EUROMOD WORKING PAPER SERIES

EM 18/18

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October 2018

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Abstract

This paper evaluates the degree of income protection the tax-benefit system provides to atypical workers in the event of unemployment, comparing them to standard employees. Our approach relies on EUROMOD, the EU tax-benefit microsimulation model, to simulate transitions from employment to unemployment for the entire workforce and to compare household financial circumstances before and after the transition. Our results show that coverage rates of unemployment insurance are low among atypical workers. These workers are also significantly more exposed to the risk of poverty than standard employees, both while in work and in the event of unemployment. Our analysis also shows that low-work intensity employees are characterised by higher net replacement rates than other groups. However, this is due to the major role played by the market incomes of other household members. Finally, we show that in countries where self-employed workers are not eligible for unemployment insurance benefits, extending the eligibility to this group of workers would increase their replacement rates significantly and make them less likely to fall into poverty in the event of unemployment.

JEL: C81, H55, I3

Keywords: income protection, atypical work, microsimulation

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* This work was supported by the Economic and Social Research Council (ESRC) through the Research Centre on Micro-Social Change (MiSoC) at the University of Essex, grant number ES/L009153/1. The results presented here are based on EUROMOD version H1.0+. EUROMOD is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from EU Member States. We are indebted to the many people who have contributed to the development of EUROMOD. The process of extending and updating EUROMOD is financially supported by the EU Programme for Employment and Social Innovation (EaSI) (2014-2020). We use microdata from the EU Statistics on Incomes and Living Conditions (EU-SILC) made available by Eurostat (59/2013-EU-SILC-LFS). The scientific output expressed does not imply a policy position of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication. The results and their interpretation are the authors' responsibility.

1. Introduction

Non-standard forms of employment, in particular temporary jobs, part-time work and solo self-employment, have become increasingly widespread in advanced economies in the last two decades. According to the 2018 report *Economic and social development in Europe* (European Commission 2018a), the proportion of permanent full-time employment in relation to total employment declined by 4 percentage points between 2002 and 2016, when it reached 59 percent. In the same period, the proportion of permanent part-time workers increased by 2 percentage points. Temporary workers, both full-time and part-time, and solo self-employed also increased their prevalence by 1 percentage point each. The process has accelerated in the aftermath of the Great Recession, also due to the increasing automation of jobs.

The signing in November 2017 of the European Pillar of Social Rights by the European Parliament, the Council and the Commission reaffirms the importance that these European institutions attribute to supporting fair and well-functioning labour markets and welfare systems (European Commission 2018b). In particular, Principle 5 of the Pillar on 'Secure and adaptable employment' states that '*regardless of the type and duration of the employment relationship, workers have the right to fair and equal treatment regarding working conditions, access to social protection and training.[…] Employment relationships that lead to precarious working conditions shall be prevented, including by prohibiting abuse of atypical contracts. […]*'. Moreover, the European Commission has adopted a Proposal for a Council Recommendation as part of the Pillar, which under Principle 12 proclaims that '*regardless of the type and duration of their employment relationship, workers, and, under comparable conditions, the self-employed, have the right to adequate social protection*'. The proposal aims to encourage EU countries to allow non-standard workers and the self-employed to be covered by social security schemes, such as unemployment benefits among others.

In this context, our work provides a twofold contribution to the debate on the needs and extent of social protection of atypical workers. First, we analyse the degree of income protection that the tax-benefit system provides to atypical workers in Europe in the event of unemployment. The analysis employs microsimulation techniques to study the resilience of disposable income for three groups of workers, namely standard employees, non-standard employees and the self-employed. Second, we assess the effects of a counterfactual scenario in which the eligibility to unemployment insurance benefits is extended to self-employed workers in countries where they are not compulsorily covered.[1]

Recent studies have highlighted two drivers of the increasing prevalence of non-standard forms of work. First, job creation and unemployment reduction have been higher political priorities than job quality, especially since the Great Recession. Flexibility in labour

[1] Although no common definition of non-standard or atypical work exists in the literature, at least three types of employment have been considered as part of this category, namely part-time work, jobs under fixed-term or temporary contacts, and self-employment (Matsaganis et al. 2015). In this study, we use the terms atypical and non-standard workers interchangeably to refer to individuals with low work intensity and the self-employed, where work intensity is defined by jointly considering the hours of work and the number of months worked during the year (European Commission 2016).

relations has increased as a consequence. Second, advanced automation is eroding labour-intensive industries, especially in advanced economies (Hipp et al. 2015; ILO 2015).

Despite acting as a stepping stone to more stable forms of employment, non-standard jobs can also lead to higher job insecurity and precariousness, with negative consequences in terms of wage polarization, human capital accumulation, and health and well-being. In addition, the concentration of atypical jobs among specific population subgroups has contributed to the development of various dualisms in the society. For example, temporary jobs are concentrated among young people, while permanent jobs are more common among older adults; part-time work is more common among women than among men, the opposite being true for solo self-employment (Arulampalam and Booth 1998; Bardasi and Francesconi 2004; Booth et al. 2002; de Graaf-Zijl et al. 2011; Hipp et al. 2015; ILO 2015).

Existing welfare institutions are undergoing a 'rethink and reform' process to cope with this new trend (Hipp et al. 2015). As they are currently designed, social protection systems usually meet the needs of standard, full-time employees. Non-standard employees are usually subject to the same eligibility rules, while the self-employed are sometimes completely excluded or able only to opt in voluntarily. Moreover, even when non-standard workers are potentially eligible, it is often difficult for them to meet the required conditions, meaning that they are excluded de facto (Spasova et al. 2017).

To assess the degree of social protection the tax-benefit system provides to atypical workers, we simulate transitions from work into unemployment for all individuals currently in work in the data and compare their disposable income before and after the transition using the tax-benefit model EUROMOD. Our results show that the prevalence of atypical work varies widely across EU countries, ranging from 6 percent of the working population in Sweden to 36 percent in Greece. Our analysis confirms the gaps in the social protection of atypical workers, with potential coverage rates of unemployment benefits lower among non-standard workers, particularly among the self-employed. Our analysis also shows that atypical workers are significantly more exposed to the risk of poverty than standard employees, both while in work and in the event of unemployment. Surprisingly, one specific category of atypical workers, namely low-work intensity employees, are characterised by higher net replacement rates (NRRs) than other groups. However, this is due to the major role played by the market incomes of other household members. Finally, our counterfactual simulations show that extending eligibility to unemployment insurance benefits to the self-employed, in countries where they are not eligible, would increase these workers' replacement rates significantly and make them less likely to fall into poverty in the event of unemployment. Therefore, our analysis sheds light on the effect of enforcing the principles of the European Pillar of Social Rights on the equal treatment of different types of workers regarding access to social protection, in particular unemployment insurance.

The remainder of the paper is organised as follows. Section 2 describes the data and the methodology employed. Section 3 reports the results of the analysis of the extent to which atypical workers are protected in the EU. Section 4 contains the results relative to a hypothetical scenario in which employees' compulsory unemployment insurance coverage

is extended to the self-employed in countries where they are not already covered. Conclusions follow.

2. Data and methodology

Our study uses microsimulation techniques to assess the degree of income protection provided by the tax-benefit system in Europe. More precisely, we use EUROMOD, the European tax-benefit microsimulation model, based on data from the European Union Statistics on Income and Living Condition (EU-SILC) and the Family Resources Survey (FRS) to simulate transitions from work into unemployment and compare disposable income before and after the transition. The remainder of the section describes EUROMOD and the data, discusses the methodology used to model transitions into unemployment, and presents the indicators used to evaluate the income protection provided by the tax-benefit system.

2.1. EUROMOD and the data

EUROMOD combines country-specific coded policy rules with representative household micro-data to simulate cash benefit entitlements, including unemployment insurance, and direct personal tax and social insurance contribution liabilities. EUROMOD has been validated at both the micro- and the macro-level and has been tested in numerous policy-relevant research applications. For a comprehensive overview, see Sutherland and Figari (2013).

The underlying micro-data used for the simulations in this study come from the 2015 EU-SILC, except for Germany, for which we use the 2014 EU-SILC, and for the UK, for which we use the 2014/2015 FRS. Our simulations are based on 2017 tax-benefit rules, which refer to policies in place on 30 June 2017. Market incomes and non-simulated tax-benefit instruments in the data are adjusted to 2017 levels using source-specific updating factors.

EUROMOD is a static microsimulation model, meaning that behavioural responses to policy reforms are not taken into account. In particular, our analysis models transitions from work into unemployment for individuals reporting to be in work in the data, assuming no behavioural responses from other household members. For the purpose of our analysis, we further assume full compliance in the sense that adjustments for tax evasion and benefit non-take-up are not taken into account when calculating NRRs. Therefore, the results should be interpreted as the 'intended effect' of the tax and benefit system on income protection.

2.2. Definition of atypical workers

In our study, atypical work is defined in terms of work intensity at the individual level and self-employment. As such, we focus on three population subgroups: (i) employees with medium or high work intensity; (ii) employees with low work intensity; and (iii) the self-employed. We follow the European Commission's (2016) proposed definition and define individual work intensity as the number of months worked during the year, multiplied by

the number of hours worked during the week (by the individual) over the median hours worked during the week (at country level). Low work intensity is defined as work intensity below 0.33 at the individual level.[2] Self-employed people are defined as those who have self-employment income and no employment income.

For the UK, an alternative definition of work intensity is used because the FRS does not contain information about the number of months worked during the year. In this case, work intensity is defined as the number of hours worked during the week (by the individual) over the median hours worked during the week (at country level). Low work intensity is defined as work intensity below 0.33 at the individual level.

2.3. Simulating transitions into unemployment and unemployment insurance benefits

The strategy for assessing the income protection provided by the tax-benefit system consists of moving people from work (employment or self-employment) into unemployment and comparing their disposable income before and after the transition (Figari et al. 2011; Fernandez Salgado et al. 2013; Jara and Sutherland 2014). The effects of a transition into unemployment are simulated for all those currently in work in the data, aged 18 to 65 years, excluding those in full-time education or retirement. Table A1 in the appendix presents the characteristics of the samples by country.

The effects of the transition into unemployment are simulated as follows. First, household disposable income is calculated before any transition into unemployment takes place. Then, for each worker in the household, individual earnings are set to zero and all benefits for which they would become eligible are simulated with EUROMOD, as is their corresponding household disposable income in the event of unemployment.[3] This is done separately for each worker in the household under the assumption that the earnings of other household members are not affected by the individual's transition.

Simulating transitions from work into unemployment for all individuals currently in work in the data is particularly useful for this study because it allows us to concentrate on specific population subgroups. In particular, atypical workers might represent a small fraction of the working population in some countries, in which case having a sufficiently large sample is an advantage for the analysis.

Focusing on transitions from work into unemployment allows us to simulate the effect of unemployment insurance schemes on income protection under certain assumptions, which are related to the limited information available in the underlying data. First, the number of months in work before the transition is used to proxy the contributory history to assess

[2] An employee with weekly working hours equal to the country median will belong to the 'low-work intensity' category if observed working less than one third of the year, i.e. 4 months. Similarly, an employee working the full year will belong to the low-work intensity category if they work less than one third of the median weekly working hours.

[3] 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.

eligibility to unemployment insurance. For instance, to be eligible for unemployment insurance in Greece, an individual is required to have contributed 5 out of 12 months, while in Germany they are required to have contributed 12 out of 24 months. In our simulations we would consider a person in the data eligible if they had worked 5 out of 12 months before transitioning into unemployment in Greece; and 12 out of 12 months in Germany (given that month-by-month employment information is available only for the previous year).[4] Second, the earnings before transition into unemployment can be used to calculate the unemployment insurance payment, which in most countries is proportional. Finally, to compare disposable income in and out of work over a similar period of time, we set unemployment duration equal to months in work during the year before the transition. Therefore, our results should be interpreted as the income protection provided over the first year of unemployment.

It should be noted that the design of unemployment insurance schemes varies widely in several aspects (e.g. eligibility conditions, level of payment, duration) across EU countries. Our simulations account for such differences, as shown in Table A.2 in the appendix.

Eligibility to unemployment insurance plays a key role in our analysis in order to assess the degree of income protection of atypical workers in the event of unemployment. In particular, for the self-employed, four categories of country can be identified. The first refers to countries where the self-employed are compulsorily covered by unemployment insurance and comprises Czech Republic, Greece, Croatia, Luxembourg, Hungary, Poland, Slovenia, Finland and Sweden. In Greece, however, the eligibility criteria for the self-employed are more stringent than those for employees, and the scheme suffers from severe non-take-up. For this reason, we do not simulate unemployment insurance for the self-employed in Greece in our baseline scenario. In Finland and Sweden, the self-employed are covered by the basic component of unemployment insurance and can opt in to the income-related component by joining an unemployment insurance fund. In our simulations, only the basic component is considered for the self-employed, as we cannot identify those affiliated to an unemployment insurance fund.

The second category refers to countries where only certain categories of self-employed are covered by unemployment insurance and comprises Ireland, Lithuania and Portugal.[5] In our analysis, we do not simulate unemployment insurance for the self-employed in the baseline scenarios of these countries because we are unable to identify the eligible categories in the data.

[4] For those countries where the qualifying period goes beyond 12 months – for instance Lithuania, where an individual is required to contribute 18 out of 36 months – we use information about working history since entering the labour market as an additional control.

[5] In Ireland, self-employed share-fishermen can pay additional social insurance contributions towards unemployment insurance. In Lithuania, only those self-employed who are owners of individual enterprises, members of small partnerships and full members of partnerships are covered by unemployment insurance. In Portugal, workers who are financially dependent on a sole contracting entity and whose service contract has been terminated against their will, as well as workers running businesses and company managers or directors who stop working and/or close the business on justifiable grounds, are eligible for unemployment insurance.

The third category regroups countries where the self-employed can join unemployment insurance schemes voluntarily and comprises Denmark, Spain, Austria, Romania and Slovakia. Only for Denmark we are able to simulate unemployment insurance for the self-employed in the baseline scenario because membership of an unemployment insurance fund has been estimated in the data based on official information.

Finally, the last category refers to countries where the self-employed are ineligible for unemployment insurance and includes Belgium, Bulgaria, Germany, Estonia, France, Italy, Cyprus, Latvia, Malta, the Netherlands and the UK. In addition, among all categories, there are countries where those ineligible for unemployment insurance or who have exhausted their rights to unemployment insurance can access means-tested unemployment assistance. This is the case in Germany, Estonia, Ireland, Greece, Spain, France, Hungary, Malta, Austria, Portugal, Finland and the UK.

2.4. Income protection indicators

In the remainder of this section we evaluate the extent of social protection provided to atypical workers by the tax-benefit system across EU Member States through three indicators.

Potential coverage rates of unemployment insurance. Unemployment insurance is the main instrument for protecting individuals from labour market risks. A first indicator of the income protection provided by the tax-benefit system is therefore the potential coverage of unemployment insurance in the event of unemployment.

Potential coverage measures the proportion of workers who would be covered by unemployment insurance schemes in the event of unemployment based on their previous work history (months of work during the last year). It is expected to range between 0 and 100 percent, with higher values indicating a higher proportion of covered workers. The analysis refers to potential coverage as it is computed for the entire workforce, as opposed to actual coverage, which is based on unemployed people currently in receipt of unemployment benefits. Potential coverage rates are expected to be higher than actual (observed) coverage rates, as unemployment incidence is not randomly distributed and is more concentrated among people less likely to be covered by such schemes.[6] The potential coverage of atypical workers will be determined by the eligibility criteria in place under each national unemployment insurance scheme.

Net replacement rates. NRRs are an important indicator of the income protection provided by the tax-benefit system in the event of unemployment. NRRs measure the proportion of household disposable income that would be maintained if a member of the household fell into unemployment.[7] More formally, the NRR of individual i is defined as

[6] Individuals with less continuous working lives are more likely to enter unemployment and also more likely to be ineligible for unemployment insurance benefits. For this reason we expect potential coverage rates to be higher than observed coverage rates.

[7] Therefore, NRRs also capture the incentives unemployed individuals would face to re-enter the labour market.

$$NRR_i = \frac{Y^{U_i}}{Y^{W_i}} ,$$

where Y^{U_i} represents the household disposable income when individual i is unemployed (U) and Y^{W_i} represents the household disposable income when individual i is in work (W). For households with multiple earners, NRRs are calculated for each earner in the household separately, assuming that the behaviour of earners and household members does not change when a person becomes unemployed.

To provide a picture of the role of different income sources on income protection in the event of unemployment, household disposable income in unemployment can be decomposed as the sum of original incomes (O) (incomes before any tax and transfer), benefits and pensions (B) minus taxes and social insurance contributions (T). More formally, NRRs can be expressed as follows:

$$NRR_i = \frac{O^{U_i} + B^{U_i} + T^{U_i}}{Y^{W_i}} .$$

The original income when individual i is unemployed includes the earnings of other household members, as well as other sources of personal income such as investments and property income, private inter-household transfers and alimonies. We follow Fernandez Salgado et al. (2013) and further break down benefits into three components: (i) unemployment benefits, including both unemployment insurance and unemployment assistance schemes; (ii) social assistance benefits, including minimum income schemes, housing benefits, etc.; and (iii) family benefits (including child benefits and other means-tested benefits such as the Working Tax Credit in the UK), pensions and disability benefits (including contributory old-age and survivors pensions, early-retirement benefits, and disability and invalidity benefits).

In principle, one would expect NRRs to range between 0 and 100 percent. However, specific features of tax and benefit systems could result in NRRs exceeding 100 percent. For instance, lower limits on unemployment insurance schemes could result in disposable income in unemployment being higher than disposable income in work for low earners. Although NRRs outside the range of 0 to 100 percent are plausible, in our analysis we exclude observations in the top percentile of the distribution if their NRR rate is above 150 percent, and observations in the lowest percentile if their NRR rate is negative. This restriction is chosen to reduce the risk of our calculations being biased by 'outliers', especially when we consider NRRs for specific subgroups.[8]

Poverty protection statistics. Unemployment is an important determinant of income poverty. Therefore, it is important to assess the extent to which the tax-benefit system would protect individuals from falling into poverty in the event of unemployment. For this purpose, we consider the poverty threshold to be 60% of the median equivalised disposable income before unemployment and evaluate the proportion of workers who

[8] A similar procedure is suggested by Jara and Tumino (2013) in their analysis of marginal effective tax rates.

would fall below the poverty line following their transition into unemployment. We do so for each of our subgroups of interest: low-work intensity employees, 'standard employees' and the self-employed.

Our strategy allows us to distinguish three particular categories. First, 'in-work poor' refers to workers whose equivalised household disposable income is already below the poverty threshold before the transition into unemployment is simulated. The second category, 'at risk', identifies those workers who are not poor in work, but who would become poor in the event of unemployment. Finally, the third category identifies the proportion of workers who would not enter poverty even after the transition into unemployment ('protected'). The analysis of poverty gaps adds to the discussion on the poverty reduction properties of unemployment insurance schemes among atypical workers.

3. Empirical results

This section discusses the empirical results of our analysis. We find that the prevalence of atypical workers (i.e. low-work intensity employees and the self-employed) varies substantially across EU countries (Section 3.1), and that the atypical workforce is heterogeneous, with nine Member States having more low-work intensity employees than self-employed. As expected, unemployment insurance benefits cover atypical workers to a lesser extent than employees with non-low work intensity (Section 3.2). Potential unemployment insurance coverage rates among low-work intensity employees do not exceed 30 percent in 15 out of 28 Member States. The self-employed are usually not covered by unemployment insurance or are subject to more stringent eligibility conditions. In 10 Member States the self-employed are covered by unemployment insurance schemes similar to those for employees.[9] Our analysis also shows that low-work intensity employees are characterised by higher NRRs than other workers. However, a decomposition of the index highlights that this is due to the major role played by the market incomes of other household members (Section 3.3). Finally, we find that atypical workers are significantly more exposed to the risk of poverty than 'typical employees', both while in work and in the event of unemployment (Section 3.4).

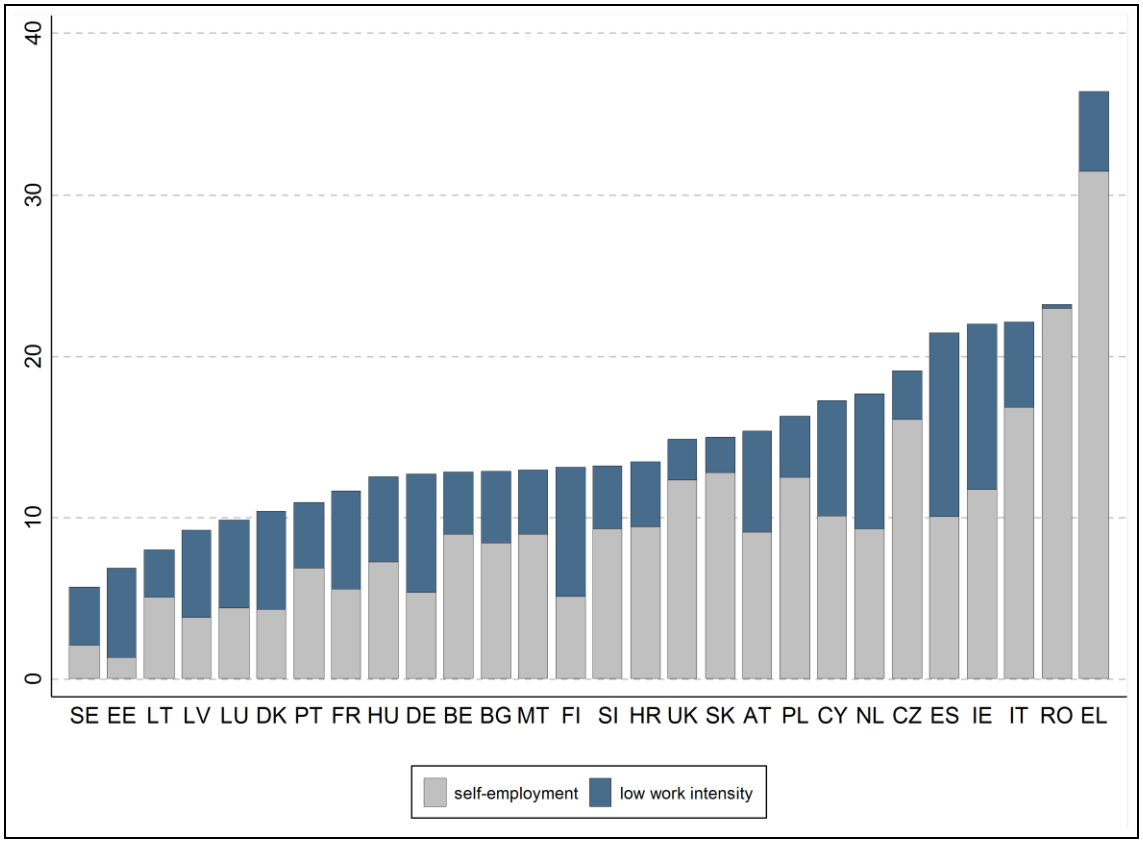
3.1. Atypical work in the EU

The prevalence of atypical workers varies greatly among EU Member States (Figure 1). The median prevalence of atypical workers among EU countries is observed in Slovenia and Finland, with a value in the range of 13 percent. The lowest prevalence is observed in Sweden, with about 6 percent of total workers classified as atypical. At the other extreme, the highest prevalence is observed in Greece, at about 36 percent. Figure 1 also provides information on the composition of atypical employment. In nine Member States low-work intensity employees outnumber the self-employed, while the opposite is true in the majority of EU countries. A strong presence of self-employment drives the high prevalence of

[9] Our simulations are not able to consider the stringent eligibility conditions for unemployment insurance of the self-employed that apply in some Member States because of a lack of information in the data. Therefore, coverage of unemployment insurance for the self-employed is considered only in those Member States for which its design is similar for employees and the self-employed.

atypical workers in Greece, Italy and Romania. As self-employed workers are not compulsorily covered by unemployment insurance in most EU countries, the composition of atypical employment is key when assessing the degree of social protection of atypical workers. The number of low-work intensity employees is particularly low in Romania, where less than 1 percent of the total workforce belongs to this category. A subgroup analysis of low-work intensity workers in Romania should therefore be considered with caution, as sample size issues are likely to affect the significance of our findings with respect to this category.

Figure 1. Prevalence of atypical work in the EU



Source: Authors' elaboration based on EUROMOD H1.0+ data.

Table 1 provides information on the workforce socio-demographic characteristics, distinguishing between 'standard' employees, low-work intensity employees and the self-employed. In all EU countries there is prevalence of women among low-work intensity employees and of men among the self-employed. Low-work intensity employees are usually relatively young, whereas self-employed workers tend to belong to the largest age group (30 to 50 years old). Highly skilled workers are under-represented among low-work intensity employees when compared to the rest of the labour force. Consistent with the skill composition, low-work intensity employees are seldom the main household earners. In a large majority of cases they belong to the poorest quintile of the earning distribution and

Table 1. Characteristics of atypical workers in the EU, %

		BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Non-low	Female	47.1	48.3	46.5	48.3	47.4	49.3	49.9	43.8	45.5	48.9	46.3	43.9	49.9	50.1	48.5	45.8	46.6	40.4	45.2	44.5	47.9	50.1	42.9	45.8	48.2	49.8	48.7	49.1
Low		70.4	55.0	70.7	57.6	84.2	59.6	59.6	54.9	57.2	64.4	53.7	49.2	54.5	60.2	58.1	68.2	59.6	76.4	68.0	69.0	62.0	61.9	59.2	54.7	64.6	56.1	59.0	79.3
SE		30.4	31.8	30.9	35.0	36.2	43.2	19.8	35.6	36.6	35.3	34.7	31.6	39.5	43.2	43.8	44.2	39.9	19.3	40.9	35.2	29.0	45.2	36.8	28.8	26.1	38.1	29.4	31.5
Non-low	Age<30	17.5	16	16.8	13.9	15.6	20	15.1	14	10.9	18.7	19.2	11.7	21	19.1	19.7	20.5	17.5	27.8	17.9	22.6	19.7	15.2	14.2	13.3	20	16.3	17.4	24
Low		34.8	33.8	37.7	41.5	18.9	40.1	35.3	28.3	25.3	41.8	51.2	29.5	50.1	30.2	33.5	27.1	30.3	39.8	36.6	36.5	37.6	33.4	44.8	38.6	43.4	45.4	54.2	28.3
SE		9.3	7.2	8.4	3.3	6.8	5.0	3.3	6.2	5.5	8.6	5.8	8.6	16.2	6.9	10.0	6.1	8.6	12.1	8.1	7.1	7.6	9.6	19.0	7.4	11.7	4.9	6.9	11.4
Non-low	Age 30-50	59.6	57.1	59.8	57.3	55.6	51.7	61.2	68.6	65.8	59	58.4	61.3	59.2	52.4	51.8	62.7	55.3	51.8	55.1	53.8	58.9	62.4	66	66.6	57.1	53.7	53.9	52.1
Low		46.7	44.6	43.8	33.7	51.8	41.7	46.8	58.6	58.1	39.4	41.4	47.6	35.4	44.0	39.8	53.8	46.9	44.5	35.5	46.6	37.5	43.7	47.2	46.1	44.3	34.4	30.3	43.1
SE		59.1	59.8	61.3	46.8	59.7	50.5	56.5	59.2	61.6	60.5	60.4	62.3	50.9	58.4	51.3	58.1	52.3	53.3	58.9	53.0	56.3	57.1	55.9	64.8	65.3	49.4	47.1	55.1
Non-low	Age 50+	22.9	26.8	23.4	28.8	28.8	28.3	23.7	17.4	23.3	22.3	22.4	27	19.9	28.5	28.5	16.8	27.2	20.4	27	23.6	21.4	22.4	19.8	20.1	22.9	30	28.7	23.9
Low		18.5	21.6	18.5	24.8	29.3	18.2	17.9	13.1	16.6	18.8	7.4	22.9	14.6	25.7	26.6	19.1	22.8	15.7	27.9	16.9	24.9	22.8	7.9	15.3	12.3	20.2	15.5	28.5
SE		31.6	32.9	30.3	49.9	33.5	44.5	40.2	34.6	32.9	30.9	33.8	29.1	32.9	34.7	38.7	35.9	39.1	34.5	33.0	39.8	36.1	33.3	25.1	27.8	23.0	45.7	45.9	33.5
Non-low	Low-skilled	12.6	11.5	3.5	14.8	6.1	10.9	13.7	13.8	29.7	12.3	9.2	28.5	14.7	8.4	4.7	30.1	10.7	40.2	17	11.7	5	49.5	18.8	9	2.6	9.8	9.9	44.7
Low		18.6	40.9	9.0	22.0	14.4	19.6	21.2	21.5	53.5	23.1	12.1	42.0	16.0	19.3	8.8	38.8	37.5	46.1	28.0	20.8	14.9	51.9	14.2	9.7	3.8	21.9	11.1	46.4
SE		9.6	17.8	1.8	14.9	2.6	9.9	21.7	36.1	43.6	10.2	16.4	32.9	24.4	14.9	3.5	15.1	5.9	66.5	19.2	6.6	7.8	55.3	57.7	12.7	1.4	17.6	21.7	52.7
Non-low	Medium-skilled	37.7	59.4	73.8	44.1	55.4	46.6	29	43.5	24.5	47	66.3	46.5	42.3	55.1	53.2	38	60.2	29.7	40.8	56.3	60.1	26.4	54.7	55.7	71.4	43.3	45.8	26.2
Low		45.1	49.4	73.1	47.0	65.9	48.8	42.4	44.0	22.9	54.4	66.2	43.9	45.8	59.4	73.7	45.5	48.8	32.1	48.3	52.1	67.5	26.3	65.7	66.6	73.0	51.7	52.7	36.4
SE		40.3	48.4	78.3	57.3	42.0	66.7	23.9	39.1	21.9	53.4	67.0	43.0	37.2	65.9	63.2	52.1	61.6	22.8	37.1	47.4	67.4	21.5	40.0	64.0	78.1	58.1	59.8	21.4
Non-low	High-skilled	49.7	29.2	22.7	41.2	38.5	42.5	57.2	42.7	45.8	40.6	24.5	24.9	43	36.5	42.1	31.9	29.1	30.1	42.2	32	34.9	24.1	26.5	35.2	26	46.9	44.4	29.1
Low		36.3	9.7	17.9	31.0	19.7	31.6	36.4	34.5	23.6	22.5	21.7	14.1	38.2	21.4	17.5	15.7	13.7	21.8	23.7	27.1	17.6	21.9	20.1	23.7	23.2	26.3	36.2	17.2
SE		50.1	33.8	19.9	27.8	55.4	23.4	54.5	24.8	34.6	36.4	16.5	24.1	38.5	19.2	33.3	32.8	32.6	10.7	43.7	46.0	24.8	23.2	2.3	23.4	20.5	24.3	18.5	25.9
Non-low	Main earner	65.7	61.3	61.8	66.3	69.6	63.9	63.4	70.4	68.4	66.4	60.9	70.4	64.4	62	61.3	64.8	64.2	58.8	66	64.3	59.2	63.5	64.3	63.5	54	67.8	64.7	62.7
Low		37.3	35.7	24.2	40.2	28.7	29.4	38.9	41.7	39.2	40.2	22.2	41.6	18.9	37.1	40.2	24.9	36.4	28.5	38.0	28.7	28.3	35.1	20.7	26.1	21.8	43.6	36.9	35.1
SE		61.9	62.6	59.6	65.1	71.6	49.4	57.4	70.6	66.6	59.2	71.7	62.1	65.6	51.5	65.8	62.9	57.6	66.3	57.9	63.2	66.9	62.2	51.3	43.8	59.4	55.8	57.6	62.5
Non-low	Quintile 1	14.9	8.6	13.8	12.8	11.8	12.8	10.5	12.4	6.4	10	11.2	9.4	9.4	9.3	13.7	14.9	12	13.8	7.8	11	12.7	14.3	1.8	8.1	14.7	8.3	14.4	15.6
Low		94.0	96.1	98.5	91.9	94.4	88.0	80.9	96.3	71.8	88.8	99.5	74.5	93.2	91.6	87.8	95.1	94.6	93.5	89.8	90.4	97.6	92.8	93.6	95.1	85.8	96.1	88.6	91.2
SE		33.8	25.5	28.8	46.1	28.3	63.7	20.0	22.5	19.0	36.6	19.6	26.9	13.4	59.3	19.2	33.0	13.9	24.1	34.0	19.9	32.4	37.1	78.3	64.6	32.1	37.7	41.2	35.8
Non-low	Quintile 2	20.1	22.6	20.2	21.5	21.7	21.4	21.3	21.7	17.8	21.5	22.9	17.5	21.6	21.9	21.7	21.4	21.4	21.4	22.2	21	22.4	21.2	22.9	22	21.6	22.2	20.8	20.6
Low		2.1	2.9	0.4	4.4	4.1	6.5	6.7	2.2	25.2	8.0	0.1	21.2	5.9	3.9	9.8	1.7	1.9	4.4	8.5	6.5	1.1	3.4	6.4	3.7	1.8	3.3	6.2	4.6
SE		27.9	15.3	24.6	16.5	19.9	12.5	26.2	19.9	27.2	19.4	18.6	28.9	24.7	13.5	15.1	12.5	21.8	20.0	16.9	28.3	9.7	18.4	10.7	15.8	14.4	23.2	29.1	19.0
Non-low	Quintile 3	21.5	23.1	22.1	22.3	22.2	21.7	22.3	23.6	23.2	22.8	22.2	23.1	22.8	22.5	21.8	20.8	22.2	21.1	23.2	22.4	22.1	21.1	25.1	23.1	21.9	23.2	21.5	21
Low		1.3	1.0	0.5	1.0	0.8	3.1	6.4	0.9	2.3	2.4	0.0	3.0	0.9	2.0	0.2	1.4	0.7	1.3	1.1	1.7	0.2	1.3	0.0	1.0	6.0	0.3	2.4	1.8
SE		14.9	16.4	14.8	6.1	14.0	13.8	18.5	16.1	27.2	12.8	14.7	17.8	21.6	13.4	15.5	26.6	19.3	22.9	16.8	18.7	14.2	18.3	3.6	8.1	11.2	12.6	8.6	16.8
Non-low	Quintile 4	22.0	23.5	22.3	22	22.7	22.1	23.1	23	25.9	23.1	21.3	25.4	22.4	23.1	22	21.5	22.4	22.1	23.9	22.9	21.6	22	25.7	23.4	21.7	23.2	21.7	21.6
Low		1.2	0.0	0.3	1.3	0.5	1.6	4.5	0.4	0.6	0.1	0.2	1.1	0.0	2.0	0.8	1.8	1.7	0.0	0.5	1.0	0.3	0.8	0.0	0.2	4.2	0.1	0.9	1.0
SE		9.7	15.2	13.8	7.0	10.1	1.1	15.5	18.2	15.7	10.8	28.9	11.5	25.4	5.1	16.3	15.4	18.8	14.6	11.9	15.1	18.0	9.4	3.7	5.3	14.7	11.6	11.7	14.3
Non-low	Quintile 5	21.6	22.3	21.5	21.3	21.6	22	22.8	19.4	26.7	22.6	22.4	24.6	23.7	23.1	20.9	21.4	21.9	21.7	22.9	22.7	21.2	21.4	24.4	23.4	20	23.1	21.6	21.2
Low		1.4	0.0	0.3	1.4	0.2	0.8	1.5	0.1	0.1	0.7	0.2	0.2	0.0	0.5	1.4	0.0	1.2	0.7	0.1	0.3	0.8	1.7	0.0	0.0	2.2	0.1	1.9	1.3
SE		13.6	27.5	17.9	24.2	27.6	9.0	19.9	23.3	10.9	20.4	18.2	14.9	15.0	8.7	33.9	12.5	26.1	18.5	20.4	18.0	25.7	16.8	3.7	6.2	27.5	14.9	9.3	14.1
Non-low	Part-time	14.4	2.9	2.8	7.3	13.3	4.7	21.7	12.8	12.7	10.3	3.4	13.1	8.3	6.1	5	13.8	4.6	6	26.2	15	5.3	4.5	0.8	5.1	2.4	6.8	6.4	17.8
Low		69.2	60.9	54.6	64.6	88.4	67.7	86.8	82.7	72.4	67.6	42.1	86.3	71.6	65.8	74.3	83.0	66.0	71.3	79.6	79.2	60.6	51.7	33.0	57.9	37.5	69.2	54.4	100.0
SE		6.0	8.1	4.7	22.8	18.4	15.0	20.9	10.6	14.5	10.0	7.3	7.4	38.2	12.1	8.8	15.9	9.4	12.8	27.7	11.6	4.7	9.7	15.9	9.9	4.4	8.7	10.8	21.6
Non-low	% hh market income	64.7	57.7	60.2	65.3	68.6	62.7	61.9	69	66.2	65	59.1	68.6	62.7	60.4	60.5	63.5	61.7	57.4	64.6	62.9	58	61.9	58.8	61	52.7	66	63.6	61.7
Low		64.7	57.7	60.2	65.3	68.6	62.7	61.9	69.0	66.2	65.0	59.1	68.6	62.7	60.4	60.5	63.5	61.7	57.4	64.6	62.9	58.0	61.9	58.8	61.0	52.7	66.0	63.6	61.7
SE		63.2	56.9	59.3	62.1	68.4	51.6	59.3	68.4	62.5	61.0	61.2	62.2	65.1	54.3	63.3	63.7	56.2	63.1	55.8	60.7	65.0	62.2	51.7	50.0	54.6	56.2	59.9	61.0

Notes: *Non-low* stands for non-low-work intensity employees; *Low* stands for low-work intensity employees; *SE* stands for self-employed, defined as those with positive self-employment income and no employment income. *Low-skilled* refers to lower secondary education or less; *medium-skilled* refers to upper secondary, non-tertiary education; *high-skilled* refers to tertiary education. Quintiles refer to earnings quintiles.

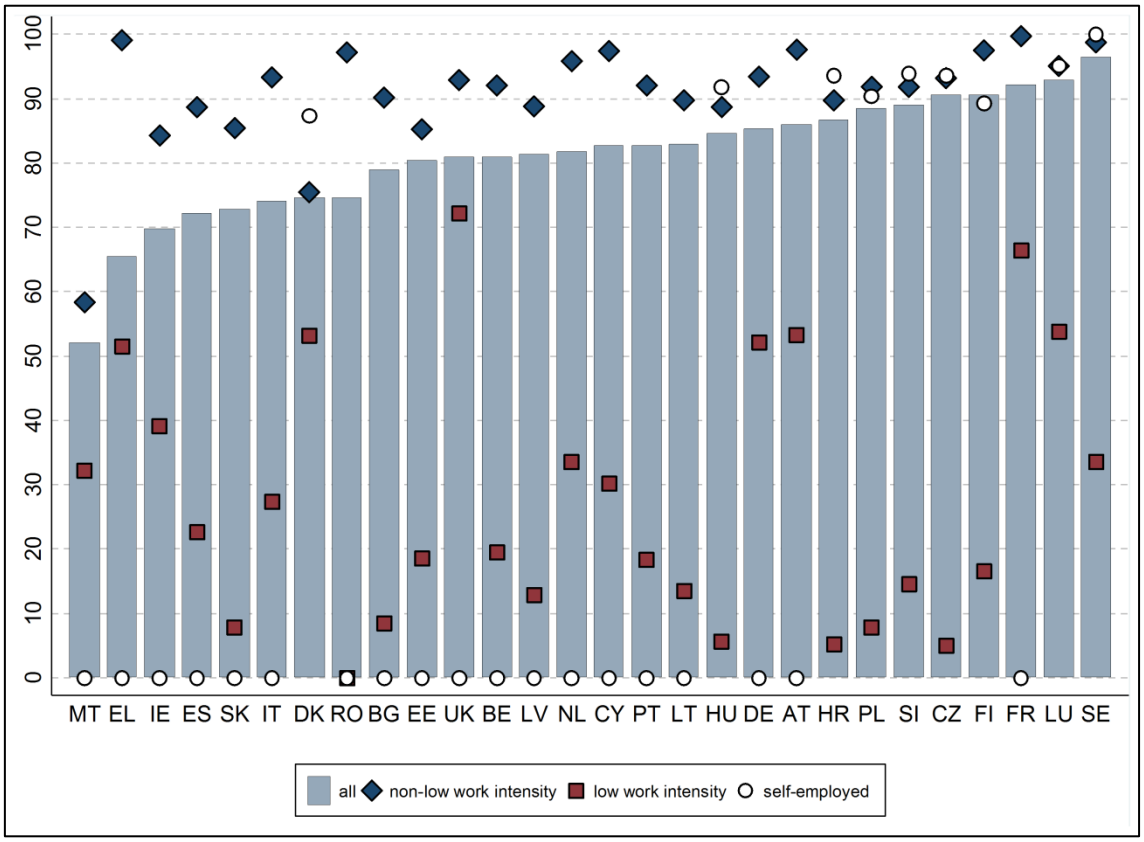
are often part-time employees. Self-employed workers tend to be less skilled than standard employees, although the differences are less pronounced than in the case of low-work intensity employees. The majority of self-employed are the main earners in their household, and their earnings profile is more evenly spread than that of low-work intensity employees.

The next section analyses the extent to which atypical workers are protected by existing unemployment insurance schemes, comparing the predicted coverage rates of low-work intensity employees and self-employed with those experienced by 'typical' employees.

3.2. Potential coverage of unemployment insurance schemes

Figure 2 shows each EU Member State's potential coverage rates from their existing unemployment insurance schemes. The chart shows figures for the entire working population as well as for the subgroups of 'typical' employees, low-work intensity employees and the self-employed.

Figure 2. Potential coverage of unemployment insurance schemes in the EU



Source: Authors' elaboration based on EUROMOD H1.0+ data.

The potential unemployment insurance coverage for the entire working population varies from 52 percent in Malta to 96 percent in Sweden. The median across EU Member States is represented by Cyprus and the Netherlands, at around 82 percent. Potential coverage rates among 'typical' employees are even higher, ranging from close to 58 percent in Malta

to close to 100 percent in France.[10] Differences in the eligibility criteria for accessing unemployment insurance schemes, as well as in the characteristics of the local workforce, explain the cross-country variation. On the one hand, eligibility conditions in Malta are more stringent than those in France in terms of the required previous contributions. On the other hand, the concept of low-work intensity is country specific, as the number of hours worked are evaluated in comparison to the country median. It is therefore possible that in certain countries individuals with a relatively short contributory history could be identified as 'typical' workers if they work more hours than the median.

Potential coverage among low-work intensity employees is significantly lower than among 'typical' employees. The indicator ranges from 5 percent in the Czech Republic, Croatia and Hungary to 72 percent in the UK. The EU median is around 20 percent (Belgium and Spain). The extremely small number of low-intensity employees in Romania affects the representativeness of the results for this category of workers.

In most countries, the self-employed are not entitled to unemployment insurance. In eight Member States – Czech Republic, Croatia, Luxembourg, Hungary, Poland, Slovenia Finland and Sweden– the self-employed are eligible for unemployment insurance under conditions similar to those for employees. In those cases, relatively high coverage rates are observed that are related to full-year working history (used to assess eligibility) for most self-employed workers. In Greece, the self-employed are also compulsorily covered by unemployment insurance. However, the stringent eligibility criteria prevent us from simulating entitlement to unemployment insurance, as eligibility is subject to having no debts to social insurance funds and the income test is based on income with one- and two-year lags. In Ireland, Lithuania and Portugal, certain categories of self-employed are entitled to unemployment insurance. However, we are not able to simulate entitlement to benefit, as we are not able to identify the eligible groups in the data. Finally, among those Member States where the self-employed can join unemployment insurance schemes voluntarily (Denmark, Spain, Austria, Romania and Slovakia), we are able to simulate entitlement only in Denmark, where participation in the unemployment insurance fund has been imputed in the data.[11]

Despite drawbacks related to the simulation of unemployment insurance for the self-employed, the findings support the existence of a gap in coverage of atypical workers when compared to 'standard employees'. The gap is due to both a lack of coverage among the self-employed in most EU countries, and low coverage rates among low-work intensity

[10] In Malta a Special Unemployment Benefit is also present. This is provided to people who fulfil the eligibility criteria of the contributory unemployment benefit and also fulfil the income conditions of unemployment assistance. In that case, the Special Unemployment Benefit replaces the unemployment insurance benefit. The coverage rates reported consider only coverage from the ordinary unemployment insurance benefit.

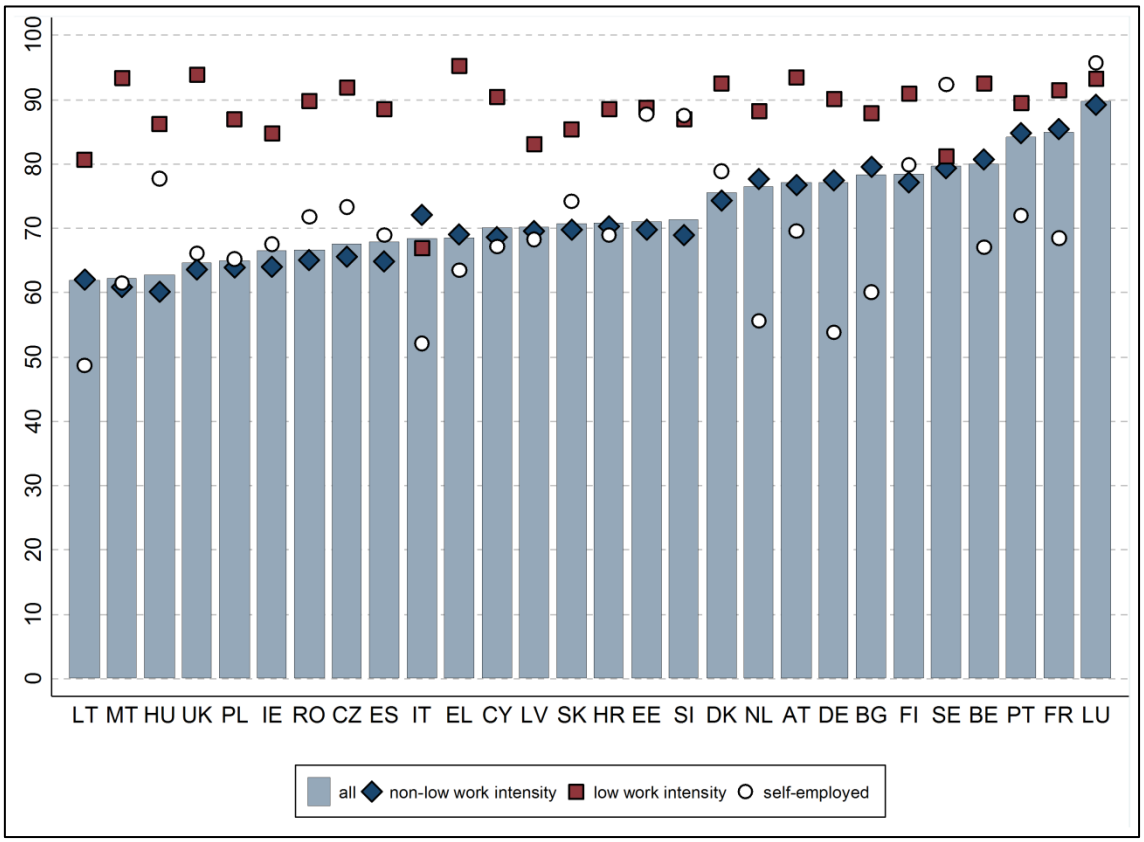
[11] Information about unemployment insurance schemes in EU Member States has been gathered from EUROMOD country reports (https://www.euromod.ac.uk/using-euromod/country-reports) and from the Mutual Information System on Social Protection (MISSOC) (https://www.missoc.org). In Denmark, only self-employed workers registered to a specific fund are entitled to unemployment insurance benefit in case of unemployment. Participating in such a fund is predicted econometrically by the EUROMOD National Team.

employees, whose discontinuous working history prevents them, in most cases, from meeting the eligibility criteria of their national unemployment insurance scheme.

3.3. Net replacement rates

Figure 3 shows the average NRRs in all 28 EU Member States. The figure provides information for the entire workforce, as well as separately for low-work intensity employees, 'typical' employees and the self-employed. NRRs for the entire workforce range from 62 percent in Lithuania to 89 percent in Luxembourg. The median is observed in Estonia, Croatia and Slovakia, with values in the range of 70 percent. NRRs for 'typical workers' follow closely those of the entire working population.

Figure 3. Mean net replacement rates in the EU



Source: Authors' elaboration based on EUROMOD H1.0+ data.

Low-work intensity employees face higher and more homogeneous NRRs, ranging from 67 percent in Italy to 95 percent in Greece.[12] Although seemingly puzzling, the results are driven by the fact that earnings of low-work intensity workers have relatively little importance to the household finances (see Table 1). As already discussed, low-work intensity employees are seldom the main household earners, and they usually belong to a low earning decile. This implies that, on average, household finances are affected to only a limited extent by the entry of these workers into unemployment.

[12] We disregard Romania because of its very small number of low-work-intensity employees.

The result is confirmed by Figure 4, which identifies the contributions that various tax-benefit components make to NRRs. Whereas for the whole in-work sample and for 'typical' employees other market incomes in the household range from 40 to 60 percent of the pre-unemployment household disposable income, these increase to between 55 and 80 percent for low-work intensity employees. Figure 4 also shows that unemployment benefits play a relatively important role in sustaining the incomes of 'typical employees', while this is much less the case for low-work intensity employees. The result is in line with the relatively low coverage rate of unemployment benefits among this subgroup. On the contrary, the figure shows that social assistance and other benefits and pensions play a more important role in protecting the incomes of low-work intensity employees.

For the self-employed, NRRs show a higher degree of heterogeneity than for the rest of the workforce. Values range from 49 percent in Lithuania to 96 percent in Luxembourg. The decomposition of the NRRs is reported in Figure 4. Other market incomes play a role similar to that relative to other 'typical' employees. Unemployment benefits play a significant role in all countries where the self-employed are eligible for unemployment insurance, but also in some countries where this is not the case (Germany, Estonia, Ireland, Malta). The result is largely due to two factors: first, unemployment assistance schemes targeting individuals who are not entitled to unemployment insurance; and second, and to a lesser extent, unemployment benefit recipients in the household of the self-employed entering unemployment. Social assistance and other benefits and pensions contribute substantially to self-employed NRRs.

The analysis of NRRs highlights the major role that the income of other household members plays in the income protection of low-work intensity employees in the event of unemployment, although the role of other benefits and pensions is not negligible. Coverage gaps prevent workers in this group from benefiting from replacement incomes from unemployment insurance schemes. In the absence of unemployment insurance, social assistance schemes (and unemployment assistance, where available) play a larger role in protecting the income of low-work intensity employees. The self-employed experience a similar situation, although other market incomes seem less relevant than for low-work intensity employees, and unemployment benefits play a significant role in countries that cover the self-employed.

The next subsection further analyses the financial circumstances of typical and atypical workers by looking at poverty indicators before and after the transition from work into unemployment.

3.4. At risk of poverty

Table 2 summarises the poverty protection indicators for the entire working population and separately for the three subgroups analysed. Looking at the entire workforce, the proportion of workers who would be protected from poverty in the event of unemployment is heterogeneous across countries, ranging from 57 percent in Hungary to 86 percent in Belgium. At the other extreme, the proportion of workers whose household equivalised disposable is below the poverty line even before the transition into unemployment varies from 3 percent in Belgium to 16 percent in Romania. France shows

the lowest proportion of workers who would fall into poverty following unemployment, at 8 percent, while Hungary shows the highest, at 31 percent.

Poverty statistics for 'typical' employees follow closely those for the entire population in all countries, although the proportion of workers protected is usually higher and the proportion of in-work poor is usually lower. As expected, the results indicate that 'typical' employees would be less affected by poverty in the event of unemployment than the entire working population.

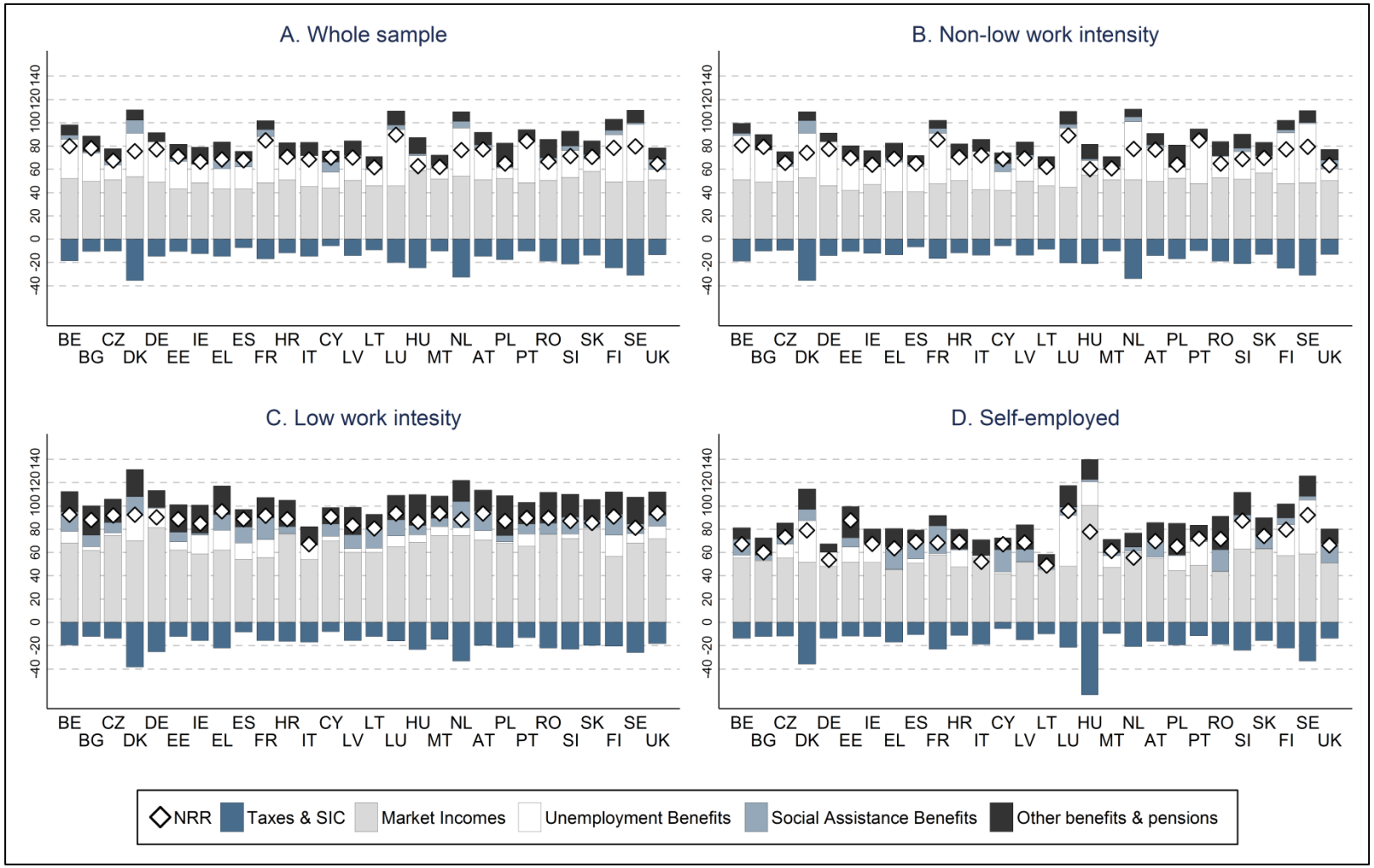
Low-work intensity employees show a significantly higher proportion of in-work poor than the entire workforce, ranging from 12 percent in Slovakia to 53 percent in Hungary. The result indicates that, even while working, the household disposable income of low-work intensity employees does not exceed the poverty threshold in a relevant number of cases. As expected, with few exceptions, the proportion of protected workers is lower among low-work intensity employees than among the rest of the population. As shown in the previous section, the presence of other household incomes as well as tax reductions and benefit payments contributes substantially to the stability of household disposable incomes among this category of workers, preventing the proportion of protected workers from being even lower. Because of the high prevalence of in-work poverty, the proportion of workers at risk of poverty in the event of unemployment varies across countries, from 4 percent in the UK to 18 percent in Belgium and Denmark.

Table A3 in the appendix reports the mean marginal effective tax rates (METRs) for 'typical' employees, low-work intensity employees and the self-employed. It shows that low work intensity does not seem imputable to work disincentives embedded in the tax-benefit system. Often used as an indicator of labour market incentives at the intensive margin (Jara and Tumino 2013), in most countries the METRs faced by low-work intensity employees are lower than those faced by the rest of the working population. Together with the high prevalence of in-work poverty, the result seems to imply that constraints on the side of demand are likely to determine low-work intensity status.

Self-employed workers experience a higher prevalence of in-work poverty than 'typical' employees and also a lower prevalence of protection in the event of unemployment. The proportion of self-employed workers at risk of poverty in the event of unemployment is also relatively high, ranging from below 5 percent in Denmark and Luxembourg, where unemployment insurance covers the self-employed, to 39 percent in Lithuania.

The results presented in this section indicate, therefore, that poverty affects significantly more atypical workers, in the form of both in-work poverty and poverty risk in the event of unemployment.

Figure 4. Decomposition of mean net replacement rates across groups



Source: Authors' elaboration based on EUROMOD H1.0+ data.

Table 2. At risk of poverty

		BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
All	Poor in work	3.1	9.2	5.3	4.3	6.1	10.3	3.9	9.7	14.8	3.9	6.7	12.0	10.0	10.5	9.9	8.2	12.5	5.3	6.2	7.6	8.4	9.2	16.0	8.4	4.8	3.9	6.1	3.8
	At risk	10.5	10.7	25.4	15.7	14.1	18.0	20.1	26.7	25.7	7.9	16.8	18.6	25.5	17.5	29.1	6.7	30.6	31.4	13.4	16.7	25.3	7.6	19.8	20.9	21.6	11.3	10.7	24.2
	Protected	86.5	80.1	69.2	80.1	79.8	71.8	76.0	63.6	59.5	88.3	76.5	69.5	64.5	72.0	61.0	85.1	56.9	63.3	80.4	75.8	66.3	83.2	64.2	70.8	73.7	84.9	83.1	72.0
Non-Low	Poor in work	1.7	6.6	2.7	2.8	4.7	8.6	2.2	5.8	9.0	2.3	5.3	7.6	8.3	7.7	8.7	7.3	9.1	4.0	3.7	5.4	5.8	7.5	3.4	5.2	2.7	1.8	5.0	2.9
	At risk	7.6	8.8	26.8	16.0	12.7	18.4	20.3	24.8	27.0	5.9	16.6	15.8	25.3	17.2	29.0	6.1	32.7	31.8	10.9	14.9	25.5	6.5	19.9	22.3	21.0	10.4	10.4	24.0
	Protected	90.6	84.6	70.5	81.2	82.6	73.0	77.5	69.4	64.0	91.8	78.2	76.5	66.4	75.1	62.3	86.5	58.3	64.2	85.4	79.7	68.8	85.9	76.7	72.5	76.2	87.8	84.6	73.1
Low	Poor in work	15.2	41.0	19.8	18.0	19.7	31.1	16.8	28.6	42.7	15.4	28.0	30.8	25.1	40.2	38.0	14.2	52.6	20.6	22.7	26.5	28.6	34.2	17.2	33.4	11.9	18.9	19.7	12.9
	At risk	18.0	10.9	6.7	18.1	9.8	11.5	15.8	13.3	14.3	15.0	5.9	21.1	9.9	15.4	17.4	19.3	9.5	7.2	12.9	10.2	10.3	13.0	15.8	11.9	12.0	17.1	19.6	3.7
	Protected	66.8	48.1	73.4	63.9	70.5	57.4	67.3	58.0	43.0	69.6	66.1	48.0	65.0	44.4	44.6	66.5	37.9	72.2	64.4	63.3	61.1	52.8	66.9	54.6	76.0	64.0	60.7	83.4
SE	Poor in work	10.6	19.4	15.9	15.1	11.3	42.8	4.5	14.7	28.1	16.3	10.6	26.2	13.6	34.7	15.5	17.2	24.2	11.8	13.2	14.1	20.0	16.2	58.2	27.5	17.1	15.5	34.4	8.0
	At risk	34.5	30.9	22.1	4.6	42.0	11.3	22.2	32.6	28.7	31.0	23.8	30.4	37.8	27.1	38.9	3.1	21.3	37.4	36.8	37.5	28.6	17.7	19.5	11.4	26.7	16.6	10.7	29.7
	Protected	55.0	49.7	62.1	80.3	46.7	46.0	73.3	52.7	43.3	52.7	65.6	43.5	48.7	38.2	45.6	79.7	54.5	50.9	50.0	48.4	51.4	66.0	22.2	61.0	56.2	68.0	54.8	62.2

Notes: The poverty threshold is 60 percent median equivalised household disposable income in the baseline before unemployment. *SE* stands for self-employed.
Source: Authors' elaboration based on EUROMOD H1.0+ data.

4. Extending social protection of the self-employed: a hypothetical reform

The results from the previous sections show that, in general, compared to low-work intensity employees, the self-employed face lower NRRs (Figure 2) and higher at risk of poverty rates in the event of unemployment (Table 2). This might be driven partly by the fact that, in most countries, the self-employed are not eligible for unemployment insurance, the main instrument that protects individuals from labour market risks.

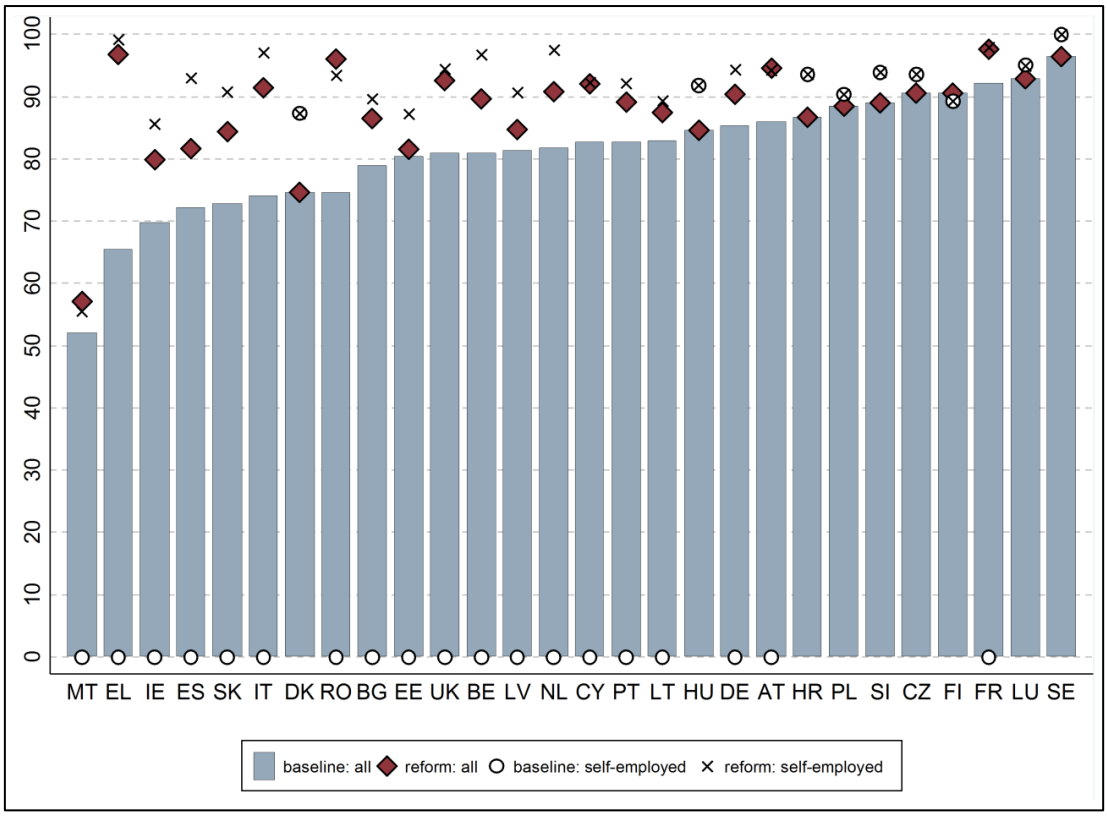
In this section, we exploit the advantages offered by microsimulation techniques and compare our baseline results with those of a counterfactual scenario in which the self-employed would be eligible for unemployment insurance under the same conditions as employees. We focus on the effects in terms of potential coverage, mean NRRs and at risk of poverty for the whole population, and for the self-employed in particular.

Figure 5 compares potential coverage rates for the whole in-work population and for the self-employed in our baseline and reform scenarios. As expected, extending eligibility to unemployment insurance to the self-employed (under the same conditions as for employees) would substantially improve the coverage rates in those countries where the self-employed are not eligible for such schemes. Coverage rates among the self-employed would exceed 85 percent in nearly all of these countries, with Malta being the exception. The largest proportion of self-employed covered by an unemployment insurance scheme would be observed in Greece, Italy and the Netherlands, with coverage rates exceeding 97 percent. This is because most self-employed workers in these countries work a full year. Sizeable increases in coverage rates would also be observed at the in-work population level. In this sense, Greece would experience the largest increase, in the region of 30 percentage points.

Figure 6 shows the effect of our hypothetical reform on mean NRRs. Looking at the entire working population, the reform would have the largest effects in Greece, Italy and Romania. The result is as expected, as these countries show the largest prevalence of self-employment in the EU (Figure 1) and experience large increases in coverage rates following the extension of eligibility (Figure 5). In the other countries, the increase in the NRR at the in-work population level would prove less relevant.

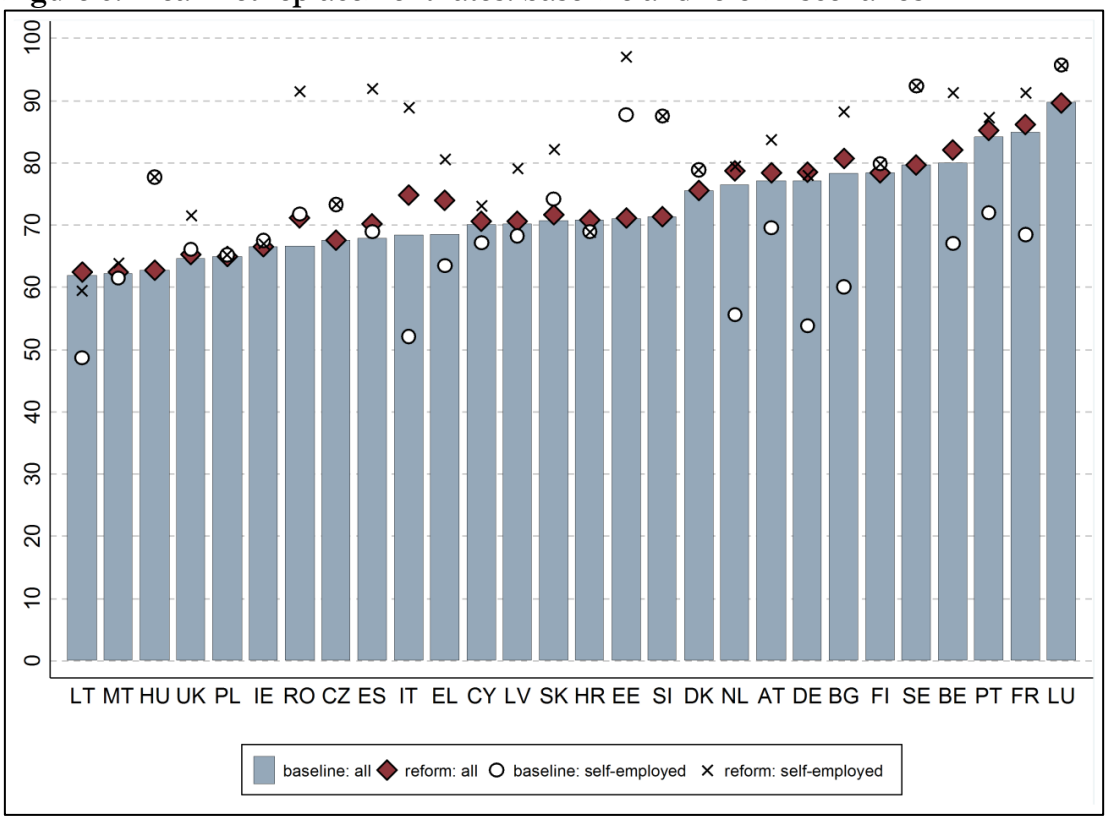
The reform would nevertheless have significant effects on the mean NRR calculated for the self-employed population. Italian self-employed workers would benefit the most, with increases in NRR of around 40 percentage points. Malta represents the other extreme, as, despite the 55 percent coverage rate in the reform scenario, the mean NRR among the self-employed would increase by only 2.3 percentage points. The relatively minor improvement in NRR in Malta is because the unemployment benefit is a flat rate with 6 months' maximum duration.

Figure 5. Potential coverage of unemployment insurance schemes: baseline and reform scenarios



Source: Authors' elaboration based on EUROMOD H1.0+ data.

Figure 6. Mean net replacement rates: baseline and reform scenarios



Source: Authors' elaboration based on EUROMOD H1.0+ data.

The increased relative importance of unemployment insurance benefits in self-employed workers' mean NRRs can be seen in Figure 7, which shows a breakdown of the mean NRRs in our baseline and reform scenarios across all Member States. As expected, the figure shows that in the reform scenario the relative importance of unemployment insurance benefits is higher than in the baseline scenario in all countries where the self-employed are not covered by an unemployment insurance scheme.

Figure 7 also allows us to understand how an unemployment insurance benefit interacts with the rest of the tax-benefit system. For example, it should be noted that the largest increase in the unemployment insurance component of the NRR is observed in Belgium, with a 41 percentage point difference. This increase is, however, counterbalanced by a 12 percentage point reduction in the social assistance component and by an increase in the taxes and social insurance contributions paid, which generate a further reduction in the NRR of 5 percentage points in the reform scenario when compared to the baseline. The result is an increase in the NRR of 'only' 24 percentage points in the reform scenario. In other cases, more complex interactions could be observed. For instance, certain family benefits could be contingent on accessing unemployment insurance, in which case extending eligibility for the self-employed could trigger an increase in family benefits. In countries where unemployment assistance is available for those not entitled to unemployment insurance, extending the latter to the self-employed could result in a reduction in or withdrawal of unemployment assistance, and, depending on the generosity of each of these instruments, this might trigger social assistance (in the event that the amount of unemployment insurance would fall short of the amount previously received in terms of unemployment assistance).

Table 3 shows how extending eligibility to unemployment insurance to the self-employed would reduce the risk of poverty in the event of unemployment. For the entire working population, the poverty risk would be reduced by 4.2 percentage points in Italy, 3.5 percentage points in Greece and 3 percentage points in Austria. Belgium and Germany would experience the largest drop in poverty rates among the self-employed, with reduction of just below 30 percentage points. The table shows that at risk of poverty rates among the self-employed in the reform scenario would become notably closer to that of the entire working population in the baseline scenario. In addition, the analysis of poverty gaps shows that the reform would reduce not only the risk of poverty in the event of unemployment but also its severity.

Figure 8 shows the average additional budgetary cost per self-employed worker, expressed as a percentage of each country's median household disposable income. The indicator takes into account not only the increase in unemployment insurance benefits paid, but also the variation in other benefits, taxes and social insurance contributions. The total net cost associated with the entire sample of self-employed workers entering unemployment is then averaged among the total number of self-employed, and scaled with respect to the median household income to allow comparisons across countries.

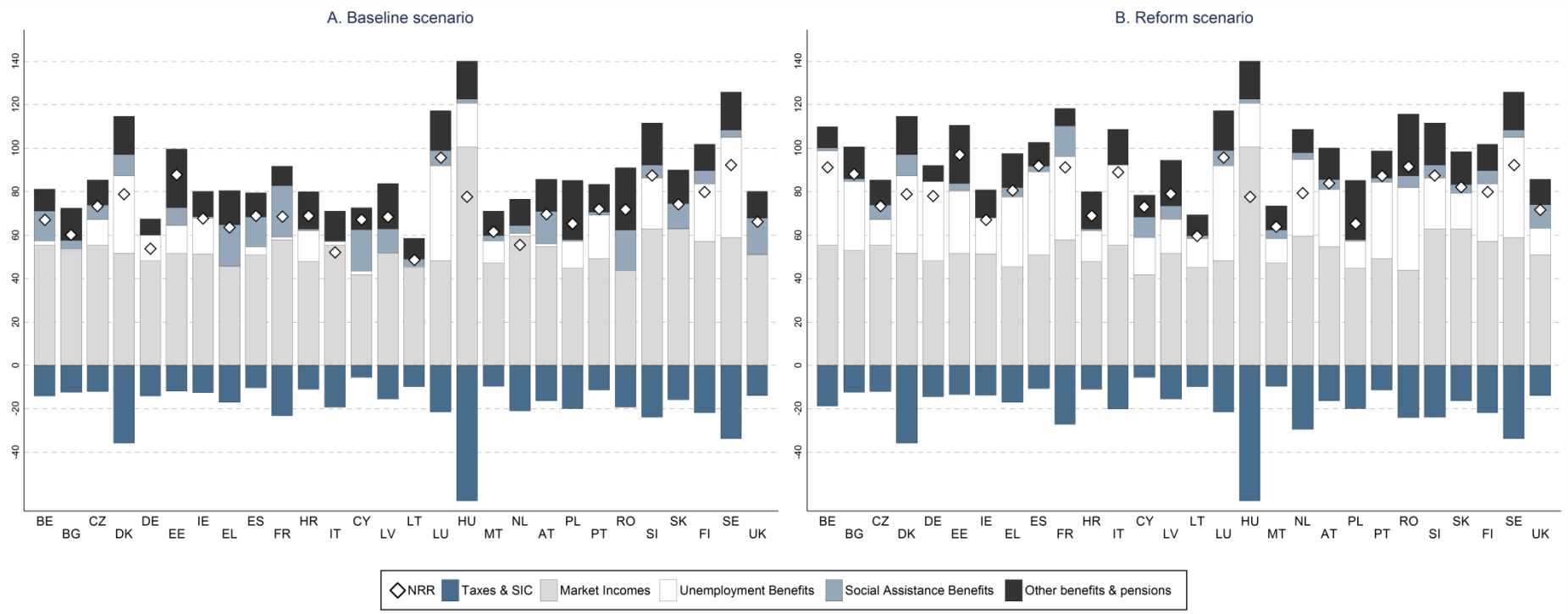
As expected, there is no additional cost in the nine countries where the self-employed are already covered by unemployment insurance in the baseline scenario. Among the other

countries, the indicator ranges from 4 percent in Ireland to 80 percent in Bulgaria. The additional average cost per self-employed worker would be above 50 percent of the median household disposable income in only four out of 28 countries. Two main factors explain the variation in reform costs across EU Member States: the design of unemployment insurance schemes and the characteristics of the self-employed population. For instance, the higher cost in Bulgaria is related to the lack of a ceiling on unemployment insurance benefit payments, and a relevant number of high-earning self-employed workers explain the results.

Our results therefore show that extending unemployment insurance coverage to the self-employed would have positive effects in terms of benefit coverage, NRRs and poverty risk reduction, at a relatively low potential cost in most EU countries. In the context of the signing of the European Pillar of Social Rights, extending unemployment insurance entitlement to the self-employed would be in line with the right to adequate social protection for all types of employment.

However, a number of caveats should be taken into account when interpreting the results. First, in our reform scenario, we have assumed that social insurance contributions remain the same as in the baseline scenario. This implies that the self-employed would be insured against unemployment risk at no extra cost. Second, the analysis does not consider any labour supply disincentive that could be associated to extending unemployment insurance coverage to the self-employed. Although potentially problematic from a theoretical perspective, recent evidence tends to attach less importance to disincentives associated to extending unemployment benefit, especially in times of recession (Howell and Azizoglu 2011). Third, income under-reporting by self-employed workers is likely to affect our results.

Figure 7. Decomposition of mean net replacement rates for the self-employed: baseline and reform scenarios



Source: Authors' elaboration based on EUROMOD H1.0+ data.

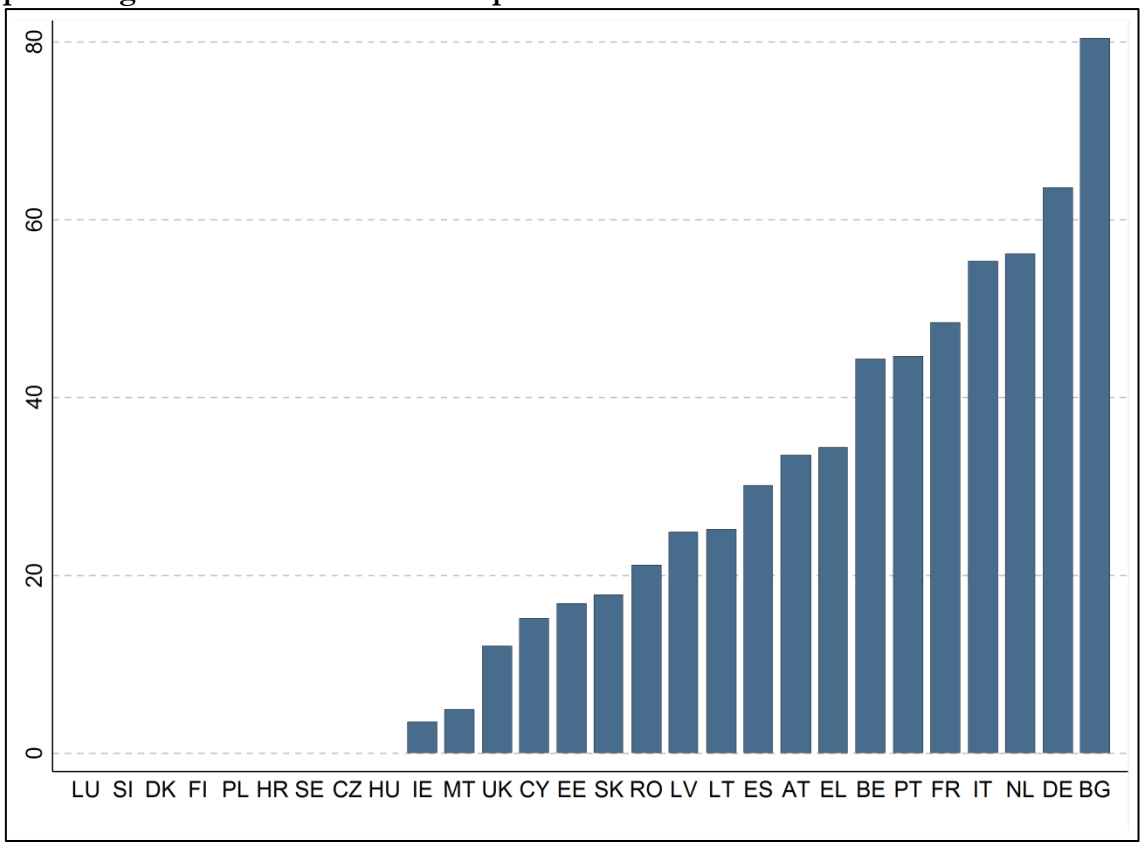
Table 3. At risk of poverty: baseline and reform scenarios

		BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Baseline: all	Poor in work	3.1	9.2	5.3	4.3	6.1	10.3	3.9	9.7	14.8	3.9	6.7	12.0	10.0	10.5	9.9	8.2	12.5	5.3	6.2	7.6	8.4	9.2	16.0	8.4	4.8	3.9	6.1	3.8
	At risk	10.5	10.7	25.4	15.7	14.1	18.0	20.1	26.7	25.7	7.9	16.8	18.6	25.5	17.5	29.1	6.7	30.6	31.4	13.4	16.7	25.3	7.6	19.8	20.9	21.6	11.3	10.7	24.2
	Protected	86.5	80.1	69.2	80.1	79.8	71.8	76.0	63.6	59.5	88.3	76.5	69.5	64.5	72.0	61.0	85.1	56.9	63.3	80.4	75.8	66.3	83.2	64.2	70.8	73.7	84.9	83.1	72.0
	Poverty gap	2.9	6.8	7.3	6.0	5.1	7.7	7.1	10.8	12.8	2.3	7.5	13.6	7.6	9.6	14.4	1.1	17.0	12.4	5.4	3.9	12.4	4.4	15.4	7.2	7.0	2.2	3.6	7.6
Reform: all	Poor in work	3.1	9.2	5.3	4.3	6.1	10.3	3.9	9.7	14.8	3.9	6.7	12.0	10.0	10.5	9.9	8.2	12.5	5.3	6.2	7.6	8.4	9.2	16.0	8.4	4.8	3.9	6.1	3.8
	At risk	7.9	8.4	25.4	15.7	12.4	17.9	20.2	23.2	24.2	6.2	16.8	14.4	24.5	16.8	28.7	6.7	30.6	31.1	11.0	13.6	25.3	6.4	17.9	20.9	19.8	11.3	10.7	23.2
	Protected	89.0	82.4	69.2	80.1	81.5	71.9	75.9	67.0	61.0	89.9	76.5	73.6	65.5	72.7	61.4	85.1	56.9	63.6	82.8	78.8	66.3	84.3	66.1	70.8	75.4	84.9	83.1	73.0
	Poverty gap	1.9	5.7	7.3	6.0	4.2	7.7	7.4	7.8	11.6	1.6	7.5	9.6	7.2	9.3	13.8	1.1	17.0	12.2	3.8	3.2	12.4	4.2	13.0	7.2	6.4	2.2	3.6	7.3
Baseline: SE	Poor in work	10.6	19.4	15.9	15.1	11.3	42.8	4.5	14.7	28.1	16.3	10.6	26.2	13.6	34.7	15.5	17.2	24.2	11.8	13.2	14.1	20.0	16.2	58.2	27.5	17.1	15.5	34.4	8.0
	At risk	34.5	30.9	22.1	4.6	42.0	11.3	22.2	32.6	28.7	31.0	23.8	30.4	37.8	27.1	38.9	3.1	21.3	37.4	36.8	37.5	28.6	17.7	19.5	11.4	26.7	16.6	10.7	29.7
	Protected	55.0	49.7	62.1	80.3	46.7	46.0	73.3	52.7	43.3	52.7	65.6	43.5	48.7	38.2	45.6	79.7	54.5	50.9	50.0	48.4	51.4	66.0	22.2	61.0	56.2	68.0	54.8	62.2
	Poverty gap	13.1	22.8	9.8	7.9	24.1	17.8	6.3	17.8	22.9	17.9	11.4	34.6	12.7	28.1	28.2	1.0	17.9	17.9	23.1	9.9	19.0	8.9	38.9	9.9	12.7	5.8	12.5	9.4
Reform: SE	Poor in work	10.6	19.4	15.9	15.1	11.3	42.8	4.5	14.7	28.1	16.3	10.6	26.2	13.6	34.7	15.5	17.2	24.2	11.8	13.2	14.1	20.0	16.2	58.2	27.5	17.1	15.5	34.4	8.0
	At risk	6.5	6.4	22.1	4.6	13.3	5.3	23.2	21.6	14.0	8.5	23.8	7.0	28.8	15.0	30.9	3.1	21.3	34.5	11.1	11.7	28.6	3.9	11.2	11.4	13.7	16.6	10.7	21.5
	Protected	83.0	74.2	62.1	80.3	75.4	51.9	72.3	63.7	57.9	75.2	65.6	66.8	57.6	50.3	53.7	79.7	54.5	53.7	75.7	74.2	51.4	79.9	30.5	61.0	69.2	68.0	54.8	70.5
	Poverty gap	2.3	9.2	9.8	7.9	6.3	12.9	8.6	8.4	10.4	6.1	11.4	11.9	9.5	19.9	17.0	1.0	17.9	16.3	6.5	4.3	19.0	6.4	28.4	9.9	8.4	5.8	12.5	6.8

Notes: The poverty threshold is 60 percent median equivalised household disposable income in the baseline before unemployment. *SE* stands for self-employed.

Source: Authors' elaboration based on EUROMOD H1.0+ data.

Figure 8. Average additional budgetary cost per self-employed worker as a percentage of median household disposable income



Source: Authors' elaboration based on EUROMOD H1.0+ data.

5. Conclusion

In the context of the signing of the European Pillar of Social Rights by the European Parliament, the Council and the Commission in November 2017, this study aims to provide an overview of the prevalence of atypical work and of the income protection that existing tax-benefit systems provide to workers in this type of employment across the 28 EU Member States. Our definition of atypical workers comprises individuals with low work intensity and the self-employed, where work intensity is defined by jointly considering the hours worked during the week and the number of months worked during the year.

The strategy for assessing the degree of income protection provided by the tax-benefit system consists of using the EU microsimulation model, EUROMOD, to simulate transitions from work into unemployment for all individuals in work in the data and to compare their disposable income before and after the transition. Thus, we assessed the resilience of disposable income with respect to unemployment across three workforce subgroups, namely low-work intensity employees, non-low-work intensity employees and the self-employed.

Our results show high heterogeneity across Member States in the prevalence and the composition of atypical employment. The proportion of atypical workers ranges from 6 percent of the working population in Sweden to 36 percent in Greece. Moreover, our

analysis highlights important gaps in the social protection of atypical workers in some EU Member States in terms of coverage by existing unemployment insurance schemes. In particular, we show that, in 15 out of 28 Member States, potential unemployment insurance coverage rates among low-work intensity employees do not exceed 30 percent, while the self-employed are covered by unemployment insurance schemes under conditions similar to those for employees in only eight countries. Low-work intensity employees usually face higher NRRs than other workers. However, this result is driven by the relatively low income lost in the event of unemployment and by the major role played by the market incomes of other household members. The gaps in atypical workers' social protection are reflected in their higher exposure to risk of poverty than standard workers', both while in work and in the event of unemployment.

Our analysis also evaluated the effects of extending the social protection provided to the self-employed by simulating a hypothetical reform scenario in which the self-employed would become eligible for unemployment insurance benefits under the same conditions as for employees in all 28 Member States. Our results show that extending unemployment insurance coverage to the self-employed would have significantly positive effects in terms of benefit coverage among this group of workers, and in terms of NRRs and poverty risk reduction. The potential cost per self-employed entering unemployment would range from 4 percent of the median household disposable income in Ireland to 80 percent in Bulgaria, depending on the design of unemployment insurance schemes and the characteristics of each country's self-employed population.

The changing nature of jobs has raised questions about the adequacy of existing tax-benefit systems to provide social protection to all types of workers. The findings presented in this paper contribute to the debate by highlighting the gaps in non-standard workers' social protection in terms of coverage against unemployment risks, and by providing insights into the effect of extending unemployment insurance eligibility to the self-employed. In the context of the signing of the European Pillar of Social Rights, further work should be undertaken to assess the effects of extending social protection to atypical workers in other spheres of working life, such as access to paternity and maternity benefits and sickness insurance.

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Appendix

Table A.1. Sample characteristics of the population in work

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Sample of observations	5450	4665	7528	6518	11123	6347	4794	10740	11998	10478	5499	16179	4751	5657	4440	3948	7262	4454	11106	5765	11246	8032	6718	10775	6818	11986	6247	16976
Population in work (000)	4439	3060	4688	2426	35549	617	1749	3532	18224	25862	1479	22650	369	872	1260	231	4145	176	7448	3828	13572	4082	8092	839	2395	2313	4504	26257
% female	46.5	47.2	44.7	48.3	49.5	49.8	47.3	41.8	45.9	49.1	45.5	42.1	49.2	50.4	48.5	47.0	46.8	39.9	46.7	45.2	46.1	50.2	41.6	44.5	45.7	49.7	48.6	47.7
% aged 18-29	17.4	16.1	16.0	15.1	15.4	20.9	15.8	12.3	12.0	19.5	19.2	12.1	22.6	19.3	19.6	20.3	17.5	26.9	18.6	22.1	18.9	15.5	15.4	13.8	19.4	18.0	18.6	22.5
% aged 30-50	59.0	56.8	59.6	55.4	55.5	51.1	59.1	65.2	64.5	57.9	57.9	60.7	56.6	52.2	51.4	62.0	54.7	51.6	53.8	53.3	57.8	61.3	63.6	65.6	57.9	51.9	52.9	52.3
% aged 50+	23.6	27.1	24.4	29.5	29.1	28.0	25.1	22.6	23.5	22.6	22.9	27.1	20.8	28.6	29.0	17.7	27.8	21.5	27.6	24.7	23.3	23.2	21.0	20.6	22.7	30.0	28.6	25.2
% low skilled	12.6	13.3	3.4	15.2	6.5	11.4	15.4	21.2	33.8	12.9	10.0	30.0	15.8	9.2	4.8	29.9	11.8	42.8	18.1	11.8	5.7	50.0	27.7	9.4	2.4	11.1	10.2	45.7
% medium skilled	38.2	58.0	74.5	44.8	55.4	47.0	29.8	42.2	24.0	47.8	66.4	45.8	42.0	55.8	54.3	39.0	59.7	29.2	41.1	55.2	61.3	26.1	51.4	56.9	72.3	44.7	46.3	25.9
% high skilled	49.2	28.7	22.1	40.0	38.1	41.6	54.8	36.6	42.2	39.3	23.6	24.2	42.2	35.0	40.9	31.0	28.5	28.0	40.8	33.0	33.0	23.9	20.9	33.7	25.3	44.1	43.5	28.4
% non-low work intensity	87.2	87.1	80.9	89.6	87.3	93.1	78.0	63.6	78.5	88.4	86.5	77.9	82.7	90.8	92.0	90.1	87.4	87.0	82.3	84.6	83.7	89.0	76.8	86.8	85.0	86.9	94.3	85.1
% low work intensity	3.8	4.4	3.0	6.1	7.4	5.5	10.2	4.9	11.4	6.1	4.0	5.3	7.1	5.4	2.9	5.4	5.3	4.0	8.4	6.3	3.8	4.1	0.2	3.9	2.2	8.0	3.6	2.5
% self-employed	9.0	8.4	16.1	4.3	5.4	1.3	11.7	31.5	10.2	5.6	9.4	16.8	10.1	3.8	5.1	4.4	7.2	9.0	9.3	9.1	12.5	6.9	23.0	9.3	12.8	5.1	2.1	12.3

Notes: In this table *self-employed* are defined as those with self-employment income and no employment income. *Low-skilled* refers to lower secondary education or less; *medium-skilled* refers to upper secondary, non-tertiary education; *high-skilled* refers to tertiary education.
Source: Authors' elaboration based on EUROMOD H1.0+ data.

Table A.2. Characteristics of unemployment insurance schemes in the EU, 2017

Country	Contribution period [a] (months)	Payment [b]	Duration (months)	Unemployment assistance	Income taxes and SICs paid on UI
BE	12/21 (age < 36), 18/33 (age ≥ 36 & age < 50), 24/42 (age ≥ 50)	65% falling to 40% of gross earnings, then minimum amount. Min. & max.	36 (no limit)	N/A	Tax
BG	9/24	60% of gross earnings. Min.	4-12	N/A	Neither
CZ	12/24 (employees & self-employed)	65% falling to 45% of net earnings. Min. & max.	5, 8 or 11	N/A	Neither
DK	12/36 (employees & self-employed)	90% of gross earnings. Max.	24	N/A	Tax
GE	12/24	67-60% of net earnings. Max.	6-24	Means-tested UA	Indirectly (tax applied on taxable income increases if UI received)
EE	12/36	50% falling to 40% of gross earnings. Min. & max.	12	Flat UA	Tax and reduced SICs
IE	9/12	Fixed amounts based on previous earnings. Min. & max.	9	Means-tested UA	Tax (except child-dependent element)
EL	5/12	Flat rate with increase for dependents.	5-12	Flat UA (means-tested)	Tax (if taxable income > €10,000/year)
ES	12/72 (employees), 12/24 (self-employed)	70% falling to 50% of previous contributory base. Min. & max.	4-24	Means-tested UA	Tax and SICs
FR	4/28	40.4% of gross earnings + fixed allocation. Min. & max.	Max. 24(36)	Means-tested UA	Tax and reduced SICs
HR	9/24 (employees & self-employed)	70% falling to 35% of gross earnings minus SICs. Min. & max.	3-15	N/A	Neither
IT	12/24	75% falling to 60% of gross earnings. Min. & Max.	10-12	N/A	Tax
CY	-	60% of basic insurable earnings + increases for dependents. Max.	6	N/A	Neither
LV	12/16	50-65% of gross earnings; reduces with length of unemployment.	9	N/A	Neither
LT	12/30	Flat rate + 40% falling to 20% of gross earnings. Max.	9	N/A	Tax
LU	6/12 (employees & self-employed)	80-85% of gross earnings. Max.	12	N/A	Tax and SICs
HU	12/36 (employees & self-employed)	60% of gross earnings. Min & max.	3	Flat UA (means-tested)	Tax and SICs

MT	5/24	Flat rate.	6	Means-tested UA	Neither
NL	6/8	75% falling to 70% of gross earnings. Max.	3-32	N/A	Tax and SICs
AT	12/24 (age ≥ 25), 6/12 (age < 25)	55% of net earnings; Min., max.	4.6-36	Means-tested UA	Neither
PL	12/18 (employees & self-employed)	Flat rate; reduced after 3 months. Min. & max.	6-12	N/A	Tax and SICs
PT	12/24	65% falling to 55% of gross earnings. Min & max.	5-18	Means-tested UA	Neither
RO	12/24	Flat rate component + 3% to 10% of gross earnings.	6-12	N/A	Tax
SI	9/24 (age ≥ 30), 6/24 (age < 30) (employees & self-employed)	80% falling to 50% of gross earnings. Min & max.	2-25	N/A	Tax and SICs
SK	24/36	50% of previous contributory base. Max.	6	N/A	Neither
FI	6/28 (employees), 15/48 (self-employed)	Basic component + 45% difference between net daily wage and basic allowance + 20% difference between daily wage and daily limit + child supplements. Min. & max.	13	Means-tested UA	Tax and health insurance contribution for medical care
SE	6/12 (employees & self-employed)	80% falling to 65% of gross earnings. Min & max.	12-15	N/A	Tax and SICs
UK	24/24	Flat rate depending on age.	6	Means-tested UA	Tax

Notes: [a] Months of contributions/period in which contributions can be made. In Cyprus, eligibility is defined in terms of the amount paid in contributions 26 weeks before unemployment. [b] Min. stands for presence of a floor in unemployment insurance (UI) payment. Max. stands for the presence of a ceiling in UI payment. UA – unemployment assistance; SIC – social insurance contribution.

Sources: MISSOC (March 2018), with additional information from EUROMOD Country Reports (https://www.iser.essex.ac.uk/euromod/resources-for-euromod-users/country-reports).

Table A.3. Mean marginal effective tax rates, 2017

Country	All	Non-low work intensity	Low work intensity	Self-employed
BE	54.4	55.8	35.6	48.5
BG	21.9	20.6	30.5	30.8
CZ	30.1	31.1	41.0	24.7
DK	45.8	46.4	39.1	42.6
DE	44.9	45.8	34.2	43.2
EE	23.1	23.0	23.4	28.8
IE	41.2	43.4	26.5	39.3
EL	32.4	32.5	16.2	34.6
ES	23.2	25.9	10.4	15.8
FR	40.0	39.2	44.4	48.5
HR	28.0	30.4	20.7	9.3
IT	39.6	41.0	9.0	42.5
CY	23.3	23.1	24.1	24.9
LV	31.1	31.5	31.0	20.8
LT	26.5	26.6	25.0	24.0
LU	43.6	43.2	45.0	50.9
HU	34.5	34.4	28.0	42.7
MT	25.7	25.8	22.8	26.1
NL	41.0	42.7	36.8	29.8
AT	42.2	42.3	31.7	48.1
PL	29.4	32.0	29.8	11.8
PT	30.9	32.2	21.3	19.8
RO	32.8	32.1	34.0	35.1
SI	39.5	41.4	35.5	24.0
SK	32.7	30.8	22.8	46.8
FI	45.5	46.3	37.0	46.0
SE	38.6	38.6	24.9	61.9
UK	38.9	39.3	32.1	37.8

Source: Authors' elaboration based on EUROMOD H1.0+ data.