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Nowcasting poverty and inequality in the context of economic growth and Covid-19 pandemic in Lithuania

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Abstract. The purpose of this article is to present a methodology and results for nowcasting poverty and inequality indicators during economic growth and the Covid-19 pandemic in Lithuania. Nowcasting combines the techniques of tax-benefit microsimulation and calibration of the survey weights. For the microsimulation, the tax-benefit microsimulation model EUROMOD is used together with its additional components for Lithuania, which were developed by the Ministry of Social Security and Labour of the Republic of Lithuania. Three economic forecasts, developed by the Bank of Lithuania for 2020, are used: the rapid V-shaped recovery scenario, intermediate U-shaped recovery scenario and a slow extended U-shaped recovery scenario. The results show Lithuania's favourable tendencies in reducing poverty and inequality in the general population and by age groups in the context of rapid economic growth and improving the improved labour-market situation in 2018–2019. The results of 2020 suggest that relative at-risk-of-poverty rates and inequality in the country are likely to decline. The foreseen decrease in the at-risk-of-poverty rate is primarily due to reducing poverty risk among older people and children. The most vulnerable age groups include youth (18–24 years) and the elder working-age population (50–64 years). Poverty rates for these groups are likely to increase in 2020. However, it should be noted that the at-risk-of-poverty rates had also declined in Lithuania during the first years of the previous economic crisis. Decomposition of demographic/employment changes and policy effects for 2019–2020 show that due to demographic and employment changes, poverty and inequality is likely to increase in Lithuania in 2020. The impact of the policy effect is progressive, more favourable to the less well-off, leading to a reduction in poverty. Progressiveness is due to the fact that during the quarantine period, flat benefits were provided to a large part of the society: children, pensioners, job-seekers, self-employed.

Keywords: nowcasting; poverty; inequality; Covid-19; Lithuania

1 Introduction

Official statistics on poverty and inequality in the European Union (EU) are based primarily on the survey data. The delay of the official statistics by 2–3 years encourages to seek ways to solve it. However, the existing data gap prevents the availability of up-to-date poverty and inequality indicators and the impact assessments of newly developed policy reforms. Most importantly, evaluating the impact of policy reforms on poverty and inequality indicators is vital in the light of the global Covid-19 pandemic. Unsurprisingly, scholarly attention developing methodologies for nowcasting distributional statistics took place by individual researchers ([19, 16, 12], etc.), and is currently being further developed by Eurostat [7]. The methodology presented in this paper further advances this research. The Lithuanian case is also of interest as the first economic estimates show that the country managed to mitigate the impact of the Covid-19 crisis with the lowest GDP decline in the second quarter of 2020 in the EU [8]. In addition, numerous measures were introduced to mitigate socio-economic consequences of the pandemic, including subsidies for employees, semi-universal payments for unemployed and self-employed, sick-leave payments for parents who looked after children during the school lockdown, lump-sum benefits for the elderly and children, etc. This strongly contrasts with the situation during the previous 2008–2009 economic crisis. Back then, Lithuania was among the countries which imposed strong fiscal consolidation measures and experienced one of the sharpest declines in the GDP followed by substantial negative socio-economic consequences [1].

This paper presents a methodology for nowcasting poverty and inequality indicators as currently being developed and used by the Ministry of Social Security and Labour of the Republic of Lithuania (MoSSL). It combines tax-benefit microsimulation techniques with the calibration of the survey weights. Data calibration was previously applied for similar purposes by Lefebure *et al.* [15], Brewer *et al.* [4], Kump and Navickė [14], Glaser-Opitzová *et al.* [13], Siebertová *et al.* [23], etc. Calibration of the survey weights allowed the authors to bring the indicators closer to external statistics. For example, Glaser-Opitzová *et al.* [13] calibrated the socio-economic variables and the distribution of income structure in the data. The present study uses six dimensions for calibrating statistical weights: age, sex, household structure, urbanization level, the number of unemployed and employed by education level. The microsimulation using calibrated data takes into account changes in the tax and benefit system during the relevant period. We use a microsimulation tax-benefit model EUROMOD [28, 11] and its additional components for Lithuania, developed by the MoSSL. The model updates variables reflecting primary market income in line with the latest available statistics and the official economic forecasts made by the Ministry of Finance of the Republic of Lithuania and the Bank of Lithuania [2]. Three economic development scenarios for 2020 have been projected: a rapid V-shaped recovery scenario, an intermediate U-shaped recovery scenario and a slow extended U-shaped recovery scenario. Concerning the model, components reflecting personal taxes and social transfers are replaced with the simulated amounts, which reflect changes in the tax-benefit rules by simulating those explicitly according to eligibility and other criteria established in the National Law. In addition to this, the method for decomposition of the effects of demographic/employment and policy changes on the at-risk-of-poverty and inequality rate and the mean equivalized household disposable income by income component is drawn by Bargain and Callan [3]. For this decomposition, counterfactual scenarios are used.

The structure of the article is as follows. The first section presents the methodology for nowcasting poverty and inequality indicators, as well as decomposition techniques. Then, results and discussion of poverty and inequality indicators in Lithuania in 2018–2020 using EUROMOD and EU-SILC data are presented in the second section. Finally, estimates will be made and presented for the general population and between the age groups.

2 Data and methods

Methodology for nowcasting poverty and inequality indicators consists of several stages: (i) application of data calibration, (ii) tax-benefit microsimulation techniques applied to calibrated data and (iii) decomposition of the results by factor, income component and by decile group. We discuss the methodology used to perform these actions below.

Data and its calibration. Survey of Income and Living Conditions (EU-SILC) was used for the data calibration and nowcasting poverty and inequality indicators. A survey is used to calculate official indicators of poverty and inequality in Lithuania and other EU countries. EU-SILC is representative data for the total population and collects statistical information about living conditions, incomes, the employment situation of private households. The nowcast was carried out in the first quarter of 2020. For nowcasting 2018–2020 poverty and inequality indicators, Lithuanian SILC data of 2018 was used. As it has been mentioned before, EU-SILC data has delayed information about household incomes. Therefore, data of the 2018 survey reflects the income reference period of 2017 and demographic characteristics of 2018. Furthermore, calibration of statistical weights is performed to adjust data for demographic and employment changes since the latest available survey. To analyze data in more detailed sections, actual data structures must be kept in mind. Using external statistics, Lithuanian SILC data of 2018 is calibrated up to the 2021 SILC survey year, reflecting the reporting income period and tax-benefit rules until 2020.

The main principle of data calibration is that it only changes weights of the variables. According to logically selected variables, the current weights (at the household level) are calibrated according to the selected control variables and get a new value. Importantly, consistency between household and individual estimates based on new weights should be preserved. To ensure the consistency between household and individual estimates, a method of 'integrative calibration' is recommended by Eurostat when calibrating EU-SILC weights [9, p. 37]: "This technique ensures "consistency" between household and individual estimates by making the household and the individual weights equal". In the process, individual variables are aggregated at household level by calculating household totals, such as the number of male/female or employed/unemployed in the household, etc. The calibration is then carried out at the household level using household variables and individual variables in their aggregated form. Hence, we carry out calibration at the household level, using integrative calibration in all cases when controls are at individual level. Similar procedure was carried out for calibrating EUROMOD weights, including Lithuania, in [14, 19].

The purpose of calibration is to compensate for data lag by calibrating them according to the latest employment, unemployment, population structure, and other information, and performing calibrations for 2020. Furthermore, calibrations were

Table 1. 2020 economic scenarios by the Bank of Lithuania.

	V-shaped scenario	U-shaped scenario	Extended U-shaped scenario
Unemployment rate, %	9.7	11.9	14.0
AMS* change, %	0.0	−2.6	−9.7
Employment change %	−2.7	−5	−7.3

Source: [2], 2020 *AMS – average monthly salary.

made by incorporating economic forecasts presented by the Bank of Lithuania (see Table 1). A V-shaped scenario forecast suggest unemployment rate of almost 10% and the highest unemployment rate in extended U-shaped scenario. As for changes in the average monthly salary (AMS), the Bank of Lithuania forecasts no change in the case of V-shaped scenario. A decrease of −2.6% is forecasted in the U-shaped scenario and more than three times higher decrease in AMS in the case of extended U-shaped scenario, compared to the U-shaped shock scenario. Looking at changes in employment, we see a projected unemployment change in V-shaped scenario of around −3%, and almost three times higher employment change in the case of extended U-shaped scenario (see Table 1).

Data from the Labor Force Survey (LFS), Eurostat and Statistics Lithuania were used to calibrate the data. For the purpose of the study, statistics for 2017–2020 were selected. It is important to note that the latest statistics were available up to 2019 only, and for 2020, indicators have been developed based on their official forecasts or, where they are not available, the linear trend of older official data. Information both from the LFS and the official forecasts is on an aggregate level, no micro-level information is used for re-weighting. This allows to easily combine the information of a similar granularity. Importantly, the calibration was based on the relative rather than the absolute change in the controlled parameters. The following control variables are used for calibrations: age (in 5-year groups), sex, household structures (7 types), the level of employment and unemployment, place of residence (urban/rural), and education structure (based on ISCED classification).

The Stata module MP15 CALIBRATE package was used to calibrate the data weights. The linear and logistic weight calibration methods used in the package are analogous to those presented by Deville and Särndal [5]. According to the EU-SILC data weighting guidelines [6, p. 32], the use of a bounded logistic method is recommended for data calibration. The latter avoids negative values that would be unacceptable for the household weight variable for practical reasons. Thus, the bounded linear and logistic distance method was used for data calibration, as both methods ensure that the data calibration weights are positive. The application of the two methods is helpful in comparing results. This also ensures that unexpected calibration results (e.g., outliers) are avoided.

While we use calibration to adjust the data for demographic changes and changes in the labour market, the method has its limitations, especially when the structure and characteristics of the new unemployed are different from those unemployed in the underlying data. An alternative is an explicit simulation of the transitions between labour market status, which is based on a multivariate econometric estimation of the probability of each individual labour market transition (for a discussion, see e.g. [19]).

The latter procedure might provide a better prediction than the re-weighting approach used in this paper. However, the LFS micro-data required for such estimations comes with a greater time lag than the published aggregated statistics and forecasts used for re-weighting. This is especially true when the current situation is being nowcasted. Hence, there is a trade-off between the extent to which the nowcast is based on up-to-date information and its detail. While acknowledging these limitations, we opt for the former solution. In addition to the reweighting, employed individuals were randomly selected to be on the furlough scheme for several months and that these adjustments are being carried out in the model itself.

Tax-benefit microsimulation. After data calibration, the EU's static tax-benefit microsimulation model EUROMOD and additional components for Lithuania developed by the Ministry of Social Security and Labour of the Republic of Lithuania (MoSSL EUROMOD) is used to nowcast poverty and inequality indicators [28, 11]. The standard scope of the simulations is described in detail in the EUROMOD Country report for Lithuania [22]. In addition, MoSSL EUROMOD model is complemented by disaggregated pension components. First, pensions are disaggregated into nine types of pensions, each of which is updated according to different uprating factors. This makes it possible to ensure different growth in pensions according to their type. Furthermore, our simulations also include adjustments for tax evasion, which are available in the EUROMOD. Tax evasion adjustment is performed by considering the differences between simulated and realized tax liabilities in the data. Cases of full and partial tax evasion are distinguished accordingly. They are differentiated according to the type of income (employed, self-employed, etc.). It is assumed that tax evasion behaviour does not change between years. It is also assumed that tax obligations in the public sector are fully met. Third, the model was improved by additional changes – wage uprating factors by type of economic activity. This has led to more detailed statistics and wage growth each year respondents working in different economic sectors. This was done by disaggregating the average wage update factors for the 12 economic activities taken from the wage statistics of Statistics Lithuania [25].

The use of microsimulation helps to include the most recent fiscal policy changes into the analysis, including the Covid-19 measures, which were introduced in 2020 (a detailed description of the Covid-19 measures modelled in EUROMOD can be found in Annex 1). The above mentioned changes to the data and microsimulation model update significantly reduce the problem of data lag. In addition, the use of external statistics allows for a significant improvement in the quality of poverty and inequality forecasts. This is confirmed by the analysis of Eurostat ESTAT and Statistics Lithuania research errors and confidence intervals [7, 26]. However, it should be acknowledged that both the EU-SILC data and microsimulation have their statistical and modelling errors. It is assumed that these errors are constant over time; hence the nowcasted change in poverty and inequality is superimposed on the latest available EU-SILC statistics. On the other hand, this approach aligns with previous research [19, 16, 12, 7].

Decomposition of results. Finally, to see what effect demographic/employment and policy changes has on poverty and inequality indicators, and the mean equivalized household disposable income, methodology for decomposition, which relies on counterfactual scenarios obtained with tax-benefit microsimulation techniques, is used

[3, 20]. Decompositions are based on introducing counterfactual income distributions where the relevant attributes (demographic structure and policy parameters) in the end-period are replaced sequentially with those from the start-period, one at a time. The estimation of demographic/employment changes (natural demographic change, migration, and employment situation) is used for calibrating the data for 2019 and 2020 (U-shaped recovery scenario) and 2020 tax-benefit policies. The results are compared with the simulation results on the data without calibrations. In this way, the pure effect on poverty and inequality due to demographic/employment changes is estimated. For the year 2020, a U-shaped recovery scenario was chosen because, when the estimations were performed, it was considered to be the most realistic scenario to be fulfilled. The policy effect (changes in tax-benefit policies) is estimated as a difference between simulated household net income under the new tax-benefit policies (deflating monetary parameters to the level of the previous year by Eurostat's Harmonized Index of Consumer Prices (HICP)) and net incomes simulated under policies of the previous year. The residual is then attributed to 'other' effects, which primarily include changes in the labour market income. Finally, policy effects on mean equivalized household disposable income are disaggregated by income component (using a simple Shapley-type before-after decomposition) and income decile group in 2019–2020 with and without the Covid-19 package.

3 Results and discussion

In this section, nowcast of poverty and inequality indicators is presented. Firstly, we present nowcasting results on relative poverty threshold and relative at-risk-of-poverty rates for total population. Later, paragraphs present relative poverty nowcast for different age groups in Lithuania based on different economic scenarios by the Bank of Lithuania. Other paragraphs focus on inequality indicators using Gini and S80/S20 indicators. Finally, results on decomposition for 2019–2020 on the at-risk-of-poverty and inequality rate, mean equivalized household disposable income by income component are presented at the end of this section.

3.1 Nowcasting relative poverty

Looking at the at-risk-of-poverty thresholds (Fig. 1), we observe a rapid increase in the median income in the population and, consequently, the nowcast on the at-risk-of-poverty threshold in 2018–2019. As for 2020, due to the consequences of Covid-19, the median income in Lithuania is estimated to fall for the first time since 2010 if the assumptions of the extended U-shaped scenario were confirmed. In this scenario, the median income would decrease by 5%. The nowcast shows that in the V-shaped and U-shaped scenarios, the median income will increase (1%–5%), but slightly modest than in previous years. The size of the relative at-risk-of-poverty threshold will change accordingly. Positive changes in the median income are in 2018–2019. Several main factors impact the country: overall economic growth, employment growth, wage growth system, etc., and recent increases in social benefits and pensions. An increase in 2020 in the median income and at-risk-of-poverty threshold will likely be driven by new measures introduced by the Covid-19 crisis: lump sums for children and the elderly, job search benefits, sickness benefits, compensation for the self-employed,

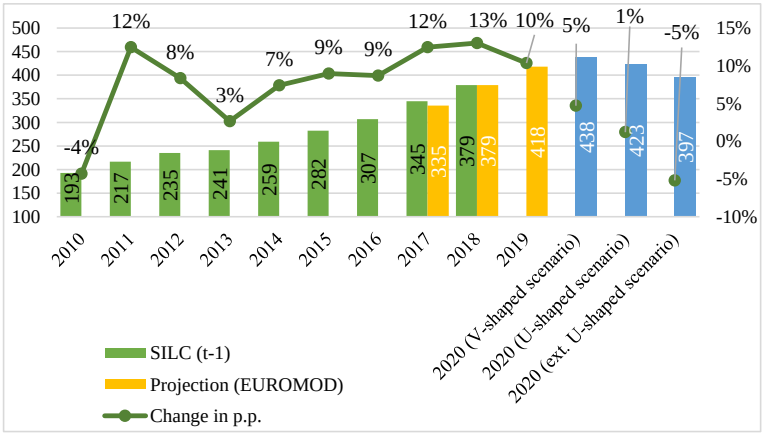

Fig. 1. Relative poverty threshold and nowcast in Lithuania in 2010–2020*.
Source: authors' calculations. **Note*: Relative poverty threshold is calculated as 60% of a median equivalized disposable income. Years refer to income year (SILC t-1).

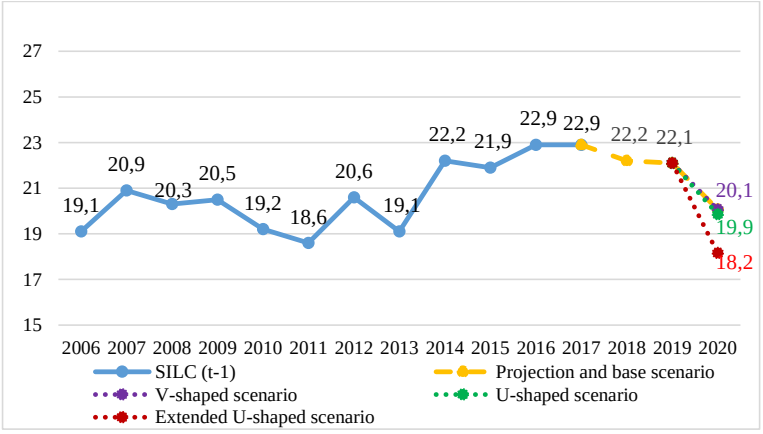

Fig. 2. Relative poverty rate and its' nowcast in Lithuania in 2006–2020, %*.
Source: authors' calculations. **Note*: Years refer to income year (SILC t-1). Floating poverty line.

subsidies during and after downtime, introduced personal income tax (PIT) changes. The nowcast assumes that social benefits and their payment duration in 2020 will not change.

In terms of changes in the at-risk-of-poverty rate, it is nowcasted that from 2017 until 2019, the at-risk-of-poverty rate decreased slightly (by about 0.8 p.p., see Fig. 2). Favourable trends in the at-risk-of-poverty rate can be based on the improving general economic situation of the country, increasing employment levels for the projected 2018–2019. On the other hand, the reduction in the at-risk-of-poverty rate was also due to significant recent changes in the social security system: regular indexation of pensions, increase in minimum monthly salary (MMS), reforms in the unemployment

Table 2. Relative poverty nowcast between age groups in Lithuania in 2019 (%), and its change in 2020 (p.p.).

	2019 nowcast	2020 V-shaped scenario	2020 U-shaped scenario	2020 extended U-shaped scenario
Total population	22.1	−2	−2.2	−3.9
Children (0–17)	20.2	−5.3	−6.1	−7.9
Youth (18–24)	18.2	+1.2	+2.8	+1.8
Working age (25–49)	14.8	−0.5	+0.1	−0.1
Older working age (50–64)	19.3	+1.1	+1.9	+1.7
Elderly (65+)	40.2	−6.3	−9.2	−15.1

insurance system, more generous unemployment benefits, the universal child benefits system, as well as the amount of state-supported income, the social assistance pension base, the amount of the basic social insurance pension, pension supplements, etc. Statistics Lithuania presents official statistics for relative poverty rate for the 2018–2019 income years [27]. Official statistics show lower relative poverty rate for the 2018 and 2019 income years (20.6% and 20.9%). These differences may be due to the methodological (data, simulation, and calibration) issues.

It is worth to mention, that forecasts for 2020 were made at the beginning of 2020 (based on the Bank of Lithuania forecasts (see Table 1)), and we estimate that further reduction in the at-risk-of-poverty rate is unsurprising, nonetheless for other reasons in 2020. First, due to the unfavourable economic situation, the population's labour market income will not grow as fast as in previous years; thus, the growth of the at-risk-of-poverty threshold is estimated to be slower (see Fig. 1). Second, a higher risk of poverty in the working-age population is likely to be offset by the relatively more stable situation of the elderly who receive old-age pensions. It should be noted that the at-risk-of-poverty rates remained relatively low in Lithuania during the 2009 economic crisis. Our results for relative at-risk-of-poverty rate for 2020 for total population are in line with Statistics Lithuania experimental statistics and in line with Eurostat flash estimates for 2020 [24, 10]. The Ministry of Social Security and Labour of the Republic of Lithuania presents results for absolute poverty nowcasts for 2020 [18]. It is estimated that absolute poverty rate increased in 2020 (compared with 2019 situation which was 5.1%), and it will be 10.6% in extended U-shaped scenario, 8.1% – in U-shaped scenario and 5.9% – in V-shaped scenario. Absolute poverty rate shows the share of population that are unable to meet minimum consumption needs. The amount for 2020 cost of basic needs was EUR 257 per month. It is a national poverty indicator and it shows, that while relative poverty is decreasing due to the Covid-19 situation, absolute poverty situation is deteriorating.

In 2018 and 2019, the at-risk-of-poverty rate is estimated to decrease in all age groups, except for the elderly (37.7% in 2017, 40.2% in 2019). In particular, the at-risk-of-poverty rate is estimated to decrease among children (23.9% in 2017, 20.2% in 2019) (see Annex 2).

Table 2 shows changes in the at-risk-of-poverty rate in 2019–2020. The results obtained show that 2020 Covid-19 scenario has a similar trend: relative poverty decrease in total population, between children and elderly, and increase between youth and older working age groups. Differences are noticed when analysing the working age (25–49) group: in 2020 U-shaped scenario relative poverty between the working age

(25–49) group is estimated to increase, while in other Covid-19 scenarios decrease is estimated. In the Covid-19 scenarios, the working-age population is most vulnerable to the risk of poverty, especially young people (18–24 years) and the older working-age group (50–64 years). These groups are especially vulnerable due to the rising unemployment and declining labour income.

On the other hand, in the face of the crisis, income of the elderly is better-protected than income of the working-age, and their relative poverty rate is estimated to decrease more pronouncedly, especially in the extended U-shaped scenario (−15.1 p.p.): pensions are indexed, supplements to small old-age pensions are paid, and a lump sum benefit of EUR 200 has been paid to this group. In addition, the deterioration in the economic situation has slowed the increase in the at-risk-of-poverty threshold (see Fig. 1). As a result, a smaller proportion of people of retirement age are at-risk-of-poverty. This trend continued after the economic crisis in 2009. As a result of the measures introduced, the income of people of retirement age in an unfavourable economic situation is relatively better-protected during the crisis.

It is important to note that for all 2020 scenarios, child poverty is likely to decrease. Such trends reflect recent reforms targeted at families with children. Universal child benefit, more generous cash social support, additional benefits and one-off benefits paid to children during the quarantine have provided additional protection for families. In addition, families with children were able to claim unemployment benefits and sickness payments during the quarantine period. Compared to the 2009 crisis, the current unemployment benefit system has been strengthened in Lithuania.

Relative poverty estimates are sensitive to the stagnating, or in the case of the V-shaped scenario, the declining threshold of at-risk-of-poverty. The foreseen decrease in the at-risk-of-poverty rate is primarily due to a reduction in the poverty risk among the elderly people, as their situation improves relative to the working-age population due to the greater stability of their pensions, as well as additional Covid-related transfers. It is estimated, that child poverty rates should also decline, resulting from enhanced child benefits and other Covid-related measures. The most vulnerable age groups include youth (18–24 years) and the older working-age population (50–64 years). Poverty rates for those groups are likely to increase in 2020. It should be noted that the at-risk-of-poverty rates had also declined in Lithuania during the first years of the previous economic crisis.

3.2 Nowcasting inequality

Nowcast on inequality shows that from the last available income statistics (for 2017) until 2019, data show only a marginal decrease in Gini (see Fig. 3). It is estimated that in 2019 Gini decrease to 35.3%. This is expected to be driven by the favourable economic and social policy factors discussed earlier: rising employment, declining unemployment, rising minimum wages, rapidly indexing pensions and pension supplements, cash benefit reforms, such as a more generous unemployment benefit system, child money, more generous family benefits, non-deductible the emergence of income in the social support system, etc.

2020 scenarios will likely lead to a further decline in the Gini coefficient, but for other reasons. In times of economic crisis, labour income, especially wage supplements, is usually declining the fastest. There is also a significant decline in self-employment

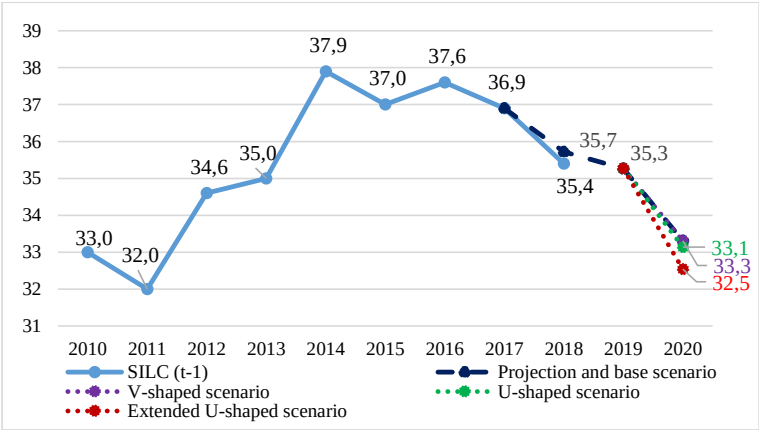

Fig. 3. Gini coefficient and its' nowcast in Lithuania in 2010–2020*.
Source: authors' calculations. **Note*: Years refer to income year (SILC t-1).

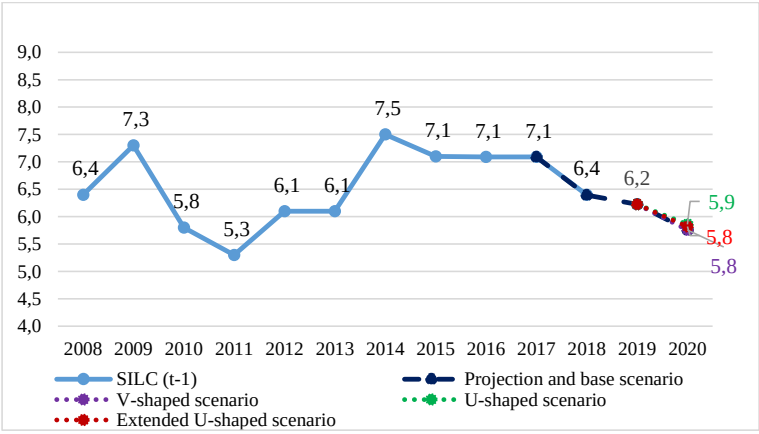

Fig. 4. Income distribution coefficient (S80/S20) and its' nowcast in Lithuania in 2010–2020*.
Source: authors' calculations. **Note*: Years refer to income year (SILC t-1).

income, investment income, wealth and distributed profits. Meanwhile, income of people in the lower part of the distribution is relatively better-protected due to the guarantees provided by the social security system: pension indexation rules, low pension supplements and benefit floors, MMS size regulation, etc. The previous crisis also saw a decline in inequality, followed by a sharp rise in inequality during the economic recovery (see Fig. 3).

Changes in the S80/S20 indicator show similar trends as the Gini coefficient. The S80/S20 income distribution ratio has been declining since 2016 (see Fig. 4). The S80/S20 measured inequality is estimated to decline in 2018, and further stabilization of this indicator is visible. In the case of 2020, a decrease in S80/S20 is also predicted. Similar factors can explain such trends as in the case of Gini. More generous social benefits, albeit insignificant, allow those on the lowest incomes to secure a slightly higher income, but not enough to bring them closer to higher-income quintiles.

3.3 Decomposition effects of demographic/employment and policy changes on the at-risk-of-poverty, inequality rate and mean equivalized household disposable income

Finally, we decompose the effects of demographic/employment and policy changes implemented in 2019–2020 on the at-risk-of-poverty and inequality rate and the mean equivalized household disposable income by income component. For 2020, a U-shaped recovery scenario is used. This scenario has been applied because, when estimations were performed, it was considered to be the most realistic scenario to be fulfilled. The estimation of policy changes draws on the method suggested by Bargain and Callan [3]. The effect is estimated as a difference between simulated household net income under the new tax-benefit policies (deflating monetary parameters by Eurostat's HICP) and net incomes simulated under policies of the previous year. Table 3 shows absolute effects on inequality and relative poverty (60% of a median equivalized disposable income) due to demographic/employment, policy and economic (other) changes in 2019–2020.

Results show that inequality and poverty are likely to increase due to changes in the demographic/employment situation in Lithuania. Relative poverty is increased among all age groups, except for the elderly (65+ years old) (see Table 4). This is a consequence of the deterioration of the economic situation, while the incomes of the elderly are slightly more protected. As a result, a marginal increase in inequality is observed.

Table 3. Absolute effects on inequality and poverty indicators due to demographic/employment, policy and economic (other) changes in 2019–2020 in Lithuania (p.p.)*.

Changes in p.p. due to:	Demographic/ employment changes (A)	Policy changes with Covid-19 package (B)	Policy changes without Covid-19 package (C)	Economic (other) changes (D)	Total change (A+B+D)
Gini	+0.9	−3.0	−1.4	−0.08	−2.18
S80/S20	+0.3	−1.0	−0.5	+0.38	−0.32
Relative poverty	+1.6	−3.8	−2.6	+0.05	−2.15

Source: authors' calculations. **Note*: years refer to income year (SILC t-1). S80/S20 – income distribution coefficient. Floating poverty risk threshold (60% of a median equivalized disposable income).

Table 4. Absolute effects on relative poverty between age groups due to demographic/employment, policy and economic (other) changes in 2019–2020 in Lithuania (p.p.)*.

Changes in p.p. due to:	Demographic/ employment changes (A)	Policy changes with Covid-19 package (B)	Policy changes without Covid-19 package (C)	Economic (other) changes (D)	Total change (A+B+D)
Total population	+1.6	−3.8	−2.6	+0.05	−2.15
Children (0–17)	+0.7	−6.8	−5.1	−0.02	−6.12
Working age (18–64)	+2.9	−1.8	−1.1	0	+1.1
Elderly (65+)	−1.8	−7.4	−4.9	−0.03	−9.23

Source: authors' calculations. **Note*: years refer to income year (SILC t-1). S80/S20 – income distribution coefficient. Floating poverty risk threshold.

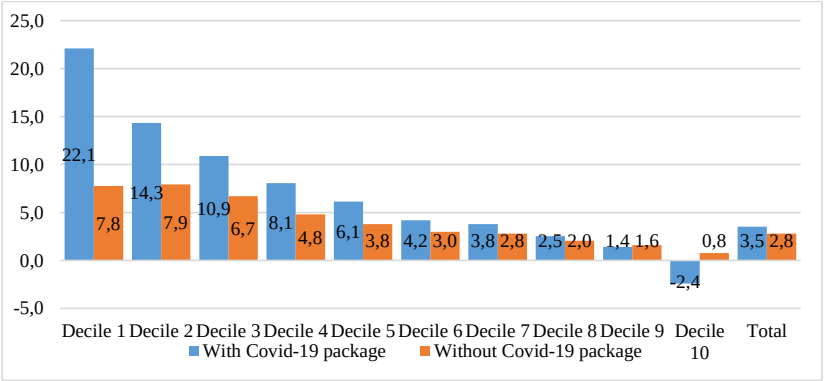

Fig. 5. Policy effects on mean equivalized household disposable income by income decile group in 2019–2020 with and without Covid-19 package (CPI = 1.0048)* (%).
Source: authors' calculations. **Note*: Calibrated data for 2019 was used.

Results also show a positive effect on poverty and inequality due to policy changes in 2020 with and without the Covid-19 policies package. This policy effect decomposition does not take into account demographic or employment changes in 2019–2020. A full description of the Covid-19 package can be found on EUROMOD country report Lithuania for 2020 [22, p. 98] and in Annex 1. Inequality and poverty are reduced in both cases (with and without the Covid-19 package). More substantial effects on reducing poverty and inequality are observed with additional Covid-19 tax-benefit policies introduced in 2020. Table 4 presents the absolute effect on relative poverty for different age groups due to demographic/employment, policy and economic (other) changes in 2019–2020 in Lithuania.

It is estimated that due to demographic/employment changes between 2019–2020 relative poverty increased in all age groups except for the elderly. Due to policy changes in 2019–2020, it is estimated that relative poverty is reduced between all age groups, especially between children and the elderly. The Covid-19 package shows a positive, however more minor poverty reduction effect among the working-age group. Implemented Covid-19 package shows that the measures taken were quite wide-ranging and not concentrated solely on the employed. In addition to subsidies for downtime for working population and compensations for the self-employed and the unemployed, there were also universal measures for pensioners and children. Retirees also benefited from a fairly significant pensions indexation in 2020.

The next step is to estimate the policy effect on mean equivalized household disposable income. Figure 5 presents policy effect results for 2019–2020 by income decile group when Covid-19 measures are not considered (e.g. automatic stabilizer due to basic social protection system) and when the Covid-19 measures are included in 2020. For detailed information about income components, see Annex 3.

When analyzing policy effect on 2019–2020 without Covid-19 measures, the positive effect is observed on mean household disposable income by income decile group. Public pensions, means-tested benefits and direct taxes play the most significant role in increased households' income (see Annex 3). Also, the most significant increase in income is observed for the lowest income deciles. Consumer price index (CPI) is

slightly above 1, which signals that increase in pension indexation, and other social benefits were above CPI, and resulted in income growth.

In 2020 (without the Covid-19 package), the general personal income tax (e.g. direct taxes) cap decreased to 84 average monthly salaries (AMS), and the second tariff increased to 32% if the annual income exceeds 84 AMS. Since 1 January 2020, general tax allowance was increased by EUR 50 a month and accounted for EUR 350 a month if the resident's monthly income does not exceed the MMS (EUR 607). Also, for people participating in the 2nd pillar pension, contribution rates with state subsidy were increased. There were also changes in public pensions in 2020: there was an increase in the amount of pension bonus (difference between 100% the cost of basic needs (CBN) and a sum of pensions), and the pension indexation coefficient was 1.0811. There were changes in child benefits design for family benefits: increased amount for universal child benefit and the amount is equal to everyone, irrespective of disability level. Children with disabilities became able to get additional child benefit. The pregnancy grant was increased, the student's childcare benefit was extended by one year, and maternity benefit is paid for mothers who had no less than 12 months over the last 24 months but were not employed or insured during pregnancy. There were changes in childcare benefit payment: if eligible, a parent receives childcare benefit and at the same time qualifies for another childcare benefit (for another child), this person can receive both benefits, but the total amount could not exceed 77.58% of earnings on which these benefits were calculated. In 2020, temporary childcare allowance was introduced as well. It is paid when the need for child protection is determined by a person who is in the temporary care of a child.

Figure 5 also presents policy effect results taking into account Covid-19 monetary measures in 2020. In addition to the above-mentioned policy changes between 2019–2020, since 1 July 2020, there was an additional increase of PIT allowance by EUR 50 per month and the increase of withdrawal rate of the tax allowance to 0.19. Temporary measures were introduced: a temporary job-seeker's allowance, a temporary benefit for self-employed, sickness benefit for parents for taking care of children and disabled children, subsidies to remain in the labour market during quarantine if downtime is declared, subsidies after the end of the quarantine. The eligibility conditions for social benefit were temporary eased, the level of income disregard was increased by 5 p.p. and the assets' test was temporary not applied during the state of emergency and for 6 months more after the end of quarantine. The social benefit amount was increased as well. In addition, there were several one-off benefits: one-off allowance for the elderly and disabled, a lump-sum benefit for children (for detailed information, see Annex 1).

Results show that the impact of the policy effect is progressive and more favourable to the less well-off between 2019–2020. We have observed that the largest share of increased income consists of non-means tested benefits. The main effect is due to benefits and pensions. Temporary job-seeker's allowance affected many inactive, low-income individuals. Policy effect progressiveness is due to the fact that flat benefits were paid to everyone: children, pensioners, job-seekers and the self-employed. These benefits increased incomes for the lowest-income earners more in relative terms and were less significant for higher-income earners. The inequality- and poverty-reducing effects of the policy measures are in line with the conclusions on the in-general progressive inequality-reducing impact of the policy reforms in Lithuania for the broader period after the accession into the EU [20].

4 Conclusions

1. The latest available indicators on poverty and inequality reflect the 2018 SILC data, it is a 2017 situation and income (t-1). Therefore, the nowcasts presented in this article reflect the actual income period, not the survey year. Poverty and inequality indicators forecasts are for 2018–2020. Nowcasts for 2020 have been performed according to the three economic development scenarios forecasts by the Bank of Lithuania with the impact of Covid-19 [2]. Nowcasts for 2018–2019 show favourable tendencies for Lithuania in the areas of relative and absolute poverty, as well as reduction of inequality in the general population and by age groups.
2. At-risk-of poverty nowcasts for 2020 suggest that relative poverty in the country will likely decline. However, this decrease will be primarily due to a reduction in the risk of poverty among the elderly due to the greater stability of their pensions. This will improve the relative position of the elderly people in the population. The risk of child poverty should also be reduced relatively significantly, benefiting from enhanced child benefits and other measures. The most vulnerable age groups in the nowcast of relative poverty include youth (18–24 years) and the older working-age group (50–64 years). Poverty rates for these groups in 2020 will likely increase in the case of U- and extended U-shaped scenarios. The nowcast of the reduction of inequality in 2018–2019 is due to positive employment and income growth trends. The economic downturn as direct result of the Covid-19 pandemic is likely to decrease inequality in the country in 2020.
3. Decomposition of demographic/employment and policy effects between 2019–2020 shows that due to demographic and employment changes between the years, relative poverty increases by 1.6 p.p., while due to policy changes in 2020 (with the Covid-19 measures using U-shaped scenario), there is estimated reduction by 3.8 p.p. Thus, in total, relative poverty is reduced by 2.2 p.p. The nowcast for relative poverty for 2020 using a U-shaped scenario shows the same result. Hence, it can be concluded that policy reform between 2019–2020 was more progressive and had a higher pro-poor orientation compared with the results without Covid-19 measures included.

5 Acknowledgement

The results presented here are based on EUROMOD version I2.0+ and additional components for Lithuania developed by the Ministry of Social Security and Labour of the Republic of Lithuania (MoSSL). The core EUROMOD model is maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex, in collaboration with national teams from the EU member states. The process of extending and updating EUROMOD is financially supported by the European Union Program for Employment and Social Innovation 'Easi' (2014–2020). The additional development of the model's component for Lithuania is carried out in the framework of project No. 10.1.1-ESFA-V-912-01-0019, "Establishment of a system for forecasting, deciding, coordinating and monitoring the effectiveness of social assistance policies". We are grateful to the many people who have contributed to

the development of EUROMOD. The results and their interpretation are the author's responsibility.

Annex 1

Covid-19 policies modelled in the EUROMOD

The Covid-19 package measures consist of a number of policies modelled in the EUROMOD as well as policies outside the scope of EUROMOD model (see below). A detailed description of temporary, one-off and adjusted policy schemes provided below is retrieved from ESPN Thematic Report [21].

Jobseeker's allowance: aimed to cover the unemployed who were not entitled to contributory unemployment benefits. This included the unemployed persons who have not required contribution record or have exceeded the maximum duration of the unemployment benefit, as well as self-employed people who are not eligible for social insurance unemployment benefits. The benefit was paid for all registered unemployed not depending on their previous employment status or social insurance record in 2020. In 2020, the amount of the jobseeker's allowance was EUR 200 per month. Moreover, a EUR 42 temporary jobseeker's allowance was paid as a top-up for the unemployed receiving contributory unemployment benefits.

Wage subsidies for furloughed employees: aimed to maintain jobs. Employers were eligible for wage subsidies for furloughed employees after the state of emergency and quarantine had been declared by the Government. The furlough can be full-time or part-time with a proportional compensation of the time employees are on furlough. In 2020, there were two optional levels of the subsidies: either 90% of employees' gross wage (capped at the amount of the monthly minimum wage (MMW), i.e., EUR 607 gross), or 70% of employees' gross wage (capped at 1.5*MMW). A more favourable option can be chosen depending on the wage of the furloughed employee. Compensations for employees aged 60 and over could reach 100% of the employee's gross wage, but no more than one MMW per month.

Wage subsidies: employers were eligible for wage subsidies after quarantine if they: a) furlough but did not dismiss employees during the quarantine; b) employed previously unemployed persons referred by the Employment Services; c) were included in the list of companies affected by COVID-19, as drawn up by the State Tax Inspectorate. The subsidies amounted up to 100%*MMW per month and were paid in the first two months after the first quarantine in 2020, and gradually decreased in the subsequent months (i.e., 50%*MMW per month for the third-fourth months and 30%*MMW per month for the fifth-sixth months). Furthermore, employers were entitled to larger subsidies (up to 2*MMW per month per employee) if they were on the list of activities approved by the Minister for Social Security of the Republic of Lithuania and Labour and the Minister for the Economy and Innovation of the Republic of Lithuania. The maximum subsidy payment period was six months after the quarantine (four months for temporary or seasonal contracts).

Benefit for self-employed persons: the benefit for the self-employed was paid irrespective of whether or not self-employment activities were restricted due to the quarantine and irrespective of any change in income from self-employment. It was not paid if a self-employed person also received employment-related income exceeding

one monthly minimum wage (MMW). The benefit could be received together with unemployment benefits. The benefit was a flat-rate payment of EUR 257 per month before the end of 2020 and for two extra months thereafter.

One-off child allowance: one-off child allowance was paid in July 2020 or with the first payment of the child benefit for the new recipients in 2020. A one-off child allowance of EUR 120 per child (EUR 200 per child for poor or large families or families raising a child with disabilities) was introduced on 6 June 2020.

Lump-sum allowance for pensioners: a lump-sum allowance of EUR 200 was paid to all people receiving contributory and non-contributory (social) pensions.

Sickness benefit: parents (also foster parents and grandparents) of children of up to 12 years of age who were not able to work due to school or childcare facility closures during quarantine, as well as other workers who provided care for disabled or elderly family members, were entitled to paid leaves in 2020. Parents with children who were not able to work due to school or childcare facility closures during the quarantine, as well as other workers who provide care for disabled or elderly people, were entitled to paid leave of up to 60 days paid at 65.9% of the gross wage until the end of the state of emergency.

Changes in PIT allowance: an increase in the Personal Income Tax (PIT) allowance as of 1 July 2020. The PIT allowance was increased by EUR 50 per month: from EUR 350 per month to EUR 400 per month, which affected all taxpayers eligible to PIT allowance.

Changes to social assistance benefit: an increase in cash social assistance is a permanent measure introduced since June 2020. A threshold to receive cash social assistance was increased from EUR 125 to EUR 137.5 per person per month. Moreover, payment of the social assistance benefit was extended to 12 months for those recipients of social assistance who get into employment. For the above-mentioned period, the amount of the benefit was increased to 100% of the previously received social assistance amount for the first three months, 80% – for the following three months, and 50% – for the final six months. Additionally, earned income disregard was increased by 5%, i.e., 5% more of the earned income are disregarded when applying the income test for social assistance. Moreover, property of families and individuals is not to be tested for entitlement to social assistance as of the start of the state of emergency in February 2020 until six months after the cancellation of the state of emergency and the quarantine [17].

Changes to child benefit: conditions of income testing to be eligible for the child benefit supplement were temporarily simplified. Eligibility conditions came into force since June 2020 until the end of emergency and quarantine plus six months. In such cases when income test is applied, average income was tested for a shorter period of three months instead of one year.

Other Covid-19 policies not covered in EUROMOD

Other tax-related measures: included deferral of tax arrears payments for affected taxpayers, exemption from fines and default interests in case of the failure to comply with tax obligations on time, and postponement of submission (and payment of) personal income tax returns. The State Tax Inspectorate has announced economic

activities in which taxpayers may have suffered a direct negative impact, and has published a list of specific taxpayers to whom the following assistance measures will automatically apply: non-recovery of declared taxes (other than customs duties), exemption from the payment of default interest, no interest accruing on concluded tax loan agreements. These taxpayers are subject to analogous measures to facilitate the payment of state social insurance contributions.

Sickness benefit: sickness social insurance benefits have been increased for employees who become infected in the performance of their duties, i.e., doctors, officials, or other employees (pharmacists, cashiers, social workers and the like) who get infected with COVID-19 while discharging their duties. Moreover, people with chronic diseases can apply for sickness benefits during the state of emergency and the quarantine (even if not infected with COVID-19) given they are not on furlough and have no possibility to work remotely. The latter arrangement is aimed at prevention of COVID-19 in this vulnerable group. If healthcare professionals, officials or other employees are infected with the COVID-19 virus, they are offered a maximum sickness benefit of 100% of the net average wage (77.58% of gross wage instead of 62.06%). Persons with chronic diseases are entitled to sickness benefit at 62.06% of their gross wage during the state of emergency and the quarantine. It is paid for up to 60 days and can be extended for the full period of the emergency and quarantine. The period of payment may not be longer than until the end of the quarantine or the state of emergency. All work contracts as well as the self-employed are included in the scheme.

Deferral of health insurance contributions for the self-employed: the self-employed were able to defer the payment of compulsory health insurance contributions during the periods of quarantine. The deferred contributions had to be paid within a period of two years after the end of the emergency situation. If the contributions were not paid within the set timeframe, but self-employed persons received healthcare services during the period at issue (except for emergency services), they had to compensate expenses of the Compulsory Health Insurance Fund.

Compensation of housing heating costs: a larger share of housing heating costs was to be reimbursed for single persons. The measure has been permanent, with no end date foreseen. A larger share of housing heating costs is to be reimbursed for single persons. Compensations for heating cover expenses that exceed 10% of the difference between income and a set threshold. The latter threshold was increased for single persons from 100% to 150% of the state supported income (SSI, EUR 125 per month in 2020).

Deferral of payments for electricity and gas: possibility to defer payment of electricity and gas bills to the public provider or arranging such payments in instalments. Payments could be deferred for a period of up to one year based on a case-by-case decision.

Annex 2

Table 5. Relative poverty nowcast between age groups in Lithuania in 2017–2019 (%).

	2017	2018	2019
Total population	22.9	22.2	22.1
Children (0–17)	23.9	21.2	20.2
Youth (18–24)	19.7	18	18.2
Working age (25–49)	15.7	15	14.8
Older working age (50–64)	20.7	19.9	19.3
Elderly (65+)	37.7	39.1	40.2

Source: authors' calculations
**Note*: Years refer to income year (SILC t-1). Floating poverty line.

Annex 3

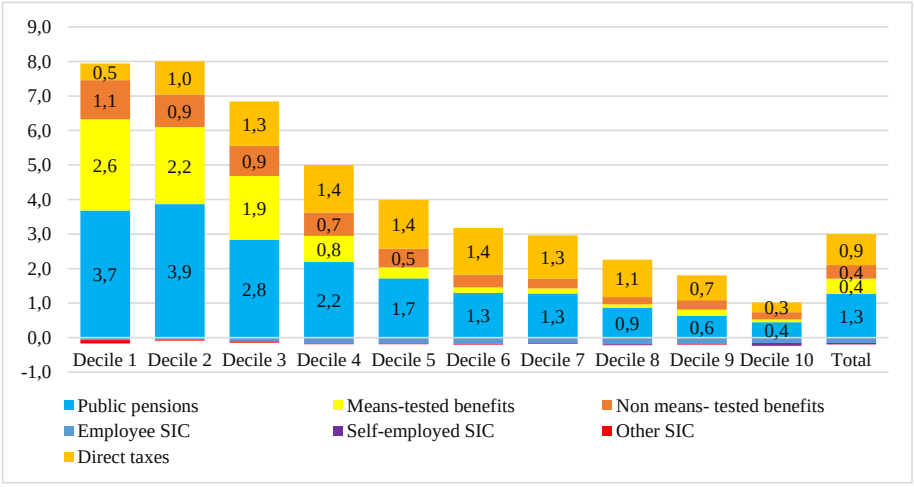

Fig. 6. Policy effects on mean equivalized household disposable income by income component and income decile group in 2019–2020 without Covid-19 package (CPI = 1.0048)*. Automatic stabilization due to social protection system. S*ource*: authors' calculations. **Note*: Calibrated data for 2019 was used. SIC – social insurance contributions. CPI – consumer price index.

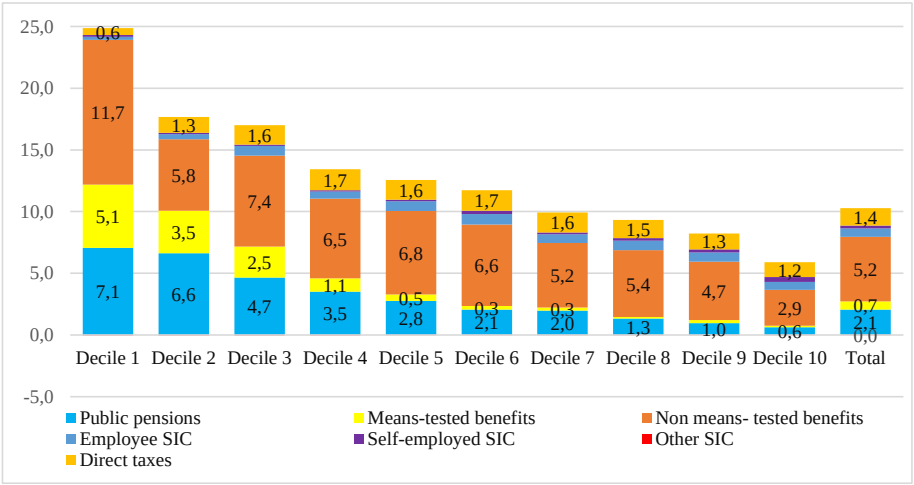

Fig. 7. Policy effects on mean equivalized household disposable income by income component and income decile group in 2019–2020 with Covid-19 package (CPI = 1.0048)* *Source*: authors' calculations. **Note*: Calibrated data for 2019 was used. SIC – social insurance contributions. CPI – consumer price index.

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REZIUMĖ

Skurdo ir nelygybės rodiklių prognozavimas ekonominio augimo ir Covid-19 pandemijos kontekste Lietuvoje

V. Gabnytė, A. Čižauskaitė, J. Navickė

Šio straipsnio tikslas yra pristatyti skurdo ir nelygybės rodiklių prognozavimo metodologiją ir jos rezultatus, atsižvelgiant į ekonominio augimo ir COVID-19 pandemijos kontekstą Lietuvoje. Prognozavimas apjungia mikrosimuliacijų ir apklausos svorių kalibracijos technikas. Mikrosimuliacijoms naudojamas mokesčių-išmokų mikrosimuliacinis modelis EUROMOD, su papildomu Lietuvos komponentu, kuris buvo vystomas Lietuvos Respublikos socialinės apsaugos ir darbo ministerijos. Taip pat naudojami ir Lietuvos banko paskelbti 2020 m. trys ekonominiai scenarijai: greito atsigavimo V-formos scenarijus, vidutinio atsigavimo U formos scenarijus ir lėto ekonominio atsigavimo ištęstos U-formos scenarijus. Rezultatai atskleidžia teigiamas skurdo ir nelygybės mažinimo tendencijas bendroje populiacijoje ir pagal amžiaus grupes esant sparčiam ekonomikos augimui ir gerėjančiai darbo rinkos situacijai 2018–2019 m. Lietuvoje. 2020 m. rezultatai rodo tolesnį santykinio skurdo rizikos lygio ir nelygybės mažėjimą Lietuvoje. Toks numatomas teigiamas skurdo mažėjimas yra pirmiausia nulemtas mažėjančio skurdo rizikos lygio tarp senyvo amžiaus asmenų bei vaikų. Pačios pažeidžiamiausios grupės yra jaunimas (18–24 m.) ir vyresnio amžiaus (50–64 m.) asmenys. Numatoma, kad 2020 m. šių grupių skurdo rizika didės. Vis tik svarbu atkreipti dėmesį, kad skurdo rizikos lygis taip pat mažėjo pirmaisiais praėjusios ekonominės krizės metais. Dekompozicijos pagal demografinius / užimtumo pokyčius ir politikos pokyčius tarp 2019–2020 m. rodo, kad dėl demografinių ir užimtumo pokyčių skurdas ir nelygybė, tikėtina, didės 2020 m. Lietuvoje. Politikos pokyčių poveikis yra progresyvus, palankesnis žemesnes pajamas gaunantiems asmenims ir teigiamai veikia skurdo mažėjimą. Politikos poveikio progresyvumas yra nulemtas karantino laikotarpio, kurio metu vienkartinės išmokos buvo teikiamos didžiajai daliai populiacijos: vaikams, pensinio amžiaus asmenims, darbo ieškantiems asmenims ir savarankiškai dirbantiems asmenims.

Raktiniai žodžiai: prognozavimas; skurdas; nelygybė; COVID-19; Lietuva