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Nowcasting risk of poverty and low work intensity in Europe

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Nowcasting risk of poverty and low work intensity in Europe[1]

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Abstract

Very low work intensity and at-risk-of-poverty are two of the three indicators used for monitoring progress towards the Europe 2020 poverty and social exclusion reduction target. Their timeliness is critical for tracing the effectiveness of policy interventions towards reaching this target. However, due in part to the complicated nature of microdata collection and processing, official Eurostat estimates of these indicators become available with a significant delay. This paper presents a method of estimating ('nowcasting') very low work intensity and poverty risk using the tax-benefit microsimulation model EUROMOD based on EU-SILC data and combined with up-to-date macro-level statistics from the Labour Force Survey. The method is applied to 12 EU Member States for the period 2009-2013. Its performance is assessed by comparing the EUROMOD estimates with the official Eurostat statistics for the years for which the latter are available. The most important measurement issues of the work intensity indicator that are relevant in the context of nowcasting are also discussed.

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Keywords: nowcasting, low work intensity, at-risk-of-poverty, European Union, microsimulation.

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1. Introduction

Three indicators are used for monitoring progress towards the Europe 2020 poverty and social exclusion reduction target: at-risk-of-poverty, very low work intensity and severe material deprivation. The timeliness of these indicators is critical for monitoring the effectiveness of policies. However, partly due to the complexity of the income micro-data collection process, estimates of the number of people at risk of poverty and social exclusion are published by Eurostat with a 2 to 3 year delay.

This paper relies on the method of estimating ('nowcasting') the current distribution of income (and related indicators) by using a tax-benefit microsimulation model based on EU-SILC data, combined with up-to-date macro-level statistics. Previous applications of this method focused primarily on nowcasting indicators of poverty risk (see e.g. Navicke et al., 2014; Leventi et al., 2014). In this paper we broaden the scope of research by attempting to nowcast another dimension of the EU-2020 poverty and social exclusion target: very low work intensity.

We use the EU-wide tax-benefit microsimulation model EUROMOD[2] with input data based on EU-SILC 2010, reporting incomes earned in 2009. Following as closely as possible the Eurostat methodology, we construct our own work intensity indicator. We discuss measurement issues of the EU indicator that are important in the context of nowcasting. We compare the EUROMOD work intensity estimates for the base year (i.e. 2009) with the official estimates from Eurostat for the same income reference period and identify the main reasons for observed discrepancies.

EUROMOD work intensity and at-risk-of-poverty estimates for years beyond 2009 are based on changes in employment modelled by explicitly simulating transitions between labour market states. Individuals are selected based on their conditional probabilities of being employed rather than being unemployed or inactive. The total number of observations selected for transitions each year corresponds to the relative net change in employment levels by age group, gender and education (a total of 18 strata) as shown in the Labour Force Survey (LFS) macro-level employment statistics. The performance of the method is assessed by comparing the EUROMOD estimates with the official Eurostat figures for the years for which the latter are available.

In the context of nowcasting, modelling work intensity is important for two reasons. First, it helps to assess the adequacy of the labour market adjustment tool developed for nowcasting risk of poverty. Capturing correctly the distribution of employment and unemployment across households is a prerequisite for estimating changes in distribution of household disposable income. Second, given that the Europe 2020 poverty reduction target is three-dimensional, nowcasting two out of the three components will facilitate the monitoring progress of the EU Member States towards meeting the target.

The paper presents estimates of at risk of poverty rates and work intensity for 2009-2013 for 12 EU Member States: Germany, Estonia, Greece, Spain, France, Latvia, Lithuania, Austria, Poland, Portugal, Romania and Finland. Over the period in question, these countries

[2] For further information on EUROMOD and its applications see Sutherland and Figari (2013).

experienced differing economic conditions: some of them have suffered a serious reduction in economic activity and employment whereas others have been affected relatively less.

The structure of the paper is as follows: In section 2 the method for nowcasting poverty risk and very low work intensity using microsimulation is explained. Section 3 discusses the definition of work intensity, explains how it was adopted in the EUROMOD framework and highlights possible sources of divergence between EUROMOD and Eurostat estimates in the base year. Section 4 addresses comparability of LFS and SILC employment statistics. Section 5 presents the EUROMOD predictions of very low work intensity beyond the base year and discusses the implications of the accuracy of these predictions for nowcasting poverty risk. Section 6 concludes by summarising the most important findings of this research and by reflecting on the main limitations of the nowcasting approach.

2. Nowcasting methodology

This section presents the method used for nowcasting work intensity and at-risk-of-poverty estimates for years beyond 2009. It builds on the methodology developed in Navicke et al. (2014) and Leventi et al. (2014) for nowcasting indicators of poverty risk. The term 'nowcasting' refers to estimation of current indicators using data on a past income distribution. The data are adjusted in an attempt to capture the most important macro-economic developments, policy changes and the complex ways in which these two factors interact with each other.

Accounting for labour market changes

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). Observations are selected based on their conditional probabilities of being employed rather than being unemployed or inactive. A logit model is used for estimating probabilities for working age (16-64) individuals in the EUROMOD input data (i.e. data based on EU-SILC 2010). In order to account for gender differences in the labour market situation, the model is estimated separately for men and women. Students, working-age individuals with permanent disability or in retirement and mothers with children aged below 2 are excluded from the estimation, unless they report employment income in the underlying data. Explanatory variables include age, marital status, education level, country of birth, employment status of partner, unemployment spells of other household members, household size, number of children, region of residence and urban (or rural) location. The specification of the logit model used and the estimated coefficients are reported in the Appendix (Tables A2-A4).

The weighted total number of observations that are selected to go through transitions corresponds to the relative net yearly change in employment levels by age group, gender and education (a total of 18 strata) as shown in the LFS. Macro-level LFS statistics are used as they are the most up-to-date source of information on employment in the EU. Changes from short-term to long-term unemployment are modelled based on a similar selection procedure (i.e. by using LFS figures on long-term unemployment as an external source of information). This transition is also critical due to its implications for eligibility and receipt of unemployment benefits. Transitions to and from inactivity are modelled implicitly through restricting eligibility for unemployment benefits, according to the prevailing rules.

Labour market characteristics and sources of income are adjusted for those observations that are subject to transitions. In particular, employment and self-employment income is set to zero for individuals moving out of employment. For individuals moving into employment, earnings are set equal to the mean among those already employed within the same stratum.

Note that employment adjustments are sufficient to estimate changes in the work intensity indicator. The remaining steps are aimed at linking changes in employment to changes in individual and household income.

Updating Market Incomes and Simulating Policies

After modelling employment transitions, the next step is to update non-simulated income beyond the income data reference period and to simulate tax and benefit policies for each year from 2009 to 2013 using EUROMOD.

Updating incomes and non-simulated benefits is carried out in EUROMOD using factors based on available administrative or survey statistics. Specific updating factors are derived for each income source, reflecting the change in the average amount per recipient between the income data reference period and the target year. In order to capture differential growth rates in employment (or self-employment) income, updating factors are disaggregated by economic activity and/or by economic sector if such information is available.

After updating market income and other non-simulated income sources, EUROMOD simulates (direct) tax and benefit policies for each year from the base year up to 2013. All simulations are carried out on the basis of the tax-benefit rules in place on the 30th June of the given policy year. In order to enhance the credibility of estimates, an effort has been made to address issues such as tax evasion and benefit non take-up. However, such adjustments are not possible to implement in all countries due to data limitations.[3]

Calibrating estimates

The last methodological step involves an attempt to account for differences between EUROMOD and EU-SILC estimates of household income in the data reference year. The main reasons for these discrepancies are related to the precision of the simulations when information in the EU-SILC data is limited, benefit non take-up and tax evasion corrections performed in EUROMOD and small differences in income concepts and definitions.[4]

In order to account for these differences, a calibration factor is calculated for each household. The factor is equal to the absolute difference between the value of equivalised household disposable income in EU-SILC 2010 and the EUROMOD estimate for the same period and

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[3] Detailed information on the scope of simulations, updating factors, non take-up and tax evasion adjustments is documented in the EUROMOD Country Reports (see: https://www.iser.essex.ac.uk/euromod/using-euromod/country-reports).

[4] For more detailed information see Figari et al. (2012) and Jara and Sutherland (2013).

income concept. For consistency reasons, the same household specific factor is applied to all later policy years.

3. The work intensity indicator

Definition

According to Eurostat's definition, the work intensity of the household refers to the number of months that all working age household members have been working during the income reference year as a proportion of the total number of months that could theoretically be worked within the household (Eurostat, 2012). The calculation of the indicator consists of the following steps.

a. The relevant working age population is defined. It includes individuals aged 18-59, excluding students aged 18-24.
b. For each working age individual the total number of months in full-time and part-time work in the income reference period is calculated. Before computing the sum, months in part-time work are adjusted for weekly working hours.[5]
c. The household level measure of work intensity is obtained by adding up the number of months in work for all working age household members and expressing it as a proportion of the total available months (12 per working age person).
d. Households where working-age adults work less than 20% of their total work potential during the year are called *(quasi-)jobless households* (or households with *very low work intensity*).

There are two issues that complicate the estimation of the work intensity indicator. First, usual weekly working hours in the main and secondary jobs (variables PL060 and PL100) are reported for the data collection period and only for those individuals whose main current economic status is employment or self-employment. Second, the number of months in work is missing for some adult respondents in SILC. The SAS code developed by Eurostat for work intensity calculations includes imputations of these key variables.[6] However, the results of these imputations are not kept in the UDB SILC microdata, and therefore are not available for external users. The imputation strategy is described in the Appendix.

Following the Eurostat methodology we have developed our own code in Stata to be able to reproduce work intensity estimation in EUROMOD. We have tested the performance of the code on three EU-SILC datasets: 2010-5, 2011-3 and 2012-1. The results of this test are shown in Table 1. The code manages to replicate Eurostat's estimates with a very high degree of accuracy. For seven countries out of twelve the estimates are exactly the same. For the remaining five the deviations are within 0.3 percentage points and are mainly due to rounding errors.

[5] The adjustment factor is equal to weekly working hours divided by 35. The adjustment is only made if hours are below 35.
[6] Available on CIRCABC (version dated with 05/10/2011).
https://circabc.europa.eu/w/browse/f16c38bd-1314-4dee-9cdf-e79a5f0ffd72

Table 1: Proportion of population (0-59) living in households with very low work intensity, EUROSTAT and own calculations, EU-SILC 2010-2012

Country	SILC 2010 (2009 incomes)		SILC 2011 (2010 incomes)		SILC 2012 (2011 incomes)	
	Eurostat[1]	Own[2]	Eurostat	Own	Eurostat	Own
DE	11.2	11.3	11.2	11.2	9.9	10.0
EE	9.0	9.0	10.0	10.0	9.1	9.1
EL	7.6	7.6	12.0	12.1	14.2	14.3
ES	10.8	10.9	13.4	13.5	14.3	14.5
FR	9.9	9.9	9.4	9.4	8.4	8.4
LV	12.6	12.6	12.6	12.6	11.7	11.7
LT	9.5	9.2[3]	12.7	12.7	11.4	11.5
PL	7.3	7.3	6.9	6.9	6.9	6.9
PT	8.6	8.7	8.3	8.3	10.1	10.3
RO	6.9	6.9	6.7	6.7	7.4	7.4
AT	7.8	7.8	8.1	8.1	7.7	7.7
FI	9.3	9.3	10.0	10.0	9.3	9.3

Notes: 1. Eurostat statistics [ilc_lvhl11] retrieved on September 26, 2014.
2. Own calculations based on the latest available UDB EU-SILC microdata: SILC 2010-5, SILC 2011-3 and SILC 2012-1.
3. This discrepancy is due to revisions of cross sectional weights in LT SILC that are not yet included in UDB SILC 2010-4.

Issues of concern

Ward and Ozdemir (2013) offer a critical assessment of the work intensity indicator, focussing on the implications of the age group taken to be of working-age, the treatment of students, the threshold defined to denote very low work intensity, the treatment of missing values and workless households with positive income from employment. Here we focus on the latter two issues, as they proved to be important for our analysis.

The key variable in the calculation of the work intensity indicator is the number of months in work. However, not all EU-SILC respondents report this information. The strategies that have been developed in order to cope with non-response and missing information vary between the countries studied.[7] In Germany, Greece, Portugal and Romania the observations affected by non-response are identified as *'interviews not completed'*.[8] Variables for both months in work and employment income are coded as missing, and it is up to users to impute appropriate values for both. Other countries (i.e. Estonia, Spain, France, Latvia, Lithuania, Poland and Austria) provide imputed income in place of missing values. In this case the relevant observations are identified as '*interviews completed from full-record imputation*'. However, the number of months in work still remains missing in most of them. Out of the seven countries in this group, only Austria provides imputed number of months along with imputed income.

[7] No strategy was adopted for Finland, as there were no such cases.
[8] Data status is reported in the UDB SILC variable RB250.

The proportion of non-respondent individuals and the approach countries take to address this issue have an impact on the quality of the work intensity indicator. The imputation strategy for missing observations adopted by Eurostat also has a non-negligible effect on the estimates in some countries; if a different imputation strategy is adopted, the calculated indicators diverge from the official figures. In most countries the number of affected observations is below 1% of the samples. The exception is Poland, where about 6-7% of the samples are affected (in EU-SILC 2010-2012). The proportion also exceeds 1% in Spain (in EU-SILC 2010) and Greece (in EU-SILC 2011 and EU-SILC 2012). Detailed information on non-response rates in the 12 EU countries studied is provided in Table 2.

Table 2: Proportion of observations affected by non-response in EU-SILC 2010-2012

Country	Data status	Identification in EU-SILC	EU-SILC 2010-5	EU-SILC 2011-3	EU-SILC 2012-1	Employment income[1]	Months in work[2]
DE	not completed	RB250 >= 21 & RB250 <= 33	0.60	0.59	0.66	missing	missing
EE	full-record imputation	RB250 == 14	0.75	0.58	0.90	imputed (zero or positive)	missing
EL	not completed	RB250 >= 21 & RB250 <= 33	0.59	1.44	2.01	missing	missing
ES	full-record imputation	RB250 == 14	1.60	0.77	0.54	imputed (zero or positive)	missing
FR	full-record imputation	RB250 == 14	0.65	0.84	0.69	imputed (zero or positive)[3]	missing
LV	full-record imputation	RB250 == 14	0.67	0.79	0.90	imputed (zero or positive)	missing
LT	full-record imputation[4]	RB250 == 14	0.07	0.00[5]	0.02	imputed as zero	zero (SILC 2010-4), missing (SILC 2012-1)
PL	full-record imputation	RB250 == 14	6.66	6.73	5.99	imputed (zero or positive)	missing
PT	not completed	RB250 >= 21 & RB250 <= 33	0.74	0.36	0.09	missing	missing
RO	not completed	RB250 >= 21 & RB250 <= 33	0.37	0.23	0.33	missing	missing
AT	full-record imputation	RB250 == 14	0.47	0.51	0.08	imputed (zero or positive)	imputed (zero or positive)
FI	(all completed)	RB250 >=11 & RB250 <=13	0.00	0.00	0.00	-	-

Notes: [1] EU-SILC variables PY010G and PY050G.
[2] EU-SILC variables PL073, PL074, PL075 and PL076.
[3] All missing observations are imputed as zero in SILC 2011-3.
[4] All interviews completed in SILC 2011-3.
[5] Break in series.

It should be noted that if non-response rates and/or the treatment of these cases change across years, this may create breaks in the work intensity measure across time.[9] Nowcasting cannot capture the dynamics of the work intensity indicator across time if such breaks exist. Examples of countries where this might have been the case are Greece (where the proportion of affected observations has been rising significantly from EU-SILC 2010 to EU-SILC 2012), France (where employment income for missing observations was coded as zero in EU-SILC 2011 but not in EU-SILC 2010 and 2012) and Austria (where non-response decreased substantially from EU-SILC 2011 to EU-SILC 2012, mostly due to switching to data collection from administrative registers).

Another source of concern related to the accurate measurement of the work intensity indicator stems from the existence of observations with inconsistent information on employment income and number of months in work. Two types of inconsistencies exist: (1) income from work is positive but months in work are zero; (2) income from work is zero while positive months in work are reported. The proportion of observations with inconsistent information on employment income and number of months in work in EU-SILC 2010-2012 is presented in Table 3. Inconsistency of type (1) is relatively high in France, Latvia, Lithuania and Finland, whereas inconsistency of type (2) is more common in Lithuania and Poland.

Table 3: Proportion of observations aged below 60 with inconsistent information on employment income and number of months in work in EU-SILC 2010-2012

Country	Positive income, zero months in work in EU-SILC			Zero income, positive months in work in EU-SILC		
	2010-5	2011-3	2012-1	2010-5	2011-3	2012-1
DE	3.2	3.3	3.6	0.2	0.7	0.3
EE	5.0	5.2	4.4	0.9	0.9	1.0
EL	0.8	0.4	0.5	0.0	0.0	0.0
ES	0.9	1.0	1.0	1.6	1.7	1.2
FR	7.5	7.0	6.8	0.7	0.8	0.6
LV	6.8	6.4	7.6	1.0	0.5	0.6
LT	5.3	1.8[1]	7.5	3.3	3.6[b]	1.9
PL	1.0	1.0	1.1	5.0	4.7	4.5
PT	0.7	0.7	1.5	1.6	1.4	2.7
RO	0.9	0.9	2.4	2.2	2.3	2.1
AT	4.6	4.6	7.9	0.3	0.4	3.8
FI	7.3	7.5	7.5	1.4	1.4	1.2

Note: [1] Break in series.

There are several reasons why such inconsistencies are observed in the data. First of all, only the main economic activity of individuals is reported in EU-SILC. Therefore, students, part-time retired, unemployed or disabled may report some income from work, while their main activity is not employment.[10] Inconsistencies of type (2) may reflect situations where a person is an unpaid

[9] Such breaks are difficult to identify and they are usually not reported by Eurostat.

[10] If information on income is provided from registers rather than interviews, inconsistency between the main economic status and income is more likely to occur. This is clearly visible in Table 3 for countries that collect information on income (at least partially) via registers, i.e. France, Latvia, Lithuania and Finland. In Austria the

family worker, is on maternity/childcare/sickness leave but still is counted as employed, is temporarily absent from work for another reason, or if the wages were delayed/not paid out. Finally, there also might be a bias in recalling correctly activities in each month of the previous year.

As pointed out in Ward and Ozdemir (2013), the existence of positive employment income implies that these people were actually working for some time, and the official indicator fails to capture this proportion of paid work performed by individuals. In the context of nowcasting, this poses additional problems. First, if people with positive income and zero months in work are not counted as employed, they remain out of the scope of labour market adjustments (i.e. they will not experience any changes in their employment status throughout the modelling period). Second, a measure of employment that focuses only on the main economic status does not correspond to the standard LFS definition. Therefore, modelling employment changes in SILC using LFS employment statistics may result in biased estimations. Differences between employment measures in SILC and LFS are discussed in more detail in Section 4.

Base year results

Having created a code that replicates the official EU indicator and being aware of the measurement issues of this indicator, we proceed by estimating work intensity of households based on EUROMOD output data for the base year.

The underlying micro data for all countries studied here are drawn from EU-SILC 2010 (2009 incomes). EU-SILC data is adjusted for EUROMOD needs.[11] The adjustments include imputation of missing values (including income variables if those are missing) and some adaptation of variables observed in the data collection period to the income reference period.[12] Information on weekly working hours and months in work is also imputed and partially synchronized with observed or imputed income. These imputations are largely country specific and are driven by the needs of the tax-benefit system of each country.

In what follows we adopt three approaches to calculate work intensity on EUROMOD data. First, we estimate work intensity using *standard* EUROMOD output data (containing country specific imputation of key variables). Our second approach is to modify EUROMOD input data by employing exactly the same imputation strategy as the one developed by Eurostat for the work intensity calculation. This allows us to replicate as closely as possible the official EU indicators of work intensity. Third, we extend the imputation of months in work also to those individuals who have positive employment income and zero months in work. The last estimate can be viewed as an upper bound of the employment measure (or as a lower bound of the proportion of (quasi-)jobless households).

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proportion of inconsistent cases increased considerably in SILC 2012, when the country started to collect income data from administrative registers.

[11] This work is usually performed by EUROMOD national teams following the EUROMOD guidelines and the Stata do-file templates. The work is documented in the EUROMOD country reports and the Data Requirement Documents provided to users together with EUROMOD input datasets.

[12] For example, children born after the income reference period are dropped from the data.

Table 3 shows estimates of the proportion of the population (aged 0-59) living in households with very low work intensity. The table presents the official EU indicator published by Eurostat as well as three alternative estimates based on EUROMOD data. It should be highlighted that all three estimates are computed using the same definition (as given by Eurostat) and that only the imputation of number of months in work and weekly working hours differ.

Table 3: Proportion of population (0-59) living in households with very low work intensity (EU-SILC 2010)

Country	Eurostat	EUROMOD (standard)	EUROMOD (synchronised)	EUROMOD (lower bound)	Ratio (2) / (1)	Ratio (3) / (1)	Ratio (4) / (1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DE	11.2	10.6	11.3	11.0	0.95	1.01	0.98
EE	9.0	9.5	9.0	8.5	1.06	1.00	0.94
EL	7.6	8.0	7.6	7.5	1.05	1.00	0.99
ES	10.8	12.8	10.9	10.8	1.19	1.01	1.00
FR	9.9	10.4	9.9	9.4	1.05	1.00	0.95
LV	12.6	12.7	12.3	11.6	1.01	0.98	0.92
LT	9.5	9.2	9.2	8.9	0.97	0.97	0.94
PL	7.3	12.6	7.3	7.3	1.73	1.00	1.00
PT	8.6	9.7	8.7	8.5	1.13	1.01	0.99
RO	6.9	7.6	7.0	6.9	1.10	1.01	1.00
AT	7.8	8.5	7.8	7.6	1.09	1.00	0.97
FI	9.3	9.4	9.3	9.1	1.01	1.00	0.98

Notes: Cases with a discrepancy of more than 5 per cent are highlighted.

Sources: (1) Eurostat statistics [ilc_lvhl11] retrieved on September 26, 2014.

(2) Estimates based on standard EUROMOD output (Version G2.0). Underlying microdata is UDB EU-SILC 2010 1st release and National SILC 2010 for Spain.

(3) Same as (2) but with imputation procedure synchronised with the Eurostat methodology.

(4) Same as (2) but with number of months in work imputed for individuals with positive employment income and zero months in work.

Estimates based on standard EUROMOD output diverge considerably from the official EU indicator. Poland has the highest discrepancy between the two. This is in line with the unusually high number of observations with missing number of months in work (around 6-7 % of the Polish sample). The other two countries with considerable deviations are Spain and Portugal, where a high proportion of missing values is also observed. This clearly indicates that the method used for the imputation of these values plays an important role in the calculation of the work intensity indicator.

Column 3 shows the estimates that are synchronised with the official EU indicator (using the same imputation strategy). These estimates are very close to the figures published by Eurostat. It should be noted that the official EU-SILC statistics were recently revised for some countries following the information from the 2011 population censuses. As EUROMOD estimates are based on the 1st release of EU-SILC 2010, some of our estimates will inevitably diverge from the updated Eurostat figures. This is the case for both Latvia and Lithuania, where the proportion of the population living in households with very low work intensity increased by 0.3

percentage points (ppts) due to revisions in weights.[13] For all the other countries the synchronised EUROMOD indicator achieves to replicate Eurostat's estimates with a very high degree of accuracy. The deviations are within 1% (or 0.1 ppts).

Column 4 shows the lower bound of the proportion of (quasi-)jobless households. The indicators are reduced by more than 5% for Latvia, Estonia and France and by 3-4% for Lithuania, Germany and Austria. This reduction implies that the current methodology excludes a non-negligible subsection of working population.

4. Employment measures in LFS, EU-SILC and EUROMOD

Employment statistics collected in LFS and published by Eurostat with only 3-4 months delay are in the basis of employment modelling in nowcasting. The accuracy of nowcasts largely depends on the extent to which the macro-level LFS statistics follow the same trends as the ones depicted in the EU-SILC data.

There are many reasons for discrepancies between employment measures in the two surveys. First of all, there are differences in survey methodology as well as operational differences that may affect the nature of non-response and sampling errors.[14] Second, the treatment of missing values is important. As previously noted, EU-SILC contains a substantial amount of missing values for employment status and the results are sensitive to their imputation. Third, the definition of employment is not directly comparable between the LFS and the EU-SILC.

In LFS, employment status is determined through an extensive set of questions on activity in the reference week. All individuals (15+) who during the reference week worked for at least one hour for pay or profit or family gain are considered as employed. In addition, persons who were not at work during the reference week but had a job or business from which they were temporarily absent are counted as employed. The EU-SILC contains several measures of employment: self-defined current economic status (PL031 variable), an employment measure that attempts to (partly) mimic the LFS methodology (PL035 variable)[15], and monthly information on the main activity during income reference period (Pl073, PL074, PL075, PL076 variables). For the purposes of nowcasting the latter measure is the most suitable as it has a direct link to individual income. This link is important because the ultimate goal of nowcasting (and thus of modelling employment changes) is to capture correctly changes in the distribution of income in later periods. To achieve better comparability between the LFS and SILC measures we adjust the latter for the number of months spent in work (i.e. a person employed for six months is counted as 50% of employed).[16] The disadvantage of this measure is that the reference population is different: in LFS employment is estimated for the population in period t; in SILC employment information is collected retrospectively, thus the reference population is for the period t+1.

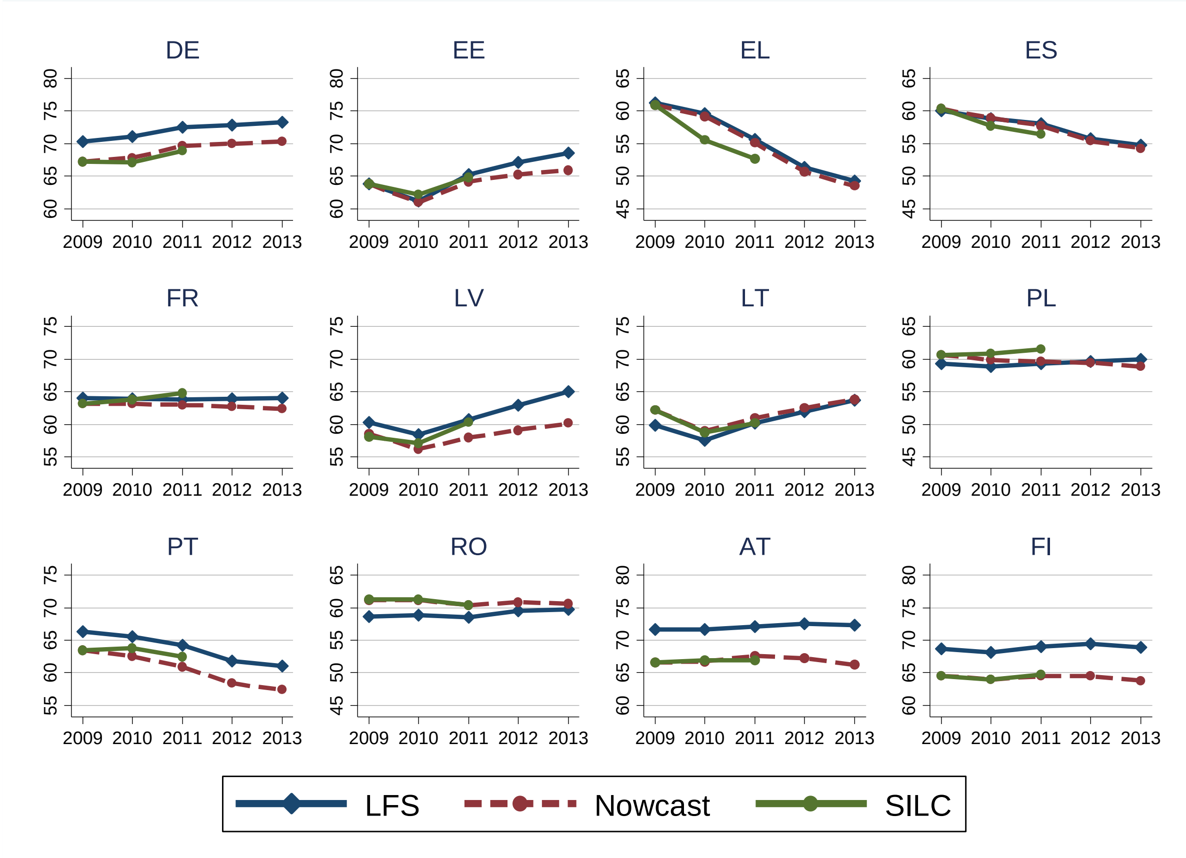
[13] Similar revisions were also done for Spain. However, in Spain we use the national SILC 2010 which already includes updated weights.
[14] A discussion on these differences and their implications can be found in Eurostat (2013).
[15] This variable identifies people who worked at least 1 hour during the week before the survey. Note that unless SILC interviews are carried out continuously throughout the year this measure may suffer from seasonality.
[16] The probability that a person is observed in employment in the reference week should be positively correlated with the fraction of the year spent in work.

Figure 1 presents employment rates in LFS, EU-SILC 2010-2012 and EUROMOD. The latter are the nowcasted employment rates based on EU-SILC 2010; missing values for number of months in work are imputed following the Eurostat methodology.[17] Interestingly, it can be seen that employment dynamics are not always consistent between the two surveys. The magnitude of changes differs significantly in the case of Greece, Estonia, Spain and Lithuania. In Portugal changes in employment rates between 2009 and 2010 follow different directions. This is also the case for Germany, France and Poland, although to a lesser extent. Even when using different labour market definitions, such as self-defined current economic status in EU-SILC or the measure that attempts to mimic the LFS methodology, discrepancies still remain. This suggests that the inherent differences in the structure of the samples of the two surveys account for a significant part of the overall differences. De Graaf-Zijl and Nolan (2011) also warn about the existence of big discrepancies between the two data sources; after aligning the definition and measurement of joblessness in EU-SILC and LFS, they find substantial differences in the percentage of adults living in jobless households in nine out of the 23 countries studied.

The breaks that occasionally occur in the two data series (EU-SILC 2011 for Lithuania, EU-SILC 2012 for Austria; LFS 2010 for Poland, LFS 2011 for Germany and Portugal and LFS 2013 for France and Austria) can also explain part of the differences.

[17] This corresponds to the second approach described in Section 3 (see also column 3 in Table 3).

Figure 1: Employment rates in LFS, EU-SILC and EUROMOD (Nowcast)



Notes: SILC estimates are lagged by one year to correspond to the income reference year.
Breaks in series (years refer to the time scale in the figure): LFS – 2010 (PL), 2011 (DE, PT), 2013 (FR, AT); SILC – 2010 (LT), 2011 (AT).

Source: LFS: Eurostat statistics [lfsa_ergaed] retrieved on September 26, 2014.
SILC: own calculations based on UDB SILC microdata 2010-5, 2011-3 and 2012-1.

5. Predictions of work intensity and risk of poverty

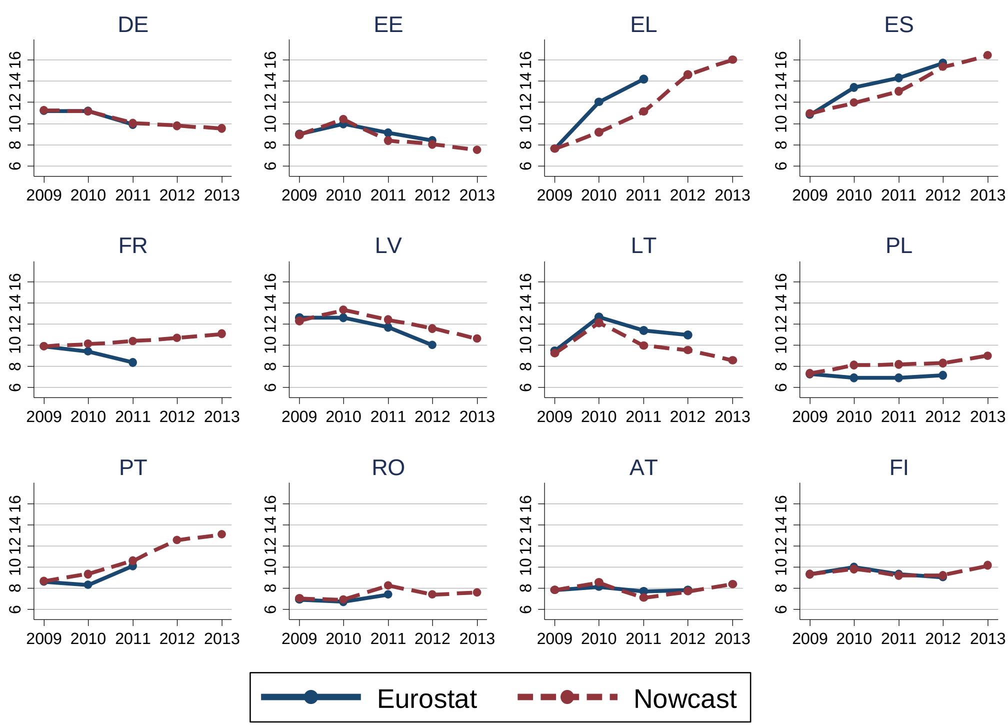
This section provides the main nowcast results. Table 4 shows the evolution of the very low work intensity indicator and the AROP rate according to EUROMOD simulations and Eurostat statistics. These results are also graphically presented in Figures 2 (very low work intensity) and Figure 3 (AROP rates). AROP rates are estimated using a poverty threshold at 60% of the median equivalised disposable income.

Table 4: EUROMOD (Nowcast) and Eurostat very low work intensity and at-risk-of-poverty estimates

	Very low work intensity					At risk of poverty				
Year	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
DE										
Nowcast	11.3	11.2	10.1	9.8	9.5	15.6	15.9	15.8	15.8	15.6
Eurostat	11.2	11.2	9.9	.	.	15.6	15.8	16.1	.	.
EE										
Nowcast	9.0	10.4	8.6	8.1	7.5	15.8	16.5	17.6	17.7	17.6
Eurostat	9.0	10.0	9.1	8.4	.	15.8	17.5	17.5	18.6	.
EL										
Nowcast	7.6	9.2	11.1	14.6	16.0	20.1	21.1	20.8	21.7	22.2
Eurostat	7.6	12.0	14.2	.	.	20.1	21.4	23.1	.	.
ES										
Nowcast	10.9	12.0	13.0	15.3	16.4	21.4	21.6	21.8	21.2	21.4
Eurostat	10.8	13.4	14.3	15.7	.	21.4	22.2	22.2	20.4	.
FR										
Nowcast	9.9	10.1	10.4	10.7	11.1	13.4	14.4	14.5	14.5	14.0
Eurostat	9.9	9.4	8.4	.	.	13.3	14.0	14.1	.	.
LV										
Nowcast	12.3	13.3	12.4	11.6	10.6	21.3	20.3	20.7	21.1	20.8
Eurostat	12.6	12.6	11.7	10.0	.	20.9	19.0	19.2	19.4	.
LT										
Nowcast	9.2	12.1	10.0	9.6	8.6	20.2	20.7	21.4	21.5	21.4
Eurostat	9.5	12.7	11.4	11.0	.	20.5	19.2	18.6	20.6	.
PL										
Nowcast	7.3	8.1	8.2	8.3	9.0	17.6	17.4	17.6	18.1	18.2
Eurostat	7.3	6.9	6.9	7.2	.	17.6	17.7	17.1	17.3	.
PT										
Nowcast	8.7	9.4	10.6	12.5	13.1	17.9	17.5	18.2	16.9	17.2
Eurostat	8.6	8.3	10.1	.	.	17.9	18.0	17.9		.
RO										
Nowcast	7.0	6.9	8.3	7.4	7.6	21.1	20.9	20.6	21.2	21.0
Eurostat	6.9	6.7	7.4	.	.	21.1	22.2	22.6	.	.
AT										
Nowcast	7.8	8.5	7.1	7.7	8.4	12.1	12.7	12.1	12.3	12.6
Eurostat	7.8	8.1	7.7	7.8	.	12.1	12.6	14.4	14.4	.
FI										
Nowcast	9.3	9.8	9.2	9.2	10.1	13.1	13.4	13.1	12.6	12.8
Eurostat	9.3	10.0	9.3	9.0	.	13.1	13.7	13.2	11.8	.

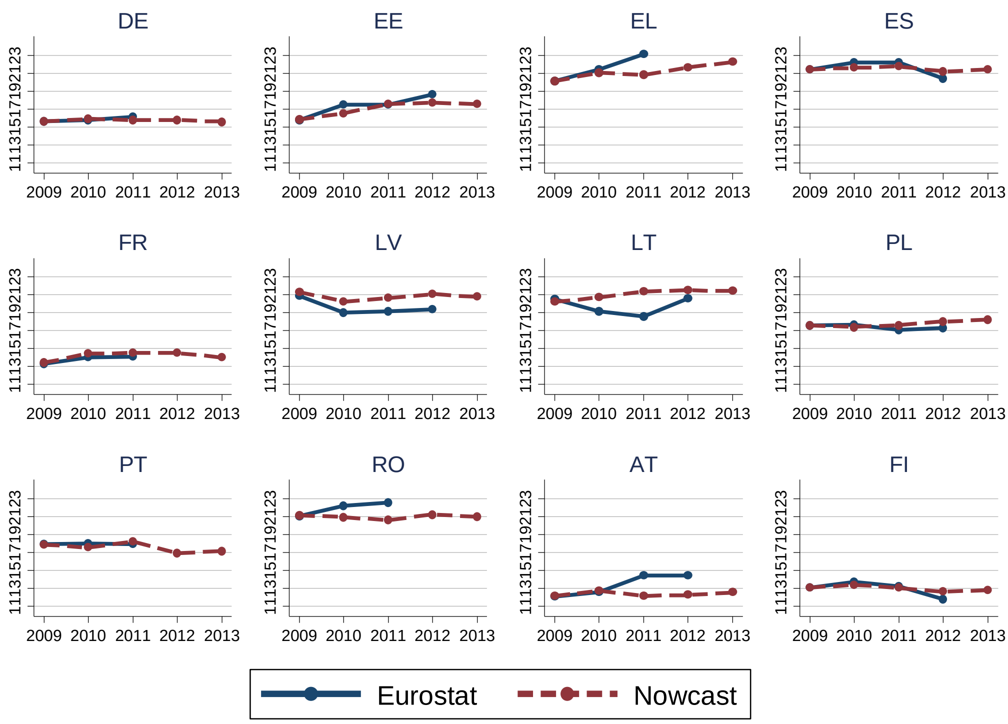
Note: EUROSTAT numbers are lagged by one year to correspond to the income reference year.
Source: Eurostat statistics [ilc_lvhl11 & ilc_li02] retrieved on September 26, 2014.

Figure 2: Very low work intensity: EUROMOD (Nowcast) and Eurostat estimates



Note: EUROSTAT numbers are lagged by one year to correspond to the income reference year.
Source: Eurostat statistics [ilc_lvhl11] retrieved on September 26, 2014.

Figure 3: At risk of poverty rate: EUROMOD (Nowcast) and Eurostat estimates



Note: EUROSTAT numbers are lagged by one year to correspond to the income reference year.
Source: Eurostat statistics [ilc_li02] retrieved on September 26, 2014.

It should be noted that the EU-SILC official statistics were recently substantially revised for Latvia and Lithuania following the updated information from the 2011 population censuses. EUROMOD nowcasting cannot replicate the dynamics of the official EU indicators for these countries, because it is based on the first release of UDB SILC 2010 (containing old weights, and therefore significantly different population structure). It also should be pointed out that the nowcasting cannot replicate or predict changes in the EU indicators in the presence of breaks in the EU-SILC data (due to changes in the survey methodology). This has been the case in Austria (SILC 2012)[18] and in Spain (SILC 2013). These countries illustrate that breaks in the EU-SILC series can obscure assessments of the evolution of these indicators; arguably simulations can provide valuable evidence on poverty and work intensity trends had these statistical breaks not occurred. Note that these type of breaks are distinct from structural breaks that may occur due to abrupt changes in a time series' pattern (e.g. due to major changes in the macroeconomic environment).

The low work intensity estimates shown in Figure 2 align well with the actual EU-SILC values in most cases. An especially good fit is observed for Germany, Estonia, Portugal, Romania and Finland. For Austria, estimates also align very well up to 2010 but start to diverge in 2011, when the break occurred.

For Greece and Spain the EUROMOD indicator follows the Eurostat trend throughout the period in question. However, it does not capture the magnitude of the increase in very low work intensity households which is revealed in the Eurostat data. In Greece, where differences are larger, this is mostly due to the high discrepancies observed between the LFS and the EU-SILC employment rates. This is also true for Spain, although to smaller extent.

Finally, substantial differences in the very low work intensity dynamics between the EUROMOD and the Eurostat figures are observed in France and Poland (in 2009-2010). In both countries the LFS employment rates show slight increase in the respective time period whereas in the EU-SILC the opposite is observed. In Poland this divergence may be related to the break in LFS data in 2010.

Composition of (quasi-)jobless households in EU-SILC and EUROMOD for the years for which SILC microdata are available (i.e. 2009-2011) are presented in the Appendix (Table A1). More than 50% of all (quasi-)jobless households in Germany, Finland and Austria are one-person households. Latvia, Portugal and Spain are the countries with the largest prevalence of households with dependent children among the household with very low work intensity. The countries where EU-SILC and nowcasting estimates diverge the most are Greece and Latvia. In the former EUROMOD does not predict the large decrease in the proportion of one-person households shown in EU-SILC whereas in the latter, nowcasting does not capture the decrease in the share of households with dependent children. Discrepancies are also observed in Portugal

[18] Eurostat reports breaks only for poverty risk estimates for Austria and not for work intensity. Our discussion of measurement issues in Section 3 suggests that switching to income collection from registers is likely to also affect the accuracy of work intensity estimates.

and Poland. To some extent, these differences may be due to the fact that no adjustments were made as part of the nowcasting exercise to account for demographic changes or changes in the composition of households. In countries where the recent economic crisis has led to significant changes in the latter (such as the formation of larger households in order to share resources) the nowcasting estimates have to be interpreted with caution.

Moving to the years for which the Eurostat estimates are not yet available (i.e. 2011 to 2013 for Germany, Greece, France, Lithuania, Portugal and Romania and 2012 to 2013 for the remaining countries), the largest increase in the very low work intensity estimate is predicted for Greece (+4.9 ppts). In Portugal the indicator is predicted to rise by 2.5 ppts. The indicator is also predicted to rise in Spain, France, Poland, Austria and Finland by 0.7 to 1.1 ppts. On the other hand, the estimate is predicted to fall for Lithuania (-1 ppt), Latvia (-1 ppt), Romania (-0.7 ppts), Germany (-0.6 ppts) and Estonia (-0.6 ppts).

Figure 3 presents the evolution of the AROP rates (estimated using a poverty threshold at 60% of the median equivalised disposable income) according to the EUROMOD and the Eurostat estimates. The dynamics of AROP are nowcasted with a satisfactory degree of accuracy in Germany, Estonia (apart from 2012), France, Poland, Portugal and Finland. In Austria the observed discrepancies are likely to be caused by the break in the SILC 2012.

For Greece and Romania, EUROMOD does not predict a substantial rise in poverty estimated by Eurostat for 2011 and 2010-2011 respectively. In Spain the nowcasting estimates also underestimate the increase in poverty in 2010.[19] The underestimation of the proportion of people at risk of poverty in Greece and Spain may be linked to the underestimation of the increase in the proportion of (quasi-)jobless households, which in turn is related to the discrepancy of employment dynamics between SILC and LFS.

For the years for which the Eurostat estimates are not yet available, the largest increase in the AROP rate is predicted for Greece (+1.4 ppts). The largest decrease in poverty is predicted for Portugal (-1 ppt), followed by France (-0.5 ppts). Poverty rates are predicted to remain relatively stable for the rest of the countries.

6. Concluding remarks

The aim of this paper has been to nowcast two out of the three dimensions of the EU-2020 poverty and social exclusion target, namely very low work intensity and risk of poverty, over a period for which EU-SILC data are not yet available. The tax-benefit microsimulation model EUROMOD was used, with input data based on EU-SILC 2010. The work intensity indicator was constructed following as closely as possible the Eurostat methodology and measurement issues of the indicator that are important in the context of nowcasting were highlighted. Building on Navicke et al. (2014) and Leventi et al. (2014), changes in the labour market were accounted for by simulating transitions between labour market states. A logit model was used for estimating probabilities for working age individuals in the EUROMOD input data; the total number of observations selected to go through transitions corresponded to the relative net change in employment levels (by age group, gender and education) depicted in the LFS macro-

[19] The substantial decrease in relative poverty in 2012 is likely to be due to a break in SILC 2013.

level statistics. Very low work intensity and income poverty rates were estimated for 2009-2013 for a total of 12 EU countries. The performance of the method was assessed by comparing the predictions with actual EU indicators for the years for which the latter are available.

The nowcasted very low work intensity estimates seem to align well with the Eurostat values in most cases, and especially well in Germany, Estonia, Portugal, Romania and Finland. For Austria, estimates align well up to 2010 but start to diverge from 2011, when a break occurred in the EU-SILC series. This has also been the case in Spain in 2012. In Latvia and Lithuania the Eurostat statistics were recently revised to align with recent population censuses. EUROMOD nowcasting cannot replicate the dynamics of the official EU indicators for these countries; it can provide evidence on income poverty and work intensity trends had these breaks/revisions not occurred. Looking at years for which the Eurostat estimates are not yet available, the largest increases in households with very low work intensity are predicted for Greece and Portugal.

The dynamics of AROP are nowcasted with a satisfactory degree of accuracy in Germany, Estonia (apart from 2012), France, Poland, Portugal and Finland. For the years for which the Eurostat estimates are not yet available, the largest increase in the AROP rate is predicted for Greece and the largest decrease for Portugal. Poverty rates are predicted to remain relatively stable for the rest of the countries.

A certain amount of caution is called for when looking at the above results. Although significant progress has been made towards modelling changes in the labour market, accounting for all the complex transitions remains beyond the scope of this analysis. Moreover, focusing on net changes in employment rates does not allow nowcasting to fully capture the extent of compositional changes in the population of employed and unemployed that might have taken place within the period of analysis. On a different note, although EUROMOD allows for the simulation of tax and benefit policies with a high degree of accuracy, there are still cases where simulations consist a simplification of the complexity of the actual legislation. The calibration factors and the factors used for updating incomes from the base year (2009) to 2013 may also negatively affect the precision of estimated distributional changes.

This research has also illustrated that the way missing information on the number of months in work is imputed can have serious implications on the work intensity and other employment-related indicators. Changes in non-response rates and/or in the treatment of these cases across years may create breaks in the work intensity measure and inhibit the potential for EUROMOD to predict what the EU-SILC will show once it becomes available. The same holds for the treatment of observations with inconsistent information on employment income and number of months in work. The existence of thorough and transparent documentation on these important issues would contribute to a better understanding of the differences between the nowcasted and the EU indicators and would enhance the trustworthiness of the latter.

Finally, the significant discrepancies in employment measures based on SILC and LFS is a matter that deserves deeper investigation. The reasons for this include differences in the surveys' methodologies, the treatment of missing values, as well as the definition of employment itself (which is not directly comparable between the two data sources). Developing a common and reliable imputation strategy, including the results of the imputations in the data and working towards the achievement of more comparable employment estimates not only would it improve the accuracy of nowcasting estimates, but it also would increase the overall efficiency of social surveys by enhancing the complementary use and analysis of existing data sources.

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Appendix

Eurostat procedure for the imputation of working hours and months in work for work intensity calculations

A. Imputation of working hours for part-time workers in the income reference period

EU-SILC contains information on usual weekly working hours in the main and secondary jobs in the data collection period (PL060 and PL100). This information is used to impute average working hours in the income reference period for part-time workers. If a person is in part-time work in both periods (according to PL031 and PL073-PL076) then average working hours in the income reference period are assumed to be the same as the reported hours in the data collection period. For the remaining individuals the hours are imputed using the median current working hours of part-time workers in six age-gender groups.

B. Imputation of number of months in work in case of non-response or other missing values

The number of months in work in the income reference period is imputed in case an interview was not completed (RB250 >= 21 & RB250 <= 33) or if the information is missing for other reasons (usually in case information is filled in from full-record imputation; RB250 = 14). The imputation is done in several stages:

1) If the interview was not completed and the within-household non-response inflation factor (HY025) is provided, then the number of additional (i.e. missing) months in work is computed by multiplying the total number of working months of the household by (1 - HY025). This is similar to how household disposable income is calculated in case of within-household non-response.

2) If the number of months in work is missing for other reasons (e.g. if information on income was imputed, but other characteristics were not), then working income (PY010G + PY020G + PY050Y) is used as a proxy to estimate the number of months in work. The following procedure is used:

- if working income > (poverty line * 2), then months in work = 12
- if poverty line < working income <= (poverty line * 2), then months in work = 6
- if poverty line/2 < working income <= poverty line, then months in work = 3
- if working income <= poverty line/2, then months in work = 0

3) If both of the above procedures do not generate a positive number of moths in place of the missing value, then the equivalised household disposable income (EHDI) before social transfers (HY022[20] * HY025 / HX050) is also checked:

- if EHDI > poverty line, then months in work = 12
- if poverty line /2 < EHDI <= poverty line, then months in work = 6

[20] HY022 must include pensions from individual private plans (PY080).

- if poverty line /4 < EHDI <= poverty line/2, then months in work = 3
- if EHDI <= poverty line/4, then months in work = 0

Table A1: Composition of (quasi-)jobless households: EUROMOD (Nowcast) and EU-SILC estimates

	one-person households (%)			households with dependent children (%)		
Year	2009	2010	2011	2009	2010	2011
DE						
Nowcast	63.2	63.1	65.1	17.8	17.9	17.3
EU-SILC	62.2	63.5	63.7	17.7	17.7	15.5
EE						
Nowcast	41.0	40.5	40.2	26.9	26.3	26.4
EU-SILC	40.0	40.5	44.5	26.5	24.8	23.9
EL						
Nowcast	23.9	22.8	25.2	17.6	21.0	17.8
EU-SILC	24.3	18.0	17.8	18.4	23.6	21.8
ES						
Nowcast	26.3	24.2	24.5	29.5	32.8	32.5
EU-SILC	26.7	22.7	24.5	30.4	31.0	30.7
FR						
Nowcast	43.5	44.4	42.3	26.2	26.2	27.0
EU-SILC	44.1	40.4	39.8	25.8	25.7	26.6
LV						
Nowcast	29.4	28.2	28.1	32.6	31.9	32.9
EU-SILC	31.1	32.5	35.8	31.8	28.2	24.4
LT						
Nowcast	46.6	42.6	45.2	16.8	23.5	20.9
EU-SILC	46.1	40.7	42.6	16.8	25.4	23.9
PL						
Nowcast	33.7	32.5	32.9	19.2	19.9	21.2
EU-SILC	33.4	37.7	35.0	19.3	17.2	18.2
PT						
Nowcast	16.2	15.8	16.1	30.6	35.0	34.9
EU-SILC	16.8	16.0	14.1	30.9	29.3	30.7
RO						
Nowcast	29.3	29.2	27.7	20.1	18.7	23.3
EU-SILC	29.3	26.8	28.4	19.9	21.8	19.8
AT						
Nowcast	54.9	49.6	52.1	17.5	20.4	17.8
EU-SILC	53.6	53.8	54.3	16.8	17.4	17.5
FI						
Nowcast	60.1	60.1	61.0	16.9	18.9	18.1
EU-SILC	61.2	60.7	61.8	17.0	19.1	15.5

Note: Cases with a discrepancy of more than 5 ppts are highlighted.
Sources: Microdata used for EU-SILC 2009, 2010 and 2011estimates: EU-SILC 2010-5, EU-SILC 2011-3 and EU-SILC 2012-1. Nowcast estimates based on EUROMOD (Version G2.0).

Table A2: Description of variables used in logit regressions

Variable	Description	Type	Reference category
Dependent			
status	Is employed (according to current self-defined economic status)	dummy	-
Independent			
dag	Age (in the end of income reference period)	continuous	-
dag2	Age squared	continuous	-
married	Married and lives with a partner	dummy	No partner
cohabit	Not married and lives with a partner	dummy	No partner
educ_low	Low level of education (lower secondary or below)	dummy	Medium level of education
educ_high	High level of education (tertiary education)	dummy	
immig_oth	Born in a country outside EU	dummy	Born in the country of residence
immig_eu	Born in a another EU	dummy	
partner_empl	Partner is employed	dummy	No partner
hh_unem	At least one member of the household is unemployed (except own spells)	dummy	No member of household is unemployed
hh_size	Household size	continuous	-
ch_n_age1	Number of children below 3 years old	continuous	-
ch_n_age2	Number of children between 3 year old and compulsory school age	continuous	-
ch_n_age3	Number of children between compulsory school age and 12 years old	continuous	-
ch_n_age4	Number of children between 12 and 24 years old	continuous	-
urban	Lives in a densely populated area	dummy	Lives in an intermediate or thinly populated area
reg_*	Regions (NUTS 2 digits)	dummy	First region

Note: The sample includes working age population individuals (aged 16-64). Students, retired, disabled as well as mothers with children 1 year old or below are excluded (unless they have positive income).

Table A3: Logit regression: Men

	DE	EE	EL	ES	FR	LV	LT	PL	PT	RO	AT	FI
dag	0.265**	0.196**	0.298**	0.222**	0.387**	0.132**	0.186**	0.245**	0.190**	0.266**	0.369**	0.360**
dag2	-0.003**	-0.003**	-0.004**	-0.003**	-0.005**	-0.002**	-0.002**	-0.003**	-0.003**	-0.003**	-0.005**	-0.004**
married	1.019**	1.097**	1.531**	0.656**	0.432**	0.866**	0.598*	0.915**	0.885**	0.301	0.430*	0.573**
cohabit	0.319*	0.837**	0.925	0.305*	0.383*	0.664**		0.556*	0.162	-0.375	-0.236	0.362*
educ_low	-0.032	-0.719**	-0.267	-0.927**	-0.381**	-0.445**	-0.700**	-0.595**	-0.576**	-0.590**	0.557**	-0.398**
educ_high	0.776**	0.779**	0.379	0.008	0.644**	0.789**	1.153**	0.860**	0.180	0.246	1.094**	0.595**
immig_oth	-0.737**	-0.275	-0.504*	-0.850**	-0.371*	0.341*	-0.034	-0.201	-0.341		-0.793**	-1.252**
immig_eu			0.016	-1.072**	-0.058		-0.087	-1.497*	0.267	-1.348	0.367	0.146
partner_empl	0.512**	-0.057	-0.099	0.094	0.674**	0.069	0.228	0.245*	0.281	0.361	0.736**	0.521**
hh_unem	-1.145**	-0.491**	-0.731**	-0.487**	-0.075	-0.458**	-0.438**	-0.454**	-0.487**	-1.441**	-0.677**	-0.156
hh_size	0.397**	-0.178	-0.298	-0.121	-0.329**	-0.021	0.354*	0.032	-0.042	-0.119	0.285*	-0.082
ch_n_age1	-0.337*	-0.193	-0.291	0.165	0.233	-0.235	0.020	0.079	-0.047	-0.418	0.205	0.359*
ch_n_age2	0.210	0.018	-0.136	0.088	-0.003	0.205	0.092	0.032	0.164	-0.213	-0.384	0.134
ch_n_age3	-0.334**	-0.047	-0.098	-0.119	0.078	-0.100	-0.668**	0.024	0.093	-0.164	-0.145	0.058
ch_n_age4	-0.073	0.085	-0.068	0.071	0.335**	-0.046	0.071	-0.006	-0.008	0.091	-0.082	0.107
urban	-0.365**	0.123	-0.550**	-0.274**	-0.285**	-0.091	0.243	-0.184*	-0.344**	-0.017	-0.383**	0.157
reg_2			0.560**	0.203	-0.197			0.191		0.388*	0.121	0.381**
reg_3			0.197	-0.317	-0.101			-0.329**		0.148	0.313*	0.307*
reg_4			0.151	0.143	0.115			-0.021		-0.074		0.144
reg_5				0.268	-0.149			-0.245				
reg_6				0.235	0.120			-0.132				
reg_7				0.219	-0.250							
reg_8				0.121	-0.569**							
reg_9				0.150	-0.388							
reg_10				-0.223	-0.349							
reg_11				-0.399	0.463							
reg_12				0.012	-0.008							
reg_13				-0.279	-0.170							
reg_14				0.288	0.032							
reg_15				-0.431**	0.024							
reg_16				-0.207	-0.326							
reg_17				0.234	-0.343							
reg_18				0.248	-0.230							
reg_19				-0.234	-0.400							
reg_20					-0.849**							
reg_21					0.106							
reg_22					-0.580							
_cons	-3.921**	-2.492**	-3.494**	-2.208**	-4.989**	-1.666**	-3.802**	-2.731**	-1.282	-2.310**	-5.597**	-6.314**
N	7,133	3,401	4,281	9,945	6,700	3,711	3,359	8,536	3,138	4,402	3,824	8,262

Note: * p<0.05; ** p<0.01

Table A4: Logit regression: Women

	DE	EE	EL	ES	FR	LV	LT	PL	PT	RO	AT	FI
dag	0.224**	0.189**	0.210**	0.252**	0.407**	0.290**	0.340**	0.227**	0.222**	0.117**	0.390**	0.385**
dag2	-0.003**	-0.002**	-0.003**	-0.003**	-0.005**	-0.004**	-0.004**	-0.003**	-0.003**	-0.001**	-0.005**	-0.004**
married	-0.392**	0.032	-0.501**	-0.594**	-0.103	-0.108	0.176	-0.016	-0.537**	-0.575**	-0.662**	0.022
cohabit	-0.056	0.054	-0.629	-0.242	0.130	-0.340*		-0.211	-0.693**	-1.347**	-0.185	0.146
educ_low	-0.425**	-0.414*	-0.305*	-0.675**	-0.649**	-0.714**	-0.737**	-0.919**	-0.554**	-0.729**	0.079	-0.703**
educ_high	0.667**	0.586**	1.099**	0.540**	0.431**	0.660**	1.244**	1.082**	0.917**	1.227**	0.632**	0.442**
immig_oth	-0.311**	-0.512**	-0.217	-0.316*	-0.706**	-0.153	-0.363	-0.810	0.123		-0.474**	-0.985**
immig_eu			-0.043	-0.370*	-0.059		0.790	-2.041*	-0.222	-3.439**	-0.161	0.087
partner_empl	0.590**	0.098	0.465**	0.217*	0.531**	0.137	0.254	0.124	0.424**	0.416**	0.713**	0.421**
hh_unem	-0.410**	-0.154	-0.128	-0.107	-0.113	-0.142	-0.391*	-0.330**	-0.152	-0.787**	-0.258	-0.108
hh_size	0.079	-0.393**	0.007	-0.101	-0.124	-0.052	-0.035	-0.057	-0.037	-0.134	0.075	-0.031
ch_n_age1	-1.523**	-1.346**	0.192	0.236	-0.294**	-0.914**	0.178	-0.765**	0.623*	-0.164	-1.906**	-1.543**
ch_n_age2	-0.466**	-0.034	-0.103	-0.148	-0.293**	0.082	0.087	-0.557**	0.026	-0.393**	-0.652**	-0.101
ch_n_age3	-0.416**	-0.276*	-0.307**	-0.188**	-0.315**	-0.067	0.146	-0.303**	-0.275*	-0.293**	-0.449**	-0.165
ch_n_age4	-0.246**	0.092	-0.112	-0.018	-0.100	-0.213**	-0.140	0.017	-0.204*	-0.022	-0.163	-0.118
urban	0.006	0.220	0.119	0.114	-0.084	-0.250**	0.141	-0.016	0.064	0.272*	-0.077	0.105
reg_2			0.165	-0.266	-0.357			-0.412**		-0.110	-0.102	0.067
reg_3			-0.200	-0.022	-0.409*			0.022		-0.121	0.243*	0.007
reg_4			0.049	0.159	-0.699**			-0.365**		-0.075		0.018
reg_5				0.466*	-0.576**			-0.291*				
reg_6				0.213	-0.132			-0.204				
reg_7				0.289	-0.295							
reg_8				0.251	-0.788**							
reg_9				-0.014	-0.764**							
reg_10				-0.265	-0.503*							
reg_11				-0.286	-0.470							
reg_12				0.257	-0.507**							
reg_13				-0.101	-0.498**							
reg_14				0.529**	-0.269							
reg_15				-0.366**	-0.473**							
reg_16				0.069	-0.352							
reg_17				-0.577	-0.282							
reg_18				0.030	-0.308							
reg_19				-0.187	-0.615**							
reg_20					-0.827**							
reg_21					-0.526**							
reg_22					-1.157**							
_cons	-2.834**	-2.203**	-3.232**	-3.293**	-5.737**	-4.233**	-5.787**	-2.403**	-2.600**	-0.553	-5.729**	-6.722**
N	7,831	3,394	4,475	10,552	6,870	4,141	3,479	8,364	3,434	4,175	3,881	7,824

Note: * $p<0.05$; ** $p<0.01$