator may therefore be improved using multiple (still relative) poverty lines. Specifically, we suggest two alternatives to the standard LWE indicator: a LWE indicator based on territorial thresholds (LWET); a LWE indicator based on territorial and sectoral thresholds (LWETS). As for the definition of economic sectors, we distinguish 13 different sectors starting from the 2-digit NACE information available on SILC data. As for the territory definition, we instead distinguish 17 different territories starting from the NUTS-2 region information.[6] The

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[5] Robustness checks were performed using thresholds set at 50%, 60%, and 2/3 of the median. The main considerations and findings of the analysis remained unchanged across these alternative specifications. More details are available upon request to the authors.

[6] The available information is related to the region of residence, while the region where the workplace is located is unknown. Despite the two territories may diverge, ISTAT (2014) reports that the province of residence (Italian NUTS-3 level) is different from the province where individuals work for less than 10% of commuting workers, so the case of workers commuting out of their region of residence is likely to be even rarer,

aggregation of both 2-digit NACE sectors and NUTS-2 regions presented above is the result of a data exploration process aimed at ensuring at least twenty observations for almost all combinations of territory and sector.[7] Similarly, to the LWE indicator, the LWET (LWETS) threshold is then equal to 60% of the territorial (and sectoral) median of gross hourly earnings distribution.

To underline the importance of exploring alternative definitions of the LWE status, we provide in the Appendix some descriptive statistics showing a comparison between LWET and the LWE thresholds (Fig. 8 in Appendix A), then a comparison between LWETS thresholds and the corresponding LWET threshold (Fig. 9 in Appendix A). These preliminary statistics clearly highlight a remarkable difference across the country in terms of territorial poverty lines. In particular, territories located in the South of Italy tend to report a threshold below the one at the national level, thus indicating an overall left-shifted earnings distribution.

As shown in the literature review, another source of income inequality is related to features (e.g. wage differentials by sectors, composition of workers population, available resources and infrastructures) of the territorial productive system. For this reason, along with differences across the country, it is likely that relevant differences exist among sectors within each territory. Figure 9 actually confirms what is expected, showing that LWETS thresholds are in most cases quite distant from the corresponding LWET ones. Moreover, some sectors (Agriculture, Retailing, Hotels and Restaurants) report a threshold steadily below the territorial one, while for others (Transport/Warehousing, Health and social services) the relative distance varies across territories. Table 5 in the Appendix shows details of the Statistical Classification of Economic Activities.

Once observed discrepancies between different poverty definitions at the aggregate level across the country, in Sect. 6, we provide an econometric analysis providing some evidence on individual (i.e. gender, age group, citizenship, education level) and labour characteristics (i.e. type of employment, part-time contract, temporary contract) which influence—*ceteris paribus*—the probability of being considered in a poverty condition according to the different definitions analysed.

The econometric analysis will follow two stages. We first explore the effects of covariates on one poverty definition per time (i.e. IWP, LWE, LWETS) and then we focus on the possible overlaps between the three poverty definitions.[8]

We estimate the probability of being poor according one of the poverty definitions adopted of individual using the following binary Logit model specification:

$$P_i^* = \beta X_i^D + \gamma X_i^L + \rho_i + u_i$$

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[7] The only combinations of sector and territory that fail to reach 20 observations are the Agriculture in Liguria, Umbria and Abruzzo-Molise, and Hotels/Restaurants in Sardinia.

[8] Additionally, a test on the skewness and kurtosis of the residuals was conducted to assess the normality assumption for each of the poverty definitions under analysis (IWP, LWE, and LWETS). The test was performed using the Stata command *sktest*, which implements the method described by D'Agostino et al. (1990) with the empirical adjustment proposed by Royston (1991). The null hypothesis assumes a normal distribution of data. Since the normality test of the residuals returned a p-value approximately equal to zero for all three poverty definition models, we rejected the null hypothesis and opted for the estimation of Logit models.

$$P_i = 1[P_i^* > 0]; u_i \underset{iid}{\sim} Logistic, \text{ independent of } X_i^D, X_i^L, \rho_i.$$

where P_i is a dummy variable that describes working poverty statuses (IWP, LWE, or LWETS respectively), X_i^D is a vector for demographic characteristics (gender, age, education level, citizenship, and municipality size) and X_i^L is a vectors that contains employment characteristics (1-digit ISCO classification level, part-time employment status, type of contract, and economic sector of activity). Since the relationship between the economic condition and the employment characteristics could be affected by confounding effects, we run both a restricted form (Model A) by considering just demographic characteristics X_i^D and an extended form (Model B), where we add information related to labour market X_i^L. Both Model A and Model B include NUTS-2 region fixed effects ρ_i.

Then, to study the overlap between the different poverty definitions, we run the following multinomial Logit model:

$$MP_{ij}^* = \beta_j X_i^D + \gamma_j X_i^L + \rho_i + \varepsilon_{ij}$$
$$MP_i = j \text{ if } MP_{ij}^* > MP_{ik}^* \text{ for } k \neq j; \ j, k = 1, 2, 3, 4, 5, 6, 7$$
$$\varepsilon_{ij} \underset{iid}{\sim} GEV(1), \text{ independent of } X_i^D, X_i^L, \rho_i.$$

The dependent variable MP can have seven values, representing an aggregation of all the possible combinations of the three-poverty definition under analysis. To be noted, the potential outcomes of MP become six if we exclude the 'no poverty' status (i.e. the absence of all the three poverty conditions considered). Similarly to the base Logit model presented above, X_i^D is a vector for demographic characteristics, X_i^L is a vector that contains employment characteristics, and ρ_i is a vector of NUTS-2 region fixed effects.

Finally, individual sample weights provided in IT-SILC data are used in all descriptive statistics and regressions presented. Also, all regressions have standard errors clusterised by the NUTS-3 region.

4 Explaining the Wage Heterogeneity

Before defining working poverty from a territorial and sectoral perspective, we investigate the relationship between labour income and these dimensions of inequality to understand to what extent wage is associated with the place where people live or the sector where they work. In order to carry out this preliminary analysis we run a OLS regression model that explains the logarithm of gross hourly wage through a set of covariates related to demographic, socio-economic, and labour characteristics. Concerning territorial heterogeneity, we explore the correlation between the territorial wage premium (i.e. the regional fixed effect coefficient on gross hourly wages) and relative differences in average housing rental prices. The latter is based on a specific question collected by the SILC questionnaire asking for the annual rent paid by
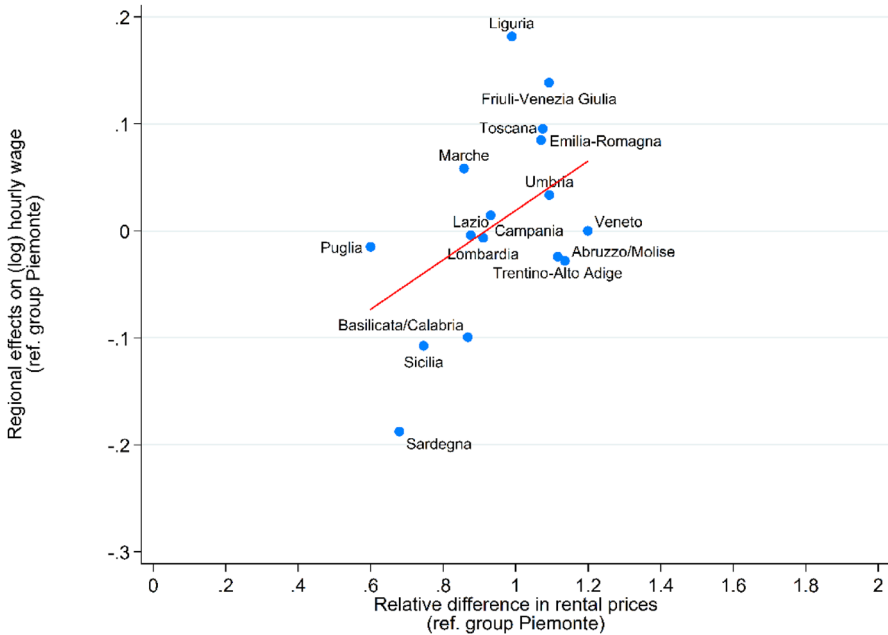
Fig. 1 Correlation between region fixed effects on (log) hourly wages and regional relative differences in rental prices. *Notes* The figure presents the coefficients of the aggregation of NUTS-2 region fixed effects only. Full estimates are presented in Table 6 in Appendix. The red line indicates a linear interpolation of the points illustrated in the figure, weighted by the regional population. *Source*: Elaboration of the authors on IT-SILC 2019 and ISTAT data

renters. As Fig. 1 shows, we can observe a remarkable positive correlation between the indicators considered, which supports the relevance of territorial inequality in Italy (Di Addario and Patacchini 2008; Acciari and Mocetti 2013; Ayala 2014). In particular, as wage levels seem to be associated with the local living standards, this evidence reinforces the need for a territorial specification of poverty as regards the Italian context.

In the same way, we examine the relationship between sectorial wage premium (estimated coefficient of the sector fixed effect on gross hourly wages) and relative differences in value-added among sectors, which can be seen as a proxy for sectorial productivity. The latter indicator, computed as the mean value-added weighted for the number of workers, relies on national accounts data provided by ISTAT. Figure 2 shows a discrete positive correlation between the sectorial wage premium and value-added, indicating that the sectorial composition is a relevant factor in determining wage differentials in the labour market (Blum 2008; Bachmann and Frings 2017). In other words, to account for different productivity and wage levels of sectors, the position of individuals along the wage distribution needs to be assessed according to the sector where they work.

In summary, assessing the economic status of individuals through nationally defined standards can lead to misattribution of poverty status, at least as regards the Italian
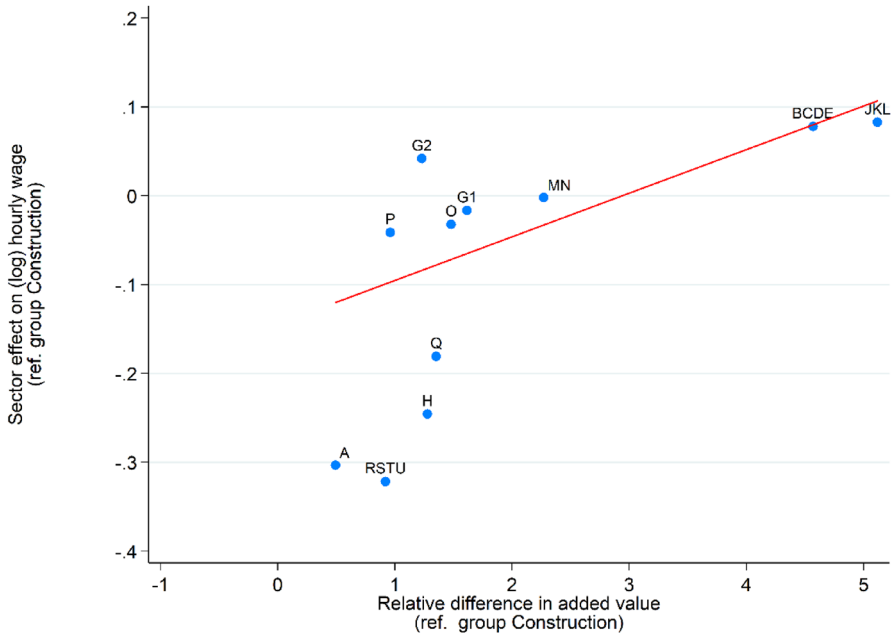
Fig. 2 Correlation between sector fixed effects on (log) hourly wage and sector relative difference in added value. *Notes* The figure presents the coefficients of economic sector fixed effects only. Full estimates are presented in Table 6. The red line indicates a linear interpolation of points illustrated in the figure, weighted by the regional population. *Source*: Elaboration of the authors on IT-SILC 2019 data

case. Furthermore, when this phenomenon is studied within the labour market, it is appropriate to relativize the condition of each individual also in relation to the economic sector, given the considerable heterogeneity in terms of productivity and wages. As these two aspects are expected to interact with each other and simultaneously influence wage levels across the country, descriptive results presented in this section reveal the potential need to account for territorial and sectoral differentials when defining the poverty threshold.

5 Descriptive Statistics

This section first compares the four poverty indicators adopted (IWP, LWE, LWET, and LWETS) to assess the extent of their potential overlap among Italian workers. While differences between IWP and the other indicators are largely expected because of usual redistributive dynamics within the household, different definitions of low-wage employment (LWE, LWET, LWETS) can also lead to a diverse attribution of the poverty condition among workers according to peculiarities featuring the territory of residence and/or the economic sector of activity. Figures 3 and 4 show the share of poor workers according to the different definitions and their overlap extent, while Table 1 reports the distribution of workers' population by a selection of poverty indicators.
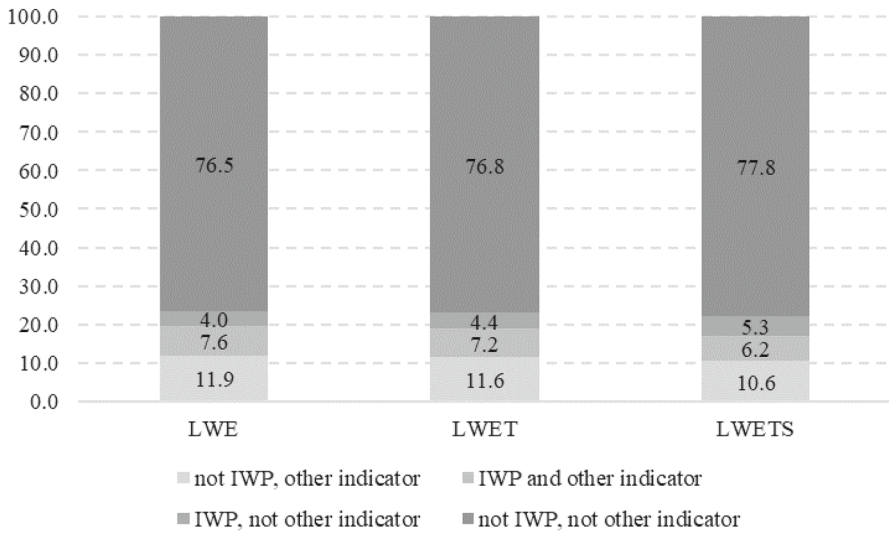
Fig. 3 Comparison between poverty definition populations (IWP vs LWE/LWET/LWETS). *Source*: Elaboration of the authors on IT-SILC 2019 data
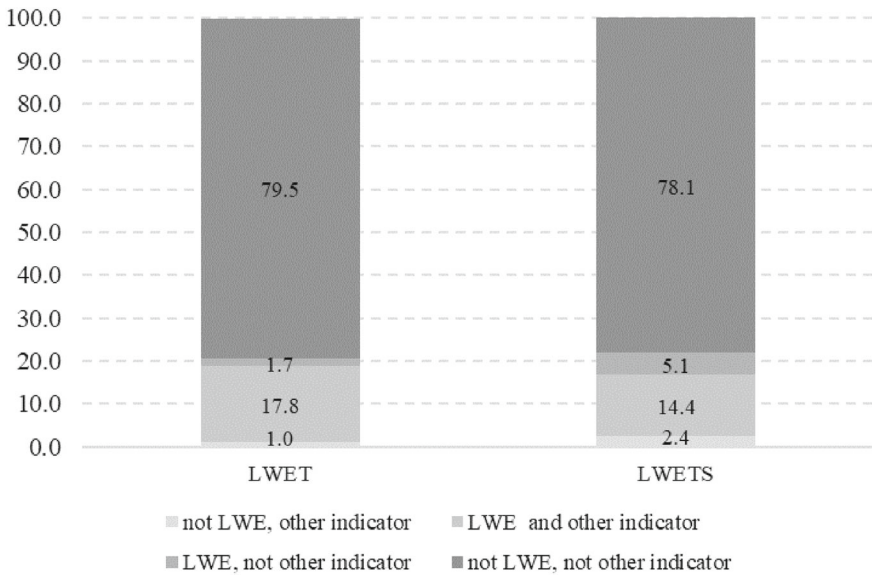

Fig. 4 Comparison between poverty definition populations (LWE vs LWET/LWETS). *Source*: Elaboration of the authors on IT-SILC 2019 data

Table 1 Distribution of workers' population by a selection of poverty indicators

IWP	LWE	LWETS	Weighted population	Weighted sample	Share
No	No	No	16,540,213	12,068	74.3
No	No	Yes	488,104	356	2.2
No	Yes	No	782,727	571	3.5
No	Yes	Yes	1,875,047	1368	8.4
Yes	No	No	833,321	608	3.7
Yes	No	Yes	48,843	36	0.2
Yes	Yes	No	349,108	255	1.6
Yes	Yes	Yes	1,338,509	977	6.0
Total			22,255,870	16,238	100.0

Elaboration of the authors on IT-SILC 2019 data

The LWETS indicator includes in poverty status about 2% of workers who would not be considered poor according to other official definitions. While 1.6% of the working poor according to the official definitions (IWP and LWE) are excluded from poverty when territorial and sectoral differences are taken into account.

According to the IWP indicator, 11.6% of workers live in a poverty condition (see Table 4 in the Appendix). However, the LWE indicator detects that 19.5% of workers have an hourly wage below 60% of the median. Comparing the two definitions, Fig. 3 highlights that only 7.6% of workers suffer both IWP and LWE statuses, then reporting a poor overlap between IWP and LWE. Indeed, 4.0% of workers are only in IWP and the larger share (11.9%) of workers is LWE without being in IWP. As for the first category of workers, they are probably defined as IWP but not as LWE because, while their individual wage stands above the low-wage threshold, their household suffers a low work intensity or counts a great number of children. Conversely, as for the second category of workers, they are probably defined as LWE but not IWP because, while suffering an individual condition of low wage, incomes from other household members are clearly enough to get a household equivalised disposable income greater than the at-risk-of poverty threshold. The same evidence is overall collected when looking at the comparison between the IWP and LWET indicators, while the overlap with the IWP indicator is even worse as regards the LWETS one. Figure 4 confirms that LWE and LWET definitions roughly identify the same people as working poor, whereas the LWE and LWETS indicators show a smaller overlapping area despite both referring to the individual gross hourly wages and then ignoring household characteristics and income.

Combining statistics from Figs. 3 and 4, two interesting considerations arise. First, given the scarce overlap with the LWE indicator, the IWP would not probably represent the best working poverty indicator to catch, for instance, the effects of the introduction of a legal minimum wage. The IWP indicator indeed considers as non-poor a large share of low-wage workers in the Italian labour market. Second, considering territorial differences in the low-wage threshold against a national low-wage threshold (e.g. to account for different living costs across the country) does not change in a relevant way

the measurement of working poverty in Italy. On the opposite, when both territorial and sectoral differences are considered through the LWETS indicator, the incidence of low-wage individuals significantly changes. Specifically, the number of poor workers is lower in the LWETS case with respect to the LWE one. As a result, when sectoral and territorial inequalities are taken into account, a more stringent poverty condition is considered, which is independent of labour market characteristics that take on different peculiarities across the country.

5.1 A Deepening Analysis by Territory and Gender

Figure 5 shows how the share of workers in low-wage employment changes across Italy and how that varies by poverty definition (the share of workers in IWP status is presented in Fig. 10 in Appendix A). According to the indicator considered, we can observe a significant variation in the incidence of the phenomenon along the national territory. Specifically, the LWETS condition seems the most spread among Italian NUTS-3 regions,[9] whereas the working poverty condition appears particularly concentrated in Southern Italy when looking at the LWE and LWET indicators. Consequently, it can be deduced that, with respect to the other two indicators, the LWETS is more able to capture a condition of working poverty coming out from the wage polarization existing among workers employed within specific economic sectors and territories. As also seen before, only slight differences emerge when comparing the incidence of LWE and LWET workers across the national territory. Again, this evidence suggests that embedding wage differentials in the working poverty threshold (and thus differences in the living costs to some extent) is not enough to explain the greater share of poor workers in most of the Southern Italian regions, but other important factors like the sectorial characteristics of the local labour market play a crucial role in this phenomenon as well.

Finally, to test the extent of the potential "gender paradox" mentioned in Sect. 2 regarding the IWP indicator in the Italian labour market, Fig. 6 shows different shares of poor workers by poverty definition and gender. The figure highlights that female workers seem to be less affected by the IWP status in Italy, even if the three indicators based on low-wage employment standards reveal opposite evidence. Moreover, as Table 4 in Appendix A illustrates, the same paradox takes place for another vulnerable category in the Italian labour market, thus the youth. Likely, once again, what we observe is that some categories of low-paid workers stand above the IWP threshold thanks to the economic support from other family members' resources, which engenders an imperfect overlap between poverty definitions.

As expected, these preliminary results clearly report that working poverty conditions strongly depend on a number of relevant demographic, territorial, and labour characteristics, which in turn may hide some extent of intersectionality (e.g. between gender and age group). For this reason, a multivariate econometric analysis is provided in the next sections. For the sake of simplicity, as the LWET indicator did not reveal

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[9] To better understand the heterogeneity of low-pay employment in Italy, we plot Fig. 3 using NUTS-3 instead of NUTS-2 as the level of aggregation for territorial analysis.

Panel A. Share of workers in LWE   Panel B. Share of workers in LWET

Panel C. Share of workers in LWETS
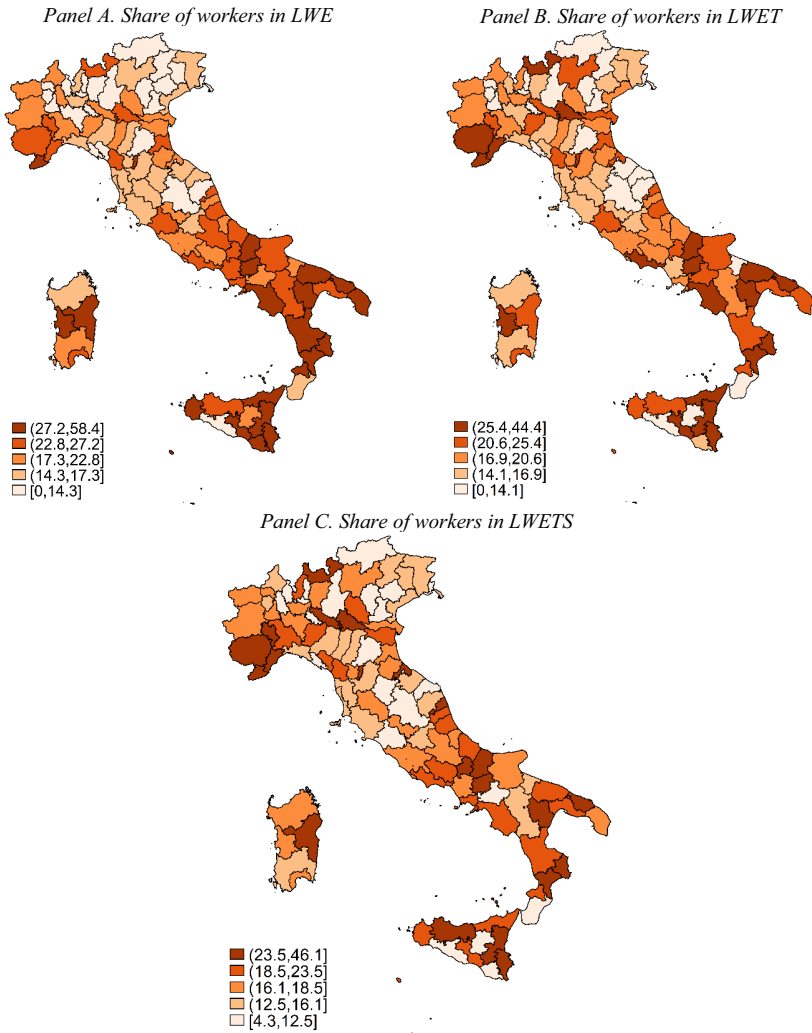
Fig. 5 Share of workers in LWE, LWET, and LWETS status by Italian NUTS-3 region (%). *Source*: Elaboration of the authors on IT-SILC 2019 data

in most cases any significant difference with respect to the LWE indicator, the LWET indicator is never reported in the analysis that follows.

6 Drivers of Poverty Statuses

Table 2 presents the estimation results of Logit models on the probability of being working poor according to one of the three different definitions of poverty: IWP, LWE, and LWETS. First, reduced models are estimated, considering only individual
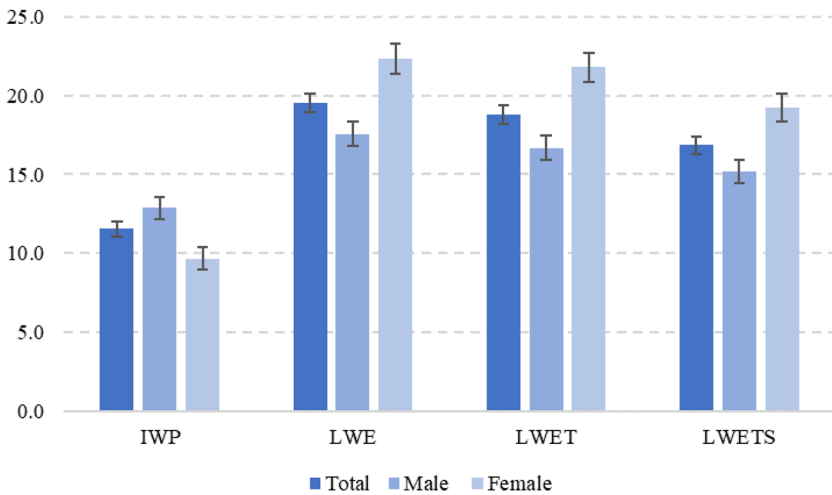
Fig. 6 Share of poor workers by poverty definition and gender. *Source*: Elaboration of the authors on IT-SILC 2019 data

and territorial characteristics (labelled as Model A). Then we add labour characteristics in the model specification, such as the type of contract, the sector, and the ISCO classification level (labelled as Model B).

In general, results confirm the considerations collected in the literature review (Sect. 2) and highlighted in the descriptive analysis (Sects. 4 and 5). Being a woman is negatively associated with the probability of being in an IWP condition (Ponthieux 2018), while the opposite occurs when looking at LWE and LWETS conditions (Mussida and Picchio 2014; Arulampalam et al. 2007). Being a foreigner or low educated, on the other hand, engenders an increase in the probability of being in a status of poverty for all the estimated models, despite respectively the greatest and lowest coefficient magnitudes being reported for the LWE indicator. Also, the age variable appears to be a relevant factor in explaining the LWE and LWETS conditions, probably because they better reflect individual choices in the life cycle with respect to participation in the labour market and career advancements (Lagakos et al. 2018). In fact, with respect to workers aged 18–29, except for the IWP status, being 30 years old or older reduces the risk of being employed in a low-wage occupation.

As for the contract type dummies included in Model B report significant coefficients for every working poverty definition but greater for low-wage conditions. Self-employed, in particular, represent the category of Italian workers with the highest risks of living in a working poverty condition (with respect to open-ended employees). Specifically, self-employed are 8.0% more likely to be in IWP status and 15.0% (18.1%) more likely to be in LWE (LWETS) status. Finally, having a part-time contract represents a significant risk factor for the IWP condition only.

Figure 7 extends the estimation results of Model B columns of Table 2 showing the marginal effects of sector dummies included in the model specification. Specifically, the figure illustrates how the probability of being in one of the three different poverty

Table 2 Determinants of working poverty conditions: Logit marginal effects

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Female	− 0.015**	− 0.026***	0.065***	0.056***	0.050***	0.052***
Foreigner	0.097***	0.059***	0.158***	0.098***	0.096***	0.086***
Aged 30–34	0.005	0.010	− 0.119***	− 0.093***	− 0.103***	− 0.094***
Aged 35–39	− 0.007	0.003	− 0.148***	− 0.108***	− 0.137***	− 0.125***
Aged 40–44	0.023	0.035**	− 0.164***	− 0.120***	− 0.140***	− 0.127***
Aged 45–49	0.016	0.034***	− 0.165***	− 0.113***	− 0.140***	− 0.127***
Aged 50–54	0.008	0.029**	− 0.174***	− 0.118***	− 0.152***	− 0.138***
Aged 55–59	− 0.015	0.001	− 0.189***	− 0.138***	− 0.164***	− 0.154***
Aged 60 or more	− 0.038***	− 0.018	− 0.164***	− 0.101***	− 0.141***	− 0.131***
Middle education	− 0.049***	− 0.020***	− 0.046***	− 0.009	− 0.029***	− 0.018*
High education	− 0.109***	− 0.061***	− 0.105***	− 0.038***	− 0.063***	− 0.056***
Temporary employed		0.057***		0.114***		0.086***
Public servant		− 0.028***		− 0.101***		− 0.087***
Self-employed		0.081***		0.153***		0.181***
Part time		0.043***		0.014		0.014
Dummy for sectors and ISCO	No	Yes	No	Yes	No	Yes
Observations	16,238	16,238	16,238	16,238	16,238	16,238
Pseudo R-squared	0.122	0.188	0.112	0.244	0.0549	0.130
Log likelihood	− 6.992e+06	− 6.466e+06	− 1.050e+07	− 8.913e+06	− 9.845e+06	− 9.062e+06

Table 2 (continued)

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Wald chi2	755.8	2081.0	986.3	3810.0	541.4	1997.0
Prob > chi2 (*p*-value)	0.00	0.00	0.00	0.00	0.00	0.00

Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Source: Elaboration of the authors on IT-SILC 2019 data
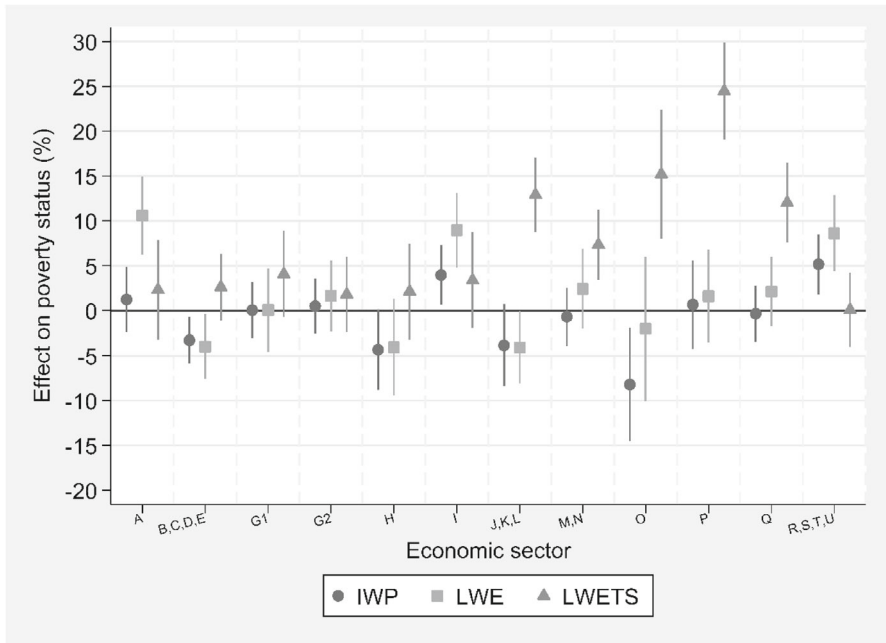
Fig. 7 Marginal effects of sector fixed effects (Construction sector as base group). *Notes*: Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights. Confidence intervals at 95% level presented. The model specifications estimated contain all the other variables presented in Model B of Table 2. *Source*: Elaboration of the authors on IT-SILC 2019 data

conditions varies depending on the economic sector of activity using workers employed in the Construction sector as the base group (see Table 5 in the Appendix A for the adopted classification of economic sectors).

Most economic sectors have insignificant effects on the probability of suffering an IWP condition. With respect to those employed in Construction, only being employed in accommodation and food services activities (I) or in cultural activities and personal services (R, S, T, U) engender a greater risk of being in IWP status, while the opposite occurs for workers employed in industry (B, C, D, E) or in Public administration and defence (O). Moving to the LWE indicator as the dependent variable, sector marginal effects overall lead to the same conclusions as before except for the fact that the coefficient related to the Public administration and defence sector is not significant anymore, whereas the Agriculture, forestry and fishing (A) one is now largely significant. To be noted, the latter marginal effect on the LWE indicator is also the only one being significantly different with respect to the corresponding one on the IWP indicator.

The coefficients that explain working poverty according to the LWETS definition are very different from those estimated for the LWE one. In particular, considering territory- and sector-specific thresholds makes the marginal effects related to the occupation in industry, accommodation and food services activities, cultural activities and personal services statistically insignificant on the probability of being working poor according to the LWETS definition. Nonetheless, working in communication, finance

and real estate activities (J, K, L), professional scientific and technical activities (M), public administration and defence (O), education (P), or human health and social work activities (Q) now engenders a greater risk of being defined as working poor. If we consider how the LWETS indicator is calculated, this evidence can be explained by a greater wage polarization within these economic sectors compared to the Construction sector (F).

Table 3 shows a further deepening of the overlap between the considered working poverty indicators illustrating marginal effects of the same covariates estimated through a multinomial Logit model on the probability of suffering a specific combination of poverty conditions (obtained crossing IWP, LWE and LWETS indicators). Specifically, we are interested in understanding which categories of workers tend to be considered poor according to the most adopted poverty indicators (IWP and LWE) and not poor according to the LWETS indicator and vice versa.[10] In the estimation, the base outcome is the first one, thus the 'IWP, no LWE, no LWETS' group.

Table 3 illustrates how poverty reduction policies require highly targeted designs and strong coordination across multiple levels. The age-related coefficients in columns 1, 2, 3 and 5 support two aspects mentioned before. Column 1 shows that the exit from the family of origin, where individuals' income top-up with those of the other adults (with possibly more consolidated working career) results in a generalized higher probability of poverty risk albeit, in line with career progression, decreasing along the age groups. On the contrary, columns 2, 3, and 5, related to LWE and LWETS indicators, highlight the exposed condition of young workers, with those aged below 30 (columns 3 and 5) or even 40 (column 2) presenting the higher probability of being in low-wage employment. Furthermore, the age-related coefficients in columns 1, 3 and 5 suggest that while being older can protect individuals from poverty risk at the individual level (LWE/LWETS), intermediate age groups (40–49 years) are more likely to experience just IWP. This finding indicates that wage-support policies aimed at middle adulthood should be complemented by work-life balance policies that assist individuals in managing household burdens.

Besides overcoming the gender paradox, columns 2, 3 and 5 confirm that the sectoral composition of the labor market matters in explaining women's disadvantaged position concerning wages. When thresholds are set within territories and sectors, being women is not associated with any significant effects. Conversely, the disadvantaging effect is evident when the threshold is set at the national level, or LWE and LWETS are jointly considered. A similar reasoning concerns temporary employment. Albeit not particularly exposed to IWP, probably as a result of a (less generalized, compared to women) safety net role of the family, these workers show a high probability of being in low-paid employment concerning LWE indicator or the joint combination of LWE and LWETS, but not when the thresholds are set within territory and sectors. Although these groups are less likely to experience family-level poverty, suggesting that household composition may act as a social safety net, wage-support policies—adapted at regional and sectoral levels—should be designed to assist these individuals. Changes in

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[10] Table 7 in the Appendix A shows instead the same multinomial Logit regression model for the full set of combinations of the analysed poverty indicators that includes the 'no poverty' status.

Table 3 Overlapping of working poverty conditions: multinomial Logit marginal effects

	(1) IWP, no LWE, no LWETS	(2) LWE, no IWP, no LWETS	(3) LWETS, no IWP, no LWE	(4) IWP and LWE or LWETS	(5) LWE and LWETS, no IWP	(6) IWP, LWE and LWETS
Female	− 0.023***	0.014***	0.001	− 0.009***	0.045***	0.004
Foreigner	0.005	0.007	0.013**	0.009***	0.033***	0.046***
Aged 30–34	0.017**	− 0.008	− 0.016*	− 0.005	− 0.079***	− 0.002
Aged 35–39	0.012	− 0.008	− 0.024***	− 0.001	− 0.093***	− 0.010
Aged 40–44	0.029***	− 0.015**	− 0.023***	0.003	− 0.110***	0.001
Aged 45–49	0.027***	− 0.019***	− 0.028***	0.005	− 0.102***	0.001
Aged 50–54	0.025***	− 0.016**	− 0.031***	0.007	− 0.105***	− 0.003
Aged 55–59	0.017***	− 0.013*	− 0.027***	0.001	− 0.110***	− 0.017*
Aged 60 or more	− 0.005	− 0.011	− 0.034***	0.006	− 0.077***	− 0.019*
Middle education	− 0.007	0.001	− 0.000	0.001	0.002	− 0.015**
High education	− 0.016***	0.005	− 0.008	− 0.007*	− 0.005	− 0.037***
Temporary employed	0.004	0.019***	0.011	0.017***	0.041***	0.040***
Public servant	− 0.001	− 0.023***	− 0.014***	− 0.008*	− 0.053***	− 0.018**
Self-employed	0.001	− 0.004	0.005	0.002	0.084***	0.078***
Part time	0.041***	− 0.002	0.005	0.004	0.013*	0.001
Observations	16,238	16,238	16,238	16,238	16,238	16,238
Pseudo R-squared	0.20	0.20	0.20	0.20	0.20	0.20
Log likelihood	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07

Table 3 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	IWP, no LWE, no LWETS	LWE, no IWP, no LWETS	LWETS, no IWP, no LWE	IWP and LWE or LWETS	LWE and LWETS, no IWP	IWP, LWE and LWETS
Wald chi2	375,643.00	375,643.00	375,643.00	375,643.00	375,643.00	375,643.00
Prob > chi2 (*p*-value)	0.00	0.00	0.00	0.00	0.00	0.00

Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

*p < 0.1; **p < 0.05; ***p < 0.01. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Piemonte is the reference category for region fixed effects, while sector F (Construction) is the reference category for sector fixed effects. Source: Elaboration of the authors on IT-SILC 2019 data

household composition, such as the loss of an additional income earner, may increase their risk of poverty.

Foreign-born individuals, self-employed and temporary workers are more likely to experience all three poverty conditions examined in this study simultaneously. For these groups, there is a need for policies that coordinate local and national contexts and address both family-level and wage-based needs. In particular, foreign-born workers require well-contextualized, regional, and sectoral interventions, as they face higher risks of poverty solely at the territorial-sectoral level. Furthermore, self-employed workers require particular attention. Indeed, these workers are more exposed to poverty only when both indicators of low-wage employment are fulfilled and when all poverty conditions are simultaneously experienced. These results indicate polarization within this category along two intersecting dimensions. There is a greater concentration of self-employment occupations within the niche of workers who are underpaid at the national level and within territorial and sectoral boundaries. The higher probability experienced by self-employment occupations of being exposed to all three conditions of poverty analyzed also suggests that these polarized workers are associated with living in households with limited economic resources. These results, as in part for those related to temporary employment, implicitly recall a generation aspect, or better to say, a trait of the Italian labour market. In 2018, self-employment occupations constituted 21.7% of all workers, and Italy was the country with the highest share of self-employment workers without employees, just after Greece and Romania (ISTAT 2019).

Analyzing LWE and LWETS jointly makes it possible to understand to what extent a wage support policy based on a national standard, such as the legal minimum wage, succeeds in affecting the whole country, while also capturing the productive peculiarities of specific territories. To the extent that a national poverty standard fails to act on poverty conditions that characterize the territory due to its productive vocation, then the intervention of collective bargaining is necessary to make up for these shortcomings. Furthermore, results show that proper reasoning on the legal minimum wage cannot consider the conditions of self-employment occupations.

7 Robustness Checks

We run several robustness checks of the models presented in the main analysis. The first group of robustness checks concerns earnings definitions, thus we replicate some descriptives and models presented in this work adopting net hourly earnings, gross annual earnings, and net annual earnings. The scale of LWE, LWET, and LWETS indices developed with different earnings definitions range up to 3 percentage points with respect to those calculated through gross hourly earnings (Fig. 11 in the Appendix B). In other words, the scale of the phenomenon remains overall the same whatever earnings definition we use. Moreover, the multivariate analysis seems to always provide similar poverty profiles if we use net hourly wage as income definition (Table 10 in the Appendix B). Instead, if we consider net or gross annual earnings having a middle educational level becomes significant in the LWE model. The same is true for

the coefficient related to part-time workers in the LWE and LWETS models. Probably, the number of hours worked in a year plays a relevant role for these categories.

Furthermore, we run another group of robustness that concerns the addition of a greater number of observations, and the exclusion of self-employed to increase the number of observations. To include additional sample observations, we use IT-SILC waves close to those adopted in the main analysis (i.e. the 2017 and 2018 waves). Specifically, considered the rotating group design featuring the EU-SILC survey sample, to develop this robustness check, we define our sample using all individuals interviewed in the 2017 IT-SILC wave and those who belong to the new rotation group in the 2018 and 2019 waves.

Except for the robustness regarding the exclusion of self-employed, the indices estimated through these restrictions return the same dimension of working poverty according to all restrictions and sample changes applied (Figs. 12 and 13 in the Appendix B). Also, robustness checks conducted on multivariate models return similar results, except for a few minor differences when considered the 'more years' sample (Figs. 16, 17, 18 in the Appendix B). However, the exclusion of self-employed entails a not negligible reduction in working poverty indices. As result, when we exclude self-employed in multivariate analysis, we observe a negative effect of the Communication, IT and Finance sector (J, K, L) in the models that explain IWP and LWE. This effect is due to the distribution of self-employed workers across the income distributions. As shown in Figs. 14 and 15 show that in the first two deciles of hourly earnings and equivalized income distributions, the proportion of self-employed workers in the Communication, IT, and Finance sectors is significantly higher compared to the overall economy.

8 Conclusions

The broad literature on working poverty still fails to find a unanimous consensus on which definition should be the most appropriate to use. As a consequence, also considering the dramatic growth of this phenomenon especially during the last two decades, several indicators have been constructed in recent empirical studies by combining labour market dimensions with different poverty standards. According to the IWP indicator, which has been introduced in the portfolio of EU social indicators since 2015 to monitor poverty among workers, an individual is defined as working poor if he worked for most of the period for which the information is reported and if he has an equivalent household income below the relative poverty line. This definition has several limits, indeed this indicator may not capture the increase in low-wage employment and the gender pay gap. The aim of this study is twofold. First, we want to propose an alternative measure to assess the poverty condition of workers in the labour market, that overcomes IWP limits. Second, we investigate the determinants of each type of working poverty explored, their potential coexistence and their peculiarity. To achieve this purpose, we use the LWE indicator, used by Eurostat as a measure to overcome some IWP limits. To develop this analysis, we use an advanced version of IT-SILC 2019, which contains information at the NUTS-2 region level. Towards this dataset, we improve this measure by considering both geographical and sectoral

disparities towards multiple poverty lines. Specifically, we suggest two alternatives to the standard LWE indicator: a LWE indicator based on territorial thresholds (LWET); a LWE indicator based on territorial and sectoral thresholds (LWETS). As for the definition of economic sectors, we distinguish 13 different sectors starting from the 2-digit NACE information available on SILC data. As for the territory definition, we instead distinguish 17 different territories starting from the NUTS-2 region information. Similarly, to the LWE indicator, the LWET (LWETS) threshold is then equal to 60% of the territorial (and sectoral) median of gross hourly earnings distribution.

The coexistence between IWP and the other poverty conditions analysed (LWE/LWET/LWETS) is not so sharp. A non-negligible share of the population who has low earnings manages to avoid poverty thanks to the pooling of the resources within the household and the redistributive role of the state. On the opposite, other individuals who have a salary above the poverty threshold, live in a poverty condition because of the low work intensity of the other household members. This evidence highlights the limitations of the IWP in detecting working poverty. Furthermore, the LWETS indicator, considering territorial and sectoral inequalities, offers a narrower definition of poverty with respect to LWE and LWET. LWETS also offers a different perspective on the distribution of the phenomena across Italy. According to the LWE indicator, poverty is more concentrated in Southern Italy, while the territorial and sectoral specification makes the phenomenon more homogeneously distributed across the territory. The scale of working poverty and its distribution across the country change considerably when moving from LWE to LWETS.

From the multivariate analysis, it emerges that the poverty profiles according to the LWE and LWETS indicators are different from the IWP indicator, because of its hybrid nature. When we investigate the coexistence of several poverty conditions, we observe that female, foreigner, young, and low-educated workers tend to report a higher probability of suffering at least one poverty condition. Furthermore, foreigners, temporary workers and self-employed are those categories who have a higher risk of suffering from a poverty condition, for all three definitions used. The results not only confirm that workers in categories more exposed to disadvantages in the labour market (female, foreign, young, low-educated workers) are also those more exposed to poverty. They also show that a more detailed measure of the phenomenon is needed to fully disentangle low-wage employment and properly intervene in working poverty. By looking only at IWP, LWE, or even LWETS, these workers are considered to be well protected from poverty risks. Still, when all indicators are observed simultaneously, their significant exposure to this risk emerges.

We believe that our results are relevant to the Italian debate on working poverty and poverty in general. Regarding policy implications, the intersection between IWP and LWE, when they coexist, could indicate a strategy to reduce inequality at the national level. On the contrary, when they diverge, focusing on the labour market, they point to pathways to limit the intergenerational transmission of poverty and inequality. The intersection between LWE and LWETS, rather than setting a narrower definition of what can be called low-paid workers, can constitute a stimulus, especially about collective bargaining and second-level agreement bargaining. Notably, it can be a stimulus to reduce the detected heterogeneity by intervening in those areas where the joint effect of territorial and sectoral thresholds leads to an underestimation of low-paid workers

compared to the national threshold. In general, our results and the approach adopted could be particularly relevant to policymaking, especially considering the recent evolution of social policies in hybridisation between active and passive interventions or/and between labour market and minimum income schemes. This trend, common to a plurality of European countries (European Commission 2023) and central in the recent main Italian welfare reforms, relies upon profiling beneficiaries according to their conditions, resources and needs, which requires, as our results showed, a detailed and multidimensional approach, along with proper "tools".

Appendix A: Additional Statistics and Estimates
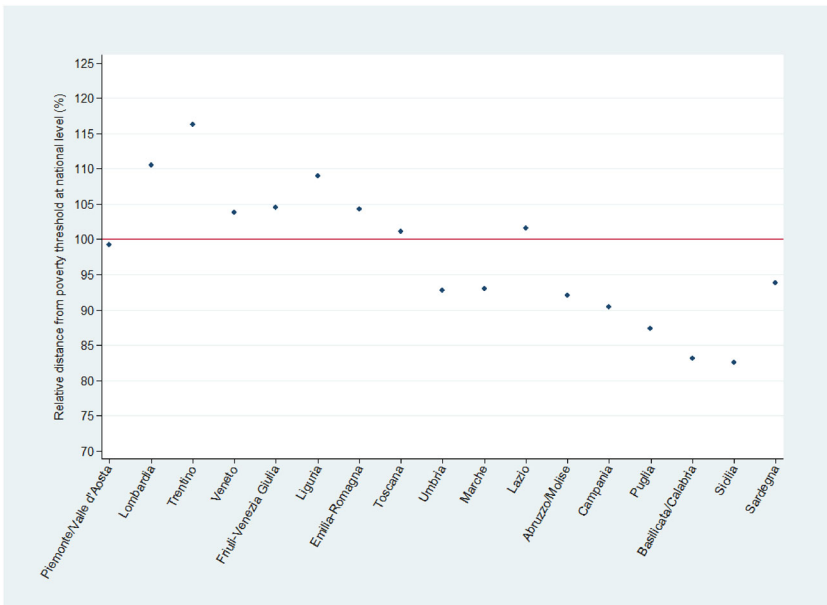
(See Figs. 8, 9, 10 and Tables 4, 5, 6, 7).

Fig. 8 Relative distance between territorial thresholds and national one (%). *Source*: Elaboration of the authors on IT-SILC 2019 data
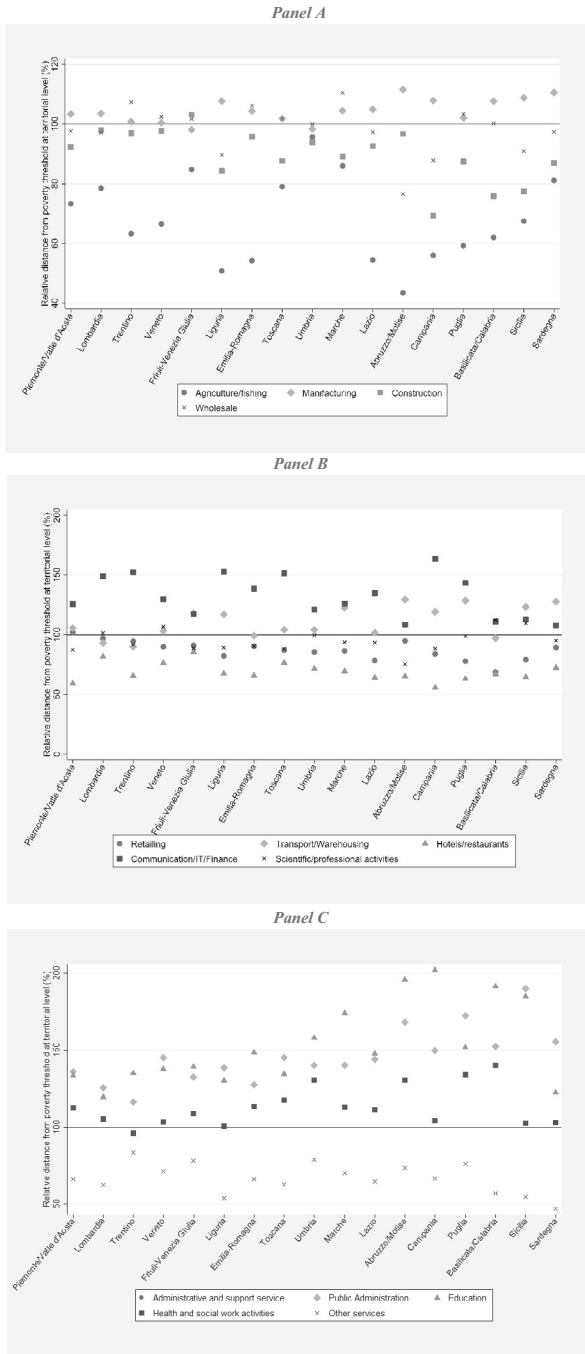
Fig. 9 Relative distance between territorial and sectoral thresholds and territorial ones (%). *Source*: Elaboration of the authors on IT-SILC 2019 data

Fig. 10 Share of workers in IWP status by Italian NUTS-3 region (%). *Source*: Elaboration of the authors on IT-SILC 2019 data
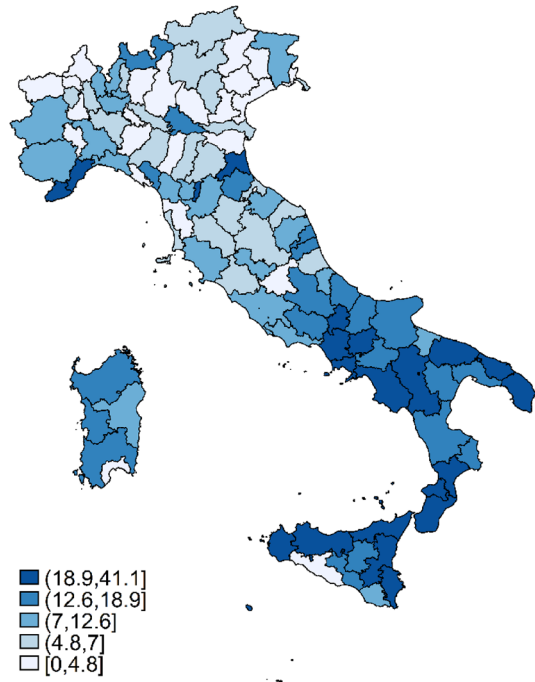
Table 4 Sample characteristics

	Share in the sample	Household equivalised disposable income	Gross hourly earnings	IWP	LWE	LWET	LWETS
Male	58.6	21,806	15.2	12.9	17.6	16.7	15.2
Female	41.5	23,016	13.6	9.7	22.3	21.8	19.2
Aged 18–29	11.5	21,343	9.7	11.4	34.3	33.4	29.7
Aged 30–34	10.4	21,674	12.1	11.9	22.4	20.9	19.2
Aged 35–39	12.1	21,486	13.8	10.9	19.9	18.6	16.0
Aged 40–44	14.9	20,935	14.6	13.6	17.3	16.1	15.2
Aged 45–49	16.1	21,468	15.3	12.7	17.2	16.9	15.2
Aged 50–54	15.7	22,076	15.9	11.7	15.8	15.7	13.8
Aged 55–59	12.9	24,560	17.0	9.7	14.5	14.4	12.7
Aged 60 or more	6.3	28,056	18.7	8.0	17.9	16.9	15.2
Resident	88.3	23,224	15.2	29.9	16.9	16.0	15.2
Foreigner	11.7	15,386	9.5	42.7	39.5	39.6	29.3
Low educational level	29.5	17,868	11.4	19.2	25.9	25.1	20.2
Middle educational level	45.3	21,877	13.9	10.5	19.4	18.6	17.0
High educational level	25.2	28,262	19.4	4.5	12.3	11.7	12.8
Open ended employed	51.6	21,771	13.7	9.7	16.1	15.4	13.1
Temporary employed	9.6	17,374	9.0	23.3	41.8	39.1	29.7
Public servant	17.0	25,290	19.3	3.6	4.1	4.0	8.5
Self-employed	21.8	23,426	15.4	16.8	29.7	29.3	26.6
Full-time workers	85.6	22,854	15.0	10.4	17.8	17.2	15.8
Part-time workers	14.4	19,048	11.8	18.4	29.7	28.0	23.0
Managers	3.11	30,565	24.2	10.2	16.0	14.9	12.8
Professionals	16.5	28,691	20.8	4.2	10.7	10.3	12.7
Technicians and Associate Professionals	17.99	25,019	16.2	5.7	12.0	12.0	13.5
Clerical Support Workers	10.65	23,479	14.5	6.4	12.6	11.6	13.3
Service and Sales Workers	17.62	19,550	11.1	15.2	30.5	29.3	21.2

Table 4 (continued)

	Share in the sample	Household equivalised disposable income	Gross hourly earnings	IWP	LWE	LWET	LWETS
Skilled Agricultural, Forestry and Fishery Workers	13.93	18,387	11.4	17.3	23.5	21.9	20.0
Craft and Related Trades Workers	8.28	19,904	13.2	9.9	12.5	12.3	13.3
Elementary occupation and machine operators	11.92	16,506	10.7	24.5	34.3	33.5	24.2
Metropolitan Area	27.53	23,567	15.7	32.4	19.0	18.9	17.5
50.000 or more inhabitants	16.98	22,476	15.0	33.2	18.8	17.5	15.9
10.000–50.000 inhabitants	26.32	21,411	13.9	31.9	19.8	18.8	16.2
Less than 10.000 inhabitants	29.17	21,829	13.8	30.8	20.2	19.4	17.5
Piemonte/Valle d'Aosta	8.25	23,208	14.0	8.7	21.1	20.6	18.8
Lombardia	18.55	25,525	16.4	6.6	13.5	16.6	15.3
Trentino	2.03	26,160	16.5	5.9	12.8	17.3	14.2
Veneto	9.18	24,211	14.9	4.2	13.8	14.4	13.1
Friuli-Venezia Giulia	2.17	23,475	14.7	5.9	13.6	14.8	13.9
Liguria	2.53	23,390	15.8	10.2	16.6	18.9	14.9
Emilia-Romagna	8.34	23,861	14.9	7.6	15.8	16.6	14.4
Toscana	6.46	23,136	14.5	9.3	18.1	18.8	16.1
Umbria	1.58	21,893	13.8	6.4	15.4	12.9	12.5
Marche	2.63	22,480	13.7	9.0	16.4	14.1	13.6
Lazio	10.17	22,866	15.3	10.5	19.2	19.5	17.9
Abruzzo/Molise	2.41	19,150	12.9	13.1	24.2	21.0	21.4
Campania	7.25	17,352	13.4	26.3	26.2	21.4	19.4
Puglia	5.91	18,560	12.5	18.9	28.2	24.3	21.2
Basilicata/Calabria	3.8	17,389	12.7	21.1	32.7	25.2	21.8
Sicilia	6.3	17,288	12.4	25.5	32.3	23.2	20.1
Sardegna	2.43	20,065	13.5	12.9	20.3	18.7	16.5
Total	–	22,307	14.6	11.6	19.5	18.8	16.9

Elaboration of the authors on IT-SILC 2019 data

Table 5 Statistical classification of economic activities. relative frequencies, mean and gini index gross hourly earnings

Sector	Denomination	Relative frequency	Gross hourly earnings	
			Mean value	Gini index
A	Agriculture, forestry and fishing	3.5	9.0	0.39
C1	Manufacture of food products, beverages, tobacco products, textiles, wearing apparel, leather and related products, wood and of products of wood and cork, paper and paper products; Printing and reproduction of recorded media	7.0	12.8	0.32
B	Mining and quarrying	16.1	15.2	0.28
C2	Manufacture of coke and refined petroleum products, chemicals and chemical products, basic pharmaceutical products and pharmaceutical preparations, rubber and plastic products, other non-metallic mineral products, basic metals, fabricated metal products, except machinery and equipment, computer, electronic and optical products, electrical equipment, machinery and equipment n.e.c., motor vehicles, trailers and semi-trailers, other transport equipment, furniture; Other manufacturing; Repair and installation of machinery and equipment			
D	Electricity, gas, steam and air conditioning supply			
E	Water supply; Sewerage, Waste management and remediation activities			
F	Construction	7.2	12.8	0.32

Table 5 (continued)

Sector	Denomination	Relative frequency	Gross hourly earnings	
			Mean value	Gini index
G1	Wholesale and retail trade and repair of motor vehicles and motorcycles; Wholesale trade, except of motor vehicles and motorcycles	5.1	14.5	0.34
G2	Retail trade, except of motor vehicles and motorcycles	7.8	12.0	0.35
H	Transportation and storage	5.5	14.4	0.27
I	Accommodation and food services activities	5.3	9.8	0.36
J	Information and communication	5.9	19.9	0.34
K	Financial and insurance activities			
L	Real estate activities			
M	Professional scientific and technical activities	5.7	16.8	0.38
N	Administrative and support services activities	4.5	12.0	0.34
O	Public administration and defence; compulsory social security	5.3	19.1	0.23
P	Education	7.2	19.8	0.29
Q	Human health and social work activities	7.2	17.2	0.38
R	Arts, entertainment and recreation	6.7	9.6	0.35
S	Other service activities			
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use			
U	Activities of extraterritorial organisations and bodies			

Elaboration of the authors on IT-SILC 2019 data

Table 6 Gross hourly earnings model. OLS estimation

Y = Log hourly gross earnings	
Female	− 0.170***
Foreigner	− 0.200***
Aged 30–34	0.175***
Aged 35–39	0.279***
Aged 40–44	0.308***
Aged 45–49	0.316***
Aged 50–54	0.346***
Aged 55–59	0.402***
Aged 60 or more	0.407***
Middle education	0.0854***
High education	0.221***
Lombardia	0.138***
Trentino	0.182***
Veneto	0.0955***
Friuli-Venezia Giulia	0.0848***
Liguria	0.0335
Emilia-Romagna	0.0583**
Toscana	− 0.00402
Umbria	− 0.0281
Marche	0.0145
Lazio	− 0.0150
Abruzzo/Molise	− 0.0994**
Campania	− 0.108***
Puglia	− 0.188***
Basilicata/Calabria	− 0.170***
Sicilia	− 0.197***
Sardegna	− 0.0647**
A	− 0.304***
B,C,D,E	0.0807***
G1	0.0305
G2	− 0.0582
H	0.0486
I	− 0.255***
J, K, L	0.170***
M,N	− 0.0520
O	0.0783**
P	− 0.0134
Q	− 0.0136

Table 6 (continued)

Y = Log hourly gross earnings	
R, S, T, U	− 0.230***
Constant	2.550***
Observations	16,238
R-squared	0.265

Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. Other control variables: municipality size, contracts, part-time and ISCO classification levels. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Piemonte" is the reference category for regions. "F" is the reference category for sectors. Source: Elaboration of the authors on IT-SILC 2019 data

Table 7 Overlapping of working poverty conditions: multinomial Logit marginal effects

	No poverty status	IWP, no LWE, no LWETS	LWE, no IWP, no LWETS	LWETS, no IWP, no LWE	IWP and LWE or LWETS	LWE and LWETS, no IWP	IWP, LWE and LWETS
Female	− 0.032***	− 0.023***	0.014***	0.001	− 0.009***	0.045***	0.004
Foreigner	− 0.113***	0.005	0.007	0.013***	0.009***	0.033***	0.046***
Aged 30–34	0.092***	0.017**	− 0.008	− 0.016*	− 0.005	− 0.079***	− 0.002
Aged 35–39	0.123***	0.012	− 0.008	− 0.024***	− 0.001	− 0.093***	− 0.010
Aged 40–44	0.114***	0.029***	− 0.015**	− 0.023***	0.003	− 0.110***	0.001
Aged 45–49	0.115***	0.027***	− 0.019***	− 0.028***	0.005	− 0.102***	0.001
Aged 50–54	0.124***	0.025***	− 0.016***	− 0.031***	0.007	− 0.105***	− 0.003
Aged 55–59	0.149***	0.017**	− 0.013**	− 0.027***	0.001	− 0.110***	− 0.017
Aged 60 or more	0.139***	− 0.005	− 0.011	− 0.034***	0.006	− 0.077***	− 0.019*
Middle education	0.018**	− 0.007	0.001	− 0.000	0.001	0.002	− 0.015**
High education	0.069***	− 0.016**	0.005	− 0.008*	− 0.007**	− 0.005	− 0.037***
Temporary employed	− 0.131***	0.004	0.019***	0.011	0.017***	0.041***	0.040***
Public servant	0.117***	− 0.001	− 0.023***	− 0.014***	− 0.008*	− 0.053***	− 0.018*
Self-employed	− 0.165***	0.001	− 0.004	0.005	0.002	0.084***	0.078***
Part time	− 0.062***	0.041***	− 0.002	0.005	0.004	0.013*	0.001
Dummy for sectors and ISCO	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,238	16,238	16,238	16,238	16,238	16,238	16,238

Table 7 (continued)

	No poverty status	IWP, no LWE, no LWETS	LWE, no IWP, no LWETS	LWETS, no IWP, no LWE	IWP and LWE or LWETS	LWE and LWETS, no IWP	IWP, LWE and LWETS
Pseudo R-squared	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Log likelihood	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07	− 1.780e+07

Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

$*p < 0.1$; $**p < 0.05$; $***p < 0.01$. In the estimation, the base outcome is the first one, thus the 'no poverty status' group. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Source: Elaboration of the authors on IT-SILC 2019 data

Appendix B: Robustness Checks

(See Figs. 11, 12, 13, 14, 15, 16, 17, 18 and Tables 8, 9, 10).
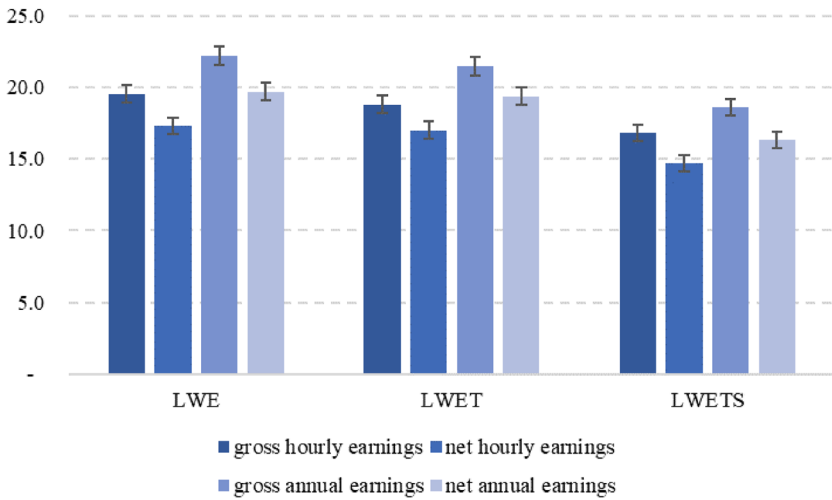
Fig. 11 LWE, LWET, LWETS indices. *Source*: Elaboration of the authors on IT-SILC 2019 data
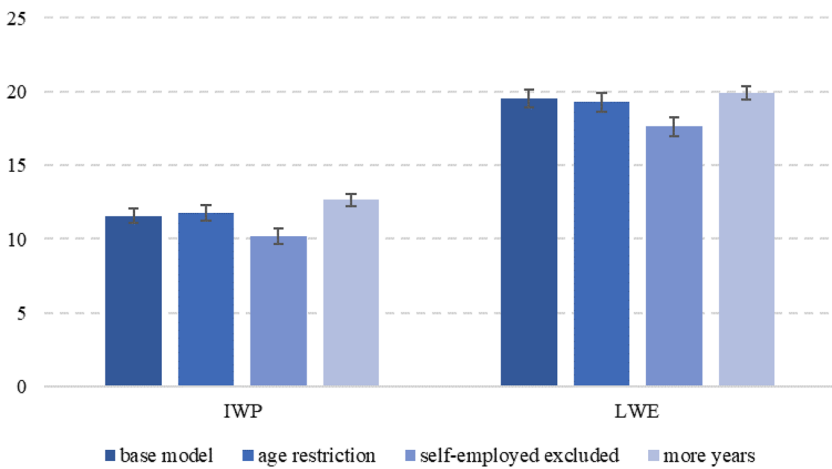
Fig. 12 IWP and LWE indices. *Source*: Elaboration of the authors on IT-SILC 2019 data
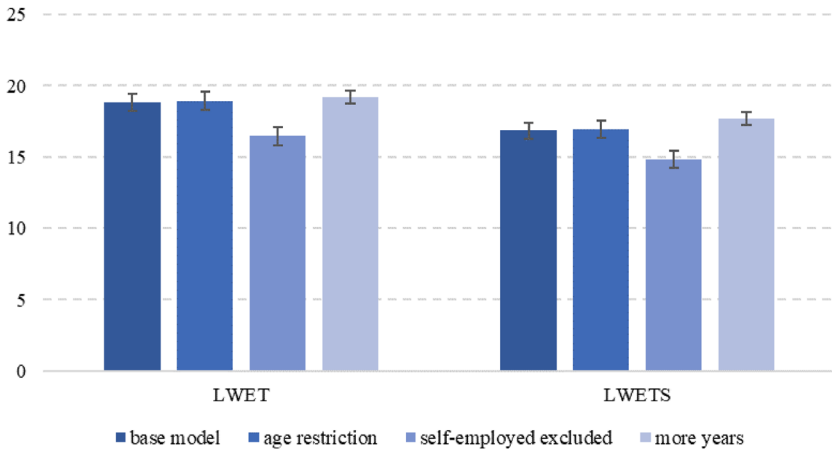
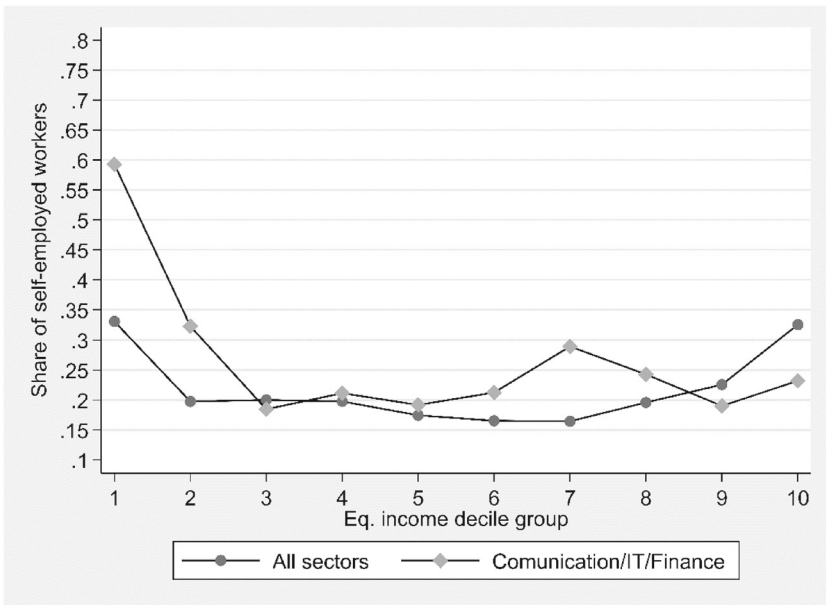**Fig. 13** LWET and LWETS indices. *Source*: Elaboration of the authors on IT-SILC 2019 data

Fig. 14 Self-employed workers in equivalent income distribution. *Source*: Elaboration of the authors on IT-SILC 2019 data
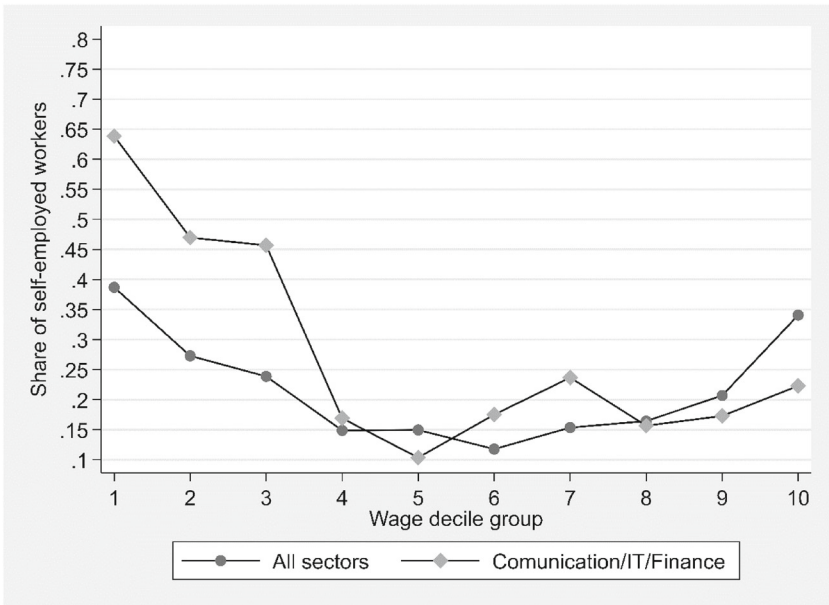
Fig. 15 Self-employed workers in hourly earnings distribution. *Source*: Elaboration of the authors on IT-SILC 2019 data
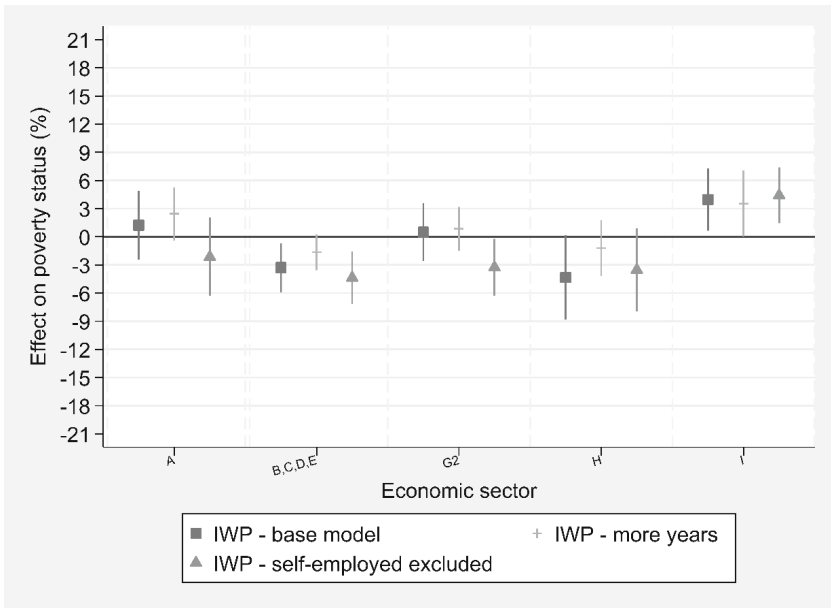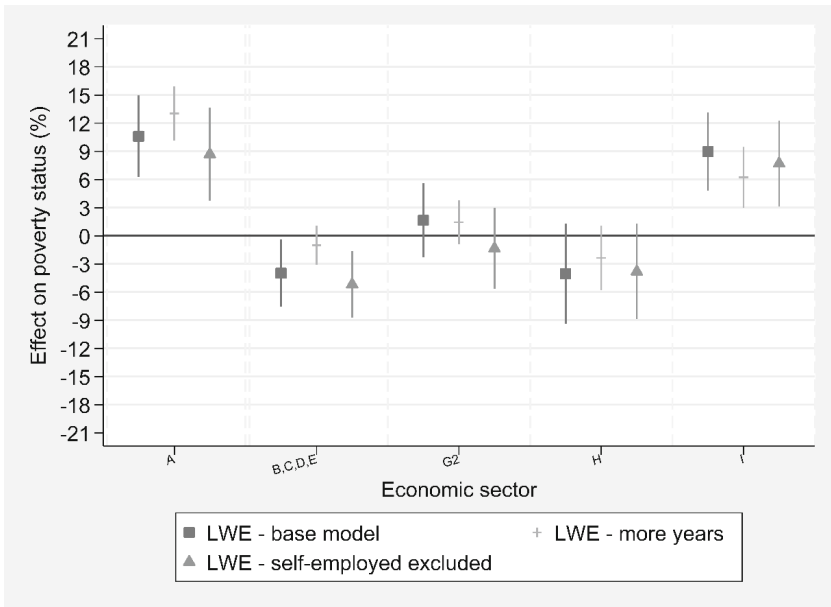
Panel A.

Panel B.
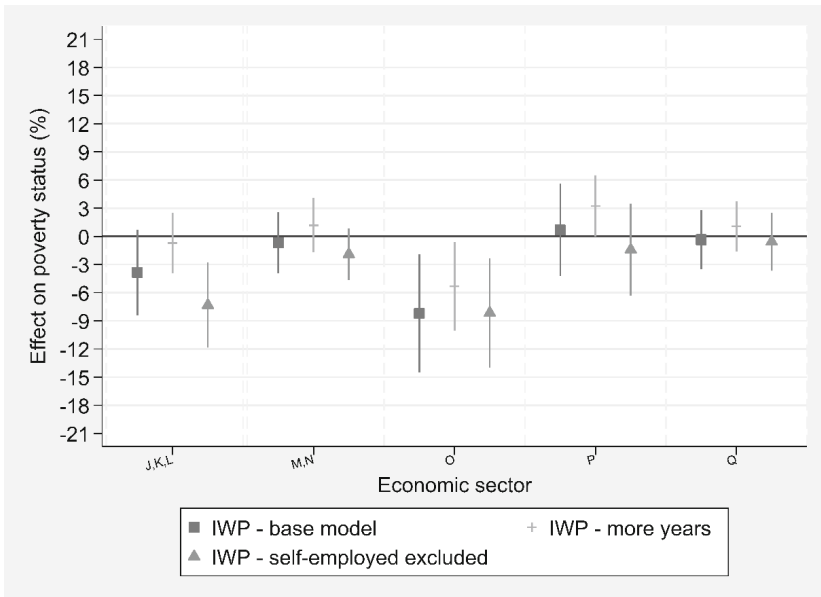
Fig. 16 Determinants of IWP: Logit marginal effects. Dummies for sectors. *Notes*: Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights. Confidence intervals at 95% level presented. The model specifications estimated contain all the other variables presented in Models B of Table 2. *Source*: Elaboration of the authors on IT-SILC 2019 data
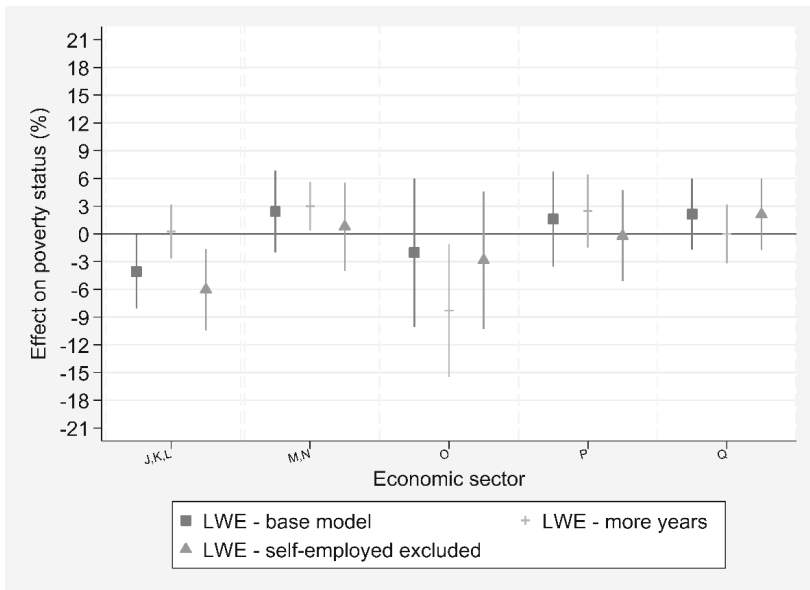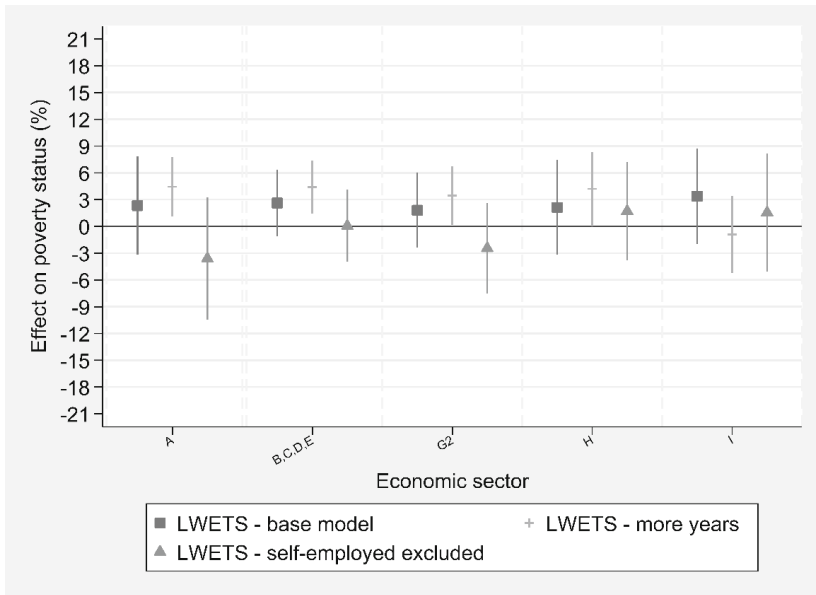
Panel A.

Panel B.

Fig. 17 Determinants of LWE: Logit marginal effects. Dummies for sectors. *Notes*: Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights. Confidence intervals at 95% level presented. The model specifications estimated contain all the other variables presented in Models B of Table 2. *Source*: Elaboration of the authors on IT-SILC 2019 data
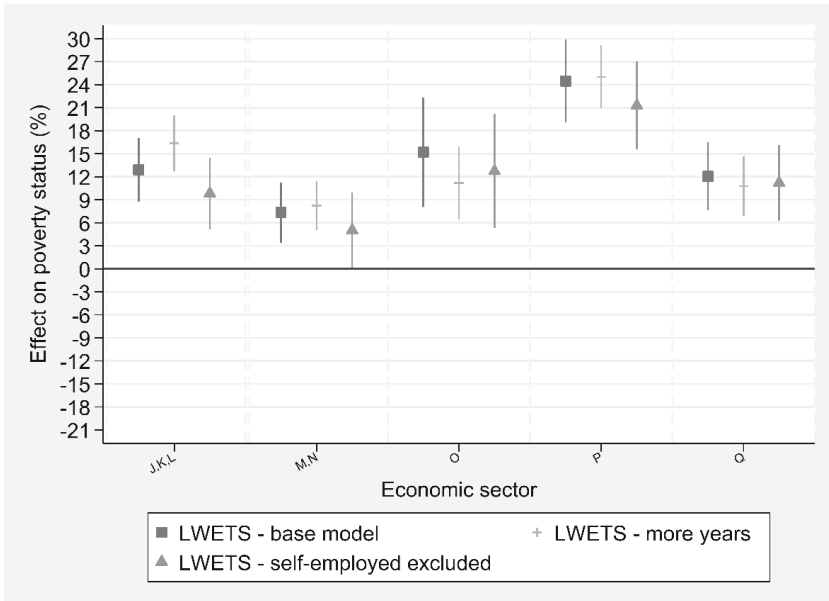
Panel A.

Panel B.

Fig. 18 Determinants of LWETS: Logit marginal effects. Dummies for sectors. *Notes*: Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights. Confidence intervals at 95% level presented. The model specifications estimated contain all the other variables presented in Models B of Table 2. *Source*: Elaboration of the authors on IT-SILC 2019 data

Table 8 Determinants of working poverty conditions: logit marginal effects

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Female	− 0.015**	− 0.026***	0.141***	0.070***	0.107***	0.072***
Foreigner	0.097***	0.059***	0.140***	0.069***	0.080***	0.066***
Aged 30–34	0.005	0.010	− 0.163***	− 0.116***	− 0.139***	− 0.106***
Aged 35–39	− 0.007	0.003	− 0.185***	− 0.129***	− 0.162***	− 0.129***
Aged 40–44	0.023	0.035**	− 0.200***	− 0.130***	− 0.180***	− 0.139***
Aged 45–49	0.016	0.034***	− 0.199***	− 0.124***	− 0.176***	− 0.137***
Aged 50–54	0.008	0.029**	− 0.212***	− 0.128***	− 0.185***	− 0.138***
Aged 55–59	− 0.015	0.001	− 0.233***	− 0.149***	− 0.207***	− 0.162***
Aged 60 or more	− 0.038**	− 0.018	− 0.203***	− 0.107***	− 0.179***	− 0.131***
Middle education	− 0.049***	− 0.020***	− 0.084***	− 0.026***	− 0.056***	− 0.027***
High education	− 0.109***	− 0.061***	− 0.145***	− 0.048***	− 0.103***	− 0.066***
Temporary employed		0.057***		0.100***		0.094***
Public servant		− 0.028***		− 0.120***		− 0.098***
Self-employed		0.081***		0.105***		0.147***
Part time		0.043***		0.191***		0.173***
Dummy for sectors and ISCO	No	Yes	No	Yes	No	Yes
Observations	16,238	16,238	16,238	16,238	16,238	16,238
Pseudo R-squared	0.12	0.19	0.11	0.24	0.06	0.15
Log likelihood	− 6.99E+06	− 6.48E+06	− 1.05E+07	− 8.92E+06	− 1.00E+07	− 9.14E+06

Table 8 (continued)

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Wald chi2	755.80	2081.00	1251.00	3432.00	649.50	4730.00
Prob > chi2 (p-value)	0.00	0.00	0.00	0.00	0.00	0.00

Gross annual earnings. Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

*p < 0.1; **p < 0.05; ***p < 0.01. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Source: Elaboration of the authors on IT-SILC 2019 data

Table 9 Determinants of working poverty conditions: logit marginal effects

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Female	− 0.015**	− 0.026***	0.117***	0.061***	0.090***	0.066***
Foreigner	0.097***	0.059***	0.130***	0.066***	0.067***	0.047***
Aged 30–34	0.005	0.010	− 0.145***	− 0.103***	− 0.116***	− 0.087***
Aged 35–39	− 0.007	0.003	− 0.165***	− 0.115***	− 0.144***	− 0.113***
Aged 40–44	0.023	0.035**	− 0.192***	− 0.131***	− 0.160***	− 0.123***
Aged 45–49	0.016	0.034***	− 0.174***	− 0.109***	− 0.150***	− 0.113***
Aged 50–54	0.008	0.029**	− 0.182***	− 0.109***	− 0.156***	− 0.113***
Aged 55–59	− 0.015	0.001	− 0.197***	− 0.127***	− 0.173***	− 0.132***
Aged 60 or more	− 0.038***	− 0.018	− 0.179***	− 0.098***	− 0.154***	− 0.110***
Middle education	− 0.049***	− 0.020***	− 0.079***	− 0.027***	− 0.045***	− 0.016*
High education	− 0.109***	− 0.061***	− 0.122***	− 0.039***	− 0.079***	− 0.044***
Temporary employed		0.057***		0.112***		0.094***
Public servant		− 0.028***		− 0.094***		− 0.082***
Self-employed		0.081***		0.145***		0.171***
Part time		0.043***		0.163***		0.141***
Dummy for sectors and ISCO	No	Yes	No	Yes	No	Yes
Observations	16,238	16,238	16,238	16,238	16,238	16,238
Pseudo R-squared	0.12	0.19	0.10	0.23	0.05	0.14
Log likelihood	− 6.994e+06	− 6.475e+06	− 9.927e+06	− 8.474e+06	− 9.387e+06	− 8.503e+06

Table 9 (continued)

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Wald chi2	755.80	2081.00	1089.00	5541.00	520.90	3060.00
Prob > chi2 (p-value)	0.00	0.00	0.00	0.00	0.00	0.00

Net annual earnings. Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Source: Elaboration of the authors on IT-SILC 2019 data

Table 10 Determinants of working poverty conditions: logit marginal effects

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Female	− 0.015**	− 0.026***	0.042***	0.037***	0.036***	0.040***
Foreigner	0.097***	0.059***	0.135***	0.085***	0.081***	0.069***
Aged 30–34	0.005	0.010	− 0.098***	− 0.084***	− 0.087***	− 0.085***
Aged 35–39	− 0.007	0.003	− 0.113***	− 0.085***	− 0.113***	− 0.106***
Aged 40–44	0.023	0.035**	− 0.138***	− 0.109***	− 0.127***	− 0.120***
Aged 45–49	0.016	0.034***	− 0.124***	− 0.088***	− 0.115***	− 0.108***
Aged 50–54	0.008	0.029**	− 0.130***	− 0.091***	− 0.118***	− 0.110***
Aged 55–59	− 0.015	0.001	− 0.144***	− 0.114***	− 0.140***	− 0.137***
Aged 60 or more	− 0.038***	− 0.018	− 0.122***	− 0.081***	− 0.110***	− 0.107***
Middle education	− 0.049***	− 0.020***	− 0.040***	− 0.012	− 0.030***	− 0.020*
High education	− 0.109***	− 0.061***	− 0.088***	− 0.039***	− 0.052***	− 0.047***
Temporary employed		0.057***		0.099***		0.071***
Public servant		− 0.028***		− 0.078***		− 0.072***
Self-employed		0.081***		0.193***		0.200***
Part time		0.043***		0.000		0.001
Dummy for sectors and ISCO						
Observations	16,238	16,238	16,238	16,238	16,238	16,238
Pseudo R-squared	0.12	0.19	0.08	0.19	0.04	0.11
Log likelihood	− 6.994e+06	− 6.475e+06	− 9.479e+06	− 8.342e+06	− 8.928e+06	− 8.236e+06

Table 10 (continued)

	IWP		LWE		LWETS	
	Model A	Model B	Model A	Model B	Model A	Model B
Wald chi2	755.80	2081.00	760.20	3762.00	442.80	1795.00
Prob > chi2 (p-value)	0.00	0.00	0.00	0.00	0.00	0.00

Net hourly earnings. Standard errors are clustered by NUTS-3 region and estimates are computed with individual sample weights

$*p < 0.1$; $**p < 0.05$; $***p < 0.01$. Other control variables: dummy for regions and municipality size. "Aged 18–29" is the reference category for age class. "Low education level" is the reference category for education. "Full-time employed not public servant" is the reference category for contract characteristics. Source: Elaboration of the authors on IT-SILC 2019 data

Declarations

Conflict of Interest The authors report there are no conflict of interest to declare.

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