

Flash estimates
of income inequalities and poverty indicators for 2021 (FE 2021)
Methodological note

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Acknowledgements:

This methodological paper focuses on the updates to the nowcasting methodology put in place in order to capture the impact of COVID-19 on income inequalities in 2021.

We appreciate the support of National Statistical Institutes, which provided new data on the short term monetary schemes.

The microsimulation results rely on the use of EUROMOD, the European Union tax-benefit microsimulation model coordinated by the Joint Research Centre with the support of the University of Essex and in collaboration with EUROSTAT and national teams. EUROSTAT would like to thank the JRC team for their support and contribution, in particular Silvia De Poli, Chrysa Leventi, Andrea Papini and Fidel Picos. Many thanks also to our colleague Hannah Kiver, which provided detailed information and methodological support for the use of labour market indicators.

EUROSTAT

Aura LEULESCU

Adriano DI GUGLIELMO

Mihaela AGAFITEI

Andrea GALLELLI

With the support of SOGETI service contract "Methodological work for the development of flash estimates":

- *Francesca DEMONTIS*
- *Cyrinus ELEGBEDE*

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1. Introduction

Providing up-to-date social statistics on income poverty and inequality is a priority for the European Commission and for the European Statistical System.

Indicators on poverty and income inequality are based on EU statistics on income and living conditions (EU-SILC). These indicators are an essential tool to prepare the European Semester (the annual cycle of economic policy coordination between EU countries) and to monitor progress on the EU's targets to address poverty and social exclusion.

Early estimates have already been produced since long at EU level on macro-indicators, such as GDP growth and inflation rate. In our case, the focus is on the distributional changes. This implies the use of models that can estimate the full range of income distribution and capture the complex interaction of multiple past and present events, such as the effects of economic and monetary policies, social reforms, shifts in macroeconomic circumstances or demographic changes.

In the aftermath of the 2008 financial crisis, flash estimates on income distribution indicators were put in place to respond swiftly to critical situations. Over the years, different approaches were tested, including macroeconomic models and current income, but most recent releases are based mainly on microsimulation and nowcasting (Bourguignon and Spadaro, 2006; O'Donoghue, 2021). This gives a more accurate analysis of distributional labour and policy effects, and how they combine.

When the COVID-19 pandemic started, several methodological changes had to be made rapidly in order to take into account the shock to employment, the loss of income related to the lockdowns and partial unemployment, and the recovery in the following year. Lately, these methodological changes have been further consolidated and developed in order to release the flash estimates based on income 2021 (FE 2021).

Nowcasting techniques are used to estimate the FE 2021¹ and the distributional impact of COVID-19 by assessing the effects of two main factors:

- 1) The impact on labour market-employment income trends was modelled on detailed distributional information on the loss of jobs and short-term work schemes from the EU-LFS

¹ For Romania, flash estimates are based on **current income information** collected in HBS (Household Budget Survey-RO). This differs from traditional EU-SILC income indicators as information is collected via a small set of questions that refer to the current reference period (e.g. current month).

and administrative data collected by Eurostat on the number of beneficiaries of different wage compensation schemes.

2) The impact of social policies, in particular temporary policy measures adopted in different countries to support household income and workers affected by the economic shutdown. Government transfers are simulated via the EUROMOD tax-benefit model, which takes into account the most recent policy changes adopted during the pandemic.

In the next sections, more details on the specific methodological developments related to the two main impacting factors are provided. First, we describe the labour transitions methodology that was adjusted to account for infra-annual spells of unemployment or periods of absence due to the sanitary crisis. Second, we rely on EUROMOD for estimating the impact of social policies and the extent to which the losses in income from work have been alleviated.

2. Methodological developments and input data

The standard nowcasting methodology to produce flash estimates on income indicators follows two main steps:

1) *Modelling labour updates and market incomes*

The statistics on labour in the standard flash estimates methodology is updated either based on reweighting or labour transitions at individual level. The first consists of deriving a new vector of sample weights in order to meet control totals for the policy simulation year for a set of main socio-demographic variables (Immervoll et al., 2005). The second approach is to model changes in employment by explicitly simulating transitions between labour market states (Figari et al., 2011; Fernandez Salgado et al., 2013; Avram et al., 2011). Depending on the general evolution of employment, updates of income from work are estimated at individual or household level.

2) *Simulating social benefits and taxes*

The simulation of policies is made using EUROMOD *I4.0+*, the European Union tax-benefit microsimulation model. Originally maintained, developed and managed by the Institute for Social and Economic Research (ISER), since 2021 EUROMOD has been maintained, developed and managed by the Joint Research Centre (JRC) of the European Commission, in collaboration with Eurostat and national teams from the EU countries. It 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 (Brewer and Tasseva 2020; Bronka et al., 2020). Income elements simulated by the model include universal and targeted cash benefits, social insurance contributions and personal direct taxes. Data on income that cannot be simulated mostly concern benefits for which entitlement is based on previous contribution history (e.g. pensions) or unobserved characteristics (e.g. disability benefits). These are extracted from the data and updated according to statutory rules (such as indexation rules) or changes to average levels over time².

² More detailed information on EUROMOD and its applications is available here: [4] H. Sutherland and F. Figari, EUROMOD: the European Union tax-benefit microsimulation model. *International Journal of Microsimulation*, (2013), 6(1), 4-26

Effects on the labour market and employment income

To capture the effects of the pandemic in 2020 and in 2021, the methodology to produce early estimates of income inequalities was adjusted to take into account factors that were specific to the COVID-19 crisis.

The first choice was to use *exclusively individual labour transitions*, the preferred method for a labour market shock. Information on labour markets fed into the model was extended to include not only transitions into/out of employment, but also workers under some kind of partial unemployment scheme or furlough. This category includes workers who are still employed, but temporarily absent or working reduced hours, due to the lockdown. They are often covered by short-time work monetary compensation schemes or similar measures (e.g. partial or temporary unemployment schemes, furlough) put in place or activated by the government to safeguard jobs across the EU.

Types of transitions

There are five types of transitions, among which the last one is specific to the current COVID-19 crisis (5).

- 1) From non-employment to employment
- 2) From employment/self-employment to short-term unemployment
- 3) From employment/self-employment to long-term unemployment
- 4) From short-term unemployment to long-term unemployment
- 5) From employment/self-employment to monetary compensation schemes

In terms of data sources, it is important to note a few aspects:

For the first type of transitions (Into/out of employment): We use detailed quarterly LFS data for net changes³ in employment broken down by sex, age, sector of activity and type of contract⁴. This allowed us “to distribute” the labour risks for workers and households at different parts of the income distribution. For FE 2021, due to the entry into force of the [new framework regulation](#) in social statistics, we used the corrected back time series for main indicators alongside more detailed information provided through LFS quarterly microdata. To cope with definition changes and reduce bias related to the break in series, we preferred for FE 2021 to select individuals undergoing transitions by using detailed breakdowns and do not use the individual probability based selection.

³ Net changes are preferred because of the EU-SILC sample size.

⁴ Breakdowns might differ function of the sample size from country to country.

For the second type of transition (into/out partial unemployment or absent), we use a combination of different sources from administrative data and LFS⁵. The primary source contains ad-hoc monthly administrative data collection provided by Member States to Eurostat on the total number of jobs supported by governmental measures. These jobs in public and private sectors are financially compensated, at least partially, by government funds that may transit or not through the employer. The data refers to stocks and the reference period is the end of the month. These data are targets to simulate quarterly transition of workers into/out short-term work schemes. As in our exercise, the distributions are core for assessing income implications we combine aggregated targets from administrative data with proxy indicators on absences and reduced working hours available in LFS quarterly microdata so that we estimate detailed targets further split by sex, age group and activity sector.

Duration of transitions: estimation of yearly spells of unemployment and/or absence from work.

Another key factor during the pandemic was the significant infra-annual (quarterly) changes seen to employment status. Since income from work is a yearly variable, it was important to quantify not only the dichotomous changes in status of employment but also the *duration and quarterly transitions*. The employment income is reduced proportionally to the total hours ‘lost’ either due to (1) spells of unemployment during 2020 and 2021 modelled via quarterly transitions and (2) spells of partial unemployment related to the health measures put in place during the pandemic.

⁵ <https://ec.europa.eu/eurostat/statistics-explained/images/b/b3/Targets.xlsx>

Policies via EUROMOD

As mentioned, the simulation of social policies and schemes put in place to mitigate the impact of the crisis was carried out using EUROMOD. In the period following the crisis related to the pandemic, this tool is particularly effective for two reasons. First, an updated model comprising the labour and social policies for the year under observation is essential for analysing government responses still in place to respond to the crisis in the EU. Second, it enables an agile interaction with the labour dynamics described in the previous sections in this paper. Concretely, EUROMOD labour market adjustment add-on is used to simulate for everyone undergoing a labour transition the policy response in terms of taxes and social benefits, including the short-term schemes adopted in response to the crisis (Christl et al., 2021).

Although compensation schemes play a fundamental role in compensating employment income losses, they have a different weight in the overall disposable income in each country. Furthermore, additional policies such minimum income schemes, child allowances or changes in unemployment benefits and pensions could have an impact on the estimated disposable income. It is worth specifying that the estimation also takes into account these components, based on an integrated methodological framework, which aims to combine labour dynamics and social policies.

A breakdown of the different income components gives a more granular analysis, and consequently, enables users to benchmark the trends observed against multiple target indicators from external sources, with the purpose of a more detailed assessment of the quality of the estimates.

EUROMOD 14.0+, is used to simulate the policies in place in the given policy year and the changes in the income distribution within the period of analysis.

COVID-19 related policies

EUROMOD contains most of the discretionary policy measures exceptionally introduced or activated by national government to address the COVID-19 economic challenges, in particular, policies to preserve jobs and stabilise the wages. During 2021, most of the European countries kept the temporary policies implemented to compensate the income losses due to the pandemic. Only for a few Member States the compensation schemes are not simulated (The Netherlands and Finland provide 100% of compensation via extensions to ordinary labour schemes) or ended in 2021 (Poland). This year was characterised by an

improved situation in the labour market, and therefore, by a reduced number of applicants to the temporary wage compensation schemes. Nevertheless, these policies were still in place and simulated for the majority of the countries and still a valid wage stabiliser.

The design of these compensation schemes differs by country:

- The compensations are paid solely by the State or both by the State and the firm (countries such as Austria, Bulgaria, Czechia, Denmark, Estonia, Lithuania, Poland, Sweden, Slovenia have a compensation paid by the firm simulated in EUROMOD).
- Employees receive either a fixed amount (Greece, Croatia) or a percentage of their employment income or net earnings (Austria) that replaces at least partially their employment income during the period that are unable to work. This percentage is often subject to a minimum (Cyprus, Estonia, Spain, France, Latvia, Slovenia, Slovakia) and/or maximum compensation. This amount can also differ if there are dependent children in the household (e.g. Spain).

Income support to self-employed individuals, such as lump-sum transfers or monetary compensation for the income losses, is simulated for a part of the countries (e.g. Belgium, Bulgaria, Cyprus, Czechia, Denmark, Greece, Spain, Finland, France, Italy, Lithuania, Latvia, Malta, Portugal, Croatia, Slovenia and Slovakia).

Ex ante Quality Assessment - Model assumptions and limitations

It is important to highlight that the uncertainty of the early estimates is particularly high in the current context and a number of caveats should be considered:

- incomplete information and model errors for the estimation of income from work;
- less distributional information used in the modelling of labour transitions due to the break in series in LFS;
- simulation of losses and compensation schemes for self-employed labour data is incomplete and simulations are based on strong assumptions concerning eligibility;
- over-simulation of benefits related to compensation schemes and assumptions of full take-up of benefits - e.g. employees with earnings below a national statutory minimum wage or self-employed can be over-compensated according to the new schemes put in place⁶;

⁶ For more details on the topic see also Fernandez-Macias and Vacas-Soriano (2016).

- lack of information on the informal economy and workers that fell outside the safety net of the tax-benefit system.

The flash estimates are essentially model based and rely on several assumptions and caveats so they cannot perfectly capture changes in the EU-SILC estimates. Although there are still limitations in the current methodology and its ability to replicate changes in EU-SILC, it can provide an early indication of the direction of change.

For *quality assessment and validation purposes*, a broader set of indicators from auxiliary sources is used: the evolution of related indicators used in the estimation (e.g. employment, social benefits and taxes simulated via microsimulation); consistency with similar income statistics at aggregated level in sectoral accounts (such as wages and salaries, mixed income, household disposable income and property income); time series analysis of EU-SILC.

Connecting the estimated changes in the income distribution with observed evolutions in related indicators (e.g. employment trends, total household income in national accounts, national data) is a key step in the quality assessment framework. This implies the triangulation of the different sources available, the analysis of inconsistencies and adjustment of the models in order to ensure to the extent possible a consistent estimation of different income components and indicators. This analysis is further supported by the information on relevant changes in social policies described in EUROMOD country reports.⁷

Furthermore, bilateral consultations with the Member States are carried out before the estimates are published. The aim of the consultation is to collect feedbacks and comments on the plausibility of the results directly from the national statistical institutes, and in some cases, where available, to compare the results with national early estimates.

3. Conclusions

During the Covid-19 pandemic, *a more agile production system* was put in place with the use of infra-annual data, new data sources and the use of forecasting models to enable early estimates on employment income to be published at the end of 2020, and a full release of poverty indicators in mid-2021 (FE 2020) and mid-2022 (FE 2021).

A cross-domain and inter-institutional collaboration was essential in order to produce and validate the early estimates. The estimation process is conducted in collaboration with the JRC and with national EUROMOD teams to produce the simulation of taxes and benefits.

⁷ More info can be found at the link <https://euromod-web.jrc.ec.europa.eu/resources/country-reports>

Updated versions of the model are released at different times of the year, in order to incorporate the latest available policies and reflect current social and economic trends.

Quality matters for EUROMOD were addressed in coordination with the above mentioned organizations and current work focuses on further improvements. For instance, full benefit take-up assumptions and possible biases related to employment income below statutory minimum wages might lead to over-simulation of benefits and further analysis is ongoing.

Furthermore, as mentioned before, bilateral consultations with the Member States are carried out before the estimates are published.

Such a *multi-source approach* was essential during the COVID-19 pandemic, given that some widely used indicators could not account for sudden changes due to the crisis. In some cases, even methodological adjustments were required in order to provide a coherent analysis of the current changes in important social and economic factors⁸.

This broader approach to quality assessment, which included involvement of different actors, broadening of data sources and analysis of under-explored factors, was beneficial to the improvement of the methodological framework, that will be further addressed with ex-post analysis when observed data will become available.

An extended publication of several supporting indicators on income from work and simulated benefits was essential for the communication of the estimates. They enable users to disentangle the labour market impact and the effects of policy measures put in place by governments to support household income and workers most affected by the pandemic.

Overall, though they are experimental, the early estimates are used by both policymakers and other EUROMOD users and researchers to make an initial assessment of the evolution of income across the distribution during the pandemic in 2020 and 2021.

⁸ Such a multi-lateral consultation approach was, for instance, particularly successful for the registration of work compensation schemes during the pandemic. The comparison of hourly labour cost data, total wages and salaries and other labour statistics from the national EUROMOD teams were helpful to feed into the analysis of the changes to employment income during the COVID-19 crisis, resulting in improved simulations for 2021.

4. Annex 1 - Current income

For Romania, FE 2021 are based on HBS data⁹. The Household Budget Survey (FBS) is organized as a continuous quarterly survey over a period of three consecutive months, based on a sample of 9504 permanent dwellings, divided into monthly independent sub-samples of 3168 permanent dwellings (per year the sample cover 38016 households). Response rate is around 80% -85%. The survey covered people with permanent residence in Romania, members of households in all counties and in Bucharest. Main variables collected are expenditures, incomes, endowment with durable goods and other demographic variables. Data are collected by face-to-face interview and self-registration for the diary. The support of data collection is the household questionnaires (CG) and the household diary (JG). The reference period for the data registration in the survey questionnaire and household diary is the calendar month (from the first to the last day of the month).

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