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## **Second earners and in-work poverty in the EU**

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# Second earners and in-work poverty in the EU\*

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## Abstract

Dual or multiple earnership has been considered an important factor to prevent in-work poverty. The aim of this paper is to quantify the impact of second earnership on the risk of in-work poverty and the role of the tax-benefit systems in moderating this risk. Our analysis refers to 2014 and employs EU-SILC data and EUROMOD, the tax-benefit microsimulation model for EU-28. We apply a pre-post analysis in combination with microsimulation techniques to assess the role of second earners in preventing in-work poverty. This is done by simulating a counterfactual scenario where second earners become unemployed. Our results show that the effect of net replacement rates of second earners on the probability of in-work poverty is negative and statistically significant, but in relative terms it appears to be small compared to the effects of individual labour market characteristics, such as low pay and part-time employment.

**JEL:** I320, I380, J6

**Keywords:** dual earnership, in-work poverty, second earners, pre-post analysis, microsimulation, European Union

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## 1 Introduction

Poverty and social exclusion in industrialized societies have been traditionally associated with long-term unemployment and household joblessness. To address these issues and to ensure the sustainability of pension and social protection systems in the era of population ageing, many governments across the European Union (EU) and beyond have introduced policies aimed at stimulating labour market participation of the disadvantaged groups such as young, older, low-skilled workers, women and migrants. However, recent evidence shows that in today's labour market having a job might not be sufficient to guarantee freedom from poverty for the employed and their households. Many EU countries have experienced a rise in in-work poverty rates in recent decades (Marx and Nolan, 2012, Eurofound, 2017, European\_Commission, 2016).

In-work poverty is related to precarious employment, including low pay, low work intensity, temporary employment and self-employment (Horemans and Marx, 2013, Lohmann, 2009, Maitre et al., 2012, Van Lancker, 2011, Broughton et al., 2016, McKnight et al., 2016, Frazer and Marlier, 2010, Ray et al., 2014). Nevertheless, while labour market characteristics are measured at an individual level, in-work poverty is measured at a household level. Therefore, characteristics such as the number of children and the labour market status of other adults in the household have been shown to play a major role. As a result, not all precarious workers live in poor households, and not all poor households contain precarious workers. From a policy perspective, in-work poverty patterns are influenced by a large number of institutional factors and the structure of the labour market. Among those, the key to providing in-work poverty reduction is the generosity of the transfer system, e.g. replacement rates of unemployed household members and cash benefits for families (Allègre, 2008, Lohmann, 2009).

In this paper we focus on a specific group of earners – second earners in multi-earner households. We define the *primary* or *main earner* as the person in the household with the highest earnings from work. The *second earner* is defined as the employed partner of the primary earner or, if the partner is not in work, as the person with the second highest earnings in the household. We seek to quantify the effect of second earners' employment in preventing in-work poverty in the EU-28 and the role of the tax-benefit systems in moderating this risk. Following Eurostat we define in-work poverty as the state when individuals are simultaneously in work and at risk of poverty, i.e. their equivalised<sup>i</sup> household disposable income is below the risk-of-poverty threshold, which is set at 60% of the national median equivalised disposable income.

To assess the role of second earnership in preventing in-work poverty, we use regression analysis, and pre-post analysis in combination with microsimulation techniques. More precisely, we use EUROMOD, the tax-benefit microsimulation model of the EU-28 (Sutherland and Figari, 2013, Sutherland, 2014, Figari et al., 2015), and the microdata from the European Statistics on Income and Living Conditions (EU-SILC) and the Family Resource Survey (FRS) for the UK. The analysis in this paper refers to 2014 policies in all EU countries.

The contribution of this study is twofold. First, we analyse the prevalence and characteristics of second earnership and the association between second earnership and in-work poverty in the EU-28 using regression analysis. Second, we use a pre-post analysis to determine the contribution of second earners in preventing in-work poverty. Our strategy consists of simulating a counterfactual scenario under which second earners become unemployed and assessing how this transition would affect household incomes and in-work poverty, as compared to the status-quo (baseline) situation. By using microsimulation techniques we can assess the impact of this transition on poverty net of the effects of tax-benefit policies which are targeted at moderating income shocks due to unemployment. We perform regression analyses on a pre- and post-transition sample of workers in multiple-earner households in order to disentangle the impact of the individual, household and policy related characteristics on the probability of in-work poverty. Given the nature of our simulations, the results presented in this paper should be interpreted as first-order effects before any behavioural adjustment occurs. Nevertheless, this analysis is relevant for the research question as it provides a transparent quantitative assessment of how important the second earners' employment is in lifting the working household above the poverty line across the EU.

The remainder of this paper is structured as follows. Section 2 summarizes previous research on in-work poverty and second earners in the EU. Section 3 describes the data and the methodology used to quantify the effect of second earnership and government policies on in-work poverty. Section 4 presents and discusses the results of our analysis. Section 5 concludes.

## **2 In-work poverty and secondary earners: literature review**

Since the late 1990s employment policies of many EU countries have become increasingly focused on getting more people into jobs by promoting and enforcing the labour market activation measures, such as training and skills development programmes for the unemployed, sanctioning of individuals not looking for jobs by withdrawing their benefits, in-work benefits, subsidized employment, etc. Raising the employments rates up to 75% of the population aged 20-64 years has been declared one of the 2020 EU targets. At the same time, the post-industrial economy has been moving towards higher job polarization, i.e. a growth in employment in the highest skilled (managerial and professional) and lowest-skilled occupations (unskilled work in service sector) and a decline in demand for individuals with medium skills (Goos and Salomons, 2009, OECD, 2015). As wage inequality has been on the increase, for the individuals at the bottom of the wage distribution even a full-time employment might no longer guarantee a poverty-free existence. As a result, many EU countries have experienced a rise in in-work poverty rates (Marx and Nolan, 2012, Eurofound, 2017, European\_Commission, 2016, Lohmann and Marx, 2018).

According to Eurostat, the working poor can be defined as employed individuals living in households with equivalised disposable income below 60% of the national median (Ponthieux, 2010). An individual is considered as employed if he/she was working for at least 15 hours a week for at least 7 months during the past year. Thus in-work poverty rate is computed as the percentage of individuals who are in work and at risk of poverty among

those who are currently in work. Alternatively, the OECD classifies as the working poor those individuals who live in households with a head of working age and at least one worker and whose equivalised household income is below 50% of the national median (OECD, 2018). Note that in both cases the concept of the working poor is different from the low-paid worker concept. Low-paid workers are defined as employees who earn two thirds or less of national median gross hourly earnings by both OECD and Eurostat. Hence, there might be low-paid workers who are not poor, and vice versa.

The way in-work poverty is defined complicates the interpretation of this measure and the identification of its underlying causes. First, since individual and household level information is combined within this measure, the poverty status of an individual does not depend only on his/her own employment characteristics, but also on the labour market status of other household members and on other characteristics of the household such as the number of dependent children. Second, given the reference period considered for the labour market status, the poverty status cannot be defined for those individuals who were employed for less than 7 months in the past year, hence some low-paid workers on short-term contracts might not be counted as working, and therefore excluded from the working poor. Third, those who were in work for more than 7 months but less than 12 months might be classified as poor on an annual basis even if they were not poor while working.

In-work poverty has been shown to be related to precarious employment characteristics, among which the most important are low pay, low work intensity, temporary employment and self-employment (Horemans and Marx, 2013, Lohmann, 2009, Maitre et al., 2012, Van Lancker, 2011, Broughton et al., 2016, McKnight et al., 2016, Frazer and Marlier, 2010, Ray et al., 2014, Lohmann and Marx, 2018). However, their impact on poverty greatly depends on the mechanisms shaping these types of labour market participation patterns. For example, part-time employment does not necessarily result in in-work poverty unless it represents an inferior form of employment (e.g. due to low pay and job insecurity) and therefore an imposed choice (Horemans and Marx, 2013). The key characteristic of almost all types of precarious work is that they are highly gendered. It has been shown that women tend to forgo better paying, full-time jobs mainly due to their caring responsibilities, while men are more likely to do so for other reasons (OECD, 2011).

At the same time, the effect of individual labour market characteristics on poverty is moderated by household composition. Dual or multiple earnership is one of the most important factors that lifts families out of poverty (Marx and Nolan, 2012). If a precarious worker is the second earner in the household (which is typically the case for coupled women), their in-work poverty risk might drop to a very low level due to the contribution of the main earner to household income. Hence, in this case precarious job characteristics may be the result of choice by people who are not particularly constrained and able to follow their preferences. In contrast, precarious workers who are the sole earners in their households are at a very substantial risk of poverty, especially if they have dependent children to support. Over the last few decades all European countries have experienced a growth in dual earnership due to the increased female labour force participation, albeit with some variation across the welfare regimes. In particular there is a higher prevalence of such households in

Scandinavian countries and lower prevalence in the Southern Europe (Andreß and Lohmann, 2008). Since dual earner families have become the most common model among couples in the EU, the relative poverty thresholds are being increasingly defined by two earner households, which further deteriorates the position of one earner households (Marx and Nolan, 2012).

Apart from individual and household characteristics, several studies have looked at the significance of institutional, labour market and demographic factors at the macro-level for in-work poverty. According to Allègre (2008), social spending as proportion of the GDP is the main factor contributing to lower in-work poverty rates in the EU. Similarly, Lohmann (2009) showed that the generosity of the transfer system (replacement rates in case of unemployment and cash benefits for families) is key to explaining both in-work poverty rates and in-work poverty reduction. In terms of differences across the welfare regimes, Crettaz and Bonoli (2010) argue that the characteristics of in-work poverty found in the socio-democratic and conservative regimes (in their study represented by Sweden and Germany) are less detrimental than those found in South-European and liberal regimes (represented by Spain and the US). In the former in-work poverty is driven by low pay and concentrated on young, single and childless adults, while full-time workers have low in-work poverty rates. In the latter in-work poverty appears to be driven by a combination of low labour market attachment, low pay and the presence of children. This highlights the crucial role in protecting children in working families played by the government tax-benefit policies.

At the same time, it is important to stress that the design of tax-benefit systems has both direct and indirect effects on in-work poverty. While generous direct transfers to low income households with children reduce in-work poverty, they might simultaneously weaken the individual incentives to undertake paid work or to increase hours of work for all the household members. A high tax burden may produce a similar negative effect on labour market participation (Jara and Tumino, 2013). Empirical studies find that labour supply elasticity is higher for low-income earners, in particular women with children, therefore tax-benefit policies tend to have a disproportionately high negative effect on the employment outcomes of second earners (Rastrigina and Vereshchagna, 2015, Evans and Harkness, 2010, Thomas and O'Reilly, 2016).

### **3 Methods and data**

Our study uses a pre-post analysis in combination with microsimulation techniques in order to assess the role of second earners in preventing in-work poverty. A pre-post analysis is a standard method of measuring the impact of different income components on poverty reduction. It helps to answer the question: what would poverty be before and after inclusion of the component in household income (e.g. see Moller et al. (2003)). More precisely, we simulate a counterfactual scenario where second earners become unemployed, and assess the effect of such transitions on in-work poverty in all EU countries. We choose to model the transition to unemployment (rather than inactivity) as it seems like the most relevant scenario in case of individuals who currently choose to work. This section provides the definitions of

in-work poverty and second earners used in our analysis. We then describe EUROMOD, the tax-benefit microsimulation model for the EU, and the data. Finally, we present the methodology used to assess the impact of secondary earners on in-work poverty.

### **3.1 Definitions of in-work poverty and second earners**

In our analysis, we follow Eurostat in defining in-work poverty as the state when individuals are currently in work and at risk of poverty, i.e. their equivalised disposable income is below the risk-of-poverty threshold set at 60% of the national median equivalised disposable income. The percentage of working poor is calculated with respect to the total number of individual who are in work. Following Eurostat's approach we consider that individuals are in work if they have declared to be employed or self-employed for at least 7 months in the year preceding the survey.

We further define *primary* or *main earner* as the person in the household with the highest earnings from work. The *second earner* is then defined as the employed partner of the primary earner. If the primary earner has no partner or the partner is not in work, the second earner is defined as the person with the second highest earnings.

### **3.2 EUROMOD and the data**

Our analysis makes use of EUROMOD, the tax-benefit microsimulation model of the European Union. EUROMOD covers all 28 EU member states and simulates, in a fully comparable manner, cash benefit entitlements and direct personal tax and social insurance contribution liabilities on the basis of the tax-benefit rules in place and representative household microdata. EUROMOD has been validated at both the micro- and the macro-level and has been tested in numerous policy-relevant research applications (Sutherland and Figari, 2013, Sutherland, 2014, Figari et al., 2015).

The microdata used in this study comes from the 2015 EU-SILC, which includes income information from the previous year (2014); the 2014 EU-SILC for Germany (with income information from 2013) and the Family Resource Survey 2013/2014 for the UK. We take the 2014 tax-benefit policies (reflecting the situation as of June 30<sup>th</sup>) as a starting point. In the case of Germany, market incomes and non-simulated tax-benefit instruments in the data are adjusted to 2014 levels using source-specific updating factors.

Our sample of interest consists of all earners aged 18-64 years in each country. We first look into the determinants of second earnership and in-work poverty by means of multivariate logistic regressions based on a pooled dataset for the EU-28 with country fixed effects, where country dummy variables control for the effect of unobserved factors that are shared within each country. We then analyze the effect of second earnership on in-work poverty by simulating transitions of second earners from work into unemployment and evaluating the change in in-work poverty and to what extent it is moderated by the tax-transfer system. The latter approach is discussed in the next section.

### **3.3 Assessing the impact of second earners and tax-benefit policies on in-work poverty: a pre-post analysis**

In order to assess the role of second earners in preventing in-work poverty we use a standard pre-post analysis. The method consists of creating a counterfactual scenario in which we simulate transitions from work (employment or self-employment) into unemployment for all second earners in our data, re-calculate their household disposable income under their new labor market status and assess how such transition would affect in-work poverty.

The effect of transitions to unemployment in our analysis is simulated in the following way. First, disposable income and in-work poverty status are calculated before the transition to unemployment takes place (baseline scenario). Then, in the counterfactual scenario, we set to zero individual earnings of all second earners in our data, simulate all social benefits and taxes they would become entitled to using EUROMOD, and re-calculate their household disposable income under unemployment.<sup>ii</sup> Finally, in-work poverty status after the transition to unemployment is recalculated and compared to in-work poverty status in the baseline scenario.

This is a static analysis that does not take into account any behavioural changes. However, it is relevant for our research question and has a number of advantages from the methodological point of view. In contrast to the existing studies of the impact of public policies on in-work poverty that look exclusively at the role of institutional indicators at the macro-level (e.g. Allègre (2008), Lohmann (2009)), the microsimulation approach enables us to obtain estimates that are representative for the whole population and to study the distribution of welfare provisions at the micro-level. Second, simulations of unemployment transitions across the whole population of second earners helps us avoid the problem of small samples and self-selection in survey data, where we observe second earners who have already become unemployed and their households have adjusted their behaviour to the new circumstances.

We use a set of indicators to measure the effects of taxes and benefits in terms of stabilizing incomes in unemployment (measure of the policy output) and reducing income poverty for working individuals (the outcome measure). The *net replacement rate* is the policy output indicator that is computed as the ratio of post-transition to pre-transition household disposable income. The outcomes are captured by comparing the *pre-* and *post-transition poverty status* using a fixed (pre-transition) poverty line. Individuals are considered poor if their equivalised disposable income after the transition falls below a poverty line fixed at 60% of the median equivalised disposable income in the original population before the transition. These indicators are used to assess the impact of second earners on in-work poverty across different types of welfare systems using a regression analysis.

## **4. Empirical results**

### **4.1 Second earnership in the EU: prevalence and characteristics**

We start the discussion of the results by looking at the share and characteristics of second earners in the EU. Figure 1 shows the breakdown of the total number of earners by earnership status in the household. The number of those who are in work among working age individuals

varies a great deal (from 90% in Sweden to only 54.4% in Greece). The relevance of dual or multiple earnership in EU countries is depicted by the fact that among all individuals who are in work the overwhelming majority lives in households with at least 2 earners (73% on average, ranging from 82% in Slovakia to 60.4% in Greece). Second earners constitute on average about a third of all earners in all the EU countries, with little cross-country variation (their share ranges from 33.5% in Portugal to 28.3% in Greece).

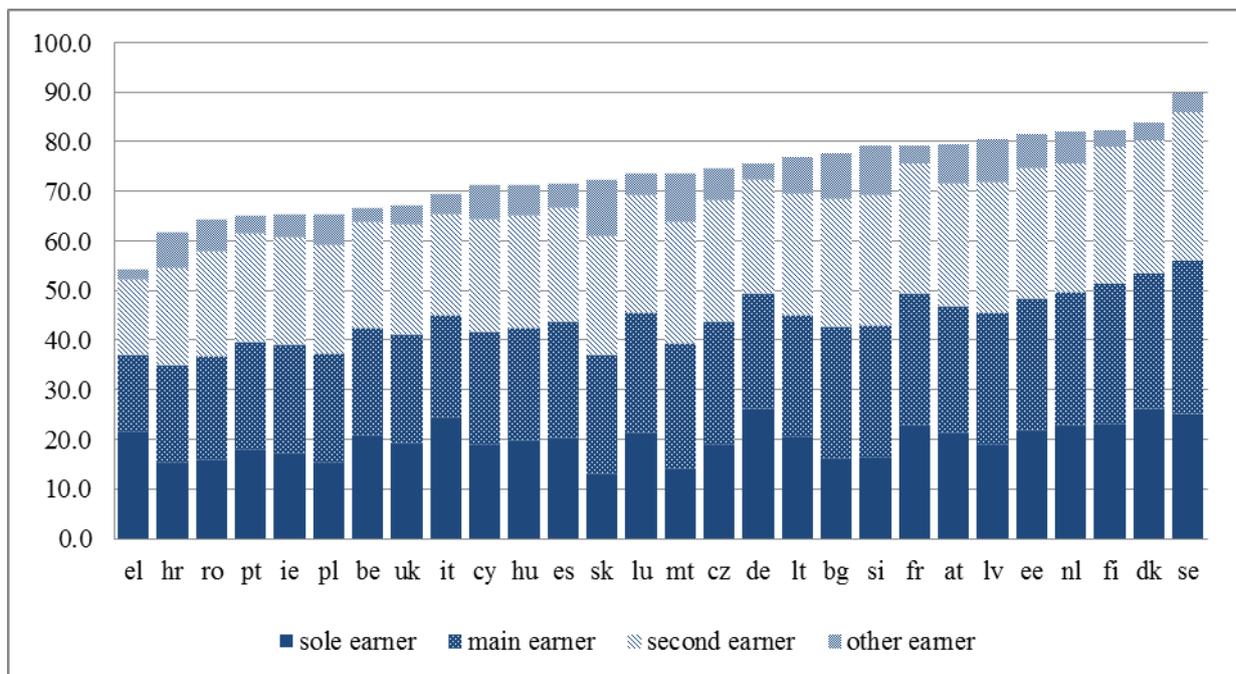


Figure 1: Distribution of working age individuals by earnership status, percent of working age individuals (18-64 years old)

Figure A1 shows that on average in the 28 EU countries second earners in multiple-earner households are predominantly women (64.1%), coupled with main earners (75.4%), earning significantly less than the main earners in their households. On average, earnings of second earners amount to 56.8% of earnings of the primary (main) earner, and this ranges from 46.5% in Germany to 70.4% in Romania.

Regarding the labour market related characteristics of second and main earners, Figure A2 shows that in most countries second earners are more likely to have precarious employment characteristics as compared to main earners, i.e. they are more likely to be less skilled (i.e. an occupational status below 3 on ISCO scale), low-paid (i.e. hourly earnings falling below two-thirds of median hourly earnings of full-time full-year workers in the country) and to work part-time (i.e. working less than 30 hours per week). In 14 out of 28 countries, secondary earners are more likely to be self-employed than main earners, with the gap of 5 p.p. and higher in Greece, Slovenia and Romania. Out of the four employment characteristics shown in Figure A2, the highest gap between second and main earners is observed in terms of low pay (Panel D) and part-time employment (Panel C).

The percentage of main earners employed part-time (i.e. working for less than 30 hours per week) ranges from less than 1% in Slovakia and the Czech Republic to 10% and more in Spain, Italy, Ireland and the Netherlands (Panel C in Figure A2). On average for the EU-28 the share of part-time workers amounts to 4.9% for main earners and 19.5% for second earners. In five EU countries, including the UK, Italy, Austria, Germany and Ireland, more than 30% of second earners are working part-time, while in the Netherlands this number goes up to 52.2%.

To measure low pay we follow OECD (2018) in using a threshold of two-thirds of median hourly earnings of full-time full-year workers in the country. The share of low-paid workers ranges from 3.8% in Slovakia to 16.8% in Greece for main earners, while for second earners the percentage of the low-paid ranges from 18.6% in Slovakia to 43.7% in Spain (Panel D in Figure A2). The average share of low-paid workers for EU-28 is at 9.6% for main earners and at 34.5% for second earners. The gap between the incidence of low pay among second and main earners is typically higher in countries where low pay is less widespread in general.

In order to examine more formally the individual characteristics associated with secondary earnership, we now estimate a logistic regression of the probability of being a second earner on a sample of all working individuals aged 18-64 years with non-zero earnings, living in households with 2 and more earners. We use a pooled dataset for the EU-28 with country fixed effects, to control for the effect of unobserved factors that are shared within each country. Following the literature, we included the following socio-demographic predictors: sex (female or not), age (in years), age squared, being partnered, the number of children aged 0-3 years, 3-5 years, 6-12 years and 13-17 years. Labour market related characteristics used as predictors include: low skill level (i.e. an occupational status below 3 on ISCO scale), self-employment, part-time employment (i.e. working less than 30 hours per week) and low pay (i.e. hourly earnings falling below two-thirds of median hourly earnings of full-time full-year workers in the country). Also, following the literature, we opted for including an interaction for sex of the second earner (female) and the number of children of each age group, assuming that the presence of younger children reduces the time in paid employment for their mothers. Table A1 shows the descriptive statistics for the variables used in the regression analysis. The results are shown in Table 1 in the form of logit coefficients ( $B$ ) and marginal effects ( $DYDX$ ). The latter show the change in the probability of being a second earner for each one step change in  $X$  for all variables in our model, with the other variables set at their means.

In line with previous studies (Marx and Nolan, 2012, Rastrigina and Vereshchagna, 2015) we can see that being a woman, working part-time and being a low paid worker increases the chances of being a second earner by more than 17%. Low skill level and self-employment have a positive effect but do not appear to be strong predictors of second earnership. Other important predictors are being partnered (a 12.8% increase in probability) and, for women, having children, especially children aged 0-3 years (an 11.5% increase) or 3-5 years (a 12.3% increase). In case of men the presence of children reduces the chances of being the second earner.

Table 1: Logistic regression of the probability of being the second earner by individual characteristics, pooled dataset for 28 EU countries with country fixed effects

	B	se	DYDX	se
female	0.8353***	(0.0216)	0.1728***	(0.0043)
age, years	0.0459***	(0.0062)	0.0095***	(0.0013)
age squared, years/10	-0.0071***	(0.0007)	-0.0015***	(0.0002)
partnered	0.6223***	(0.0288)	0.1287***	(0.0059)
low-skilled	0.1213***	(0.0178)	0.0251***	(0.0037)
self-employed	0.1129***	(0.0266)	0.0234***	(0.0055)
part-time job	0.8473***	(0.0255)	0.1753***	(0.0051)
low-paid job	0.8548***	(0.0217)	0.1768***	(0.0043)
number of children 0-3 years	-0.3648***	(0.0406)	-0.0755***	(0.0084)
number of children 3-5 years	-0.3280***	(0.0362)	-0.0679***	(0.0075)
number of children 6-12 years	-0.2395***	(0.0212)	-0.0496***	(0.0044)
number of children 13-17 years	-0.2547***	(0.0242)	-0.0527***	(0.0050)
female*number of children 0-3 years	0.5574***	(0.0557)	0.1153***	(0.0115)
female*number of children 3-5 years	0.5930***	(0.0504)	0.1227***	(0.0104)
female*number of children 6-12 years	0.4651***	(0.0288)	0.0962***	(0.0059)
female*number of children 13-17 years	0.3526***	(0.0334)	0.0729***	(0.0069)
constant	-2.2725***	(0.1229)		
Observations	185,947			

Notes: Robust standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.1

N: Working individuals aged 18-64 years with non-zero earnings, living in households with 2 and more earners

## 4.2 In-work poverty in the EU

There is great deal of variation in in-work poverty rates within the EU (Figure 2). The in-work poverty rate ranges from less than 3% of the working population in Belgium and Finland up to a high of 17% in Romania. In terms of the conventional welfare regime classification (Esping-Andersen, 1990, Arts and Gellissen, 2002) the variation within the country groupings is also substantial. For example, among socio-democratic welfare regimes, Finland has a 2.8% risk of in-work poverty, whereas Denmark and Sweden present higher levels of 4.7% and 6%, respectively. In general, it appears that all West-European countries have lower rates of in-work poverty compared to Southern Europe. East-European countries fall into two clusters. The first one comprises countries with low in-work poverty rates similar to those in Western Europe (the Czech Republic, Slovakia, Croatia and Slovenia). The rest of East-European countries form a cluster where in-work poverty rates are as high as in Southern Europe. As our results do not confirm the presence of clear-cut welfare regime groupings, on graphs below EU countries are grouped by geographical clusters to facilitate presentation of the results. In-work poverty rates of second earners in all EU countries are either lower or equal to those of main earners, because the latter group includes sole earners. This confirms the results of previous studies of multiple earnership and in-work poverty in the EU (Maitre et al., 2012, Horemans and Marx, 2013, European\_Commission, 2016, Eurofound, 2017).

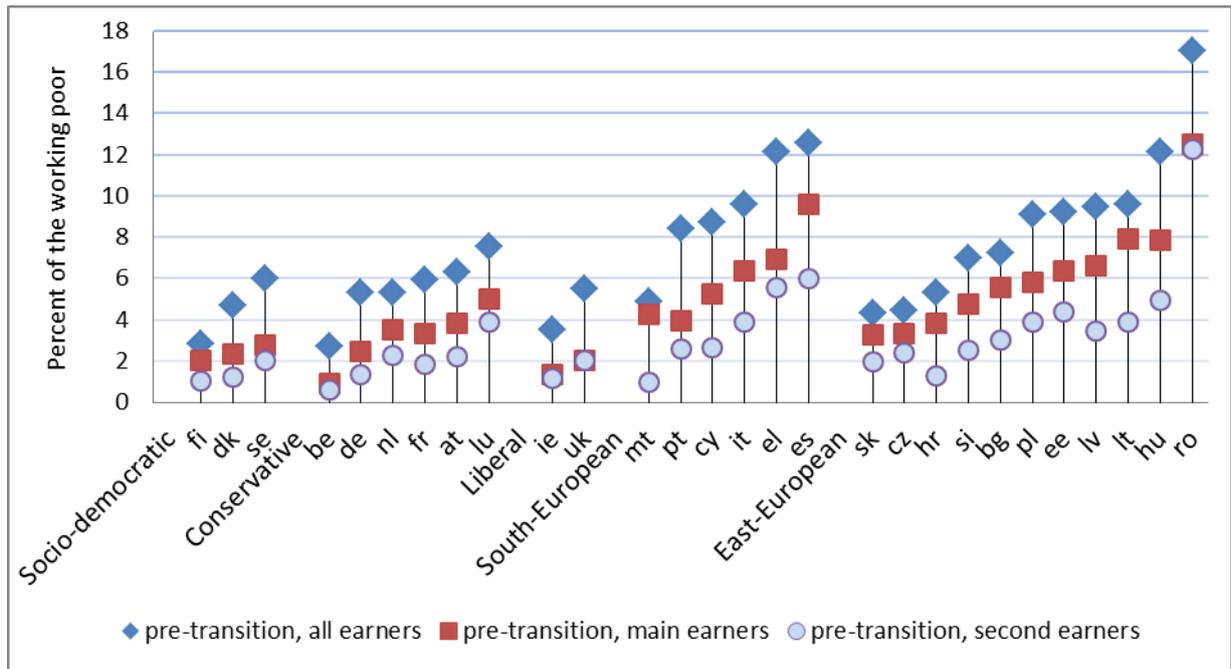


Figure 2: In-work poverty rates for the whole population, main and second earners, percent

Next, we turn to the determinants of in-work poverty. Table 2 shows a logistic regression of *in-work poverty status* for all earners aged 18-64 years, on a pooled dataset of 28 countries with country fixed effects. To measure the effects of the earner's status within the household, we have added a categorical predictor showing whether an individual is the main earner, second earner, other (third and subsequent) earner, with sole earners being the reference category. The set of individual characteristics of workers included as predictors of in-work poverty status is the same as in the regression for the probability of being a second earner (Table 1). Additionally, to control for household economic resources, we have included characteristics such as the number of earners in the household, home ownership status (whether tenant or not) and the financial capital (in a logarithmic form). The descriptive statistics for the variables used on the analysis are presented in Table A2. We have estimated two models: the baseline model with all the above-mentioned predictors (Model 1) and the model with the same predictors and interactions between the earner's status (main earner, second earner or other earner) and their individual characteristics (Model 2).

Model 1 shows that as far as the earner's status in the household is concerned, compared to sole earners (the reference category), main earners in households with multiple earners have a 4.1% lower probability of being poor while working. Being a second or other earner in a household with multiple earners reduces the chances of being working poor by more than 10%. As regards to other individual level characteristics we control for in this model, we see that women are slightly less likely to be poor while working compared to men, while partnered individuals are more prone to in-work poverty compared to non-partnered ones. The effect of age appears to have a U-form shape, i.e. the probability of in-work poverty first

decreases with years of working experience and then increases for older workers. However, the relative impact of these demographic characteristics on the probability of in-work poverty is small (below 3%). As also predicted by previous research on in-work poverty, household level characteristics matter for explaining in-work poverty. The poverty risk increases with the number and age of children and reduces with the number of workers in the household. Not owning a home (being a tenant) is positively associated with in-work poverty, while having higher financial capital is a poverty reducing characteristic. Yet again the impact of these variables on the probability of in-work poverty appears to be much smaller than that of individual labour market characteristics. Part-time employment and low pay are particularly important. The former increases the probability of in-work poverty by 8%, the latter – by almost 12%. Being a low-skilled or a self-employed worker increases the probability of in-work poverty by 3.5 and 4.8%, respectively.

After adding interactions of all personal characteristics<sup>iii</sup> with earnership status (Model 2), we can see that the estimated impact on in-work poverty of being a women, having a part-time job and even having a low paid job, is negative, or poverty reducing for second earners, as opposed to the impact of these characteristics on main earners. Overall the impact of all personal employment characteristics on in-work poverty for individuals living in households with multiple earners is much smaller than for sole earners. In other words, our analysis shows that multiple earnership serves as an important poverty preventing factor for individuals with precarious employment characteristics.

Table 2: Logistic regression of the probability of being working poor, pooled dataset for 28 EU countries with country fixed effects

	Model 1				Model 2			
	B	se	DYDX	se	B	se	DYDX	se
main earner	-0.8326***	(0.0613)	-0.0410***	(0.0030)	-1.0459***	(0.1343)	-0.0510***	(0.0066)
secondary earner	-2.1834***	(0.0750)	-0.1075***	(0.0037)	-1.2291***	(0.1522)	-0.0600***	(0.0075)
other earner	-2.1549***	(0.1318)	-0.1061***	(0.0065)	-2.6460***	(0.4198)	-0.1291***	(0.0205)
female	-0.2272***	(0.0377)	-0.0112***	(0.0019)	-0.2221***	(0.0526)	-0.0108***	(0.0026)
age, years	-0.0542***	(0.0120)	-0.0027***	(0.0006)	-0.0126	(0.0128)	-0.0006	(0.0006)
age squared, years/10	0.0050***	(0.0014)	0.0002***	(0.0001)	0.0003	(0.0015)	0.0000	(0.0001)
partnered	0.6049***	(0.0444)	0.0298***	(0.0022)	0.9234***	(0.0513)	0.0450***	(0.0025)
low-skilled	0.7235***	(0.0414)	0.0356***	(0.0021)	0.5468***	(0.0567)	0.0267***	(0.0028)
self-employed	0.9759***	(0.0390)	0.0481***	(0.0019)	0.8031***	(0.0582)	0.0392***	(0.0028)
part-time job	1.6385***	(0.0452)	0.0807***	(0.0023)	1.7125***	(0.0631)	0.0835***	(0.0031)
low-paid job	2.4315***	(0.0380)	0.1198***	(0.0018)	2.3713***	(0.0529)	0.1157***	(0.0025)
number of children 0-3 years	-0.0015	(0.0609)	-0.0001	(0.0030)	-0.0147	(0.0615)	-0.0007	(0.0030)
number of children 3-5 years	0.2155***	(0.0474)	0.0106***	(0.0023)	0.2218***	(0.0480)	0.0108***	(0.0023)
number of children 6-12 years	0.2797***	(0.0265)	0.0138***	(0.0013)	0.2689***	(0.0270)	0.0131***	(0.0013)
number of children 13-17 years	0.7771***	(0.0297)	0.0383***	(0.0015)	0.7708***	(0.0302)	0.0376***	(0.0015)
number of earners	-0.4950***	(0.0526)	-0.0244***	(0.0026)	-0.4958***	(0.0511)	-0.0242***	(0.0025)
tenant	0.3132***	(0.0420)	0.0154***	(0.0021)	0.3223***	(0.0425)	0.0157***	(0.0021)
ln of financial capital	-0.0668***	(0.0048)	-0.0033***	(0.0002)	-0.0615***	(0.0048)	-0.0030***	(0.0002)
second earner*female					-0.2532*	(0.1016)	-0.0123*	(0.0050)
second earner*partnered					-1.1419***	(0.1087)	-0.0557***	(0.0053)
second earner*low-skilled					0.2003+	(0.1115)	0.0098+	(0.0054)
second earner*self-employed					0.5294***	(0.0949)	0.0258***	(0.0046)
second earner*part-time					-0.3523***	(0.1026)	-0.0172***	(0.0050)
second earner*low-paid					-0.1900+	(0.0974)	-0.0093+	(0.0047)
main earner*female					0.3292***	(0.0884)	0.0161***	(0.0043)
main earner*partnered					-0.7176***	(0.0992)	-0.0350***	(0.0048)
main earner*low-skilled					0.4279***	(0.0981)	0.0209***	(0.0048)
main earner*self-employed					-0.0125	(0.0910)	-0.0006	(0.0044)
main earner*part-time					0.4290***	(0.1161)	0.0209***	(0.0057)
main earner*low-paid					0.4880***	(0.0874)	0.0238***	(0.0043)
other earner*female					0.1638	(0.1901)	0.0080	(0.0093)
other earner*partnered					-1.1828***	(0.2004)	-0.0577***	(0.0097)
other earner*low-skilled					0.6912*	(0.2855)	0.0337*	(0.0139)
other earner*self-employed					1.3280***	(0.1857)	0.0648***	(0.0091)
other earner*part-time					-0.7472***	(0.2086)	-0.0364***	(0.0102)
other earner*low-paid					0.2088	(0.2892)	0.0102	(0.0141)
Observations	216,355				216,355			

Notes:  
Robust standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.1  
N: All earners aged 18-64 years with non-zero earnings

## 4.2 The impact of second earners on in-work poverty in the EU: a pre-post analysis

We now move on to our pre-post analysis. In order to quantify the impact of second earners on in-work poverty in different types of welfare regimes in the EU, we compare the situation before the transition (baseline scenario) and the situation after the transition of second earners into unemployment (counterfactual scenario).

Importantly, the pre-post analysis in combination with EUROMOD enables us to assess the impact of government policies aimed at preventing income losses due to unemployment at the individual level, which we measure with the indicator of *net replacement rates (NRRs)*, or the ratio of the post-transition to pre-transition household disposable income. The size of NRRs is determined both by the generosity of tax-benefit systems towards the unemployed and their families (unemployment and other benefits that the family or the household might be eligible for) and by market incomes of other household members, particularly so for second earners. The decomposition of NRRs of main and second earners is shown in Figures A3 and A4.

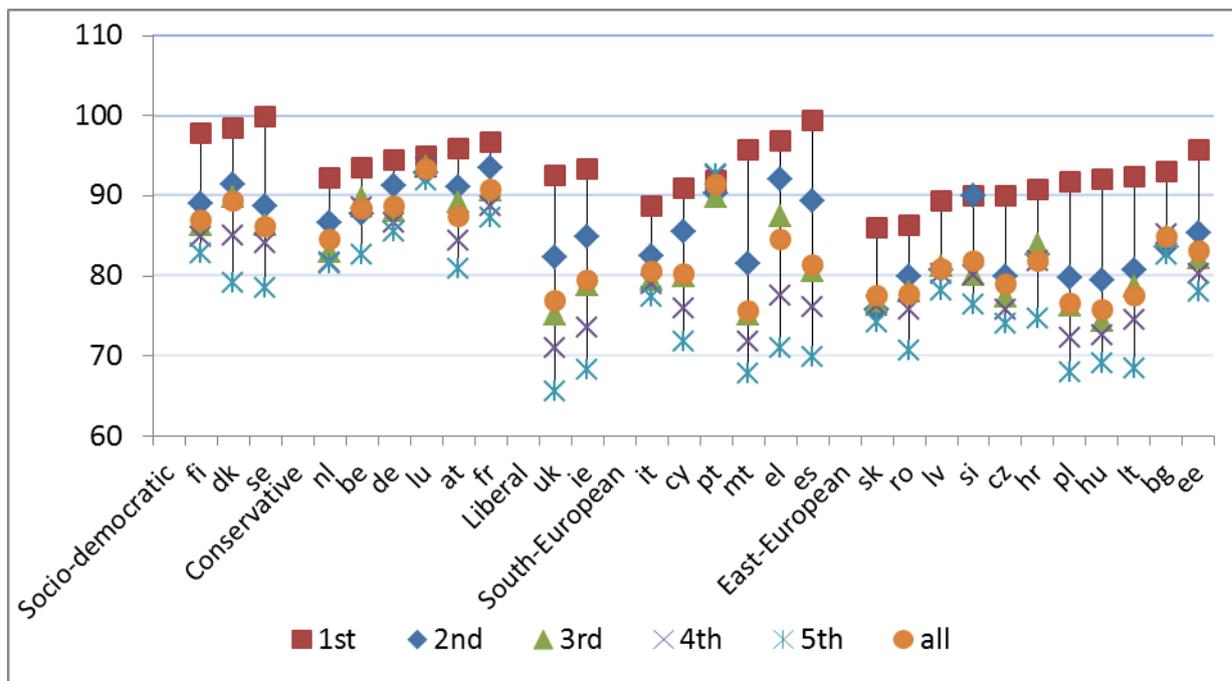


Figure 3: Net replacement rates of second earners by pre-transition earnings quintiles, percent

Figure 3 shows the variation in NRRs of second earners across countries and within each country by quintiles of the pre-transition individual earnings. Within each welfare regime, the countries are ranked by mean replacement rates of all second earners in the sample. NRRs at the mean vary from 75.6% in Malta to 93.4% in Luxembourg, with the average for EU-28 at 83%. NRRs are highest in socio-democratic and conservative regimes, where unemployment benefits play a particularly important role (see Figure A4). Countries from liberal and South-European regimes have the highest within-the-country variation of NRRs of second earners,

Portugal being the exception. NRRs are particularly high at the bottom of the distribution due to the small contribution of earnings from second earners to household disposable income but also reflect differences in the generosity of the tax-benefit system (e.g. larger in Nordic countries). Second earners from the top quintile benefit from the highest (90% and over) net replacement rates in Portugal, Luxembourg and France.

Figure 4 shows the extent to which in-work poverty would increase if all second earners would become unemployed, given that their lost earnings would be partially replaced by unemployment benefits and other tax-benefit instruments they are eligible for. In all countries, in-work poverty would increase substantially, however, the effect of this transition varies widely across countries. In Greece, Ireland and Finland, in-work poverty would increase by less than 2 p.p. following an entry of all second earners into unemployment. Hungary and Poland would experience the largest increase in in-work poverty of over 8 p.p.

The reasons for the cross-country differences in the in-work poverty changes depend on a combination of factors, such as the pre-transition level of in-work poverty, the prevalence of second earners in the country, the level of earnings of second earners and their household members and the design of the tax-benefit system, i.e. the level of replacement income of second earners once they become unemployed (captured by our indicator of NRRs). Figure A5 plots the change in in-work poverty rates due to transition of second earners into unemployment against mean NRRs of second earners. As expected, these two indicators are negatively correlated; in countries where second earners have high NRRs, the change in in-work poverty is smaller and vice versa. Yet NRRs is not the only factor affecting the change in poverty. In order to assess the relative contribution of various factors to in-work poverty rates we will need to apply a regression analysis.

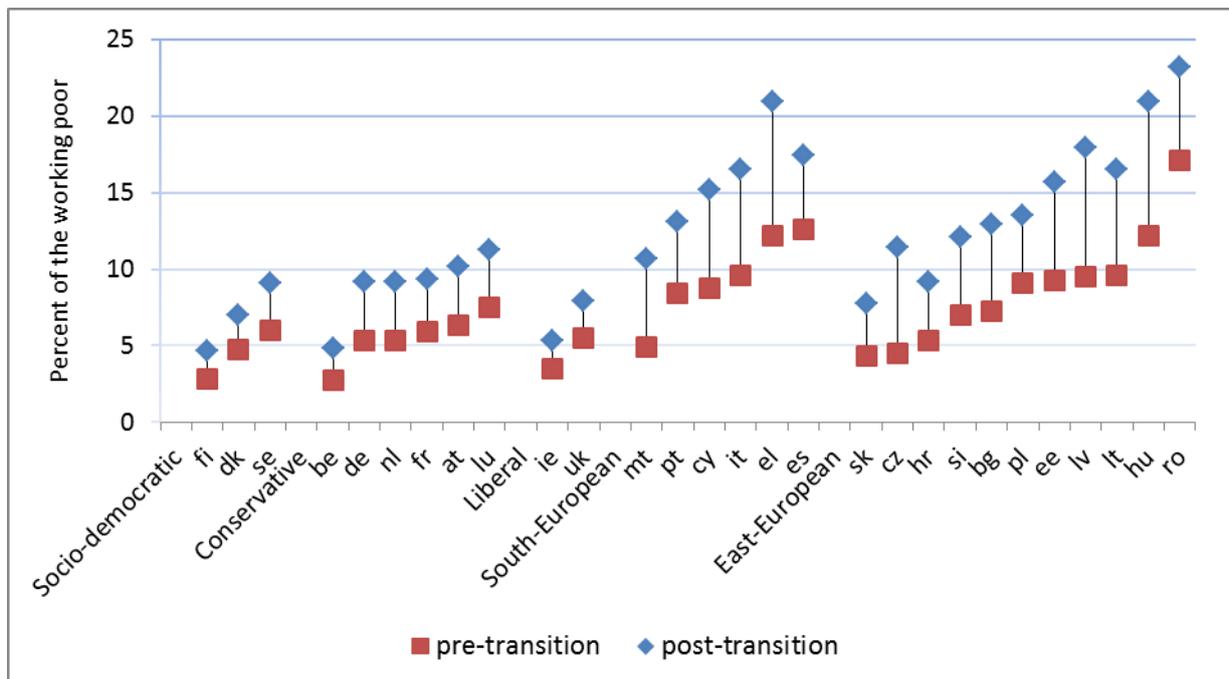


Figure 4: Pre- and post-transition in-work poverty rates in the EU, percent

Apart from the main counterfactual scenario where all second earners are moved into unemployment, we have also assessed the effect of unemployment shocks of smaller magnitudes, whereby 5%, 10%, 25%, and 50% of second earners with the highest probability of unemployment risk would lose their jobs. The probability of unemployment was calculated from a probit model of unemployment experience in the past year as a function of a set of individual, household and job characteristics for a sample of people in work in the EU-SILC data. These results show that the impact of partial transitions on in-work poverty is very small (Figure A6). The reason behind the negligible effects of smaller unemployment shocks is that second earners with the highest probability of becoming unemployed (i.e. those transitioning into unemployment first) are characterized by low pay and their contribution to household disposable income is minor.

Having analyzed how the transition of second earners affects aggregate indices of in-work poverty, we turn to the regression analyses of the *pre-* and *post-transition in-work poverty status for main and other earners* in the households with multiple earners (Table 3). The set of predictors remains the same as in the models for all earners presented in Table 2. In addition, simulating the transition enables us to measure the moderating effect of the tax-benefit systems on in-work poverty. This is done by introducing *net replacement rates of second earners* as a predictor of post-transition in-work poverty of all other earners in their households (Model 2). In contrast to previous studies, we measure the effect of government policies at the individual level, which enables us to take into account the level and the distribution of government provisions across the whole population of workers. It should be noted that NRRs do not capture only the generosity of the tax-benefit system towards the unemployed but are also influenced by earnings (or more generally market income) of other household members. The regression analysis aims at controlling for these factors in order to assess the net impact of the tax-benefit system on in-work poverty. In Model 3 we have restricted the sample to individuals who were not poor before the transition of secondary earners into unemployment. The descriptive statistics for the variables used in these regression models are presented in Table A3.

Looking more closely at the covariates associated with post-transition poverty risk in Table 3 (Models 2 and 3) we can see that the direction of the effects of personal and household characteristics remains broadly the same as in the pre-transition model (Model 1). However the size of the effects in post-transition Model 2 becomes significantly larger than in the pre-transition model. The exceptions are “age” and “partnership status” which are no longer statistically significant. Low pay and part-time employment continue to be the most important predictors, increasing the probability of in-work poverty by 13.5 and 8.2%, respectively. NRRs of secondary earners have a statistically significant poverty reducing effect, but it appears to be small compared to the effects of individual employment characteristics, i.e. 10 p.p. increase in NRRs reduces the probability of poverty by 1.4%.

In Model 3 we have removed from the sample all individuals who were already classified as the working poor before moving second earners into unemployment in order to target those who could become poor after the simulated transitions. The direction of the effects of personal and household characteristics is similar to Model 2 but with a reduction in their

predicted power, which is expected, as these variables are more correlated with the status of being working poor in the baseline and those individuals are not part of the sample in Model 3. On the other hand, we observe an increase in the size of the effect of NRRs (a 10 p.p. increase in NRRs would result in a 3% reduction in the probability of in-work poverty which is twice as high compared to Model 2). In other words, for those who were not working poor before the transition, the unemployment of second earners becomes the main driving factor of poverty, thus NRRs play a more important role.

Table 3: Logistic regression of the probability of being a working poor before and after the transition of second earners to unemployment, pooled dataset for 28 EU countries with country fixed effects

	pre-transition in-work poverty				post-transition in-work poverty							
	Model 1				Model 2				Model 3			
	B	se	DYDX	se	B	se	DYDX	se	B	se	DYDX	se
net replacement rate of secondary earners, %					-0.0272***	(0.0026)	-0.0014***	(0.0001)	-0.0896***	(0.0032)	-0.0030***	(0.0001)
female	0.0525	(0.0740)	0.0015	(0.0022)	0.3240***	(0.0555)	0.0169***	(0.0029)	0.3300***	(0.0688)	0.0110***	(0.0023)
age, years	-0.0002	(0.0248)	-0.0000	(0.0007)	0.0029	(0.0189)	0.0002	(0.0010)	0.0256	(0.0250)	0.0009	(0.0008)
age squared, years/10	-0.0001	(0.0029)	-0.0000	(0.0001)	-0.0006	(0.0022)	-0.0000	(0.0001)	-0.0025	(0.0029)	-0.0001	(0.0001)
partnered	0.0444	(0.1038)	0.0013	(0.0031)	0.1307	(0.0813)	0.0068	(0.0042)	-0.0771	(0.1027)	-0.0026	(0.0034)
low-skilled	0.8438***	(0.0891)	0.0249***	(0.0027)	1.0960***	(0.0611)	0.0572***	(0.0033)	1.2811***	(0.0778)	0.0426***	(0.0027)
self-employed	1.0455***	(0.0711)	0.0309***	(0.0021)	0.9913***	(0.0580)	0.0517***	(0.0030)	0.5650***	(0.0767)	0.0188***	(0.0026)
part-time job	1.6530***	(0.1002)	0.0488***	(0.0031)	1.5699***	(0.0833)	0.0819***	(0.0044)	1.3186***	(0.1076)	0.0439***	(0.0036)
low-paid job	2.6988***	(0.0755)	0.0797***	(0.0024)	2.5878***	(0.0640)	0.1350***	(0.0032)	2.3168***	(0.0841)	0.0771***	(0.0029)
number of children 0-3 years	0.0549	(0.1278)	0.0016	(0.0038)	-0.1528	(0.0945)	-0.0080	(0.0049)	-0.1353	(0.1200)	-0.0045	(0.0040)
number of children 3-5 years	0.3330***	(0.0928)	0.0098***	(0.0027)	0.2983***	(0.0684)	0.0156***	(0.0036)	0.3748***	(0.0861)	0.0125***	(0.0029)
number of children 6-12 years	0.3331***	(0.0539)	0.0098***	(0.0016)	0.2500***	(0.0416)	0.0130***	(0.0022)	0.2534***	(0.0533)	0.0084***	(0.0018)
number of children 13-17 years	0.7707***	(0.0546)	0.0228***	(0.0016)	0.7980***	(0.0408)	0.0416***	(0.0021)	0.7872***	(0.0511)	0.0262***	(0.0017)
number of earners	-1.0389***	(0.0646)	-0.0307***	(0.0019)	-1.2785***	(0.0535)	-0.0667***	(0.0027)	-1.3916***	(0.0726)	-0.0463***	(0.0024)
tenant	0.4072***	(0.0921)	0.0120***	(0.0027)	0.3588***	(0.0718)	0.0187***	(0.0038)	0.3803***	(0.0879)	0.0126***	(0.0030)
ln of financial capital	-0.0688***	(0.0096)	-0.0020***	(0.0003)	-0.0771***	(0.0081)	-0.0040***	(0.0004)	-0.0848***	(0.0111)	-0.0028***	(0.0004)
constant	-3.5780***	(0.5695)			0.2252	(0.4809)			4.8593***	(0.5808)		
Observations	82,777				82,777				79,472			

Notes:

Robust standard errors in parentheses

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.1

N: Model 1 - main/other earners in households with 2+ earners before the transition; Model 2 - main/other earners in households with 2+ earners after the transition; Model 3 - main/other earners in households with 2+ earners after the transition that were not poor before the transition

## 5. Conclusion

In-work poverty rates are the result of complex interactions between individual and household level characteristics and institutional and labour market structures. Among these factors, dual earnership and the design of tax-benefits systems have been regarded as the most influential determinants of in-work poverty rates. The present paper aimed to quantify the impact of second earnership on the risk of in-work poverty and the role of the tax-benefit systems in moderating this risk.

First, we analysed the prevalence and characteristics of second earnership in the EU-28 and looked at the association between second earnership and in-work poverty at the individual level using the conventional techniques whereby the in-work poverty status is regressed on a number of individual and household level predictors. Second earners are a specific group of individuals which constitutes about a third of all earners of active working age (18-64 years) in the EU countries. They are predominantly women, coupled with main earners, who earn significantly less than the main earners (56.8% on average across the EU countries). Our analysis of individual characteristics of second earners provided tentative explanations as to why their earning capacity is lower than that of the main earners: they are significantly more likely to be low-paid and to work part-time. Statistically significant but less important predictors of second earnership are low skills, self-employment, being partnered and, for women, having children aged up to 5 years.

Our results show that in-work poverty rates vary significantly across the EU, from 3% to 17% of the working population. In terms of the conventional welfare regime groupings, higher in-work poverty is typical of South-European and the majority (but not all) East-European countries. At the same time, in-work poverty rates of second earners in all EU countries are either lower or equal to the in-work poverty rates of main earners and are much lower than the poverty rates for the whole working population, because the latter includes sole earners. This result has been further confirmed by the regression analysis of the probability of in-work poverty for all workers. Other characteristics being equal, second earners have significantly lower chances of being poor while working as compared to sole earners and main earners. The effects of earnership status greatly outweigh the effects of other individual and household demographic characteristics on the probability of in-work poverty. Importantly, for secondary earners, characteristics such as being female, working part-time and low pay do not have a poverty increasing effect, as opposed to the impact of these characteristics on main earners. For this group, the level of earnings of the main earner is the main factor preventing in-work poverty. The impact of all personal employment characteristics on in-work poverty for individuals living in households with 2+ earners is much smaller than for sole earners, which confirms that multiple earnership indeed serves as an important poverty preventing factor for individuals with precarious employment characteristics.

Second, this paper has offered an innovative approach to measuring the effects of dual earnership on in-work poverty in the EU. In order to determine the contribution of the second earners in preventing in-work poverty we have used a pre-post analysis in combination with microsimulation techniques. Our strategy consisted of simulating a counterfactual scenario

under which secondary earners would become unemployed and assessing how this transition would affect household incomes and in-work poverty status, as compared to the status-quo (baseline) situation. Simulation of unemployment transition for the whole population of second earners helps us avoid the problem of small samples and self-selection in survey data, where we can only compare the situation of multi-earner households with that of households where potential second earners are currently out of work, and may or may not enter the labour market depending on their preferences and constraints which are not known to us. Using EUROMOD to simulate tax liabilities and benefit entitlements gave us an additional advantage, as we were able to estimate the net effect of the transition, accounting for the income smoothing effect due to the government tax-benefit policies aimed at income replacement after unemployment. This approach has the advantage of exploiting heterogeneity across the population by accounting for the role of tax-benefit policies at the individual level compared to the existing studies of the impact of public policies on in-work poverty that looked exclusively at the role of institutional indicators at the macro-level.

The government effort in preventing in-work poverty has been approximated by the indicator of net replacement rates of second earners, i.e. the percentage of equivalised household disposable income that is replaced by government transfers (or by a reduction in taxes) in case of unemployment of a second earner. NRRs of second earners are quite high - 83% on average for EU-28, but this number varies both between and within EU member states. It is noteworthy, NRRs capture not only the role of the tax-benefit system but also the protection provided by market income of other household members, e.g. the main earner in the household. Under the counterfactual scenario, in-work poverty rate would go up by 4.5 p.p. on average for all 28 countries, or by 66% in relative terms. Between-country variation in the poverty increase after the transition of second earners to unemployment is large and is a result of a combined effect of public policies, original distribution of earnings and the socio-demographic composition of the population.

Next, we have compared the results of the regression analyses using a pre- and post-transition samples of earners in households with at least 2 earners in order to disentangle the impact of the individual, household and policy related characteristics on the probability of in-work poverty. This approach allows us to assess the extent to which tax-benefit policies measured by NRRs mitigate the risk of in-work poverty in case second earners would enter unemployment, controlling for individual earnings and other household incomes. These results show that the NRRs have a negative (poverty reducing) and statistically significant impact on the probability of in-work poverty, but in relative terms it appears to be small compared to the effects of individual employment characteristics. In particular a 10 p.p. increase in NRRs reduces the probability of poverty by 1.4%, while, for instance, low pay increases it by 13.5%. Overall, the direction of the effects of personal and household characteristics under the counterfactual scenario remained broadly the same as under the baseline scenario. However the size of the effects of all predictors became significantly larger. Focusing on the sample of individuals who were not working poor in the baseline (i.e. those who would be affected by second earners' transitions), the effect of NRRs on the probability of in-work poverty after the transition of second earners into unemployment doubles whereas the effect of individual and household characteristics decreases.

Further research could extend the analysis presented in this paper in several dimensions. First, in order to provide an overall assessment of the relevance of second earnership in preventing in-work poverty, we modelled transitions into unemployment of all second earners. As such, our results represent an upper bound of the effect of second earnership on in-work poverty. Future work should account for the fact that the probability of becoming unemployed varies across individuals. Second, we concentrated on the effect of second earners' entry into unemployment. An alternative way to assess the effect of second earnership on in-work poverty could focus on the impact of entries into employment of working age individuals who are out of work. The effects of such approach depend, however, on the assumptions about the employment preferences of these individuals and level of earnings and hours of work (among others) these individuals would face when entering employment. Third, our analysis did not take into account potential adjustments in the behaviour of other household members after the entry of the second earner into unemployment. Structural labour supply models could be used to predict potential reactions of household members following unemployment shocks. Alternatively, one could also evaluate the amount of additional labour supply needed to compensate the loss of employment by second earners. Finally, our analysis has focused on cash programmes, omitting non-cash policies which might play an important role in preventing the in-work poverty. Imputing information on non-cash policies in survey data across countries in a consistent way remains, however, a challenging task. Despite these shortcomings, the analysis presented in this paper provides a transparent quantitative assessment of how important second earners' employment and government policies are in lifting the working individuals above the poverty line, which is relevant both in terms of employment activation policies and social protection programs in the EU.

## References:

- ALLÈGRE, G. 2008. Working poor in the EU: an exploratory comparative analysis. *Working Paper No 2008-35*. OFCE – Centre de recherche en économie de Sciences Po.
- ANDREB, H. J. & LOHMANN, H. (eds.) 2008. *The working poor in Europe: Employment, poverty and globalisation*, London: Edward Elgar.
- ARTS, W. & GELLISSSEN, J. 2002. Three worlds of welfare capitalism or more? *Journal of European Social Policy*, 12, 137-58.
- BROUGHTON, A., GREEN, M., RICKARD, C., SWIFT, S., EICHHORST, W., TOBSCH, V., MAGDA, I., LEWANDOWSKI, P., KEISTER, R., JONAVICIENE, D., RAMOS MARTIN, N. E., VALSAMIS, D. & TROS, F. 2016. Precarious employment in Europe: Patterns, trends and policy strategies. European Parliament.
- CRETTAZ, E. & BONOLI, G. 2010. Why are some workers poor? The mechanisms that produce working poverty in a comparative perspective. *Working Papers on the Reconciliation of Work and Welfare in Europe. REC-WP 12/2010*.
- ESPING-ANDERSEN, G. 1990. *The three worlds of welfare capitalism*, Cambridge, Polity Press.
- EUROFOUND 2017. *In-work poverty in the EU*, Luxembourg, Publications Office of the European Union.
- EUROPEAN COMMISSION 2016. *Low pay and in work poverty: Preventative measures and preventative approaches*, Luxembourg, Publications Office of the European Union.
- EVANS, M. & HARKNESS, S. 2010. The impact of the tax and benefit system on second earners. *Journal of poverty and social justice*, 18, 35-51.
- FIGARI, F., PAULUS, A. & SUTHERLAND, H. 2015. Microsimulation and policy analysis. In: ATKINSON, A. B. & BOURGUIGNON, F. (eds.) *Handbook of income distribution*. Amsterdam: Elsevier.
- FRAZER, H. & MARLIER, E. 2010. In work poverty and labour market segmentation in the EU: Key Lessons. Synthesis Report. *EU Network of Independent Experts on Social Inclusion, DG Employment, Social Affairs and Inclusion*. Brussels.
- GOOS, M. & SALOMONS, A. 2009. The polarization of the European labor market. *American Economic Review*, 99, 59-63.
- HOREMANS, J. & MARX, I. 2013. In-work poverty in times of crisis: Do part-timers fare worse? *ImPRovE Discussion Paper No. 13/14*. Antwerp.
- ILO 2012. International Standard Classification of Occupations: ISCO-08. Geneva: International Labour Office.
- JARA, H. X., GASIOR, K. & MAKOVEC, M. 2017. Low incentives to work at the extensive and intensive margin in selected EU countries. *EUROMOD Working Papers EM3/17*. Colchester: University of Essex.
- JARA, H. X. & TUMINO, A. 2013. Tax-benefit systems, income distribution and work incentives in the European Union. *International Journal of Microsimulation*, 6, 27-62.
- JARA, H. X. & TUMINO, A. 2018. Income protection of atypical workers in the event of unemployment in Europe. *JRC Working Papers on Taxation and Structural Reforms No 05/2018*. Seville: Joint Research Centre of the European Commission.
- LOHMANN, H. 2009. Welfare States, labour market institutions and the working poor: A comparative analysis of 20 European countries *European Sociological Review*, 25, 489-504.

- LOHMANN, H. & MARX, I. (eds.) 2018. *Handbook on In-Work Poverty*, Cheltenham, UK: Edward Elgar Publishing.
- MAITRE, B., NOLAN, B. & WHELAN, C. T. 2012. Low pay, in-work poverty and economic vulnerability: a comparative analysis using EU-SILC. *The Manchester School*, 80, 99-116.
- MARX, I. & NOLAN, B. 2012. In-work poverty *GINI Discussion Paper 51*.
- MCKNIGHT, A., STEWART, K., HIMMELWEIT, S. M. & PALILLO, M. 2016. Low pay and in-work poverty: preventative measures and preventative approaches. Brussels: European Commission. Directorate-General for Employment, Social Affairs and Inclusion Directorate Social Affairs. Unit C1 - Social investment Strategy.
- MOLLER, S., HUBER, E., STEPHENS, J. D., BRADLEY, D. & NIELSEN, F. 2003. Determinants of relative poverty in advanced capitalist democracies. *American Sociological Review*, 68, 22-51.
- OECD 2011. *Doing better for families*. Paris: Organisation for Economic Cooperation and Development.
- OECD 2015. Non-standard work, job polarisation and inequality. *In It Together: Why Less Inequality Benefits All*. Paris: OECD Publishing.
- OECD 2018. *OECD Employment Outlook 2018*, Paris, OECD Publishing.
- PONTHIEUX, S. 2010. In-work poverty in the EU. *Eurostat Methodologies and Working Papers*. Luxembourg: Eurostat.
- RASTRIGINA, O. & VERESHCHAGNA, A. 2015. Secondary earners and fiscal policies in Europe. Luxembourg: European Commission - Directorate-General for Justice.
- RAY, K., SISSONS, P., JONES, K. & VEGERIS, S. 2014. Employment, pay and poverty. Evidence and policy review. York: Joseph Rowntree Foundation.
- SUTHERLAND, H. 2014. Multi-country microsimulation. In: O'DONOGHUE, C. (ed.) *Handbook of microsimulation modelling*. Bingley, UK: Emerald.
- SUTHERLAND, H. & FIGARI, F. 2013. EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation*, 6, 4-26.
- THOMAS, A. & O'REILLY, P. 2016. The impact of tax and benefit systems on the workforce participation incentives of women. *OECD Taxation Working Papers, No. 29*. Paris: OECD Publishing.
- VAN LANCKER, W. 2011. The European world of temporary employment: Gendered and poor? *European Societies*, 14, 83-111.

ANNEX

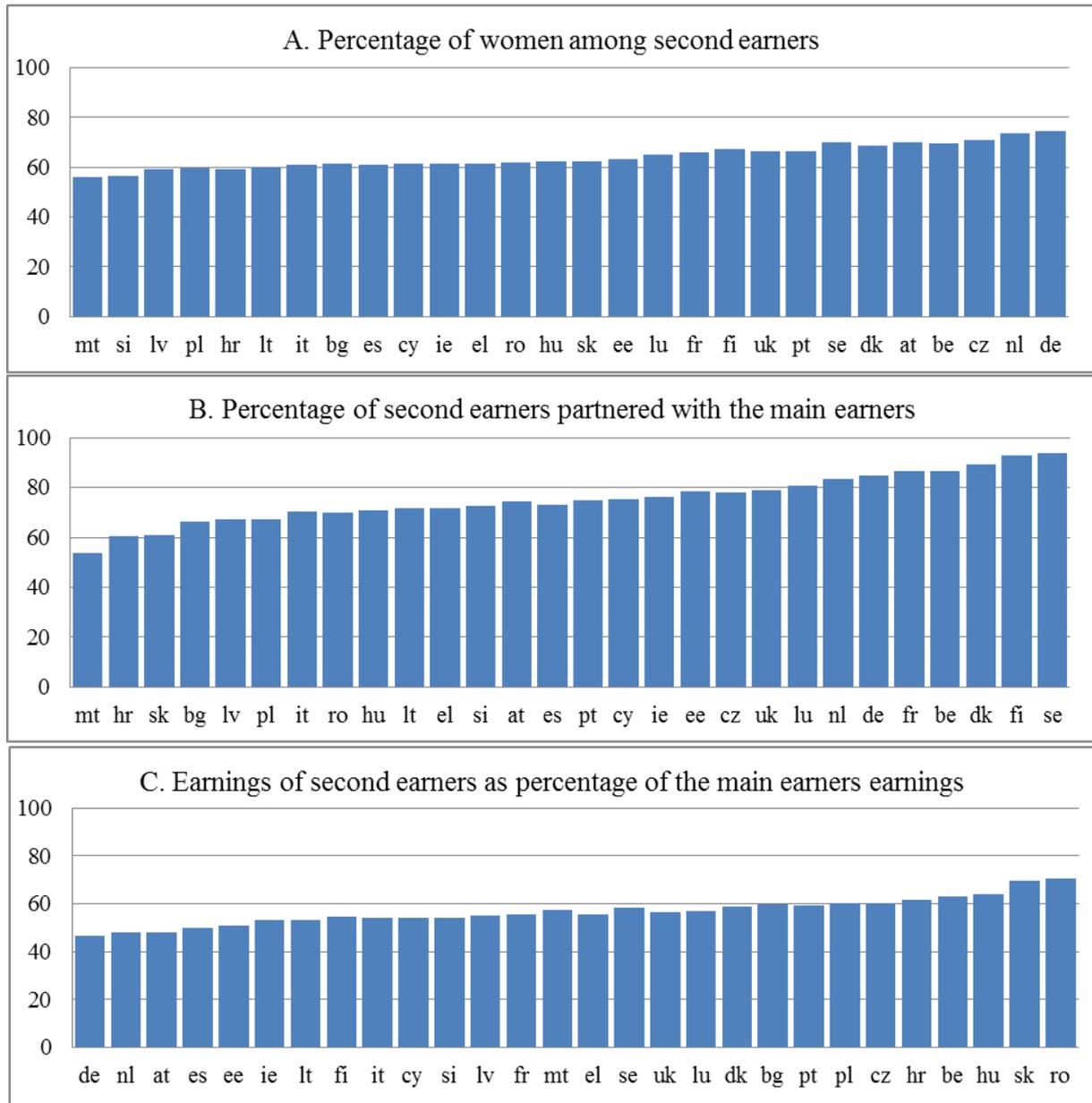


Figure A1: Characteristics of second earners: gender, partnership status and earnings, percent

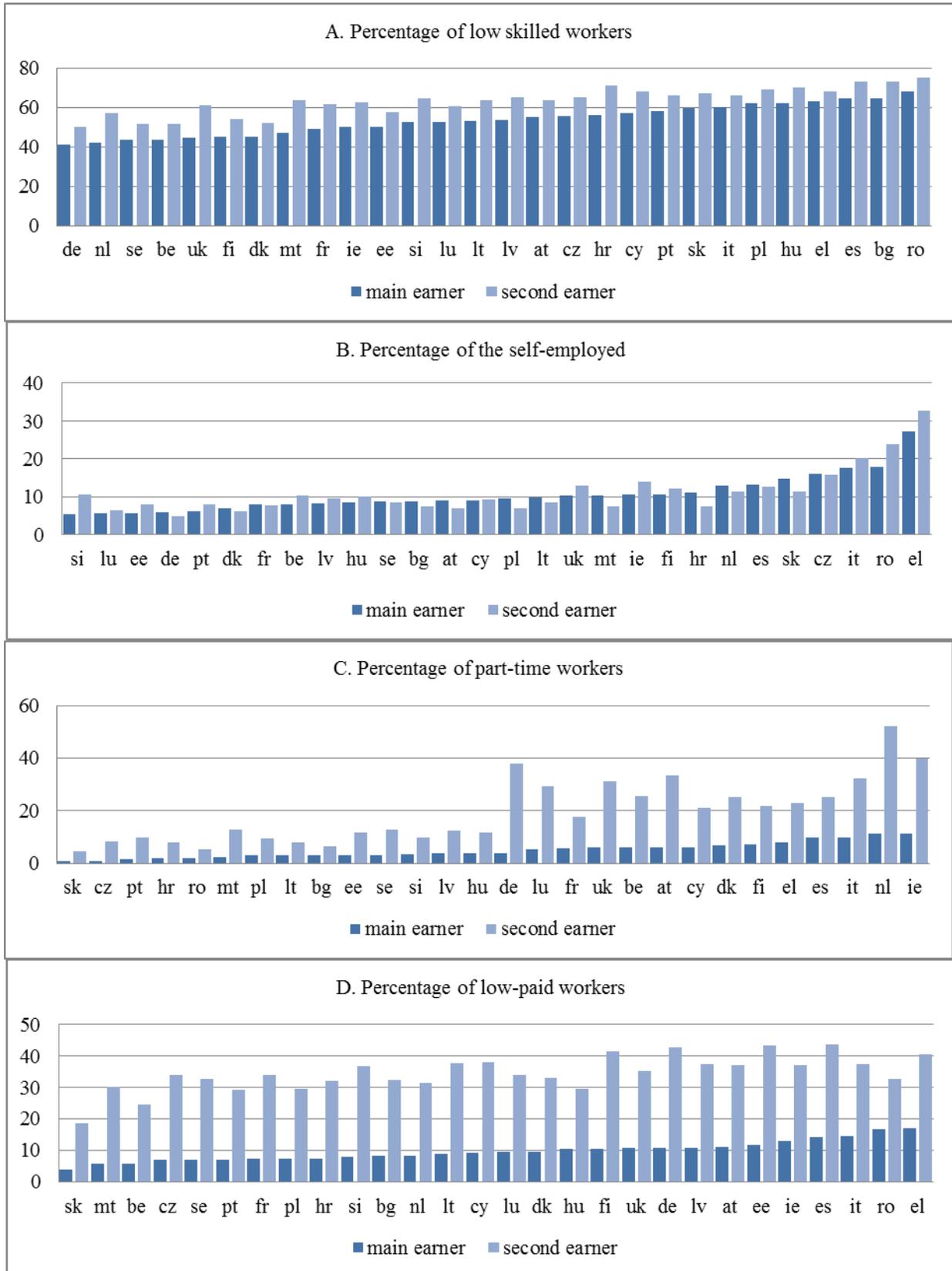


Figure A2: Labour market characteristics of second earners and main earners: prevalence of low skills, self-employment, part-time employment and low pay, percent

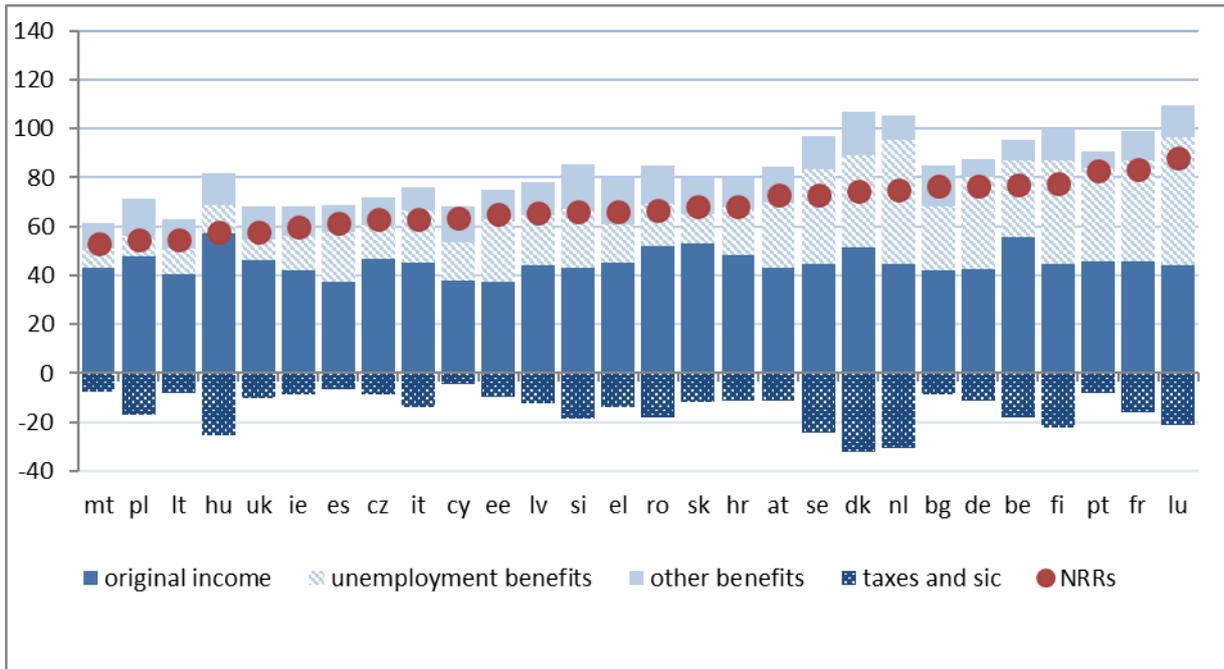


Figure A3: Decomposition of mean net replacement rates of main earners, percent

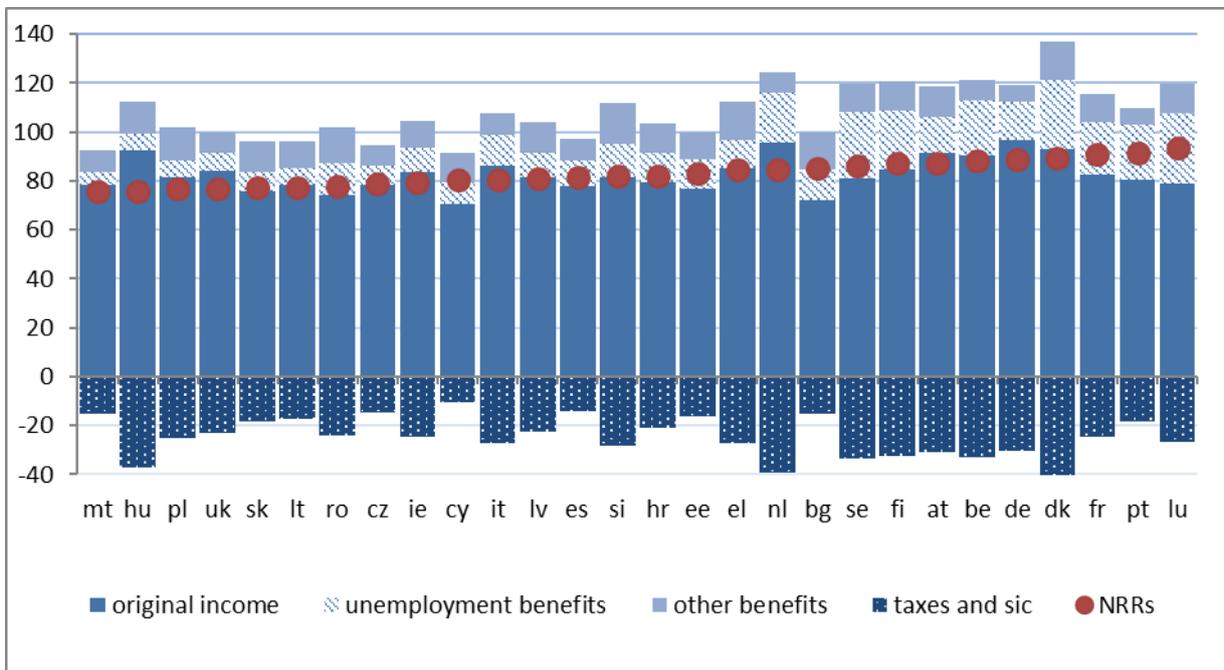


Figure A4: Decomposition of mean net replacement rates of second earners, percent

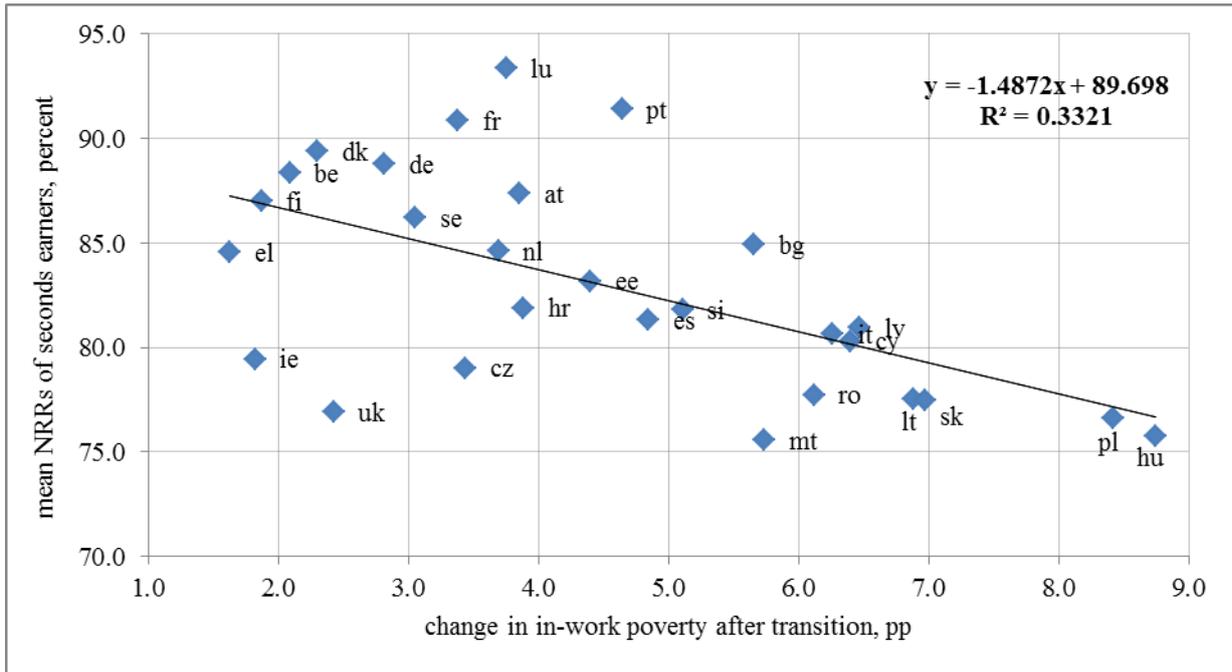


Figure A5: Mean NRRs of second earners vs. changes in in-work poverty rates due to transition in the EU

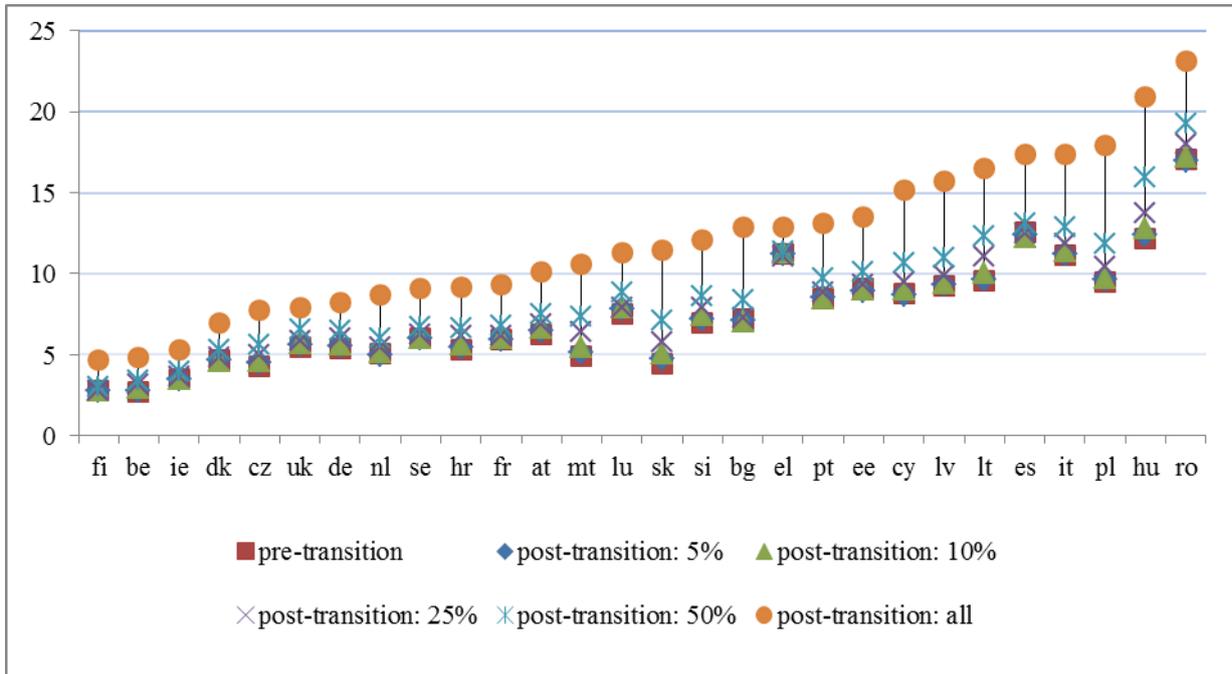


Figure A6: Pre- and post-transition in-work poverty rates under different types of shocks, percent of working age population

Table A1: Descriptive statistics for variables used in the logistic regression of the probability of being the second earner by individual characteristics, pooled dataset for 28 EU countries

	mean	sd	min	max
female	0.489		0	1
age, years	41.59	12.04	18	64
age squared, years/10	187.5	98.83	32.40	409.6
partnered	0.787		0	1
low-skilled	0.611		0	1
self-employed	0.114		0	1
part-time job	0.145		0	1
low-paid job	0.271		0	1
number of children 0-3 years	0.104	0.332	0	4
number of children 3-5 years	0.123	0.359	0	3
number of children 6-12 years	0.299	0.606	0	7
number of children 13-17 years	0.251	0.532	0	5

Observations 185,947

Notes:

N: Working individuals aged 18-64 years with non-zero earnings, living in households with 2 and more earners

Table A2: Descriptive statistics for variables used in the logistic regression of the probability of being working poor, pooled dataset for 28 EU countries

	mean	sd	min	max
main earner	0.368		0	1
secondary earner	0.319		0	1
other earner	0.0506		0	1
female	0.474		0	1
age, years	43.42	11.13	18	64
age squared, years/10	200.9	95.06	32.40	409.6
partnered	0.720		0	1
low-skilled	0.591		0	1
self-employed	0.133		0	1
part-time job	0.127		0	1
low-paid job	0.181		0	1
number of children 0-3 years	0.0953	0.318	0	4
number of children 3-5 years	0.116	0.349	0	3
number of children 6-12 years	0.283	0.597	0	7
number of children 13-17 years	0.224	0.508	0	6
number of earners	1.827	0.738	1	14
tenant	0.164		0	1
ln of financial capital	3.507	4.645	-2.996	22.54

Observations 216,355

Notes:

N: All earners aged 18-64 years with non-zero earnings

Table A3: Descriptive statistics for variables used in the logistic regression of the probability of being a working poor before and after the transition of second earners to unemployment, pooled dataset for 28 EU countries

	pre-transition in-work poverty				post-transition in-work poverty							
	Model 1				Model 2				Model 3			
	mean	sd	min	max	mean	sd	min	max	mean	sd	min	max
female	0.337		0	1	0.337		0	1	0.335		0	1
age, years	43.06	11.14	18	64	43.06	11.14	18	64	43.11	11.14	18	64
age squared, years/10	197.8	93.65	32.40	409.6	197.8	93.65	32.40	409.6	198.2	93.74	32.40	409.6
partnered	0.833		0	1	0.833		0	1	0.834		0	1
low-skilled	0.553		0	1	0.553		0	1	0.541		0	1
self-employed	0.120		0	1	0.120		0	1	0.110		0	1
part-time job	0.0656		0	1	0.0656		0	1	0.0603		0	1
low-paid job	0.117		0	1	0.117		0	1	0.0970		0	1
number of children 0-3 years	0.105	0.332	0	4	0.105	0.332	0	4	0.105	0.332	0	4
number of children 3-5 years	0.128	0.364	0	3	0.128	0.364	0	3	0.127	0.362	0	3
number of children 6-12 years	0.306	0.613	0	7	0.306	0.613	0	7	0.302	0.608	0	6
number of children 13-17 years	0.247	0.527	0	4	0.247	0.527	0	4	0.240	0.520	0	4
number of earners	2.219	0.702	1	14	2.219	0.702	1	14	2.228	0.696	1	14
tenant	0.130		0	1	0.130		0	1	0.128		0	1
ln of financial capital	3.639	4.686	-2.996	22.14	3.639	4.686	-2.996	22.14	3.718	4.712	-2.996	22.14
net replacements rates, %					83.09	11.11	4.490	165.8	82.74	10.65	4.680	149.9
Observations	82,777				82,777				79,472			

Notes:

N: Model 1 - main/other earners in households with 2+ earners before the transition; Model 2 - main/other earners in households with 2+ earners after the transition; Model 3 - main/other earners in households with 2+ earners after the transition that were not poor before the transition

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<sup>i</sup> Here and throughout the paper household disposable income is equivalised using the modified OECD equivalence scale.

<sup>ii</sup> Other relevant labour market variables entering the simulations are adjusted to reflect the corresponding change in their labour market situation e.g. labour market status set to unemployment, hours of work set to zero, etc. For more information on the simulation of transitions into unemployment with EUROMOD see Jara et al. (2017) and Jara and Tumino (2018).

<sup>iii</sup> Interactions of earnership status with age and age squared were dropped because they were not statistically significant.