EUROMOD baseline report

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Foreword

This paper presents a selection of baseline results and headline indicators from the latest public version (I5.0+) of EUROMOD, the tax-benefit microsimulation model for the EU. The model was previously maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, and since 2021 these responsibilities were taken over by the Joint Research Centre of the European Commission (Unit JRC.B2) in collaboration with Eurostat and 27 national teams. The model yearly update is financially supported by the following Directorate-Generals of the European Commission: DG EMPL, DG ECFIN, DG REFORM, DG TAXUD, JRC and Eurostat.

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Executive Summary

- EUROMOD is a tax-benefit microsimulation model for the European Union that enables researchers and policy analysts to calculate, in a comparable manner, the effects of taxes and benefits on household incomes and work incentives for the population of each country and for the EU as a whole.
- The scope of EUROMOD simulations includes direct taxes and social insurance contributions (SICs), as well as non-contributory in-cash social benefits. The lack of information on individual contributory history in the underlying microdata prevents the simulation of most contributory benefits and pensions, with the exception of unemployment benefits.
- This report presents the key baseline results from EUROMOD version I5.0+. The analysis covers the years 2019-2022 and focuses on income poverty, inequality and work incentives indicators. Despite being based on the same source of data (i.e. EU-SILC), EUROMOD-based indicators might not coincide with ESTAT indicators for a number of reasons, such as the differences between simulated and reported variables, modelling of non-take-up and tax evasion, differences in definitions of households incomes as well as differences in the release version of the data used.
- In the base year 2019, EUROMOD-based estimates of at-risk-of-poverty rates are the highest in Bulgaria, followed by Romania, Hungary, Latvia, Spain and Italy (all above 20%). At the other extreme, the lowest poverty rates are registered in Czechia and Croatia, followed by Denmark, Slovakia and Finland (all below 11%). In Romania, child poverty reaches 28%, followed by Bulgaria, Hungary, Spain and Italy (above 25%).
- Looking at the effect of tax-benefit policies on poverty rates across the EU during 2019-2022, we observe that public pensions play the largest anti-poverty effect among the various instruments of the tax-benefit systems. These are followed by non-means tested and means tested benefits, whose effects on poverty are, however, a third of pensions. Taxes and SICs play in general a smaller role in reducing poverty.
- If we analyse the redistributive impact of tax-benefit systems (excluding pensions) in terms of relative income inequality, we observe a heterogeneous picture. Countries with the strongest redistributive effect are mostly Nordic and Central European countries, while the weakest impact is typically found in Eastern European countries. Further heterogeneity can be observed in the drivers of the redistributive impact. Some countries achieve large redistributive effects with highly progressive systems (Ireland), while others rely more on high levels of taxation (Denmark).
- EUROMOD also calculates Marginal Effective Tax Rates (METRs) for all individuals with earned income. They represent the proportion of a hypothetical marginal increase in earnings that would be "taxed away" due to social insurance contributions, taxes and loss of benefit entitlements. Therefore the METRs provide a measure of labour market incentives at the intensive margin (i.e. working more, earning a somewhat higher income). According to EUROMOD simulations, in the base year 2018 Belgium exhibits the highest mean METR by far (54%), followed by Denmark, Germany and Lithuania, all above 44%. The lowest mean METRs are observed in Cyprus, Bulgaria and Estonia (all below 25%).
- Given the extraordinary impact of the COVID crisis on the labour market, standard EUROMOD simulations using 2019 income information do not accurately reflect the impact of 2020 and 2021 policies. This can be overcome by using EUROMOD's Labour Market Adjustment (LMA) add-on, as a way to simulate transitions to unemployment and short-term compensation schemes. When accounting for labour market transitions, we observe that the majority of countries experience a drop in both market income and disposable both in 2020 and 2021. When zooming on disposable income, we observe that European tax-benefit systems are able to absorb a significant proportion of the market income loss caused by adverse labour market transitions, with Slovakia, Ireland, Croatia, and Belgium being the countries with the strongest cushioning effect.
- The analysis of the evolution of income distribution in the post-financial crisis decade (2010-2019) shows that both market income and disposable income growth have occurred at very similar rates across income percentiles. The main exception is the growth of market income for the poorest 5%, which appears far more volatile. However, this volatility does not translate to the growth of disposable income pointing to the role of the tax-benefit system in absorbing these fluctuations.

Acknowledgements

This report would not be possible without the many people who contribute and have contributed to the development of EUROMOD. We are particularly indebted to the EUROMOD National Teams that make the annual update of the model possible and to the Eurostat colleagues that collaborated on the production of the EUROMOD input data: Sébastien Chami, Albane Gourdol, Olga Moraru and Anastasija Norkuviene.

We would also like to acknowledge the support provided by Eurostat for providing access to microdata from the EU Statistics on Incomes and Living Conditions (EU-SILC) made available under the agreement RPP 189/2019-ECHP-LFS-EU-SILC-HBS. We would also like to thank the National Statistical Institutes of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Poland, Slovakia, Slovenia, Spain and Sweden. None of the aforementioned data providers bears any responsibility for the analysis or interpretation of the data reported here.

Abstract

This report provides a selection of baseline results and headline indicators from the latest public version (I5.0+) of EUROMOD, the tax-benefit microsimulation model for the EU. We begin by presenting indicators for income inequality and at-risk-of-poverty. We then provide a comparative decomposition of the redistributive effect of the tax-benefit systems across the EU. We study how different Member States achieve various degrees of redistribution through different combinations of progressivity and size of their tax-benefit systems. We then analyse various work incentive indicators both at the intensive and the extensive margin, discussing how effective marginal rates of taxation and replacement rates vary across countries. The report also describes the way EUROMOD can be used to simulate economic shocks leading to labour market transition through the LMA (Labour Market Adjustment) add-on. We illustrate this by simulating the impact of the COVID-19 pandemic and the cushioning effect of policy measures taken by EU Member States. Finally, we present the evolution of the income distribution over the post-financial crisis decade and we compare living standards across EU countries at the top and the bottom of the income distribution.

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1 Introduction

This report presents a selection of baseline results and headline indicators from EUROMOD microsimulation model, version I5.0+. The analysis covers the years 2019-2022 and focuses on income distribution, the redistributive and cushioning effect of the tax-benefit systems in the EU and the potential incentives to work they provide. Throughout our analysis, we will mostly focus on 2019 policy simulations, the so-called base-year simulations in the EUROMOD modelling conventions (baseline year hereafter). These policy simulations match the income year (2019) of the most recent EUROMOD input data (2020) derived from the European Statistics on Income and Living Conditions (EU-SILC), available at the time of the EUROMOD release I5.0+. The analysis is then extended to the subsequent years thanks to income uprating.

EUROMOD is a tax-benefit microsimulation model that covers the 27 Member States of the European Union. The model, used in combination with representative household microdata from the EU-SILC, allows researchers and policy analysts to study the fiscal and distributional effects of existing policies and policy reforms. These analyses can be carried out for individual member states as well as for the EU as a whole.

The model is developed and maintained by the Joint Research Centre of the European Commission, in collaboration with Eurostat and a network of national experts from the various Member States. Its baselines scenarios include direct taxes, social insurance contributions and cash benefits (including pensions). The model is distributed with an open-source license, and it can be freely downloaded from the EUROMOD JRC website (https://euromod-web.jrc.ec.europa.eu/). The EUROMOD software and its source code, written in C#, can be also accessed from the website. To ensure cross-country comparability, EUROMOD runs on microdata from the EU Statistics on Incomes and Living Conditions (EU-SILC). EU-SILC contains information on income and socio-demographic circumstances of representative samples of private households in each EU Member State.[1] More details about the EUROMOD project and the process of model update and validation can be found in last year Baseline Report (see Maier, Ricci et al, 2022).

Reporting and analysing the baseline indicators of EUROMOD year by year is an important task for a number of reasons. Firstly, presenting and discussing key model predictions in terms of poverty and inequality is crucial for transparency toward our users. Secondly, EUROMOD baseline indicators in each year constitute the benchmark against which any reform or counterfactual scenario should be compared against. Accordingly, interpreting and understanding the baseline results is key to interpret the model predictions when exploring alternative policy scenarios. Finally, EUROMOD baseline results include a set of complementary indicators that help describing the properties and the effects of the tax-benefit system, which are not produced by ESTAT (also because they cannot be calculated with the sole information available in SILC). Since these indicators are quite numerous, each year we publish in the baseline report a selection of them to offer our readers a flavour of the type of analysis which can be undertaken with EUROMOD. In this year report, we analyse the redistributive properties of the EU tax-benefit systems using the Kakwani decomposition and we provide a comparative analysis of the impact of COVID in the EU using EUROMOD extended functionalities.

The remaining of the report is structured as follows. In Section 2, we present indicators for income inequality and at-risk-of-poverty using EUROMOD. In Section 3, we provide a comparative decomposition of the redistributive effect of the tax-benefit systems across the EU. We study how different Member States achieve various degrees of redistribution through different combinations of progressivity and size of their tax-benefit systems. In Section 4, we discuss work incentive indicators both at the intensive and the extensive margin. We analyse how effective marginal rates of taxation and replacement rates vary across countries. In Section 5, we present a simulation of the impact of the COVID-19 pandemic in the EU and the cushioning effect of the tax-benefit systems. In Section 6, we discuss the evolution of household income for selected moments of the income distribution over the post-financial crisis decade. Finally we compare living standards across EU countries at the top and the bottom of the income distribution. Section 7 concludes.

[1] The use of EU-SILC and EU-SILC-based EUROMOD input data is subject to permission by Eurostat. More information can be found in https://euromod-web.jrc.ec.europa.eu/download-euromod/.

2 Poverty, inequality and the effects of the tax benefit system in the EU

In this section, we present EUROMOD headline indicators of inequality and poverty and decompose the impact of the main components of the tax-benefit system over them. Section 2.1 provides a selection of poverty indicators based on alternative poverty thresholds, along with the Gini index in each country. We then move in sections 2.2 and 2.3 to analyse the impact of the tax-benefit system on poverty and inequality. In each case, we have calculated the indicators using Eurostat methodology.[2]

The statistics presented may differ from those directly produced by Eurostat based on EU-SILC data for a number of reasons. First and foremost, EUROMOD simulates most taxes and benefits, which are in turn an important part of disposable income. In turn, these components are either self-reported or derived by administrative sources in SILC. Second, for a number of countries EUROMOD does not account for non-take-up of benefits and tax evasion, hence its outcomes may reflect the intended impact of the tax-benefit system rather than the actual one. Finally, further differences might emerge due to differences in the release version of the SILC data used. More detailed explanation on the differences can be found in section 4.2 of Maier, Ricci et al. (2022).

Throughout the section, we present results for the whole period 2019 – 2022. Results for the baseline year (2019) are reported in the main text, since it is the year where policy rules match the income reference period of the input data (2020 data, 2019 incomes), hence no uprating are needed. Additionally, the whole series 2019 – 2022 is available in Annex 4 of this paper. For years 2020-2022, incomes that are not simulated (e.g. market incomes) are uprated from the income reference year 2019 to the following years based on indices for each separate income source (e.g. earnings indices for earnings, pension uprating indices for pension-related incomes).[3] Accordingly, our results show how poverty and inequality indicators evolve over time in each country, as a result of policy changes and changes in income levels, abstracting from changes in socio-demographic characteristics of the population, which are kept constant as in the income reference year.[4]

2.1 Poverty risk and inequality in the EU

In this section, we present at-risk-of-poverty rates for the whole population of each Member State, together with its breakdown by subgroups of population, as well as a measure of income inequality. These are reported in Table 1 which displays at-risk-of-poverty rates for three poverty thresholds (i.e 50%, 60% and 70% of national median equivalised household incomes) as well as risk of poverty for children (aged under 18) and older people (aged 65 or more) based on the 60% threshold. Income inequality is measured through the Gini coefficient.

Table 1 shows that the highest at-risk-of-poverty rate based on the 60% poverty line in the baseline year 2019 is observed in Bulgaria (24.1%), followed by Romania, Hungary, Latvia, Spain and Italy (above 20%). The lowest poverty rates are registered in Czechia and Croatia (9.6%), followed by Denmark, Slovakia and Finland (below 11%). The ranking of countries seems to remain relatively stable when considering alternative poverty thresholds (50% and 70% of the poverty line). Poverty risk results are higher for more vulnerable categories, such as children and elderly people. In Romania, child poverty reaches 28% in the base year, followed by Bulgaria, Hungary, Spain and Italy (above 25%). The lowest child poverty rates (below 12%) are observed in Slovenia, Czechia, Denmark, Poland and Finland. Elderly poverty reaches 40.6% in Estonia, 39.6% in Bulgaria, 37.8% in Latvia. At the other end of the spectrum, the countries with the lowest elderly poverty rates (below 8%) are France, Netherlands and Luxembourg. Overall income inequality, as measured by the Gini index, is the highest in Bulgaria and the lowest in Slovakia; differences between the two are striking, in the latter Gini index is half in size. These results are very much in line with findings of Maier, Ricci et al. (2022).

Table A4.1 (Annex 4) also shows that over the period 2019 – 2022 changes in poverty rates due to changes in tax-benefit policies and income levels tend to be relatively small, though decreases in poverty rates were more prevalent than in previous years and increases, where they occurred, less marked. Much of this relates

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[2] A description of EUROSTAT method can be found at https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_statistics_on_income_and_living_conditions_(EU-SILC)_methodology.

[3] For a description of the income uprating in EUROMOD, see Maier, Ricci et al (2022). Detailed rules and guidelines about how uprating factors are implemented in EUROMOD can be found in the EUROMOD modelling conventions, available in https://euromod-web.jrc.ec.europa.eu/resources/model-documentation.

[4] Luxembourg is an exception, since no 2020 input dataset is available. 2019 (2018 incomes) is used instead, so non-simulated variables are uprated for all years.

to the effects of 2021 policy reforms, particularly those enacted in response to COVID-19 pandemic. Nonetheless, increases in poverty rates greater than 2 percentage points were estimated in Ireland. On the other hand, the countries experiencing the largest decrease in relative poverty were Romania and Spain, where the poverty rate is estimated to have decreased by around 2 percentage points.

Table 1. EUROMOD poverty and inequality statistics, baseline year 2019

Country	Poverty risk			Poverty risk (60%)			Gini coefficient
	50%	60%	70%	age<18	age>=65	Poverty threshold EUR/year	
AT	6.8	13.7	20.7	16.5	13.7	15,884	0.248
BE	5.7	12.4	21.6	13.7	15.8	14,689	0.228
BG	16.8	24.1	31.2	27.9	39.6	2,799	0.398
CY	5.6	14.8	24.1	18.1	21.4	10,120	0.292
CZ	4.5	9.1	18.0	11.0	13.6	6,319	0.235
DE	11.8	18.5	25.9	19.9	20.3	15,199	0.308
DK	6.0	12.2	20.9	9.6	12.4	19,344	0.253
EE	11.0	19.6	27.6	13.5	40.6	7,268	0.303
EL	10.2	16.7	23.9	19.7	12.9	5,512	0.301
ES	14.2	20.9	27.4	27.0	19.1	9,571	0.314
FI	3.3	10.7	20.9	10.8	10.2	14,913	0.252
FR	6.0	11.4	20.4	15.9	7.5	13,025	0.283
HR	12.8	19.3	25.9	16.7	33.6	4,988	0.276
HU	14.8	21.0	27.7	25.1	25.4	3,621	0.312
IE	7.4	17.2	27.1	19.5	27.5	15,227	0.283
IT	14.4	20.8	27.3	25.8	16.8	10,604	0.319
LT	11.9	19.4	27.1	18.3	32.0	4,917	0.337
LU	3.6	13.1	21.5	17.0	6.9	24,277	0.258
LV	14.2	20.6	27.5	15.1	37.8	4,995	0.337
MT	7.9	15.4	23.4	15.2	29.0	9,892	0.300
NL	5.4	12.1	20.3	14.0	7.4	15,530	0.266
PL	8.1	14.3	21.6	11.9	18.0	4,737	0.265
PT	9.6	16.4	24.0	17.2	19.7	6,681	0.308
RO	15.7	22.7	29.9	28.0	24.5	2,602	0.328
SE	8.0	14.7	23.8	18.1	11.8	14,886	0.254
SI	4.8	11.5	20.2	9.3	15.7	8,338	0.236
SK	7.2	11.7	18.4	17.4	8.9	5,198	0.211

Source: EUROMOD version I5.0+

2.2 The effect of taxes and benefits on the risk of poverty

The one area that EUROMOD is especially designed to address is the role of taxes and benefits in reducing inequality and poverty risk. In this section we look at the role of the various components of the tax-benefit system in reducing the poverty risk. This is shown in Table 2, where the poverty threshold is maintained at 60% of median household disposable income as tax-benefits components are added and subtracted in order to highlight the role played by each of them in reducing poverty. Accordingly, columns 3-7 of Table 2 show what happens to poverty if each tax-benefit component (i.e. means-tested benefits, non-means-tested benefits, taxes and social insurance contributions) is added back (in the case of taxes) or deducted (in the case of benefits) from disposable income. Column 8 displays estimates on the basis of market income and column 9 shows the result adding public pensions to market income. The role of public pensions is also graphically illustrated in Figure 1.

As can be seen in Figure 1, the effect of adding public pensions to market income reduces poverty before taxes and benefits significantly in all countries. In the base year 2019, public pensions show the largest anti-poverty effect among various instruments of EU tax-benefit systems. Table 2 shows that in Greece, when added to market incomes, pensions contribute to reducing the poverty rate by almost 25 percentage points, the largest effect across countries. Other countries where public pensions play a major role in reducing poverty (i.e. a reduction of about 20 percentage points or higher) are Belgium, Finland, France and Portugal. On the contrary, the countries where public pensions are less effective in reducing poverty when added to market incomes are Netherlands and Ireland. In these countries in fact an important part of the pensions system consists of occupational and private pensions (included in market income), while public pensions have the role of a residual safety net.

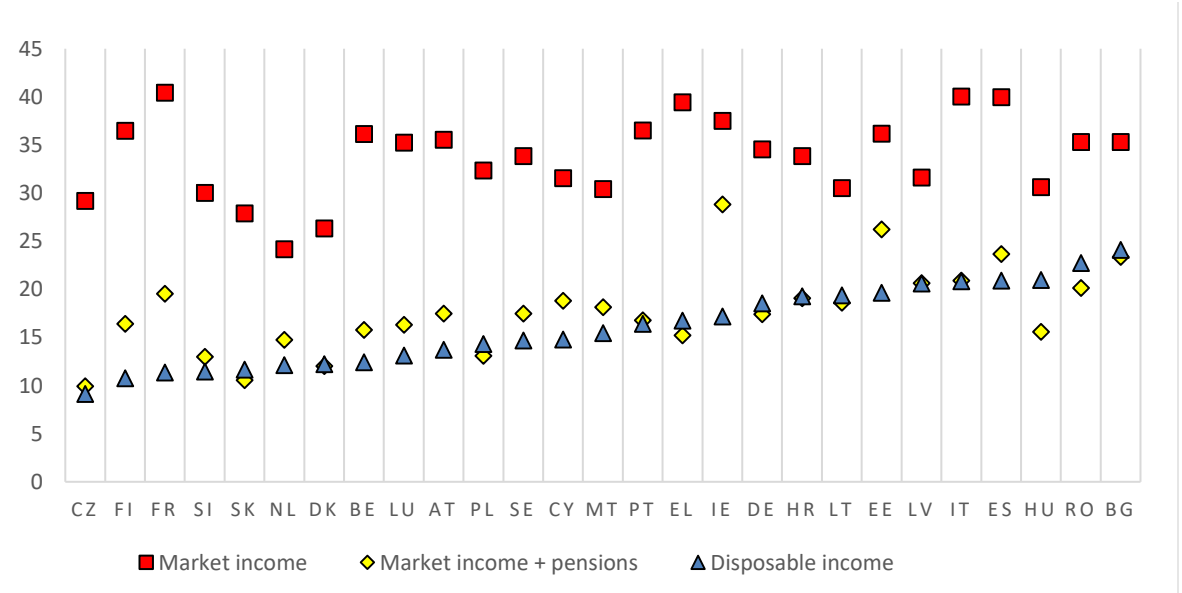
After public pensions, universal benefits or benefits not subject to a means-test (e.g. unemployment benefits) are another important instrument of poverty reduction. This is particularly the case for Luxembourg, Slovenia, Sweden, Denmark, Estonia and France: in these countries, when non-means tested benefits are subtracted from disposable income, the poverty rate increases between 7 and 9 percentage points. On the other hand, the anti-poverty effect of non-means-tested benefits in the base year is very modest in Greece, slightly above 1 percentage point only.

In addition, in several countries an important anti-poverty role is played by means-tested benefits. Especially, in Ireland, Denmark, Finland and France. In these countries, when means-tested benefits are subtracted from disposable income, the poverty rate increases between around 7 and 10 percentage points. On the other hand, in many countries, the anti-poverty effect of means-tested benefits remains modest. In fact, in most countries the increase is below 3 percentage points; and for Estonia, Hungary and Latvia, the anti-poverty effect of means-tested benefits is very close to zero.

Adding back taxes and social contributions (SICs) to disposable income has a relatively small poverty-reducing effect, with a similar impact in each case. Larger effects for taxes are observed in the Nordic countries, where the tax system has a more marked redistributive role, whereas in some Central and Eastern European countries, such as Hungary, Poland and Romania, the effects are larger for SICs.

Table A4.2 in Annex 4 compares the impact of different components of the tax/benefits systems on poverty over the years 2019-2022. In general, the rankings of countries regarding the poverty reduction properties of the tax/benefits systems, are largely preserved. For most countries the performance of means-tested benefits remains basically unchanged, mostly between -1 and 1 percentage points. The main exceptions are non-means tested benefits in Poland whose poverty-reducing effect is reduced by about 5% due primarily to childcare allowance being reclassified from means to non-means tested benefits in 2020.

Figure 1. Poverty risk and the role of public pensions and non-pension benefits and taxes (2019 incomes and policies)



Source: EUROMOD version I5.0+

Note: Countries have been ranked according to the poverty estimates for disposable income. The poverty line for the three measures is the one of disposable income.

Table 2. Effects of tax-benefit components on at-risk-of-poverty rate, baseline year 2019

Country	Disposable Income (DPI)	DPI less means-tested benefits	DPI less non-means-tested benefits	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
AT	13.71	16.90	20.16	13.56	18.06	35.53	17.47
BE	12.41	16.58	15.73	12.17	11.04	36.12	15.78
BG	24.10	25.94	26.36	22.19	21.44	35.31	23.38
CY	14.77	20.54	17.07	14.45	11.46	31.55	18.81
CZ	9.12	10.52	12.05	8.71	7.29	29.19	9.93
DE	18.55	20.17	22.79	17.02	14.96	34.55	17.42
DK	12.21	20.16	19.61	3.91	12.12	26.33	12.03
EE	19.64	20.13	29.85	18.59	18.92	36.18	26.21
EL	16.73	21.30	18.03	14.36	13.21	39.43	15.22
ES	20.91	23.81	23.98	20.30	18.32	39.95	23.67
FI	10.74	18.49	16.93	6.88	8.90	36.47	16.41
FR	11.36	21.36	18.11	8.89	9.65	40.42	19.54
HR	19.28	20.50	21.04	19.16	16.15	33.84	19.09
HU	20.97	21.37	24.04	16.01	16.29	30.63	15.58
IE	17.19	26.79	23.49	16.71	17.06	37.49	28.83
IT	20.85	23.29	23.59	18.71	18.30	40.03	20.92
LT	19.36	20.71	25.67	16.90	15.23	30.53	18.62
LU	13.12	15.92	20.05	12.39	7.93	35.26	16.32
LV	20.62	20.62	25.72	18.32	18.46	31.60	20.64
MT	15.43	19.17	17.98	14.69	13.03	30.41	18.14
NL	12.11	18.71	17.58	10.16	8.37	24.15	14.74
PL	14.31	18.48	17.91	9.24	10.74	32.36	13.09
PT	16.40	18.73	18.52	15.54	14.16	36.51	16.77
RO	22.73	24.29	26.77	20.96	18.30	35.30	20.14
SE	14.67	17.69	23.86	10.03	12.89	33.85	17.48
SI	11.46	15.38	18.44	10.55	7.38	30.03	12.99
SK	11.66	12.47	16.49	11.11	7.42	27.90	10.57

Source: EUROMOD version I5.0+

2.3 The effect of taxes and benefits on inequality

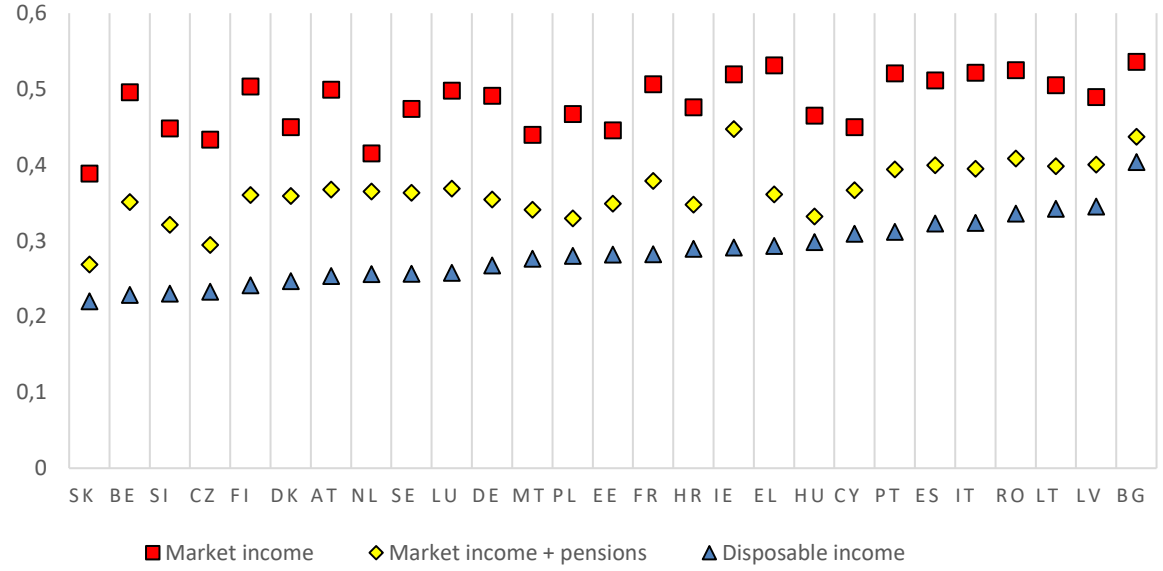
Similarly to the previous section, we move now to analyse the role of taxes and benefits in reducing inequality. Table 3 and Figure 2 are just analogous to Table 2 and Figure 1 and show the role of tax-benefit components of household income in reducing income inequality as measured by the Gini coefficient. Inequality of market income including public pensions (before taxes) is everywhere lower than inequality of market income but higher than that of disposable income.

As in the case of poverty, public pensions are the most significant income component in reducing market income inequality. The countries experiencing the largest reduction in the Gini coefficient once public pensions are added to market income are Greece (the Gini drops by over 0.16 points), followed by Belgium, Czechia, Finland, France, and Poland (over 0.14 points). At the other end of this ranking, in the Netherlands and Ireland the Gini coefficient drops only by less than 0.07 points, given the greater importance of private and

occupational pensions (included here in market income) in these countries, in addition to publicly provided old-age pensions.

Non-pension benefits and taxes (income taxes and social contributions) vary in their effectiveness in reducing income inequality across countries. They have a relatively large role compared with other countries in Austria, Belgium, Denmark, Finland, France, Ireland, Luxembourg, Ireland, The Netherlands and Sweden.

Figure 2. Income inequality (Gini coefficient) and the role of public pensions and non-pension benefits and taxes (2019 incomes and policies)



Source: EUROMOD version I5.0+

Note: Countries have been ranked according to the value of the Gini coefficient for disposable income.

After pensions, direct taxes are on average the second instrument for reducing income inequality. The largest effect of taxes can be found in Belgium, Germany, Ireland, Luxembourg and the Netherlands, where the Gini coefficient increases by over 0.06 points when direct taxes are added back to disposable income. These countries are characterized by progressive tax systems, which could explain the equalising effect of direct taxes on the income distribution. On the contrary, in Bulgaria, Hungary and Romania the effect of direct taxes in reducing inequality is close to zero, likely because of their flat tax systems. As a complementary tax on labour income, SICs have a much smaller impact on income inequality. Moreover, the impact of SICs over income inequality is ambiguous with the sign of their effect varying across countries. A possible explanation for this is that SICs are typically levied on the basis of a flat rate while featuring systems of floor and ceiling that end up determining their progressivity or regressivity.

Means and non-means-tested benefits also have an impact on income inequality. On average, this impact is similar and smaller by half to the one of direct taxes. As far as means-tested benefit are concerned the greatest inequality reduction is observed for Ireland where the Gini increases by around 0.07 points these are removed from disposable income. The other countries where means-tested benefits have a large effect on the Gini are the Netherlands, Denmark, France and Finland (between 0.04 and 0.05 percentage points). When considering the inequality-reducing effect of non-means tested benefits, we find that in Sweden, Estonia and Denmark non-means tested benefits have the largest inequality-reducing effect (around 0.04 points).

Table A4.3 in Annex 4 compares the impact of different components of the tax/benefits systems on inequality over the years 2019-2022.

Table 3. Effects of tax-benefit components on Gini coefficient rate, baseline year 2019

Country	Disposable Income (DPI)	DPI less means-tested	DPI less non-means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
AT	0.25	0.28	0.28	0.31	0.26	0.49	0.36
BE	0.23	0.25	0.25	0.31	0.25	0.49	0.35
BG	0.40	0.41	0.41	0.41	0.40	0.53	0.43
CY	0.29	0.32	0.30	0.32	0.29	0.44	0.35
CZ	0.23	0.24	0.25	0.27	0.25	0.43	0.30
DE	0.31	0.33	0.33	0.37	0.32	0.52	0.40
DK	0.25	0.29	0.29	0.31	0.25	0.45	0.36
EE	0.30	0.31	0.34	0.34	0.31	0.47	0.38
EL	0.30	0.33	0.31	0.34	0.31	0.53	0.37
ES	0.31	0.34	0.33	0.36	0.31	0.50	0.39
FI	0.25	0.30	0.28	0.30	0.27	0.51	0.36
FR	0.28	0.34	0.31	0.32	0.29	0.53	0.39
HR	0.28	0.29	0.28	0.30	0.30	0.46	0.33
HU	0.31	0.32	0.33	0.31	0.32	0.46	0.34
IE	0.28	0.36	0.31	0.36	0.30	0.52	0.45
IT	0.32	0.34	0.32	0.37	0.33	0.52	0.39
LT	0.34	0.35	0.36	0.37	0.36	0.50	0.41
LU	0.26	0.28	0.29	0.33	0.26	0.50	0.37
LV	0.34	0.34	0.36	0.37	0.35	0.48	0.39
MT	0.30	0.32	0.31	0.34	0.30	0.46	0.37
NL	0.27	0.31	0.29	0.33	0.28	0.42	0.37
PL	0.26	0.28	0.28	0.28	0.27	0.45	0.31
PT	0.31	0.32	0.32	0.36	0.32	0.52	0.39
RO	0.33	0.34	0.34	0.34	0.37	0.52	0.40
SE	0.25	0.28	0.31	0.30	0.26	0.47	0.35
SI	0.24	0.26	0.26	0.27	0.26	0.45	0.32
SK	0.21	0.22	0.23	0.23	0.22	0.39	0.26

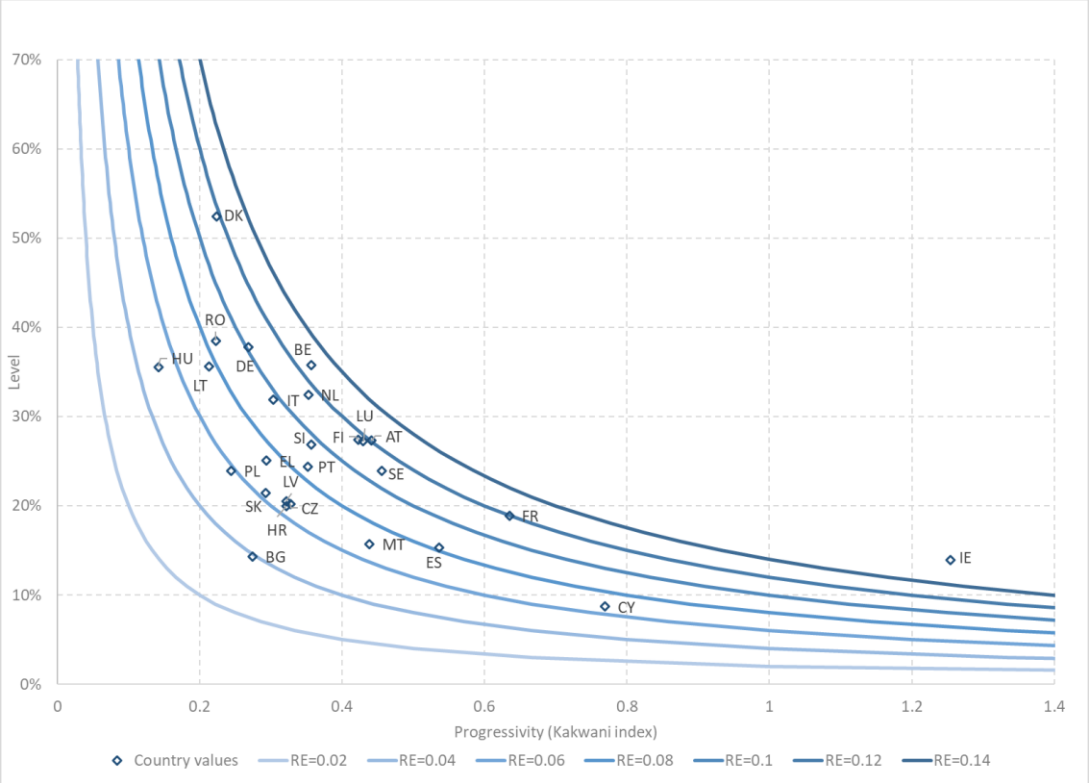
Source: EUROMOD version I5.0+

3 Breaking down the redistributive effect of the tax-benefit systems in the EU

In this section we decompose the redistributive effect of the tax-benefit system in the EU-27 countries, for the baseline year 2019, using the Kakwani decomposition framework. We start by looking into the overall redistributive effect (RE) of the tax-benefit system as modelled in EUROMOD (excluding pensions), and by disentangling the roles played by relative progressivity (measured by the Kakwani index) and the relative size of the policies in relation to disposable income (level effect). Furthermore, we decompose the overall redistributive effect to identify the role played by each of the tax-benefit components. The methodologies used are based on Kakwani (1977), Reynolds-Smolensky (1977) and the adaptation and generalisation proposed by Onrubia et al. (2014). The formalisation of the indicators and details on the income and policy components included can be found in Annex 5.

In Figure 3 we plot the Kakwani decomposition of the redistributive effect for all EU member states. The redistributive effect of a policy (or in this case, of the whole tax-benefit system, except pensions) is the product of its *relative progressivity* (measured by the Kakwani index, and plotted in the horizontal axis) and its *level* (relative size with respect to disposable income, plotted in the vertical axis), minus a re-ranking effect.[5] In order to easily compare countries, we also plot"iso-redistribution curves"[6] that represent the multiple combinations of progressivity and level of redistribution that lead to the same redistributive effect.[7]

Figure 3. Progressivity (x), level (y) and redistribution of the tax-benefit system before re-ranking (position w.r.t. curves)



Source: EUROMOD version I5.0+
Note: Kakwani index, level and RE displayed in this figure refer to the net effect of taxes and benefits modelled in EUROMOD baseline 2019. This consists of personal income taxes and cash benefits.

[5] The re-ranking effect in redistribution analysis refers to changes in the relative ranking of individuals when the income distribution is changed by a policy. For example, an individual A with lower market income than an individual B may end up with a higher disposable income because he/she is entitled to a specific benefit and B is not.

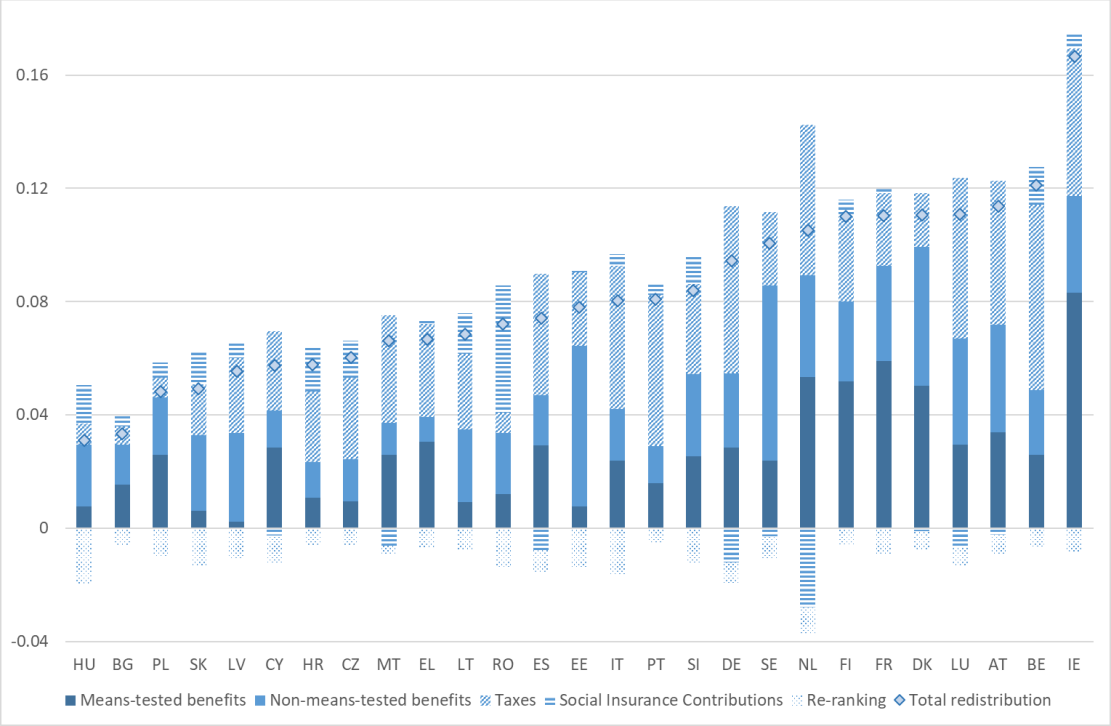
[6] This way of plotting the Kakwani decomposion was inspired by López Laborda et al. (2022)

[7] Note that we plot the values before re-ranking effect, to keep consistence between the pairs of progressivity and level value and total redistribution.

Countries with the strongest redistributive effect (i.e. those that are further away from the axis origin in Figure 3 and, therefore, closer to the darker curves), are mostly Nordic and Central European countries (Ireland, Denmark, Belgium, the Netherlands, France and Austria). This relatively strong redistributive effect is, however, obtained through different policy designs. At one extreme is Ireland, with a very progressive tax-benefit system which is however relatively low in terms of level (low burden over disposable income). In other words, the overall impact of the tax-benefit system on household income is low on average, but it is very progressive in the way it redistributes from the most to the least well off. At the other extreme is Denmark, featuring one of the lowest progressive tax-benefit systems, but which achieves a redistributive effect very similar to Ireland due the high level (i.e. a very high burden over disposable income, of about 60%). Among countries with the lowest redistributive effect are Poland, Hungary and Bulgaria (and, typically, Central and Eastern European countries), while Southern European countries (Spain, Greece, Malta, Cyprus, and Portugal) tend to feature an intermediate level of redistribution compared with their European peers.

In Figure 4, we decompose the total redistributive effect by the tax-benefit system components. Countries are ranked from left to right with respect to the total redistributive effect of their tax-benefit system. Four clear patterns emerge. First, the countries with the strongest redistributive effect (those located on the right-hand-side of the figure) largely achieve it through means-tested benefits (in particular this is the case of Ireland, France, Finland and Denmark) and direct taxes (this is particularly the case of Belgium and Luxembourg). Second, social benefits (as a whole) are the main drivers of the redistributive effect across the EU-27. Third, direct taxes are the main driver of the redistributive effect in many of the countries which achieve an intermediate level of redistribution, mostly Southern European countries. Fourth, social insurance contributions play a very minor redistributive role, with the exception of Romania where their magnitude, combined with their progressive nature, makes their redistributive effect larger than any other component.

Figure 4. Redistribution of the tax-benefit system by component



Source: EUROMOD version I5.0+

Note: The decomposition of the redistributive effect (RE) displayed in this figure refers to the net effect of taxes and benefits modelled in EUROMOD baseline 2019. This mainly consists of personal income taxes and cash benefits (pensions, consumption and wealth taxes, as well as in-kind benefits are excluded).

4 Work incentives on the intensive and extensive margins: marginal effective tax rates and net replacement rates.

EUROMOD can be used to calculate the effects of the tax and benefit systems on work incentives. In this section, we present and discuss two indicators that provide valuable insights in this regard: the marginal effective tax rates and the net replacement rates. The first indicator measures the part of the extra pay that the tax-benefit system takes away from individuals when their earnings increase, in terms of both increased taxes and lost benefits, and it is often used as a measure of work incentives at the intensive margin (i.e. how much labour to supply). The second indicator, instead, measures households replacement income when one of its members lose her earnings (e.g. because of lay-off) and it is often taken as a measure of work incentives at the extensive margin (i.e. whether to participate or not in the labour market). Figures are reported for the baseline year 2019, while in the Annex 4 we present the series for the policy years 2019 – 2022.

We consider first the marginal effective tax rate (METR). METRs are calculated for all individuals with earned income based on the increase in disposable income out of an increase in 3% earnings. Specifically, the METR is the share of the employment income growth that does not translate in disposable income because of the increase in tax liabilities and benefit withdrawal. In Table 4 we present results for individuals of working age (18-64) who have more than one unit of national currency of monthly earnings. We exclude from our calculations the top percentile of the METR distribution if the value is above 150% and the lowest percentile if the value of METR is negative. These exclusions are made for average METR to be less sensitive to "outliers", although such values are in principle plausible. Furthermore, we assume full take-up of benefits and full tax compliance in all countries. Hence, all of the marginal earnings are assumed to be earned in the official economy and are subject to taxes, contributions and benefit withdrawal, under full compliance. METRs are therefore to be considered as indicators of the effects of the design of the tax-benefit system on marginal earnings that are retained rather than calculations of the marginal return to additional work in practice.

Table 4 shows that Belgium exhibits by far the highest mean METR (54%), followed by Denmark, Luxembourg, Germany and Finland, where METRs range between 44% and 46%. The lowest mean METRs are observed in Cyprus, Estonia and Bulgaria (below 25%). As we can be seen in Annex 4, Table A4.4, the ranking of countries remains largely the same when ranked by the median METR instead of the mean. This also shows which countries have made reduced disincentives to labour market participation over the period considered, and which ones have worsened in the ranking. Looking at mean METR, Hungary is the country with the largest decrease in disincentives between 2019 and 2022 (more than 7 percentage points). That is because of the introduction of two main reforms on income tax in 2022; specifically an income tax allowance for young taxpayers (those aged 25 years or less) and a tax refund for families with children.

In Table 4, further presents average METR decomposition in three main components: (1) taxes, representing the average increase in taxes paid at the household level as a proportion of the increase in individual gross earnings; (2) social insurance contributions, including changes in both employee, self-employed and other social insurance contributions paid by the individual; and (3) benefits, representing the average reduction in benefits and pensions paid at the household level as a proportion of the increase in earnings.

Despite a wide variation across countries, the graph shows that the tax component is usually the most important. Its size varies significantly across countries and range from relatively low values in Cyprus, Bulgaria and Romania to relatively high values in Denmark and Belgium. In Denmark, almost all of the average METR is accounted for by taxes. While in Belgium the share of taxes is lower but still accounting for most of the average METR. Nordic countries together with Germany, Luxembourg and Belgium also have the highest METR due to taxes in absolute terms (all over 27%), while taxes seem to offer less disincentive to work at the margin in Cyprus, Bulgaria and Croatia, countries which are also characterized by a relatively flat tax system. Countries where the contribution of SIC to METR is the largest are instead Hungary, Romania, Lithuania, Slovenia and Slovakia, in all cases above 17% (27% in Romania). At the other end of the spectrum, in Spain, Estonia, Ireland and Denmark, the SIC contribution to METR is the lowest, below 5 percentage points (in Estonia, for example, most of SICs are paid by employers). In a few countries, the contribution of benefits is also relevant to the mean METR, however to a minor extent if compared to SIC and especially to taxes.

Table 4. Mean Marginal effective tax rates by component, 2019

Country	Taxes	SIC	Benefits	Total METR
AT	20.7	16.4	3.5	40.6
BE	34.2	16.7	3.4	54.4
BG	7.9	13.1	1.1	22.2
CY	6.3	10.1	3.6	20.0
CZ	16.6	11.4	1.3	29.4
DE	26.8	15.8	2.7	45.2
DK	43.3	0.0	2.2	45.6
EE	19.3	3.2	2.4	24.9
EL	15.9	15.9	1.0	32.7
ES	19.3	4.1	2.8	26.2
FI	18.6	11.2	10.4	40.2
FR	10.0	15.4	0.6	26.0
HR	15.4	17.5	0.1	33.0
HU	27.2	4.8	4.8	37.0
IE	28.0	9.5	2.4	40.0
IT	18.7	21.0	0.7	40.4
LT	28.0	11.4	5.3	44.6
LU	19.0	10.7	0.8	30.4
LV	17.5	6.2	3.4	27.1
MT	21.8	11.8	5.1	39.1
NL	16.2	10.9	0.6	27.7
PL	21.5	11.1	1.3	33.8
PT	8.0	27.2	2.0	37.3
RO	26.2	6.1	3.1	35.4
SE	16.7	18.1	4.9	39.7
SI	13.4	17.1	2.0	32.5

Source: EUROMOD version I5.0+

Finally, we consider the Net Replacement Rate (NRR). Table 5 provides the NRR by country as well as its breakdown by component. Recall that the NRR represents the ratio between household income when one of its member loses her income (i.e. the replacement income), as opposed to the situation when she does not. The NRR breakdown highlights the importance of each tax-benefit component as well as of market income (of other members of the household) in the replacement income. Looking at the overall NRR, countries featuring the highest replacement rates are Denmark, Luxembourg, Finland, France and Portugal. Note that Denmark and Luxembourg are also the countries with the highest replacement on the account of social benefits. Across countries, market income together with social benefits appear to account for most of the replacement income. However, while social benefits depend on the very rules in force in the tax-benefit system, the market income component has more to do with the household structure as well as with the labour market participation of particular groups of the population such as women, the youngest and the oldest. With exception of countries with large marginal rates of income taxation, such Denmark, Sweden and Finland, the contribution of taxes to NRR is generally small. Similarly, and with limited exceptions (e.g. Netherlands and Romania), the contribution of SIC is also small.

Table 5. Net Replacement Rate by component, 2019

Country	Taxes	SIC	Market income	Benefits	Total NRR
AT	-6.6	-8.8	52.6	40.0	77.2
BE	-13.6	-7.7	57.7	39.0	75.4
BG	-4.5	-7.0	53.0	36.5	78.1
CY	-1.9	-4.9	50.7	26.9	70.7
CZ	-4.0	-6.6	51.8	24.7	65.8
DE	-8.9	-8.4	51.8	42.1	76.5
DK	-37.6	-1.1	57.8	58.5	77.6
EE	-6.3	-1.3	40.9	39.3	72.6
EL	-7.9	-8.4	47.0	40.1	70.8
ES	-5.2	-4.0	48.2	32.0	70.9
FI	-18.4	-4.5	47.2	53.8	78.1
FR	-12.4	-5.1	48.2	52.5	83.2
HR	-2.4	-10.2	55.9	27.7	71.0
HU	-6.8	-3.0	49.2	27.3	64.7
IE	-10.1	-2.2	53.6	29.4	70.8
IT	-10.0	-6.8	46.8	37.7	67.7
LT	-8.6	-13.5	56.4	38.5	72.9
LU	-12.0	-11.6	44.9	66.0	87.3
LV	-7.6	-5.1	48.5	33.4	69.2
MT	-4.6	-5.0	53.3	20.7	64.4
NL	-10.9	-29.3	60.2	55.3	75.3
PL	-9.3	-7.5	54.2	20.6	58.0
PT	-5.3	-5.6	52.7	41.9	83.7
RO	-4.9	-18.1	59.2	27.9	64.1
SE	-19.0	-5.6	46.1	52.1	73.7
SI	-6.5	-16.4	61.5	32.2	70.9
SK	-4.1	-12.6	60.7	28.6	72.5

Source: EUROMOD version I5.0+

5 The impact of the COVID-19 pandemic in the EU and the cushioning effect of policy

EUROMOD allows users to design and implement labour market transitions. The transitions are made operational through the Labour Market Adjustment (LMA) add-on and allow for the simulation of policies triggered by changes in the labour market status of individuals. The add-on runs from policy year 2020 onwards, on all 27 EU member states and with all input datasets. In its original form, it covered the transition from employment to unemployment (short-term or long-term), and the transition from unemployment to employment. Following the COVID crisis, the LMA add-on has been modified to also cover transitions to monetary compensation schemes. A detailed analysis of the effectiveness of those schemes during the first year of the COVID pandemic can be found in Christl et al. (2022).

Intuitively, the LMA add-on modifies the values of specific socio-demographic variables of observations eligible for transitions in order to reflect their new labour market status. These include variables such as earnings, months in work, labour market characteristics, etc. Detailed information can be found in the *"Summary note for the EUROMOD Labour Market Add-on"* and the note "*Simulating labour market transitions in EUROMOD"*, included in the EUROMOD model documentation.[8]

The modelling of those transitions is performed using a random allocation based on aggregate statistics included in all models in a uniform way. Two main sources of data are used: administrative data collected by national teams and EUROMOD developers and data provided by Eurostat.[9] Information about the source of data by type of transition is included in the EUROMOD Country Reports.[10] For example, to simulate transitions to monetary compensation schemes, we use the above-mentioned aggregate statistics to define the share of employees/self-employed (disaggregated by gender and sector of activity) who move to monetary compensation along with the duration of this transition. We then randomly select in our microdata individuals to experience this transition until the target statistics are met. For those selected individuals, the LMA Add-on will adjust their labour market status, job characteristics and income variables.

Figure 5 shows the share of employed people (both employees and self-employed) transiting to monetary compensation schemes in 2020 and 2021, based on the data included in EUROMOD. In 2020, the highest share of people entering monetary compensation schemes is observed in Cyprus, France, Italy, Croatia, Greece and Luxembourg (more than 30% of the total workforce). On the other hand, in Sweden and Finland we observe a lower share of people entering in those schemes (less than 10% of the workforce). The latter is also the case for Latvia, Bulgaria, Hungary and Ireland. As expected, in 2021 the share of people transiting to monetary compensation schemes is lower than in 2020 for all EU countries. Still, in counties such as Malta, Cyprus and Greece more than 20% of employed people undergo this labour market transition.

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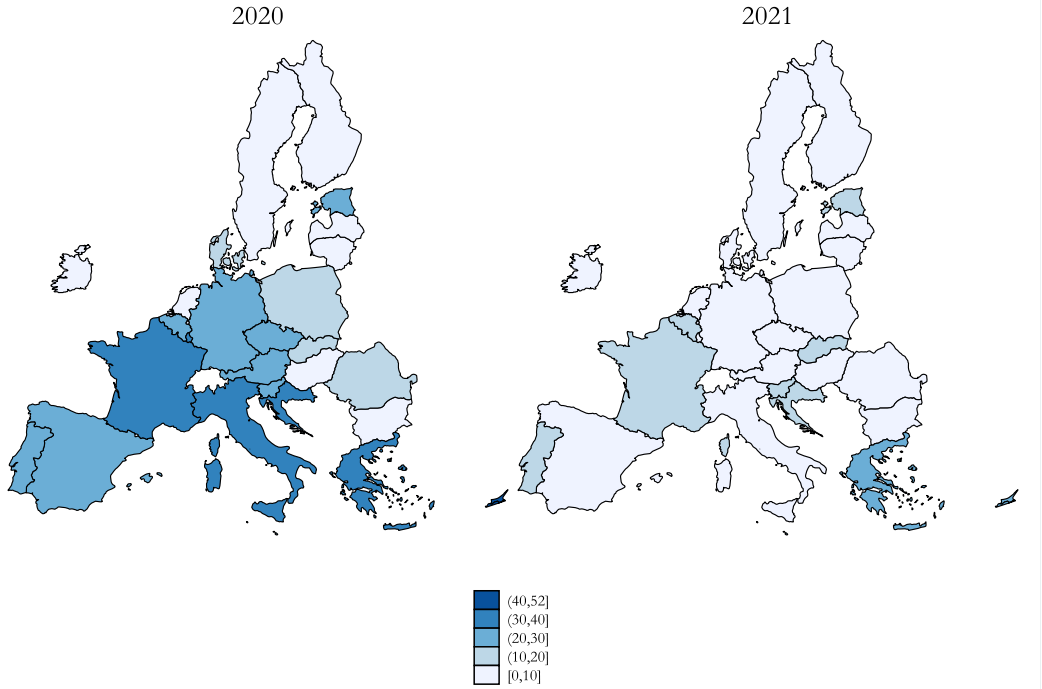
8 Available at https://euromod-web.jrc.ec.europa.eu/resources/model-documentation.

9 In Eurostat data, labour transitions are produced by Eurostat, using detailed distributional information on the loss of jobs and short-term work schemes from the Labour Force Survey and administrative data. The impact across different categories of individuals, the duration of unemployment/absence and percentage of hours worked are modelled using the EU-LFS longitudinal and quarterly transitions as target. For more information please consult the methodological note available here. For cases where national administrative data are used, please check the corresponding Country Reports.

10 At the time of preparing the public release of EUROMOD (version I5.0+), no statistics were available for Ireland for 2021.

Figure 5. Share of people transiting to monetary compensation schemes in 2020 and 2021, % of total workers



Source: EUROMOD version I5.0+

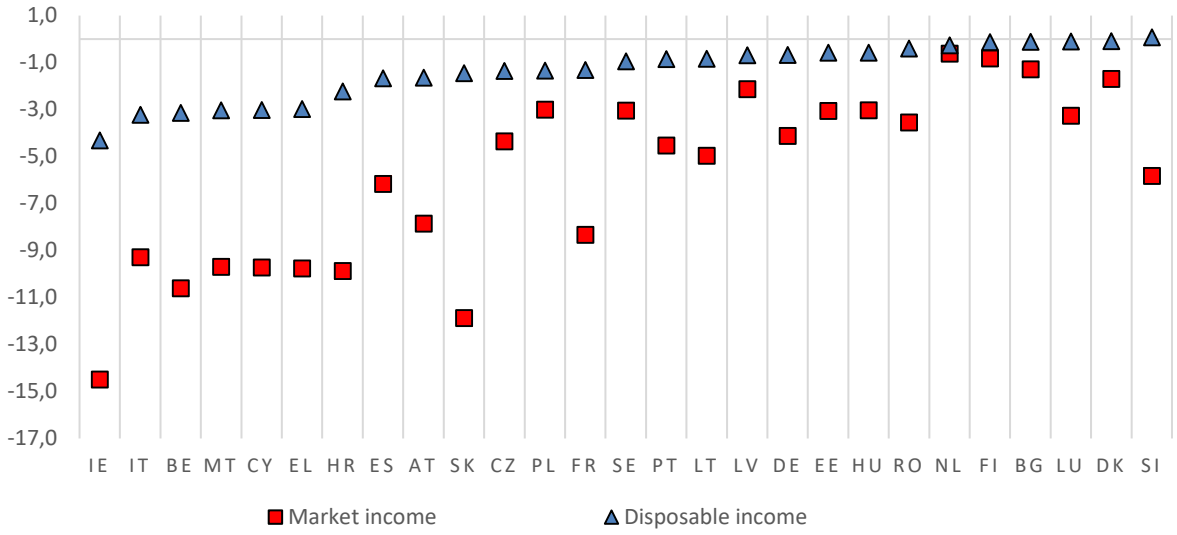
To examine how the impact of those transitions translate into changes in household income, we compare market and disposable incomes after the transitions (LMA add-on switched on) with respect to the baseline simulations (LMA Add-on switched off), for both 2020 and 2021. Figures 6 and 7 show percentage changes in market income and disposable income for the entire population, whereas Table 6 shows the percentage changes in disposable income for quintile groups, as well as for the entire population.

We observe that the majority of countries experience a drop in market income when labour market transitions are accounted for. This applies for both 2020 and 2021. The fall in market income widely varies among countries and is due to two types of transitions: from employment to monetary compensation schemes and from employment to unemployment. In 2021, we observe increases in market income in a small number of countries (namely Luxembourg, Poland and Finland); these are due to the prevalence of transitions from unemployment to employment in those Member States.

When focusing on disposable income, we observe that European tax-benefit systems are able to absorb a significant proportion of the market income loss caused by adverse labour market transitions. In 2020, a very strong cushioning effect can be observed in Slovakia, Ireland, Croatia, and Belgium. Looking at income quintiles, we observe that the decreases in disposable income usually follow a progressive pattern (i.e. they become more pronounced as we move from the poorest to the richest quintiles of the distribution). The result aligns with the existence of upper thresholds or lump-sum components in the amounts of monetary compensation schemes (i.e. components that are not connected to individuals' previous earnings), the progressivity of European tax systems and the stronger presence of means-tested benefits at the bottom of the income distribution. Finally, is worth noting that in a number of countries, disposable income is estimated to increase in some quintiles of the income distribution, and especially the poorest one. The main reason for this increase is the existence of monetary compensation schemes as the ones described above and of social benefits (such as unemployment and social assistance benefits) that are able to more than offset the effect of adverse labour market transitions.[11]

[11] Please note that in countries where the monetary compensation scheme has a minimum amount based on the minimum wage, we might overestimate the compensation for individuals who, according to SILC data, earn less than the minimum wage.

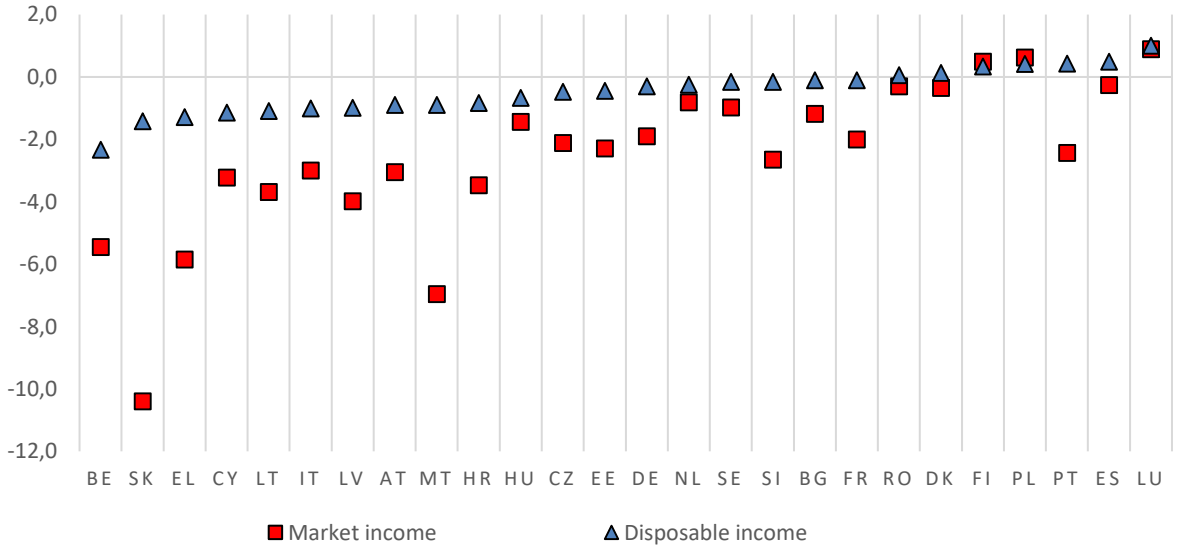
Figure 6. Percentage change (%) in market income and disposable income in 2020



Source: EUROMOD version I5.0+

Note: Order of countries according to decreasing disposable income loss.

Figure 7. Percentage change in market income and disposable income in 2021



Source: EUROMOD version I5.0+

Note: Order of countries according to decreasing disposable income loss.

Table 6. Change in mean equivalised disposable income with labour market changes by quintile, w.r.t. baseline (%)

		Mean equivalised disposable income					
Country	**Policy year**	**Quintile 1**	**Quintile 2**	**Quintile 3**	**Quintile 4**	**Quintile 5**	**All**
AT	2020	-0.40	-0.84	-1.43	-1.25	-2.69	-1.64
AT	2021	-0.08	-0.41	-1.27	-0.98	-1.11	-0.90
BE	2020	1.17	-1.08	-2.99	-3.70	-5.27	-3.13
BE	2021	0.54	-0.96	-2.32	-2.55	-3.83	-2.34
BG	2020	0.02	-0.06	-0.04	-0.07	-0.19	-0.11
BG	2021	0.02	-0.07	-0.06	-0.06	-0.18	-0.11
CY	2020	0.00	-1.68	-3.10	-2.88	-4.22	-3.01
CY	2021	0.82	-0.28	-1.21	-0.91	-2.01	-1.15
CZ	2020	0.16	-0.46	-0.96	-1.21	-2.58	-1.35
CZ	2021	0.36	-0.18	-0.13	-1.07	-0.69	-0.48
DE	2020	4.31	0.25	-0.70	-1.04	-1.91	-0.67
DE	2021	1.89	-0.24	-0.62	-0.65	-0.48	-0.31
DK	2020	0.29	0.04	-0.09	-0.03	-0.28	-0.08
DK	2021	0.59	0.47	0.00	0.06	-0.05	0.13
EE	2020	0.54	-0.50	-0.30	-0.49	-1.09	-0.58
EE	2021	0.63	-0.18	-0.47	-0.35	-0.88	-0.45
EL	2020	-0.09	-1.28	-1.79	-2.66	-4.81	-2.97
EL	2021	0.51	-0.56	-0.99	-1.71	-1.79	-1.29
ES	2020	-0.03	-1.09	-1.50	-1.52	-2.30	-1.66
ES	2021	7.88	0.70	0.61	-0.10	-0.66	0.48
FI	2020	1.83	0.53	-0.47	-0.32	-0.77	-0.13
FI	2021	2.72	0.78	0.06	0.00	-0.29	0.33
FR	2020	2.64	0.46	-0.53	-1.59	-3.17	-1.31
FR	2021	2.16	0.47	-0.30	-0.29	-0.69	-0.11
HR	2020	0.82	-0.71	-1.81	-2.19	-3.77	-2.22
HR	2021	0.54	-0.14	-0.71	-0.94	-1.44	-0.84
HU	2020	1.56	-0.62	-0.76	-0.91	-0.64	-0.58
HU	2021	-0.22	-1.08	-0.71	-1.00	-0.38	-0.67
IE	2020	-0.73	-0.88	-2.95	-4.43	-6.92	-4.31
IE	2021	n/a	n/a	n/a	n/a	n/a	n/a
IT	2020	-1.33	-2.53	-3.02	-3.07	-3.97	-3.22
IT	2021	-0.39	-0.91	-1.08	-1.08	-1.08	-1.01
LT	2020	0.01	-0.15	-0.66	-0.69	-1.41	-0.84
LT	2021	-0.03	-0.26	-1.31	-1.38	-1.34	-1.10
LU	2020	4.28	2.34	0.05	-0.68	-1.85	-0.09
LU	2021	4.35	3.67	0.74	0.13	-0.21	1.00
LV	2020	-0.51	-0.22	-0.45	-0.75	-0.92	-0.68
LV	2021	0.48	-0.19	-0.79	-1.08	-1.59	-0.99
MT	2020	-1.28	-2.09	-2.43	-2.68	-4.26	-3.02
MT	2021	0.36	-0.55	-0.11	-0.76	-1.77	-0.90
NL	2020	2.25	-0.36	-0.59	-0.46	-0.65	-0.26
NL	2021	1.40	-0.30	-0.62	-0.51	-0.38	-0.25
PL	2020	-0.10	-0.52	-0.96	-1.35	-2.19	-1.34
PL	2021	1.60	0.99	0.37	0.23	-0.02	0.41
PT	2020	2.41	-0.07	-0.43	-1.02	-1.86	-0.84
PT	2021	4.16	1.93	0.46	0.09	-0.70	0.42
RO	2020	3.46	-0.04	-0.43	-0.41	-1.15	-0.40
RO	2021	3.77	0.54	0.18	-0.17	-0.66	0.05
SE	2020	0.66	-0.66	-1.11	-1.27	-1.21	-0.94
SE	2021	2.33	-0.12	-0.51	-0.59	-0.42	-0.16
SI	2020	5.54	1.51	-0.61	-1.07	-1.26	0.08
SI	2021	3.45	0.76	-0.69	-1.08	-0.85	-0.16
SK	2020	0.05	-0.79	-1.35	-1.89	-2.02	-1.45
SK	2021	0.14	-0.67	-1.26	-2.14	-1.91	-1.42

Source: EUROMOD version I5.0+

6 Income distribution in perspective: levels and trends across the EU during the post-financial crisis decade (2010-2019)

In this section, we take a time-series perspective in looking at the distribution of income across Member States. Specifically, we use EUROMOD in combination with EU-SILC data over the post-financial crisis period, i.e. 2010 -2019[12], to study how the distribution of income compares among Member States and over time. For this purpose we study income levels at purchasing power parity (PPP) for three different moments of the income distribution, i.e:

- **(i)** the bottom, as captured by the 5th and 10th percentile;
- **(ii)** the centre, in the 50th percentile;
- **(iii)** the top, as captured by the 90th percentile.

In each case we compare the distribution of market income (including pensions) and the one of disposable income (i.e. income after direct taxes, SICs and social benefits). Results are presented in Figure 8 where, to enhance visualization, we highlight the results for the countries in the high (red line), in the medium (green line) and in the low (blue line) part of the range[13].

The most volatile market income (including pensions) are located at the lower end of the distribution (i.e. the 5th and the 10th percentiles). The largest swings are observed in the 5th percentile of Luxembourg, Czechia and Belgium. In the first case, market income of the 5th percentile has largely reduced over the time period under consideration, whereas in the other two cases it increased. Also, looking at the very bottom of the market income distribution (i.e. the 5th percentile) we find that households living in some of the highest income per capita Member States, such as in the Netherlands, Germany and France, undergo the lowest market income once accounting for the cost of living. On the other hand, the ranking of market income across countries tends to be better aligned with the ranking of per-capita income as we move to the higher income percentiles. Income levels in Romania, Latvia and Bulgaria are typically located at the low-end of the distribution. To get a sense of how they compare with their EU peers, note that the poorest 10% in Luxembourg and Denmark earns as much in market income as it does the medium class in Romania, Latvia and Bulgaria at purchasing power parity (namely, after removing differences in the cost of living).

Regarding disposable income, due to the effects of the tax-benefit system it tends to be higher than market income for the 5th and 10th percentile, about the same for the 50th percentile and lower for the top 10%. Also note that, across income percentiles, disposable income ranking between countries tends to be more in line with the ranking of per-capita income, because the higher generosity of the benefits system in richer member states (see section 3 for an overview of 2019). For example, for the 5th percentile, while Dutch, German and French households are at the bottom of the ranking by market income, these countries move toward the top in the ranking of disposable income. On the other hand, Romania, Latvia, Lithuania and Bulgaria remain at the bottom of the ranking across the distribution of disposable income. This indicates that even when accounting for the effects of the tax-benefit systems and differences in the cost of living, households in these countries face the lowest standards of living compared to their European peers. Furthermore, differences in disposable income across the EU are very significant. In this regard, just note that the top 10% of households by income in Romania, Latvia, Lithuania and Bulgaria have about the same disposable income than the bottom 10% in Luxembourg. This significant gap is even larger than for market income, indicating once more that the higher generosity of the tax-benefit system in richer countries is often reinforcing differences in living standards.

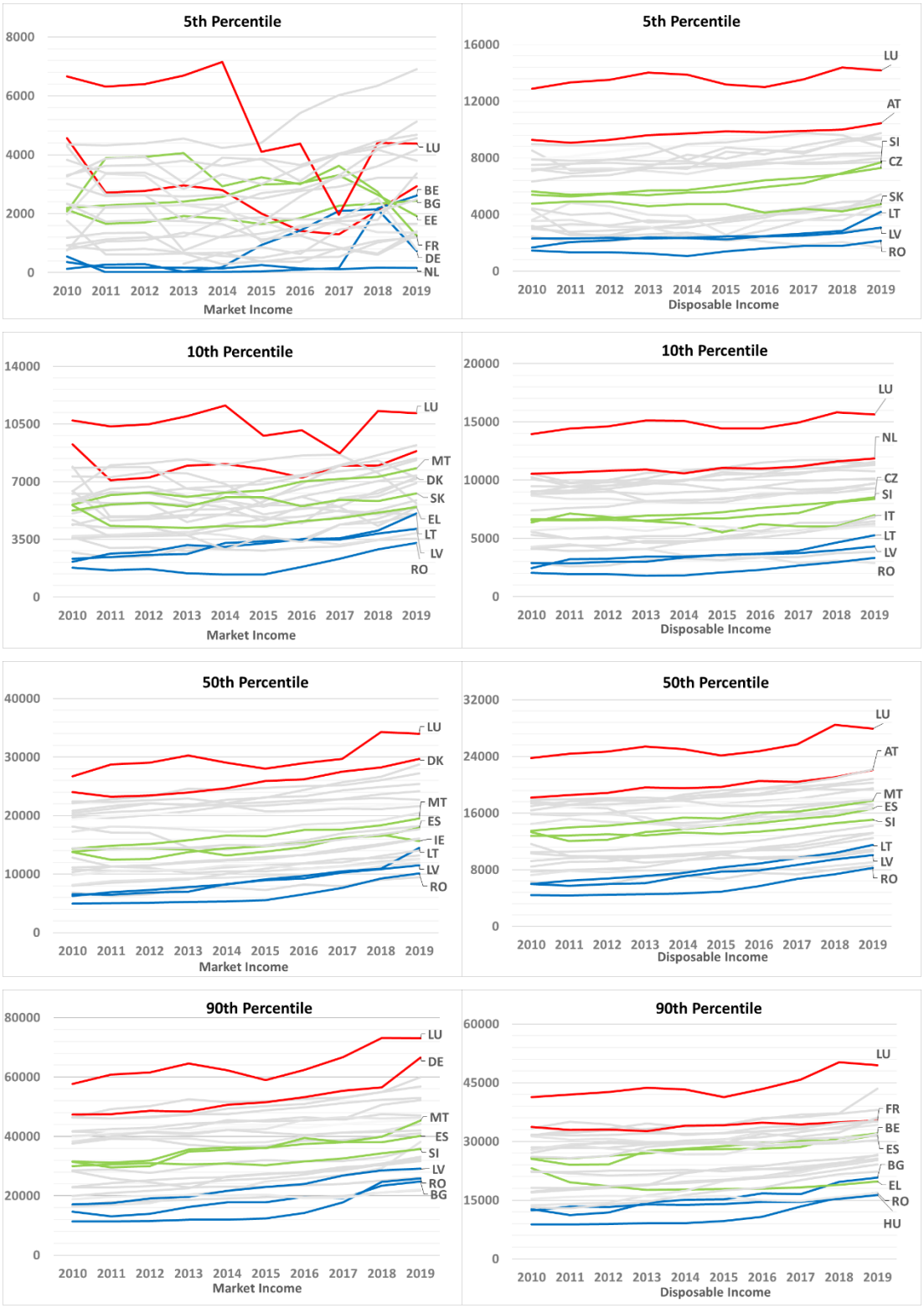
Finally, Figure 9 presents the EU average rates (calculated as simple averages) of income growth for market income and disposable income, over 2010 -2019 for the same selected percentiles. There we can observe that both market income and disposable income growth have occurred at very similar rates across income percentiles. The main exception is the growth of market income for the poorest 5%, which appears far more volatile. However, this volatility does not translate to the growth of disposable income pointing to the role of the tax-benefit system in absorbing these fluctuations. In terms of the evolution of these growth rates over

[12] Note that for this period most EUROMOD policy years match income reference year in the EUROMOD input data, hence not needing uprating factors in most cases.

[13] Comparison are made with respect to the beginning of the series (2010).

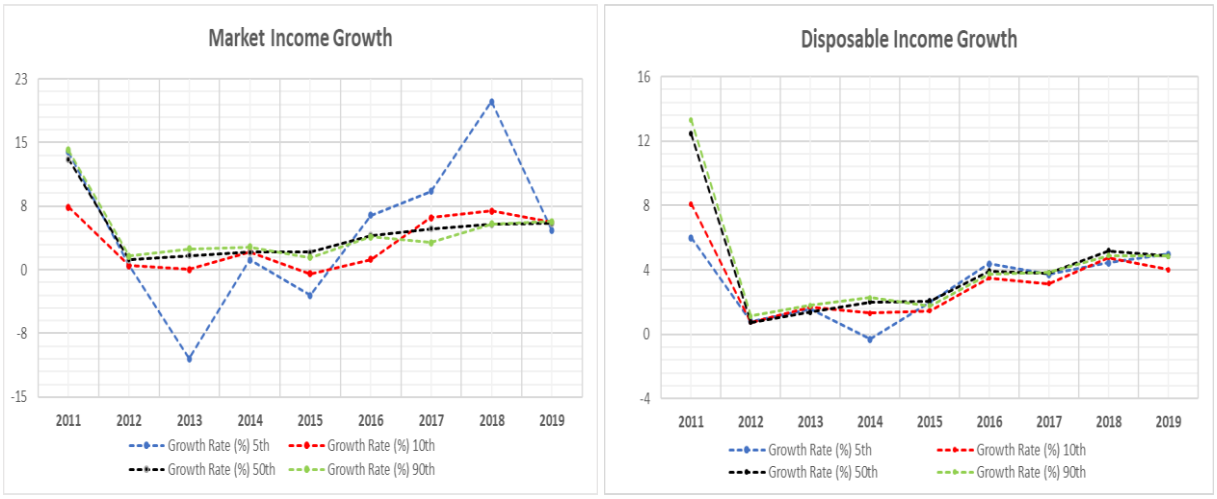
time, we observe a dramatic drop between 2011 and 2012, in correspondence of the European sovereign debt crisis. Between these years, market and disposable income growth drop from beyond 10% to close to zero. However, in the successive years up to 2019 we observe a slow but consistent recovery with disposable income growth reaching about 5% in 2019, and market income about 7%.

Figure 8. Market and disposable income in the EU (€ per year in PPP), 2010-2019. Selected income percentiles



Source: EU-SILC 2011-2020 and EUROMOD version I5.0+

Figure 9. Market and disposable income growth 2010-2019. EU average. Selected income percentiles.



Source: EU-SILC 2011-2020 and EUROMOD version I5.0+

7 Conclusions

This report provides a number of baseline results and headline indicators from the latest public version (I5.0+) of EUROMOD, the tax-benefit microsimulation model for the EU. Throughout this work, we discussed the main indicators of income inequality and at-risk-of-poverty across time and EU countries. We illustrated how the tax-benefit system in each country affects inequality and poverty, as well as how it achieves redistribution. In doing so, the results show that inequality and poverty vary significantly across Member States and so does the ability of the tax-benefit systems to counteract them. Crucially, countries featuring higher degrees of inequality and poverty are also characterized by lower living standard even when accounting for differences in the cost of living.

Moreover, the report sheds light on the features of the tax-benefit system that affects incentives to labour supply both at the extensive and the intensive margin, looking at measures of take-home pay and of income replacement. As the tax systems across EU countries display a great variety in terms of both income taxation and generosity of social assistance schemes, these indicators vary significantly across Member States. Furthermore, we discussed how EUROMOD, that is an otherwise static calculator, can provide a dynamic account of the evolution of households´ income through the analysis of labour market shocks using the Labour Market Adjustment add-on. Using this add-on, and additional information from Eurostat, we simulated the labour market shock caused by the COVID-19 pandemic and analysed its impact in terms of household income as well as the cushioning effect of the tax-benefit systems. Finally, in the last part of the report, we looked at the distribution of income across Member States over the post-financial crisis period and analyse how the distribution of income compares among Member States at purchasing power parity over time and across deciles. We discuss the volatility of the various sources of income.

Reporting and analysing the baseline indicators of EUROMOD is an important task for a number of reasons. Firstly, it is important to document the key model predictions in terms of poverty and inequality for model transparency. Secondly, they constitute the benchmark against which any reform or counterfactual scenario should be compared against. Accordingly, interpreting and understanding the baseline results is key to interpret the model predictions when exploring alternative policy scenarios. Thirdly, EUROMOD baseline results include a set of complementary indicators that help describing the properties and the effects of the tax-benefit system, which are not produced by ESTAT, also because they cannot be calculated with the sole information available in SILC.

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Annex 1. SILC datasets used to create EUROMOD input datasets used in this report

Country	Base dataset for EUROMOD
AT	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
BE	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
BG	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
CY	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
CZ	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
DE	EMSD = UDB (C20_release_22_03 rev.3)
DK	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
EE	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
EL	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
ES	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
FI	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
FR	EMSD = UDB (C20_release_22_03 rev.1) + National SILC
HR	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
HU	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
IE	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
IT	EMSD = UDB (C20_release_22-03_rev.1) + National SILC
LT	UDB (C20_release_21_09_rev.1) + National SILC
LU	UDB (C19_release_20_09)
LV	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
MT	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
NL	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
PL	UDB (C20_release_22_03) + National SILC
PT	UDB (C20_release_22_03)
RO	UDB (C20_release_21_09_rev1)
SE	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
SI	EMSD = UDB (C20_release_21_09 rev.1) + National SILC
SK	EMSD = UDB (C20_release_21_09 rev.1) + National SILC

Annex 2. National teams contributing to EUROMOD I5.0+

Table A2.1. National teams and team leaders by country

Country	National team – team leader
AT	European Centre for Social Welfare Policy and Research - Michael Fuchs
BE	University of Antwerp – Gerlinde Verbist K.U. Leuven – André Decoster
BG	University of National and World Economy (UNWE) – Ekaterina Tosheva
CY	Ministry of Labour, Welfare and Social Insurance - Costas Stavrakis
CZ	CERGE-EI – Daniel Münich
DE	ifo Institute – Leibniz Institute for Economic Research at the University of Munich – Mathias Dolls
DK	Roskilde University – Bent Greve
EE	PRAXIS Center for Policy Studies – Merilen Laurimäe and Kelly Toim
EL	Athens University of Economics and Business (AUEB) – George Economides
ES	Institute for Fiscal Studies – Noemí Villazán Pellejero
FI	Research Department of the Social Insurance Institution of Finland (KELA) – Tapio Räsänen
FR	Aix-Marseille University – Alain Trannoy
HR	Institute of Public Finance – Ivica Urban
HU	TÁRKI Social Research Institute – Péter Szivós
IE	Economic and Social Research Institute (ESRI) – Karina Doorley
IT	Milan University – Carlo Fiorio University of Eastern Piedmont – Francesco Figari
LT	Vilnius University – Jekaterina Navickė
LU	LISER – Nizamul Islam
LV	Baltic International Centre for Economic Policy Studies (BICEPS) – Anna Pluta
MT	Ministry for Finance and Employment – Stephanie Vella
NL	Stichting Centerdata – Klaas de Vos
PL	Center for Economic Analysis (CenEA) – Michał Myck
PT	Lisboa School of Economics & Management – Carlos Farinha Rodrigues Institute of Public Policy – Joana Vicente
RO	National Research Institute for Labour and Social Protection – Eva Militaru
SE	SOFI - Stockholm University – Rense Nieuwenhuis
SI	Institute for Economic Research (IER) – Nataša Kump
SK	Ministry of Finance of the Slovak Republic – Martin Mikloš

Annex 3. Country notes: tax evasion, benefit non-take-up and full year adjustment

Table A3.1. Summary of tax compliance, benefit non-take up and full year adjustments in EUROMOD I5.0+, 2019-2022 systems

Country	Benefit take-up adjustment (BTA) 2019-2022	Tax compliance adjustment (TCA) 2019-2022	Full year adjustment (FYA)			
			2019	2020	2021	2022
AT	-	-	-	-	-	-
BE	on	-	-	-	-	-
BG	-	on	-	off	off	off
CY	-	-	off	off	-	-
CZ	-	-	-	off	off	off
DE	-	-	-	-	-	-
DK	-	-	-	-	-	-
EE	on		-	off	off	off
EL	on	on	off	off	off	off
ES	on	-	-	off	-	-
FI	on	-	-	off	off	off
FR	on	-	-	-	-	on
HR	on	-	-	-	-	-
HU	-	-	-	off	off	off
IE	on	-	-	-	-	-
IT	-	on	-	on	on	-
LT	-	off	-	on	on	-
LU	-	-	-	-	-	-
LV	on	-	-	-	-	-
MT	-	-	-	-	-	-
NL	-	-	-	-	-	-
PL	-	-	-	-	-	-
PT	on	-	-	-	-	-
RO	on	on	-	-	-	-
SE	-	-	-	-	-	-
SI	on	-	-	-	-	-
SK	on	-	on	-	on	on

Source: EUROMOD version I5.0+

Note: "on" ("off") indicates that the adjustment is available and switched on (off) by default; "-" indicates that no adjustment is available.

Tax evasion

For **Bulgaria** tax evasion adjustments have been made because of oversimulation of taxes and social insurance contributions. The adjustment is based on a comparison between net and gross employment incomes. Under this approach, it is assumed that an individual is involved in the shadow economy if her (positive) net and gross employment incomes are equal. Such an individual is assumed to be a full tax evader and hence, no income tax and social insurance contributions are simulated for her. Furthermore, for the simulation of the income test for child and social assistance benefits, the earnings of a tax evader are not taken into account because it is assumed that they will not be reported and thus, will not be part of the income test. No correction for individuals with self-employment income has been done. These adjustments lead to more accurate simulations of the tax and benefit instruments.

For **Greece** tax evasion adjustments have been made on the basis of external estimates for the extent of average income underreporting by income source (earnings, self-employment income from farming and non-farm business). Assuming that net incomes reported in SILC reflect true incomes, two sets of gross incomes have been derived – one under the assumption of full compliance and the other assuming that everyone have underreported a given income source to the tax authority by the same proportion. A user can choose which

assumption is utilised for calculating disposable incomes, and the model automatically draws on the relevant set of gross incomes. Adjustments for tax evasion are used by default for the baseline scenarios.

For **Italy** self-employment income has been calibrated in order to take into account tax evasion behaviour. Since we implement our own net-to-gross procedure (starting from net incomes reported in SILC data), we split the recorded self-employment income into two components: the first component declared to the tax authorities (and hence grossed up) and the second component not declared (but still included in the definition of disposable income). The coefficient used to separate the two components allows us to get a total aggregate gross self-employment income corresponding to the aggregate amount of reported self-employment income as reported in the official statistics.

For **Romania** all self-employed in agriculture living in rural areas and with a self-employment income below the average wage are assumed to evade taxes.

Full compliance is assumed for both income taxes and social insurance contributions for the rest of the countries.

Benefit non-take-up

For **Belgium** we employ a simple non-take-up correction of the main means-tested benefits by applying the take-up proportions estimated on a caseload basis. In particular, we adjust for the non take up of benefits with a simple random non take-up correction by applying the take-up proportion estimated as the ratio between the caseload recipients reported by the Official Statistics and those simulated to be entitled by EUROMOD. Take-up probabilities are applied at the household level (so that people entitled to the same benefits within a household exhibit the same take-up behaviour), for each benefit separately.

For **Croatia**, non-take-up is simulated for subsistence benefit on the assumption that small entitlements (i.e. smaller than 3% of the average net wage) are not claimed. Full take-up is assumed for all other simulated means-tested benefits.

For **Estonia** non-take-up is simulated for social assistance on the assumption that small entitlements (either in absolute or relative to other household income) are not claimed. Full take-up is assumed for all other simulated means-tested benefits.

In **Finland** eligibility for income support is assessed at the family level (rather than at the household level). For example, adult children can apply separately from their parents. In practice, however, this happens rarely. Therefore, in the model we account for non-take-up by simulating income test at the household level. Also, the households where the head is self-employed are excluded from eligibility (as they rarely apply for income support).

For **France** non-take-up correction of the main means-tested social assistance benefit (RMI/RSA)[13] is simulated to be random- proportions of non-take-up -separately by active and inactive units (for RSA) taken from external data.

For **Greece** a random non-take-up correction is simulated for unemployment assistance benefit for long-term unemployed and child benefit. Full take-up is assumed for all other simulated means-tested benefits.

For **Ireland**, non-take-up is simulated for the Working Family Payment (formerly known as Family Income Supplement), applying external estimates on the caseload. Full take-up is assumed for all other means-tested simulated benefits.

For **Latvia** non take up is simulated for paternity benefit based on the benefit receipt observed in the data.

For **Poland,** the eligibility of housing benefit, due to significant differences between the number of recipients simulated by the model (assuming full take up) and reported in official statistics, is conditional on receipt being reported in the input database. Furthermore, due to lack of information on assets that are necessary for the means-test, the eligibility for temporary social assistance is simulated conditional on an estimated expected probability to be eligible. Moreover, by law the central government is obliged to pay just a share of the total benefit amount. The rest (or part of it) may be paid by the local government. In EUROMOD, we assume that only the central government pays its part.

For **Portugal** full take up is assumed in the simulation of all means-tested benefits. However, given the inability of simulating all eligibility conditions for the social solidarity supplement for the elderly, the simulation of this benefit overestimates the number of recipients and aggregate amounts. Thus, the beneficiaries were calibrated to guarantee consistency with the official statistics.

For **Romania** non-take-up is simulated for the minimum guaranteed income, which under full take-up is overestimated by a factor of 4. The calibration is based on the assumption that households headed by a person under 26 do not claim for they are students.

For **Slovenia** a non-take-up correction is simulated in the years 2017-2021 for social assistance only if older input data (based on SILC 2018 or SILC 2019) are used. Baseline simulations of the years 2019-2022 do not correct for non-take-up because input data based on SILC 2020 do not require such a correction.

For **Slovakia** a non-take-up correction is simulated for the material need benefits. The take-up rate is calculated as the ratio between the actual expenditure based on administrative data and the expenditure simulated by EUROMOD without correcting for non-take-up.

In **Spain** a non-take-up adjustment is simulated for the national and regional minimum income schemes. These benefits are overestimated in EUROMOD due to (i) the non-simulation of some eligibility conditions, because of lack of relevant information in EU-SILC, (ii) the non-take-up by potential beneficiaries, and (iii) the existence of different regional budget constraints and bureaucratic procedures across regions. The calibration aligns both the simulated number of beneficiaries and total expenditure by region with the figures obtained from official statistics.

Full take-up is assumed for all simulated means-tested benefits for the remaining EU countries.

Full year adjustments

For **Cyprus** for employees' and employers' contribution to the General Health System in 2019 and 2020.

For **Czechia** in **2020** and **2022** for the change in the Minimum Living Standard index, and in **2021** for the change in the amount of the Child Allowance.

For **Estonia** in **2007** for child allowance and allowance for families with 3+ children. In **2009** for unemployment insurance benefit, employer social insurance contribution, credited social insurance contribution, employee social insurance contribution and self-employed social insurance contribution. In **2013** for child allowance and needs based family benefit. In **2017** for parental allowance for families with 7+ children / many children. In **2020** for unemployment insurance benefits. In **2021** and **2022**, for pension contribution payments (2nd pillar).

For **Finland** since 2020, several benefits amounts are increased in August. The full year adjusments calculate the monthly average taking into account the increase of the benefits amounts in August.

For **France** in **2022** several benefit amounts and pensions increased in July, as well as the SMIC in August, as response to rising consumer price inflation.

For **Greece** in **2019** and **2022** for employees' and employers' social insurance contribution for supplementary pensions. In **2020** for employees' and employers' social insurance contribution for unemployment.

For **Italy** in **2020** for a reform of the bonus "IRPEF". In **2021** for the introduction of the Children Universal Allowance. In the baseline, both in 2020 and 2021, the full year adjustment extension is set to on.

For **Lithuania** in **2017** for unemployment insurance benefit, in 2020 to take into account the increase in the social assistance benefit, and in 2021 for the single person benefit. For **Netherlands** in **2015** for Social Assistance Benefit (net).

For **Portugal** in **2012** the equivalence scale used for Social insertion income changed in August.

For **Slovakia** in **2019, 2021 and 2022** for several changes introduced within these years with regards the Child Benefit and the Tax Credit on Dependent Children.

For **Spain** in **2015** for Personal Income Tax. In **2018** for self-employed SIC. In **2020** for the simulation of the new nation-wide minimum income scheme.

No full-year adjustments are applied for the remaining EU countries.

Annex 4. Additional tables

Table A4.1 EUROMOD poverty and inequality statistics: 2019-2022

		Poverty risk			Poverty risk (60%)			
Country	**Policy year**	**50%**	**60%**	**70%**	**age<18**	**age>=65**	**Poverty threshold EUR/year**	**Gini coefficient**
AT	2019	6.8	13.7	20.7	16.5	13.7	15884	0.248
AT	2020	6.3	13.3	20.4	15.8	13.8	16571	0.243
AT	2021	6.2	13.4	20.3	16.3	13.1	16766	0.244
AT	2022	6.7	13.0	19.4	16.2	13.2	18324	0.238
BE	2019	5.7	12.4	21.6	13.7	15.8	14689	0.228
BE	2020	5.3	11.8	21.2	12.6	15.6	14828	0.225
BE	2021	5.5	12.0	21.5	13.4	15.6	15247	0.228
BE	2022	5.6	12.8	22.3	12.7	20.8	16275	0.230
BG	2019	16.8	24.1	31.2	27.9	39.6	2799	0.398
BG	2020	16.6	24.4	31.4	28.0	40.9	3042	0.400
BG	2021	16.8	24.5	31.2	27.6	41.5	3400	0.400
BG	2022	17.0	24.4	31.4	26.9	42.3	3692	0.399
CY	2019	5.6	14.8	24.1	18.1	21.4	10120	0.292
CY	2020	5.5	15.8	24.1	18.4	27.1	10183	0.292
CY	2021	5.7	15.6	23.9	18.0	27.0	10308	0.293
CY	2022	5.7	15.6	23.8	17.6	27.9	10404	0.293
CZ	2019	4.5	9.1	18.0	11.0	13.6	6319	0.235
CZ	2020	3.9	8.2	16.4	10.1	10.7	6411	0.228
CZ	2021	4.7	9.9	18.8	11.8	14.4	7281	0.239
CZ	2022	3.9	8.0	16.2	10.3	9.4	8202	0.227
DE	2019	11.8	18.5	25.9	19.9	20.3	15199	0.308
DE	2020	11.1	17.9	25.5	18.1	19.4	15399	0.303
DE	2021	11.5	18.2	26.0	18.0	20.9	15906	0.308
DE	2022	12.2	18.9	26.5	19.2	22.5	17214	0.310
DK	2019	6.0	12.2	20.9	9.6	12.4	19344	0.253
DK	2020	6.1	12.5	21.2	9.5	14.0	19604	0.255
DK	2021	6.2	12.5	21.3	8.7	16.0	19534	0.260
DK	2022	6.3	12.7	21.2	8.8	16.3	19912	0.261
EE	2019	11.0	19.6	27.6	13.5	40.6	7268	0.303
EE	2020	10.0	18.8	27.0	13.6	37.6	7486	0.300
EE	2021	11.2	19.3	27.9	13.5	40.0	7883	0.305
EE	2022	10.8	19.1	27.7	13.6	39.0	8316	0.306
EL	2019	10.2	16.7	23.9	19.7	12.9	5512	0.301
EL	2020	11.3	17.8	25.5	19.6	16.1	5601	0.309
EL	2021	10.8	17.4	25.1	19.4	15.0	5623	0.312
EL	2022	10.4	16.9	24.2	18.7	14.4	5695	0.307
ES	2019	14.2	20.9	27.4	27.0	19.1	9571	0.314
ES	2020	14.3	20.5	27.7	27.3	15.9	9483	0.312
ES	2021	14.1	20.5	27.3	26.2	19.2	9767	0.307
ES	2022	12.0	19.1	26.6	24.8	15.8	9900	0.302
FI	2019	3.3	10.7	20.9	10.8	10.2	14913	0.252
FI	2020	3.3	10.5	20.8	10.3	10.0	15142	0.247
FI	2021	3.5	10.8	21.1	10.6	10.6	15363	0.249
FI	2022	3.7	11.3	21.4	11.4	11.1	15824	0.251
FR	2019	6.0	11.4	20.4	15.9	7.5	13025	0.283
FR	2020	5.3	10.3	18.8	14.3	6.1	12854	0.277
FR	2021	5.9	11.1	20.1	15.7	7.3	13304	0.283
FR	2022	5.7	10.9	19.9	15.5	6.7	13747	0.281
HR	2019	12.8	19.3	25.9	16.7	33.6	4988	0.276
HR	2020	13.0	19.5	26.2	16.6	34.8	5099	0.280
HR	2021	13.0	19.5	26.5	16.6	34.9	5356	0.285

		Poverty risk			Poverty risk (60%)			
Country	**Policy year**	**50%**	**60%**	**70%**	**age<18**	**age>=65**	**Poverty threshold EUR/year**	**Gini coefficient**
HR	2022	12.9	19.2	26.2	16.2	34.7	5646	0.283
HU	2019	14.8	21.0	27.7	25.1	25.4	3621	0.312
HU	2020	14.9	21.1	27.6	25.8	27.3	3556	0.312
HU	2021	15.3	21.6	27.2	25.7	30.8	3788	0.313
HU	2022	14.9	21.6	27.3	24.3	31.2	3672	0.316
IE	2019	7.4	17.2	27.1	19.5	27.5	15227	0.283
IE	2020	9.1	17.3	26.8	20.0	20.1	15489	0.290
IE	2021	12.2	19.9	28.3	23.5	22.1	16755	0.299
IE	2022	12.7	20.5	28.8	24.1	23.4	17632	0.302
IT	2019	14.4	20.8	27.3	25.8	16.8	10604	0.319
IT	2020	13.8	20.7	27.4	25.7	17.1	10796	0.312
IT	2021	13.0	20.1	27.2	23.7	17.4	10870	0.306
IT	2022	13.2	20.0	26.9	23.7	17.1	11388	0.309
LT	2019	11.9	19.4	27.1	18.3	32.0	4917	0.337
LT	2020	9.6	16.9	24.8	13.3	30.6	5511	0.322
LT	2021	10.7	18.7	25.4	16.6	31.7	5906	0.330
LT	2022	10.5	18.2	25.5	16.4	30.1	6658	0.329
LU	2019	3.6	13.1	21.5	17.0	6.9	24277	0.258
LU	2020	3.6	12.9	21.5	16.1	7.2	24730	0.258
LU	2021	3.2	12.4	21.3	15.5	7.2	25126	0.257
LU	2022	2.7	11.7	21.3	14.5	5.8	25825	0.256
LV	2019	14.2	20.6	27.5	15.1	37.8	4995	0.337
LV	2020	14.1	20.2	27.3	15.2	36.6	5310	0.334
LV	2021	13.7	20.2	27.4	13.6	38.3	6073	0.327
LV	2022	13.2	19.8	27.2	13.3	37.4	6561	0.322
MT	2019	7.9	15.4	23.4	15.2	29.0	9892	0.300
MT	2020	7.3	14.3	23.4	14.5	25.1	9753	0.293
MT	2021	7.2	14.2	23.3	14.5	24.8	10017	0.294
MT	2022	7.0	14.4	23.1	14.8	25.6	10648	0.294
NL	2019	5.4	12.1	20.3	14.0	7.4	15530	0.266
NL	2020	5.4	11.9	20.1	13.2	7.8	16119	0.266
NL	2021	5.4	12.0	20.2	13.1	8.3	16620	0.264
NL	2022	5.3	11.5	19.6	12.7	7.5	16732	0.262
PL	2019	8.1	14.3	21.6	11.9	18.0	4737	0.265
PL	2020	8.0	14.3	21.9	11.1	20.2	4918	0.261
PL	2021	8.2	14.6	22.2	11.9	20.8	5199	0.263
PL	2022	7.8	13.8	21.6	11.5	18.2	5475	0.256
PT	2019	9.6	16.4	24.0	17.2	19.7	6681	0.308
PT	2020	9.7	16.4	24.1	17.0	20.2	6774	0.308
PT	2021	9.7	16.4	23.9	16.8	20.6	6827	0.308
PT	2022	9.7	16.8	24.1	16.6	22.6	7096	0.309
RO	2019	15.7	22.7	29.9	28.0	24.5	2602	0.328
RO	2020	15.5	22.9	29.4	29.5	22.9	2772	0.327
RO	2021	15.3	23.1	29.4	29.7	22.4	3056	0.325
RO	2022	13.4	20.8	27.9	29.2	13.4	3386	0.313
SE	2019	8.0	14.7	23.8	18.1	11.8	14886	0.254
SE	2020	8.2	14.6	23.9	18.5	10.4	15675	0.256
SE	2021	8.6	14.7	24.2	18.5	10.7	16573	0.256
SE	2022	8.7	14.8	24.1	18.7	10.2	16053	0.255
SI	2019	4.8	11.5	20.2	9.3	15.7	8338	0.236
SI	2020	5.2	12.0	20.6	10.1	15.9	8726	0.235
SI	2021	6.1	12.7	20.8	11.2	16.9	9155	0.238
SI	2022	5.5	12.0	20.2	10.8	14.3	9456	0.234
SK	2019	7.2	11.7	18.4	17.4	8.9	5198	0.211
SK	2020	7.1	11.4	18.0	16.6	8.5	5468	0.209

		Poverty risk			Poverty risk (60%)			
Country	**Policy year**	**50%**	**60%**	**70%**	**age<18**	**age>=65**	**Poverty threshold EUR/year**	**Gini coefficient**
SK	2021	7.1	11.9	18.4	17.0	9.4	5771	0.211
SK	2022	7.2	11.9	18.8	16.6	11.0	6149	0.213

Source: EUROMOD version I5.0+

Table A4.2 Effects of tax-benefit components on poverty risk (60%): 2019-2022

Country	Policy year	Disposable Income (DPI)	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
AT	2019	13.71	16.90	20.16	13.56	18.06	35.53	17.47
AT	2020	13.34	16.31	20.23	13.66	11.13	36.07	17.85
AT	2021	13.45	16.63	19.80	13.78	11.01	35.75	17.70
AT	2022	12.96	16.18	20.37	13.61	10.95	36.35	18.33
BE	2019	12.41	16.58	15.73	12.17	11.04	36.12	15.78
BE	2020	11.77	16.40	15.32	11.93	10.31	36.23	15.65
BE	2021	12.03	16.36	15.44	11.95	10.55	36.04	15.42
BE	2022	12.78	17.09	16.11	12.38	11.33	35.85	16.17
BG	2019	24.10	25.94	26.36	22.19	21.44	35.31	23.38
BG	2020	24.41	26.16	26.77	22.66	21.72	35.10	23.69
BG	2021	24.46	25.58	26.59	23.15	21.34	35.26	23.91
BG	2022	24.40	25.75	26.77	23.20	21.54	35.38	24.17
CY	2019	14.77	20.54	17.07	14.45	11.46	31.55	18.81
CY	2020	15.76	20.58	17.97	15.00	12.06	31.04	18.40
CY	2021	15.63	20.17	17.92	15.21	12.21	31.01	17.96
CY	2022	15.61	20.06	17.90	15.09	12.25	30.94	17.83
CZ	2019	9.12	10.52	12.05	8.71	7.29	29.19	9.93
CZ	2020	8.16	9.46	11.60	7.67	6.78	29.65	9.62
CZ	2021	9.91	11.23	12.95	9.62	7.72	30.31	10.87
CZ	2022	8.03	10.40	10.96	7.76	6.29	30.88	9.85
DE	2019	18.55	20.17	22.79	17.02	14.96	34.55	17.42
DE	2020	17.91	19.95	22.60	16.38	14.41	35.08	17.59
DE	2021	18.24	20.30	22.89	16.80	14.80	34.99	17.76
DE	2022	18.92	20.52	23.56	17.41	15.64	34.94	17.92
DK	2019	12.21	20.16	19.61	3.91	12.12	26.33	12.03
DK	2020	12.49	20.07	19.98	3.92	12.33	26.25	11.96
DK	2021	12.52	19.45	20.36	3.55	12.10	25.68	11.72
DK	2022	12.66	19.89	20.36	3.60	12.15	25.36	11.69
EE	2019	19.64	20.13	29.85	18.59	18.92	36.18	26.21
EE	2020	18.84	19.33	29.41	17.55	18.16	36.22	25.37
EE	2021	19.30	19.78	29.79	18.24	18.81	35.72	25.53
EE	2022	19.11	19.51	29.43	17.55	18.57	35.28	24.78
EL	2019	16.73	21.30	18.03	14.36	13.21	39.43	15.22
EL	2020	17.81	21.73	19.30	15.85	14.39	39.78	16.76
EL	2021	17.36	21.63	18.95	15.73	14.13	39.50	16.39
EL	2022	16.90	21.98	18.39	15.18	13.75	40.10	17.02
ES	2019	20.91	23.81	23.98	20.30	18.32	39.95	23.67
ES	2020	20.46	23.96	23.67	19.85	17.86	40.25	23.66
ES	2021	20.53	23.71	23.83	19.85	18.11	39.63	23.36
ES	2022	19.09	23.72	22.47	18.27	16.53	39.51	23.34
FI	2019	10.74	18.49	16.93	6.88	8.90	36.47	16.41
FI	2020	10.53	18.34	16.90	6.70	8.90	36.42	16.39
FI	2021	10.83	18.34	17.05	7.10	9.22	36.19	16.27
FI	2022	11.32	18.66	17.36	7.53	9.68	36.30	16.49

Country	Policy year	Disposable Income (DPI)	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
FR	2019	11.36	21.36	18.11	8.89	9.65	40.42	19.54
FR	2020	10.26	21.53	17.24	8.13	8.85	40.98	19.86
FR	2021	11.13	21.49	17.91	8.79	9.56	40.50	19.63
FR	2022	10.87	21.30	17.43	8.59	9.23	40.32	19.56
HR	2019	19.28	20.50	21.04	19.16	16.15	33.84	19.09
HR	2020	19.50	20.96	21.38	19.42	16.49	33.87	19.34
HR	2021	19.51	21.01	21.41	19.44	16.51	33.77	19.38
HR	2022	19.17	20.65	21.12	19.13	16.29	33.55	19.25
HU	2019	20.97	21.37	24.04	16.01	16.29	30.63	15.58
HU	2020	21.13	21.54	23.74	16.46	16.77	30.80	16.07
HU	2021	21.56	21.99	24.05	17.24	17.32	30.39	17.01
HU	2022	21.64	22.07	23.94	18.54	17.84	32.39	18.24
IE	2019	17.19	26.79	23.49	16.71	17.06	37.49	28.83
IE	2020	17.26	26.38	24.25	16.81	17.00	36.83	28.18
IE	2021	19.86	27.22	26.01	18.97	19.22	37.84	28.83
IE	2022	20.49	27.31	26.40	19.21	19.57	37.34	28.59
IT	2019	20.85	23.29	23.59	18.71	18.30	40.03	20.92
IT	2020	20.67	23.28	23.98	18.54	18.28	40.33	21.17
IT	2021	20.14	23.62	23.14	18.25	17.75	40.28	21.18
IT	2022	19.96	24.80	22.80	17.88	18.04	40.52	21.64
LT	2019	19.36	20.71	25.67	16.90	15.23	30.53	18.62
LT	2020	16.89	19.32	24.97	15.19	13.37	31.15	18.74
LT	2021	18.67	20.44	25.49	16.42	14.81	30.82	18.77
LT	2022	18.19	20.11	25.39	16.18	14.47	30.87	18.65
LU	2019	13.12	15.92	20.05	12.39	7.93	35.26	16.32
LU	2020	12.90	15.90	20.05	12.40	8.01	35.25	16.06
LU	2021	12.38	15.71	19.53	11.75	7.30	34.91	16.01
LU	2022	11.72	15.82	19.42	10.96	6.66	34.99	15.90
LV	2019	20.62	20.62	25.72	18.32	18.46	31.60	20.64
LV	2020	20.18	20.18	25.11	18.44	18.22	31.77	20.62
LV	2021	20.25	20.38	26.65	18.78	18.25	32.39	22.22
LV	2022	19.83	20.03	26.04	18.43	17.77	32.36	21.42
MT	2019	15.43	19.17	17.98	14.69	13.03	30.41	18.14
MT	2020	14.31	18.86	17.20	13.82	12.23	30.78	17.86
MT	2021	14.24	18.89	16.90	13.60	12.12	30.59	17.89
MT	2022	14.36	18.90	17.81	13.57	12.01	30.54	18.21
NL	2019	12.11	18.71	17.58	10.16	8.37	24.15	14.74
NL	2020	11.88	18.85	17.09	10.13	8.46	24.52	14.96
NL	2021	12.01	19.13	17.25	10.34	8.65	24.85	15.20
NL	2022	11.49	19.02	16.91	9.92	8.58	24.95	15.16
PL	2019	14.31	18.48	17.91	9.24	10.74	32.36	13.09
PL	2020	14.34	16.39	22.54	9.47	11.20	33.48	15.05
PL	2021	14.63	16.54	23.81	9.56	11.55	33.14	15.90
PL	2022	13.79	15.73	22.77	11.45	10.95	34.72	17.60
PT	2019	16.40	18.73	18.52	15.54	14.16	36.51	16.77
PT	2020	16.40	18.74	18.52	15.69	14.26	36.52	16.97
PT	2021	16.38	18.65	18.54	15.62	14.23	36.29	16.88
PT	2022	16.76	18.98	18.77	15.81	14.40	36.10	17.12
RO	2019	22.73	24.29	26.77	20.96	18.30	35.30	20.14
RO	2020	22.88	24.19	26.50	20.99	17.97	35.58	19.72
RO	2021	23.05	23.54	26.89	21.09	17.78	35.72	19.70
RO	2022	20.82	24.37	24.56	19.31	16.17	36.63	20.71
SE	2019	14.67	17.69	23.86	10.03	12.89	33.85	17.48
SE	2020	14.64	17.89	23.64	10.22	12.93	33.93	17.56
SE	2021	14.72	17.93	23.71	10.31	13.12	33.85	17.52
SE	2022	14.81	17.81	23.69	10.43	13.16	33.91	17.44

Country	Policy year	Disposable Income (DPI)	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
SI	2019	11.46	15.38	18.44	10.55	7.38	30.03	12.99
SI	2020	11.98	15.69	18.99	10.99	7.58	29.99	12.93
SI	2021	12.72	15.60	19.60	11.48	8.30	29.68	12.76
SI	2022	11.98	15.54	19.08	11.07	7.70	30.46	13.07
SK	2019	11.66	12.47	16.49	11.11	7.42	27.90	10.57
SK	2020	11.41	12.18	16.56	10.79	7.25	28.28	10.82
SK	2021	11.88	12.34	16.75	11.24	7.41	27.99	10.99
SK	2022	11.90	12.46	16.85	10.98	7.74	27.73	11.32

Source: EUROMOD version I5.0+

Table A4.3. Effects of tax-benefit components on Gini coefficient: 2019-2022

	Policy year	Disposable Income (DPI) 50%	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
AT	2019	0.25	0.28	0.28	0.31	0.26	0.49	0.36
AT	2020	0.24	0.27	0.27	0.30	0.26	0.49	0.36
AT	2021	0.24	0.27	0.27	0.31	0.26	0.49	0.36
AT	2022	0.24	0.27	0.27	0.30	0.26	0.49	0.36
BE	2019	0.23	0.25	0.25	0.31	0.25	0.49	0.35
BE	2020	0.23	0.25	0.24	0.30	0.25	0.49	0.35
BE	2021	0.23	0.25	0.25	0.31	0.25	0.49	0.35
BE	2022	0.23	0.25	0.25	0.31	0.26	0.49	0.35
BG	2019	0.40	0.41	0.41	0.41	0.40	0.53	0.43
BG	2020	0.40	0.41	0.41	0.41	0.40	0.53	0.43
BG	2021	0.40	0.41	0.41	0.41	0.40	0.53	0.43
BG	2022	0.40	0.41	0.41	0.41	0.40	0.53	0.43
CY	2019	0.29	0.32	0.30	0.32	0.29	0.44	0.35
CY	2020	0.29	0.32	0.30	0.32	0.29	0.44	0.35
CY	2021	0.29	0.32	0.30	0.32	0.29	0.44	0.35
CY	2022	0.29	0.32	0.30	0.32	0.30	0.44	0.35
CZ	2019	0.23	0.24	0.25	0.27	0.25	0.43	0.30
CZ	2020	0.23	0.24	0.24	0.26	0.25	0.43	0.29
CZ	2021	0.24	0.25	0.25	0.26	0.25	0.43	0.29
CZ	2022	0.23	0.24	0.24	0.25	0.24	0.44	0.28
DE	2019	0.31	0.33	0.33	0.37	0.32	0.52	0.40
DE	2020	0.30	0.33	0.32	0.37	0.31	0.52	0.40
DE	2021	0.31	0.33	0.33	0.37	0.32	0.53	0.40
DE	2022	0.31	0.34	0.33	0.38	0.32	0.53	0.41
DK	2019	0.25	0.29	0.29	0.31	0.25	0.45	0.36
DK	2020	0.26	0.30	0.30	0.31	0.26	0.45	0.36
DK	2021	0.26	0.30	0.30	0.31	0.26	0.45	0.37
DK	2022	0.26	0.30	0.30	0.32	0.26	0.45	0.37
EE	2019	0.30	0.31	0.34	0.34	0.31	0.47	0.38
EE	2020	0.30	0.31	0.34	0.33	0.30	0.47	0.38
EE	2021	0.30	0.31	0.34	0.34	0.31	0.47	0.38
EE	2022	0.31	0.31	0.35	0.34	0.31	0.47	0.38
EL	2019	0.30	0.33	0.31	0.34	0.31	0.53	0.37
EL	2020	0.31	0.34	0.32	0.34	0.31	0.53	0.37
EL	2021	0.31	0.34	0.32	0.34	0.32	0.53	0.37
EL	2022	0.31	0.34	0.31	0.34	0.31	0.53	0.37
ES	2019	0.31	0.34	0.33	0.36	0.31	0.50	0.39
ES	2020	0.31	0.34	0.32	0.36	0.31	0.50	0.39

	Policy year	Disposable Income (DPI) 50%	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
ES	2021	0.31	0.34	0.32	0.36	0.30	0.50	0.39
ES	2022	0.30	0.34	0.31	0.35	0.30	0.50	0.39
FI	2019	0.25	0.30	0.28	0.30	0.27	0.51	0.36
FI	2020	0.25	0.29	0.27	0.30	0.26	0.50	0.36
FI	2021	0.25	0.29	0.27	0.30	0.27	0.50	0.36
FI	2022	0.25	0.30	0.27	0.30	0.27	0.51	0.36
FR	2019	0.28	0.34	0.31	0.32	0.29	0.53	0.39
FR	2020	0.28	0.33	0.30	0.32	0.29	0.53	0.39
FR	2021	0.28	0.34	0.31	0.32	0.29	0.53	0.39
FR	2022	0.28	0.34	0.31	0.32	0.29	0.53	0.39
HR	2019	0.28	0.29	0.28	0.30	0.30	0.46	0.33
HR	2020	0.28	0.29	0.29	0.30	0.30	0.46	0.34
HR	2021	0.28	0.29	0.29	0.31	0.30	0.46	0.34
HR	2022	0.28	0.29	0.29	0.30	0.30	0.46	0.34
HU	2019	0.31	0.32	0.33	0.31	0.32	0.46	0.34
HU	2020	0.31	0.32	0.33	0.31	0.32	0.46	0.34
HU	2021	0.31	0.32	0.33	0.32	0.32	0.46	0.35
HU	2022	0.32	0.32	0.33	0.32	0.32	0.46	0.34
IE	2019	0.28	0.36	0.31	0.36	0.30	0.52	0.45
IE	2020	0.29	0.36	0.31	0.36	0.30	0.51	0.45
IE	2021	0.30	0.36	0.32	0.37	0.31	0.51	0.45
IE	2022	0.30	0.36	0.33	0.37	0.31	0.51	0.45
IT	2019	0.32	0.34	0.32	0.37	0.33	0.52	0.39
IT	2020	0.31	0.34	0.32	0.36	0.32	0.52	0.39
IT	2021	0.31	0.34	0.31	0.36	0.31	0.52	0.39
IT	2022	0.31	0.34	0.31	0.36	0.32	0.52	0.39
LT	2019	0.34	0.35	0.36	0.37	0.36	0.50	0.41
LT	2020	0.32	0.33	0.35	0.36	0.35	0.50	0.40
LT	2021	0.33	0.34	0.35	0.36	0.35	0.50	0.41
LT	2022	0.33	0.34	0.35	0.36	0.35	0.50	0.41
LU	2019	0.26	0.28	0.29	0.33	0.26	0.50	0.37
LU	2020	0.26	0.28	0.29	0.33	0.26	0.50	0.37
LU	2021	0.26	0.28	0.29	0.33	0.26	0.50	0.37
LU	2022	0.26	0.28	0.29	0.32	0.26	0.50	0.37
LV	2019	0.34	0.34	0.36	0.37	0.35	0.48	0.39
LV	2020	0.33	0.34	0.35	0.36	0.34	0.48	0.39
LV	2021	0.33	0.33	0.35	0.36	0.34	0.48	0.39
LV	2022	0.32	0.33	0.34	0.36	0.33	0.48	0.39
MT	2019	0.30	0.32	0.31	0.34	0.30	0.46	0.37
MT	2020	0.29	0.32	0.30	0.33	0.29	0.46	0.36
MT	2021	0.29	0.32	0.30	0.34	0.29	0.46	0.36
MT	2022	0.29	0.32	0.31	0.34	0.29	0.46	0.37
NL	2019	0.27	0.31	0.29	0.33	0.28	0.42	0.37
NL	2020	0.27	0.31	0.29	0.33	0.28	0.42	0.37
NL	2021	0.26	0.31	0.29	0.32	0.28	0.42	0.37
NL	2022	0.26	0.31	0.29	0.32	0.27	0.42	0.37
PL	2019	0.26	0.28	0.28	0.28	0.27	0.45	0.31
PL	2020	0.26	0.27	0.29	0.27	0.27	0.45	0.32
PL	2021	0.26	0.27	0.30	0.27	0.27	0.45	0.32
PL	2022	0.26	0.27	0.29	0.27	0.27	0.45	0.32
PT	2019	0.31	0.32	0.32	0.36	0.32	0.52	0.39
PT	2020	0.31	0.32	0.32	0.36	0.32	0.52	0.39
PT	2021	0.31	0.32	0.32	0.37	0.32	0.52	0.39
PT	2022	0.31	0.32	0.32	0.37	0.32	0.52	0.39

	Policy year	Disposable Income (DPI) 50%	DPI less means-tested	DPI less non means-tested	DPI plus direct taxes	DPI plus SIC	Market income	Market income plus pensions
RO	2019	0.33	0.34	0.34	0.34	0.37	0.52	0.40
RO	2020	0.33	0.34	0.34	0.34	0.37	0.52	0.39
RO	2021	0.32	0.33	0.34	0.33	0.37	0.52	0.39
RO	2022	0.31	0.34	0.33	0.32	0.36	0.52	0.40
SE	2019	0.25	0.28	0.31	0.30	0.26	0.47	0.35
SE	2020	0.26	0.28	0.31	0.30	0.26	0.47	0.35
SE	2021	0.26	0.28	0.31	0.30	0.26	0.47	0.35
SE	2022	0.26	0.28	0.31	0.29	0.26	0.47	0.35
SI	2019	0.24	0.26	0.26	0.27	0.26	0.45	0.32
SI	2020	0.24	0.26	0.26	0.27	0.26	0.45	0.32
SI	2021	0.24	0.26	0.26	0.27	0.26	0.45	0.32
SI	2022	0.23	0.26	0.26	0.27	0.25	0.45	0.31
SK	2019	0.21	0.22	0.23	0.23	0.22	0.39	0.26
SK	2020	0.21	0.21	0.23	0.23	0.22	0.39	0.26
SK	2021	0.21	0.22	0.23	0.23	0.22	0.39	0.26
SK	2022	0.21	0.22	0.24	0.23	0.22	0.39	0.27

Source: EUROMOD version I5.0+

Table A4.4. Mean and median marginal effective tax rates: 2019-2022

Country	Concept	2019	2020	2021	2022
AT	mean	40.6	40.5	41.3	40.8
AT	median	43.3	43.3	43.3	43.7
BE	mean	54.4	54.7	54.8	55.6
BE	median	57.2	57.3	57.6	58.7
BG	mean	22.2	21.8	21.1	21.3
BG	median	22.4	22.4	22.4	22.4
CY	mean	20.0	20.9	21.1	21.0
CY	median	10.7	11.6	11.6	11.6
CZ	mean	29.4	29.2	25.0	25.2
CZ	median	31.1	31.1	26.0	26.0
DE	mean	45.2	45.4	44.5	44.7
DE	median	44.5	44.5	44.5	44.5
DK	mean	45.6	45.1	45.0	45.1
DK	median	42.9	42.9	42.9	42.9
EE	mean	24.9	25.0	25.3	25.4
EE	median	22.9	22.9	22.9	22.9
EL	mean	32.7	29.7	28.1	28.1
EL	median	36.1	31.5	29.2	28.8
ES	mean	26.2	27.0	27.8	28.5
ES	median	29.3	29.8	30.7	30.7
FI	mean	45.7	46.4	45.9	45.6
FI	median	45.9	46.6	46.9	46.8
FR	mean	40.2	39.8	39.6	39.9
FR	median	37.8	34.1	34.1	34.1
HR	mean	26.0	24.7	23.4	24.8
HR	median	20.0	20.0	20.0	25.4
HU	mean	33.0	32.6	32.5	25.5
HU	median	34.5	34.5	34.5	34.5
IE	mean	37.0	38.2	38.3	39.0
IE	median	48.5	48.5	48.5	48.5
IT	mean	40.0	40.4	42.0	39.2
IT	median	43.2	43.8	42.8	41.6
LT	mean	40.4	40.8	41.1	41.8
LT	median	44.3	45.2	45.5	45.9
LU	mean	44.6	44.9	46.0	46.6
LU	median	46.1	47.2	47.7	48.0
LV	mean	30.4	30.7	30.3	31.8
LV	median	31.8	31.8	33.0	34.9
MT	mean	27.1	27.6	27.9	28.0
MT	median	25.0	25.0	25.0	25.0
NL	mean	39.1	39.5	39.1	38.4
NL	median	49.3	49.0	49.1	48.9
PL	mean	27.7	26.2	26.2	24.5
PL	median	30.3	29.5	29.5	31.8
PT	mean	33.8	33.6	34.1	34.2
PT	median	34.0	34.0	34.0	34.0
RO	mean	37.3	37.0	36.2	36.3
RO	median	41.5	41.5	41.5	41.5
SE	mean	35.4	35.2	35.0	35.4
SE	median	32.4	32.5	32.5	32.5
SI	mean	39.7	38.4	37.7	37.0
SI	median	40.0	39.0	38.8	38.5
SK	mean	32.5	32.0	32.9	32.5
SK	median	29.9	29.9	29.9	29.9

Source: EUROMOD version I5.0+

Annex 5. Decomposition of the redistributive effect of the tax-benefit system

Following Kakwani (1977), the redistributive impact of the tax-benefit system can be decomposed as follows:

$$RE = \frac{\overline{\mathrm{Y_I} - Y_D}}{\overline{\mathrm{Y}_D}} * \Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_D} - R$$

where

Y_I is initial income (original + pensions in our case)

Y_D is disposable income (initial income + benefits - taxes - social insurance contributions)

$\frac{\overline{Y_I - Y_D}}{\overline{\mathrm{Y}_D}}$ is the level $\Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_D}$ is the progressivity (Kakwani index) of the tax-benefit system as a whole, which is in turn the difference between the concentration index of the aggregated tax-benefit components (sorted by initial income) minus the Gini coefficient of initial income ($\mathrm{C}_{Y_I - Y_D} - \mathrm{G}_{\mathrm{Y}_I}$)

R is a re-ranking effect, i.e. the Gini coefficient of disposable income minus the concentration index of the same variable, but sorted by initial income ($\mathrm{G}_{\mathrm{Y}_D} - \mathrm{C}_{\mathrm{Y}_D}$).

Figure 3 depicts the values of $\Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_D}$ (x axis) and $\frac{\overline{Y_I - Y_D}}{\overline{\mathrm{Y}_D}}$ (y axis) for all EU member states. The position in the graph in relation to the curves is determined by $\frac{\overline{Y_I - Y_D}}{\overline{\mathrm{Y}_D}} * \Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_D}$ (R is not considered for the graphical representation). This redistributive effect without re-ranking is usually referred to in the literature as Reymond-Smolensky index (see, e.g. Verbist and Figari 2014).

Following the generalisation of Onrubia et al (2014) for taxes, we propose the following formula to decompose the impact by tax-benefit component:

$$RE = \sum_{\mathrm{i}=1}^{\mathrm{m}} \frac{\overline{\mathrm{C}_\mathrm{i}}}{\overline{\mathrm{Y}_D}} * \Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_I+\mathrm{C_i}} - R$$

where

Y_I is initial income (original + pensions in our case)

Y_D is disposable income (initial income + benefits - taxes - social insurance contributions)

$\mathrm{C_i}$ is each of the m components (taxes and benefits) added/subtracted to initial income

$\frac{\overline{\mathrm{C_i}}}{\overline{\mathrm{Y}_D}}$ is the level of each component (average component over disposable income)

$\Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_I+\mathrm{C_i}}$ is the progressivity (Kakwani index) corresponding to component *i*, which is the difference between the concentration index of the component (sorted by initial income) minus the Gini coefficient of initial income ($\mathrm{C}_{\mathrm{C_i}} - \mathrm{G}_{\mathrm{Y}_B}$)

R is a re-ranking effect, i.e. the Gini coefficient of disposable income minus the concentration index of the same variable, but sorted by initial income ($\mathrm{G}_{\mathrm{Y}_D} - \mathrm{C}_{\mathrm{Y}_D}$).

Figure 4 depicts the values of the redistributive impact ($\frac{\overline{\mathrm{C_i}}}{\overline{\mathrm{Y}_D}} * \Pi^{\mathrm{K}}_{\mathrm{Y}_I,\mathrm{Y}_I+\mathrm{C_i}}$) of each of the following components: means-tested benefits, non-means tested benefits, taxes and social insurance contributions. Additionally, it shows the overall re-ranking effect $-R$.

Table A4.5 lists the income concepts used for the abovementioned computations.

Table A4.5. Income concepts used for the decomposition of the redistributive impact

Concept	**Corresponding EUROMOD income list**
Initial income = market income + pensions (Y_I)	ils_origy + ils_pen
Means-tested benefits	ils_benmt
Non-means-tested benefits	ils_bennt
Taxes	ils_tax
Social insurance contributions paid by the individual	ils_sicdy
Disposable income (Y_D)	ils_dispy = ils_origy + ils_benmt + ils_bennt - ils_tax - ils_sicdy

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