Methodological note - updates 2020

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EUROSTAT
Directorate F: Social statistics
Unit F1: Social indicators; methodology and development; Relations with users

http://ec.europa.eu/eurostat
1. **Nowcasting methodology in the context of COVID-19**

EUROSTAT is usually releasing the flash estimates on the yearly change of the income indicators year N in July/September year N+1. In the current context, it was considered important to release preliminary analysis on the COVID-19 effects on the income distribution already in 2020. The current note provides an overview of the methodological updates done for the purpose of these preliminary estimates.

While the study is still based on microsimulation, the standard nowcasting methodology is re-used in the COVID-19 context based on a series of adaptations and model assumptions. It is important to note that the level of uncertainty is higher than for the standard flash estimates given the use of incomplete data (second wave is not taken into account in the estimations) and of forecasting techniques in the model. Data presented should be interpreted in terms of general trends and magnitude and precise figures should not be overemphasised.

An important advantage of the current methodology of nowcasting is that it incorporates in the simulation detailed microdata on the two main impacting factors:

1) **the effects on the labour market** and particular workers at risk due to the COVID-19 economic shutdown and the reduction of the economic activity.

2) **the impact of temporary policy measures** introduced in different countries in order to support households’ income and workers affected by the COVID-19 economic shutdown. The use of a tax-benefit microsimulation model is essential in current conditions.

The analysis focused on employment income, both wages and self-employment, on which more information is available at the moment. The use of microsimulation allows both decomposing income losses by main types of labour transitions and distributing across different sub-groups of the working population.

2. **Effects on the labour market**

The update of labour in the standard flash estimates methodology is either based on reweighting or labour transitions at individual level. The first one consists in the derivation of 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). In the second one changes in employment are modelled by explicitly simulating transitions between labour market states (Figari et al., 2011; Fernandez Salgado et al., 2013; Avram et al., 2011). In the case of the flash estimates, this is a country dependent choice based on the ability of the model to accurately capture SILC changes in the past.
For the analysis of the COVID-19 effects in 2020, this methodology was modified in order to take into account specific factors to the current crisis. The first choice was to rely exclusively on individual labour transitions, a methodology preferred in the case of a labour market shock.

Secondly, the information on the labour markets entering the model was extended to include not only transitions into/out of employment, but also workers under some kind of partial employment. In the latter category there are workers still employed, but absent or with reduced working hours due to the lockdown. These are often covered by short-time work schemes or similar measures (e.g. partial or temporary unemployment schemes, furlough) put in place or activated by the government in order to preserve jobs across EU.

Transitions to unemployment

For the estimations of the number of individuals undergoing transitions to unemployment, we use as targets the partially observed annual value of the employment rate for 2020, obtained by grouping its quarterly forecasts. These forecasts are computed via a Vector AutoRegressive Moving-Average processes with eXogenous regressors (VARMAX) model, taking into account 2 breakdowns (gender and age groups). The VARMAX method enables to model the dynamic relationship both between the dependent variables and also between the dependent and independent variables. Our system of equations is composed by:

- two quarterly dependent variables Employment rate and a restricted “inactive rate” based on the so-called “inactive close to the labour market” from the LFS dataset. The latter group refers to individuals who might be associated to the labour force, but who are not recorded as such because they do not fulfil one of the three ILO requirements of availability to work, work search and being not employed. It was included in order to address the specificities of the COVID crisis, with a large number of people going from employment to inactive due to restrictions related to the lockdown;
- while on the right side of the model, by one regressor with more recent data availability: the unemployment rate by sex and age (une_rt_m). Which is a monthly regressors, that has been extended via an ARIMA model until December 2020, then grouped by quarters and finally used as covariates in the above mentioned VARMAX model.

Finally, the quarterly forecasts have been grouped in order to estimate the annual values of the employment rate 2020 by age (16-24; 25-65) and gender. As a final adjustment, we take also in consideration the proportion of temporary workers and self-employed in the total number of newly unemployed/employed based on quarter 2 LFS longitudinal data in order to better “distribute” the labour market effects.

1 This last group of people is called the potential additional labour force. For more details, see link.
2 At the moment of the analysis, September 2020 was the latest observed value for most of the countries.
3 Q1 and Q2 observed; Q3 and Q4 estimated.
It worth to say that also other monthly regressors have been tested: Short-term business statistics / Production in industry; Harmonised index of consumer prices (HICP), but the more parsimonious and better performing option has been selected for the final release.

This analysis does not include at this stage information on the second lockdown.

Transitions to short term work schemes (absent/reduced hours)

To estimate the transitions to short-term work schemes for employees, we use a combination of different sources from administrative data and LFS\(^4\). The primary source contains monthly administrative data provided by Member States to Eurostat via an ad-hoc data collection on the total number of jobs supported by governmental measures. These are jobs in public and private sectors that 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. As in our exercise the distributions are core for assessing income implications we combine overall targets from administrative data with proxy indicators on absences and reduced working hours available\(^5\) in LFS quarterly microdata. This allowed further disaggregating the targets for short-term schemes by sector (when not available in administrative data), gender and age. In addition, survey data from LFS covers also information on self-employed by sector. It is important to note that the indicator for self-employed represents mainly a measure of the effect of the pandemic in terms of reduced working hours. It is less straightforward to link the number of self-employed absent with the number of beneficiaries of different work schemes put in place by the government.

Finally, these overall trends are translated in distributional information by assessing the risk of individuals either to lose their job (1) or to have reduced working time in quarter 2 (2). We model via a logistic regression at individual level for all countries these probabilities. The main impacting factors used in the model are age groups, sex, economic sector, occupation and type of contract (temporary vs permanent). Probabilities are finally imputed in the baseline SILC file using the common labour and demographics characteristics. The baseline SILC file used for this risk analysis has income and labour variables updated to 2019 (the same microdata file used for the flash estimates 2019). The labour information is then updated from 2019 to 2020 based on the aforementioned probabilities. This allows “to distribute” the labour risks for workers and households at different parts of the income distribution.

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\(^5\) See appendix for more details on the definition of the indicators
3. Policies via Euromod

The update of policies is done via EUROMOD, the European Union tax-benefit microsimulation model, maintained, developed and managed by the Institute for Social and Economic Research (ISER) at the University of Essex and the Joint Research Centre (JRC) in the European Commission, in collaboration with national teams from the EU Member States.

EUROMOD is used to simulate changes in the income distribution within the period of analysis. All simulations are carried out on the basis of the tax-benefit rules in place on the 30th June of the given policy year.

Income elements simulated by the model include universal and targeted cash benefits, social insurance contributions and personal direct taxes. Income elements 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 read from the data and updated according to statutory rules (such as indexation rules) or changes in their average levels over time. Both contributory and non-contributory unemployment benefits are simulated in the model. In some countries, an effort has been made to address issues such as tax evasion and benefit non-take-up. More detailed information on EUROMOD and its applications is available here.

In the current context, 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 (wage compensation schemes) and the income support to self-employed.

In EUROMOD, there are 25 EU countries with a wage compensation scheme for employees implemented to mitigate the loss of employment income. The exceptions are the Netherlands and Finland:

- EUROMOD does not simulate the wage compensation scheme in the Netherlands, because employees will continue to receive 100% of their original wage even if in monetary compensation.
- Finland has been excluded from the chart due to a specific difference with the other countries. Compensation schemes are not in place for employees. Temporary laid off employees can apply for earnings-related unemployment benefit, if they are members of an unemployment fund and meet a specified work requirement. Otherwise, they can apply for unemployment benefit from the Kela (The National Social Insurance Institute).

These schemes provide a monetary compensation to employees absent from work due to COVID-19 restrictions. The design of these compensation schemes differ by country:

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• The compensation are paid solely by the State or both by the State and the firm (10 countries\(^7\) have a compensation paid by the firm simulated in EUROMOD).
• Employees receive either a fixed amount (EL, HR, MT) or a percentage of their employment income or net earnings (AT, IE) that replaces at least partially their employment income during the period that are unable to work. This percentage is often subject to a minimum (BE CY EE ES FR LU LV PT SI SK) and/or maximum compensation. This amount can also differ if there are dependent children in the household (e.g. ES).

It should be noted that in countries where a minimum compensation is given based e.g. on minimum wage, EUROMOD could over-simulate the replacement income for individuals with low incomes (e.g. employees earnings below minimum wage which are actually not having a contract). In addition, sometimes not all eligibility criteria can be observed in the data and therefore the simulation is less accurate.

The maximum duration of the wage compensation schemes is 4 months, focusing on policies available until the end of June 2020. Therefore it does not include changes to wage compensation schemes that were agreed from July onwards. The estimated of the number of “hours-month” lost is based on the evolution of the share of people affected between March and June based on LFS data.

\(^{7}\) AT BG CZ DK EE LT PL PT SI SK
4. Appendix: main definitions new indicators and variables

Main indicators for assessing labour market risks

We consider a person employed in quarter 1 is losing the job in two different situations 1) if the employed transitions to unemployment defined according to the ILO definition or 2) if the employed person transitions to inactive but remains close to the labour market or the self-defined status is unemployed. Three categories of discouraged persons are identified based on whether they are or not available to start a job, their willingness to get a job and their approach to seek an employment, similar to the labour market slack indicator. Overall, persons are those persons who were without work and available for work but did not look for work for believing that they have no chance in getting an employment. There was a clear increasing trend for this category for most countries during quarter 2, as it is likely that individuals could not search for work or were not available due to the lockdown. These are not counted as unemployed according to the ILO concept but are included in our lose job indicator.

The second indicator for labour market risks it is essential for any microsiulation exercise in the current context. It is composed of a) temporary layoffs or people absent from work and b) people with reduced working hours. One of the immediate and tangible effect is the reduction in the number of hours actually worked by employees or even temporary cessation of activity in many sectors of the economy. When available the explicit variable on absence due to COVID-19 is used. It is included on an exceptional basis in the second quarter of LFS survey in some countries. If not available, a derived indicator on absences is computed based on core LFS variables. The later option of the indicator was validated using two criteria: 1) most countries had a larger than ten fold increase between Jan and April for absences in these categories 2) it was rather close to the COVID-19 question on absences for countries where the explicit questions was asked.

Explanatory and disaggregation variables

In the table below there are the main variables used to estimate the probability to lose the job or the to be absent/have reduced hours. These were also used for presenting the figures by different sub-groups.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Age at the time of interview</td>
<td>Continuous</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Categorical</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>Occupation 1)</td>
<td>High skilled white collar (ISCO88 codes 1,2 and 3)</td>
<td>Ordinal</td>
</tr>
<tr>
<td></td>
<td>Low skilled white collar (ISCO88 codes 4 and 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High skilled blue collar (ISCO88 codes 6 and 7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low skilled blue collar (ISCO88 codes 8 and 9)</td>
<td></td>
</tr>
<tr>
<td>Economic sector (NACE rev2)</td>
<td>A: Agriculture, forestry and fishing</td>
<td>Categorical</td>
</tr>
<tr>
<td></td>
<td>B-E: Manufacturing, mining, and other industry</td>
<td></td>
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<tr>
<td></td>
<td>F: Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G: Wholesale and retail trade; repair of motor vehicles and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H: Transportation and storage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I: Accommodation and food service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>J: Information and communication</td>
<td></td>
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<tr>
<td></td>
<td>K-N: Finance and insurance; real estate; professional, scientific</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O-U (excluding R): Public administration, defence, education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R: Arts and entertainment</td>
<td></td>
</tr>
<tr>
<td>Employees</td>
<td>Employee with permanent contract</td>
<td>Categorical</td>
</tr>
<tr>
<td>Self-employed</td>
<td>Employee with temporary contract</td>
<td></td>
</tr>
</tbody>
</table>

1) Occupation according to International Standard Classification of Occupation (ISCO_88(COM)) at 1 digit level

- 1: Legislators, senior officials and managers
- 2: Professionals
- 3: Technicians and associate professionals
- 4: Clerks
- 5: Service workers and shop and market sale workers
- 6: Skilled agricultural and fishery workers
- 7: Craft and related trades workers
- 8: Plant and machine operators and assemblers
- 9: Elementary occupations
- 10: Armed forced
5. References


