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Nowcasting: estimating developments in median household income and risk of poverty in 2014 and 2015

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Nowcasting: estimating developments in median household income and risk of poverty in 2014 and 2015 [1]

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Abstract

The at-risk-of-poverty rate (AROP) is one of the three indicators used for monitoring progress towards the Europe 2020 poverty and social exclusion reduction target. Timeliness of this indicator is crucial for monitoring of the social situation and of the effectiveness of tax and benefit policies. However, partly due to the complexity of EU-SILC data collection, estimates of the number of people at risk of poverty are published with a significant delay. This paper extends and updates previous work on estimating ('nowcasting') indicators of poverty risk using the tax-benefit microsimulation model EUROMOD. The model's routines are enhanced with additional adjustments to the EU-SILC based input data in order to capture changes in the employment characteristics of the population since the data were collected. The nowcasting method is applied to twenty-five EU Member States. AROP rates are estimated up to 2015 for twenty countries and 2014 for the remaining five countries. The performance of the method is assessed by comparing the predictions with actual EU-SILC indicators for the years for which the latter are available.

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Keywords: Nowcasting, A t-risk-of-poverty, European Union, Microsimulation.

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1. Introduction

Together with very low work intensity and severe material deprivation, the at-risk-of-poverty indicator is used for monitoring progress towards the Europe 2020 poverty and social exclusion reduction target. The timeliness of this indicator is crucial for keeping track of the effectiveness of policies and the impact of macroeconomic conditions on poverty and income distribution. However, partly due to the complexity of the data collection process, estimates of the number of people at risk of poverty are released by Eurostat with a two years' time lag on average for most countries. In the first quarter of 2016 the estimates of at-risk-of-poverty rate based on 2014 income are available only for 2 EU countries.

This research note extends and updates previous work on nowcasting the at-risk-of poverty (AROP) indicator for a number of EU countries (Rastrigina et al. 2015a; Leventi et al., 2013). The term 'nowcasting' refers to the estimation of current indicators using data on a past income distribution together with various other sources of information. The analysis is expanded to eight additional countries not previously covered (Czech Republic, Denmark, Ireland, Croatia, Luxembourg, Hungary, Malta and Sweden); the timing of projections is extended by one or two additional years; the underlying micro and macro data are updated; and the microsimulation-based methodology is further refined.

Microsimulation models have been widely used for assessing the distributional impact of current and future tax-benefit policy reforms, as well as the impact of the evolution of market incomes, changes in the labour market and in the demographic structure of the population.[2] Using microsimulation techniques based on representative household data enables changes in the distribution of market income to be distinguished and the effects of the tax-benefit system to be identified taking into account the complex ways in which these factors interact with each other (Peichl, 2008; Immervoll et al., 2006). Combined macro-micro modelling has also been used for analysing the impact of macroeconomic policies and shocks on poverty and income distribution.[3] In these studies the construction of the necessary macro-level data is usually based on Computable General Equilibrium models. These data are then fed into a microsimulation model.

The present analysis makes use of EUROMOD, the microsimulation model based on EU-SILC data which estimates in a comparable way the effects of taxes and benefits on the income distribution in each of the EU Member States. For the purposes of the nowcasting exercise standard EUROMOD routines, such as simulating policies and updating market incomes, are enhanced with additional adjustments to the input data in order to capture changes in the employment characteristics of the population since the SILC data were collected.

The twenty-five EU countries that are included in the note are Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Romania, Slovakia, Finland and Sweden (i.e. all EU Member States but Belgium, Slovenia, and the United Kingdom). The nowcasting method is applied to EU-SILC 2012 data (referring to incomes of 2011). AROP rates are estimated up to 2015 for twenty countries and 2014 for five countries (namely Lithuania, Luxembourg, Hungary, Malta and Romania). The method is evaluated by comparing nowcast and Eurostat estimates for incomes in the period 2011 to 2013, when both are available.

The most important findings can be summarised as follows. With the exception of Greece, both mean and median equivalised household disposable incomes in 2014/2015 are significantly different from their 2013 levels in the countries included in the analysis. The highest increases in the median are predicted for Estonia and Latvia (approximately 17% and 16% respectively in 2013-2015), Romania (11.3% increase

[2] Some examples include Brewer et al. (2013) for the UK, Keane et al. (2013) for Ireland, Brandolini et al. (2013) for Italy, Matsaganis & Leventi (2014) for Greece and Narayan & Sánchez-Páramo (2012) for Bangladesh, Mexico, Philippines and Poland.

[3] A detailed review is provided in Bourguignon et al. (2008) and Essama-Nssah (2005).

in 2013-2014) and Bulgaria (10.8% increase in 2013-2015). These increases are mainly driven by pronounced wage growth accompanied by growth in employment. Median income is also expected to increase by more than 5% in Slovakia, Lithuania, Poland and Hungary. A reduction in the median is only expected in Cyprus (-5.4% in 2013-2015).

Changes in relative at-risk-of-poverty rate for the total population in 2013-2015 (or 2014) are found to be statistically significant in twelve out of the twenty-five EU member states. The countries where relative poverty is predicted to increase the most are Latvia (+1.3 ppts in 2013-2015), Romania (+0.8 ppts in 2013-2014) and the Netherlands (+0.7 ppts in 2013-2015). The biggest decreases in the AROP rate are estimated for Hungary (-2.2 ppts in 2013-2014), Cyprus (-1.8 ppts in 2013-2015), Bulgaria (-1.0 ppt in 2013-2015) and Portugal (-0.8 ppts in 2013-2015). In all other countries the predicted changes are within ±0.6 percentage points. At-risk-of poverty rate calculated using a poverty threshold anchored in 2013 (and adjusted for inflation) decreases in all countries but Denmark.

The structure of the research note is the following: in Section 2 the nowcasting methodology is explained. Section 3 presents and discusses the predictions of the AROP indicators. Section 4 reflects on the possible sources of divergence between the EUROMOD and Eurostat estimates for the period in which both are available. Section 5 concludes by summarising the most important findings and policy implications of this research.

2. Methodology

The nowcasting methodology presented in this research note is based on microsimulation techniques used in combination with the latest macro-level statistics. It aims at developing a generic approach that can be applied to all EU countries in a straightforward, flexible and transparent way. By doing so, it ensures the comparability and consistency of results both across countries and through time.

In this work the microsimulation model EUROMOD is used to simulate changes in the income distribution within the period of analysis. 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; severance payments are not. Detailed information on EUROMOD and its applications can be found in Sutherland & Figari (2013).

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 these probabilities for working age (16-64) individuals in the EUROMOD input data. 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 and their age, home ownership, 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 A1-A3).

The weighted total number of observations that are selected to go through transitions corresponds to the relative net yearly change in employment rates by age group and gender (a total of 6 strata)[4] as shown in the Labour Force Survey (LFS) statistics. 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 (with unemployment duration more than one year) as an external source of information. This transition is 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.

Unemployment benefits are simulated for those moving out of employment in case they are eligible for such benefits according to the country rules. If the rules require assessment of earnings and number of months in work for several years preceding unemployment, we assume that these remain unchanged throughout the assessment period and equal to the values observed in the income reference period. For those moving into long-term unemployment the eligibility is adjusted assuming that the duration of unemployment spell is more than one year. In some countries long-term unemployed are not eligible to any unemployment benefits (e.g. Latvia); in other countries they are not eligible for unemployment insurance but still qualify for unemployment assistance (e.g. Greece, Spain, Portugal); in countries with fairly long duration of unemployment insurance (e.g. Finland) we assume that long-term unemployed continue to receive unemployment insurance.

After modelling labour market 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 2011 to 2015 (or 2014) 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 statutory rules (such as indexation rules for pensions) or the change in the average amount per recipient between the income data reference period and the target year. The latter is preferred for the nowcasting exercise, especially in case of pensions. The evolution of average pensions can capture important changes in the population of pensioners (e.g. inflow of newly retired pensioner with higher average pensions). In order to capture differential growth rates in employment income, updating factors are disaggregated by economic activity and/or by economic sector if such information is available. The evolution of average employment income and average income from pensions shown in EU-SILC and nowcasted with EUROMOD is presented in the Appendix (Figures A1-A2).

After updating market income and other non-simulated income sources, EUROMOD simulates (direct) tax and (cash) benefit policies for each year from the base year up to 2015. All simulations are carried out on the basis of the tax-benefit rules in place on the 30th June of the given policy year. The exceptions to this rule are Estonia (2013), Greece (2011-2015), and Portugal (2012), where policy changes after the 30th of June were taken into account to better match the annual income observed in the EU-SILC data. In order to enhance the credibility of estimates, an effort has been made to address issues such as tax evasion (in Bulgaria, Greece, Italy and Romania) and benefit non take-up (in Estonia, France, Ireland, Greece, Portugal and Romania).

[4] The number of strata has been reduced from 18 age-gender-education groups (used in e.g. Rastrigina et al. 2015a) to 6 groups based solely on age and gender. Education level is no longer used to define the strata because the correspondence of employment rates by education level in EU-SILC and LFS is quite weak. Education is still controlled for in estimation of employment probabilities.

However, such adjustments are not possible to implement in all countries due to data limitations.[5]

For Bulgaria tax evasion adjustments are based on a comparison between net and gross employment incomes. An individual is assumed to be involved in the shadow economy if her (positive) net and gross employment incomes are equal. For Greece tax evasion adjustments have been made on the basis of external estimates for the extent of average income underreporting by income source (earnings, self-employment income from farming and non-farm business). For Italy self-employment income has been calibrated in order to take into account tax evasion behaviour. For Romania all self-employed in agriculture living in rural areas and with a self-employment income below the average wage are assumed to evade taxes.

For Estonia non take-up is simulated for social assistance on the assumption that small entitlements are not claimed. For France and Greece random non take-up corrections are simulated for the main social assistance benefit and for the unemployment assistance benefit for older workers respectively. For Ireland non take-up is simulated for the family income supplement, applying external estimates on the caseload. In Portugal non take-up adjustments were implemented for the social solidarity supplement for the elderly. Finally, in Romania similar adjustments were made for the minimum guaranteed income.

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 simulations when information in the EU-SILC data is limited, issues of benefit non take-up, under-reporting of income components, tax evasion and small differences in income concepts and definitions.[6]

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 2012 and the EUROMOD estimate for the same period and income concept. For consistency reasons, the same household specific factor is applied to all later policy years. This is based on the assumption that the discrepancy between EUROMOD and EU-SILC estimates remains stable over time.

3. The nowcast

This section provides the main nowcast results. We test the nowcasting methodology for twenty-five EU countries using 2011 as a starting year and we nowcast the AROP rates up to 2015 for twenty countries (i.e. attempting to predict what EU-SILC 2016 will show once it becomes available) and up to 2014 for five countries, namely Lithuania, Luxembourg, Hungary, Malta and Romania. The choice of years was made in order to reflect the latest available policy year simulated in EUROMOD for each of the countries studied. At the time of writing the latest available Eurostat indicators came from EU-SILC 2014, referring to 2013 incomes.[7] Thus, the indicators are predicted one or two years ahead.

Tables 1a and 1b show the nowcasted changes in equivalised household disposable income and AROP rates between income years 2013-2015 and 2013-2014 respectively. The tables also report initial levels for 2013 incomes based on EU-SILC 2014.

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

[6] For more detailed information on these issues see Figari et al. (2012) and Jara and Leventi (2014).

[7] The only exception is Latvia, for which the latest Eurostat indicators available at the time of writing come from EU-SILC 2015. However, for comparability purposes Table 1a also shows the nowcasted changes in equivalised household disposable income and AROP rates for Latvia between 2013 and 2015.

The reason for focusing on changes in indicators rather than their absolute values is mainly due to sampling and other errors that may lead to wide confidence intervals around point estimates of the AROP indicators in EU-SILC (see Goedemé, 2010; Goedemé, 2013). Hence, the nowcasts of direction and scale of change are likely to be more reliable than the point estimates for each particular year. Using one dataset for microsimulation across all years, which is the case for the simulations in this paper, involves a reduction in the standard errors due to covariance in the data (Goedemé et al., 2013). The statistical significance of changes in the value of indicators between 2013 and 2014 (or 2015), taking into account the covariance in the data, is marked in the tables.

Table 1a. Eurostat 2013 levels and nowcast change in mean income, median income and AROP rates in 2013-2015

	Household income *level and nominal change in %*		**At risk of poverty *rate and change in percentage points***					
	Mean	**Median**	**All**	**Male**	**Female**	**Children (< 18)**	**Adults (18-64)**	**Elderly (65+)**
Bulgaria *(in BGN)*								
Eurostat level	7,642	6,476	21.8	20.9	22.6	31.7	18.9	22.6
Nowcast 2013-2015	10.2***	10.8***	-1.0**	-1.3***	-0.7*	-1.4*	-1.4***	1.0*
Czech Republic *(in CZK)*								
Eurostat level	223,423	198,028	9.7	8.9	10.5	14.7	9.1	7.0
Nowcast 2013-2015	4.7***	4.9***	0.0	-0.3†	0.3†	0.2	-0.3†	1.1***
Denmark *(in DKK)*								
Eurostat level	232,001	207,785	12.1	12.4	11.8	9.2	13.8	9.8
Nowcast 2013-2015	1.9**	0.5†	0.4	0.3	0.6*	1.1**	0.3	0.1
Germany								
Eurostat level	22,537	19,733	16.7	15.9	17.4	15.1	17.2	16.3
Nowcast 2013-2015	3.7***	3.8***	0.3**	0.3*	0.4**	0.6*	-0.1	1.5***
Estonia								
Eurostat level	8,820	7,217	21.8	20.1	23.3	19.7	19.4	32.6
Nowcast 2013-2015	15.4***	17.3***	0.2	-0.8*	1.1***	-1.0*	-0.8**	5.4***
Ireland								
Eurostat level	23,099	19,636	15.3	15.0	15.6	17.1	15.6	10.3
Nowcast 2013-2015	2.3***	3.1***	-0.3	-0.5	-0.1	-0.5*	-0.7	2.3***
Greece								
Eurostat level	8,879	7,680	22.1	22.2	22.0	25.5	23.5	14.9
Nowcast 2013-2015	0.1	0.8	-0.4	-0.4	-0.4	-0.9	-0.3	-0.3
Spain								
Eurostat level	15,405	13,269	22.2	22.4	22.1	30.5	22.9	11.4
Nowcast 2013-2015	4.0***	4.6***	-0.6*	-1.0***	-0.3	-0.7†	-1.1***	1.3***
France								
Eurostat level	24,612	21,199	13.3	12.6	14.1	17.7	13.2	8.6
Nowcast 2013-2015	1.4***	2.3***	0.5**	0.6**	0.4*	1.1**	0.3	0.4**

Table 1a (cont'd). Eurostat 2013 levels and nowcast change in mean income, median income and AROP rates in 2013-2015								
	Household income ***level and nominal change in %***		**At risk of poverty** ***rate and change in percentage points***					
	Mean	**Median**	**All**	**Male**	**Female**	**Children (< 18)**	**Adults (18-64)**	**Elderly (65+)**
Croatia *(in HRK)*								
Eurostat level	43,947	39,600	19.4	18.7	20.1	21.1	17.9	23.1
Nowcast 2013-2015	3.6***	2.4***	-0.5	-0.8**	-0.3	0.0	-1.0**	0.4
Italy								
Eurostat level	17,914	15,759	19.4	18.4	20.5	25.1	19.7	14.2
Nowcast 2013-2015	1.5***	2.3***	-0.1	-0.3	0.0	-0.5†	-0.6**	1.7***
Cyprus								
Eurostat level	18,418	14,400	14.4	13.1	15.6	12.8	13.4	22.4
Nowcast 2013-2015	-4.1***	-5.4***	-1.8***	-0.9*	-2.5***	0.3	-1.3**	-7.8***
Latvia								
Eurostat level	6,970	5,828	22.5	19.7	24.8	23.2	18.6	27.6
Nowcast 2014-2015	14.9***	16.1***	1.3***	0.4	2.1***	-0.3	-0.5	8.9***
Netherlands								
Eurostat level	23,190	20,891	11.6	11.3	11.9	13.7	12.4	5.9
Nowcast 2013-2015	2.8***	3.4***	0.7**	1.0**	0.5*	1.3**	0.9**	-0.5**
Austria								
Eurostat level	26,080	23,211	14.1	13.3	14.9	18.2	12.9	14.2
Nowcast 2013-2015	2.6***	2.6***	-0.2	0.0	-0.3	0.0	-0.2	-0.3**
Poland *(in PLN)*								
Eurostat level	25,871	22,399	17.0	17.2	16.8	22.3	16.7	11.7
Nowcast 2013-2015	5.9***	5.6***	0.1	0.1	0.0	0.2	0.0	0.1*
Portugal								
Eurostat level	9,856	8,229	19.5	18.9	20.0	25.6	19.1	15.1
Nowcast 2013-2015	4.0***	4.8***	-0.8*	-1.1**	-0.6	-0.7	-1.9**	2.5***
Slovakia								
Eurostat level	7,484	6,809	12.6	12.7	12.6	19.2	12.3	6.2
Nowcast 2013-2015	7.0***	6.9***	-0.6*	-0.8*	-0.5*	-0.8	-0.8**	0.2
Finland								
Eurostat level	26,130	23,702	12.8	12.3	13.3	10.9	12.5	16.0
Nowcast 2013-2015	1.3***	1.2***	-0.2	-0.1	-0.3*	0.3	0.0	-1.3***
Sweden *(in SEK)*								
Eurostat level	249,904	234,633	15.1	13.9	16.3	15.1	14.7	16.5
Nowcast 2013-2015	3.9***	4.0***	0.3†	0.2	0.5†	-0.3	0.0	2.1***

*Notes: Estimated changes between 2013-2015 are statistically significant at: † 90% level, * 95% level, ** 99% level, *** 99.9% level. Standard errors around AROP indicators are based on the Taylor linearization using the DASP module for Stata. Only sampling error is taken into account. Household incomes are equivalised using the modified OECD scale. The changes shown are percentage changes in the median and the mean and percentage point changes in AROP indicators. Mean and median equivalised household income in EUR per year, unless otherwise specified.*

Source: Eurostat database: codes "ilc_li02" and "ilc_di03", last accessed on January 27, 2016; EUROMOD Version G3.0.

Table 1b. Eurostat 2012 levels and nowcast change in mean income, median income and AROP rates in 2013-2014

	Household income *level and nominal change in %*		At risk of poverty *rate and change in percentage points*					
	Mean	**Median**	**All**	**Male**	**Female**	**Children (< 18)**	**Adults (18-64)**	**Elderly (65+)**
Lithuania *(in LTL)*								
Eurostat level	20,630	16,652	19.1	17.8	20.3	23.5	17.6	20.1
Nowcast 2013-2014	5.7***	6.9***	0.1	0.3	-0.1	0.2	-0.3	1.2**
Luxembourg								
Eurostat level	38,555	34,320	16.4	16.3	16.6	25.4	15.8	6.3
Nowcast 2013-2014	1.8***	2.0***	0.2	0.2	0.2	0.5	0.2	0.0
Hungary *(in HUF)*								
Eurostat level	1,521,615	1,354,933	14.6	14.9	14.4	24.6	14.5	4.2
Nowcast 2013-2014	5.2 ***	5.5 ***	-2.2 ***	-2.4 ***	-2.0 ***	-4.2 ***	-2.2 ***	0.3
Malta								
Eurostat level	14,291	12,787	15.9	15.7	16.0	24.1	13.2	16.9
Nowcast 2013-2014	3.3***	4.1***	0.6	0.7†	0.4	0.9	0.3	1.3***
Romania *(in RON)*								
Eurostat level	10,927	9,704	25.4	25.5	25.2	39.4	23.8	15.5
Nowcast 2013-2014	11.5***	11.3***	0.8*	0.6*	1.0***	-0.5	0.0	5.7***

Notes: *Estimated changes between 2013-2014 are statistically significant at: † 90% level, * 95% level, ** 99% level, *** 99.9% level. Standard errors around AROP indicators are based on the Taylor linearization using the DASP module for Stata. Only sampling error is taken into account. Household incomes are equivalised using the modified OECD scale. The changes shown are percentage changes in the median and the mean and percentage point changes in AROP indicators. Mean and median equivalised household income in EUR per year, unless otherwise specified.*

Source: *Eurostat database: codes "ilc_li02" and "ilc_di03", last accessed on January 27, 2016; EUROMOD Version G3.0.*

The results show that both mean and median equivalised household disposable incomes in 2015 (or 2014) are significantly different from their 2013 levels for twenty-four out of the twenty-five countries. The only exception is Greece, where the changes in nominal mean and median incomes between 2013 and 2015 are small and insignificant. A reduction in the median income is only expected in Cyprus (-5.4%) in 2013-2015. In Estonia and Latvia nominal median incomes are predicted to grow by a staggering 17.3% and 16.1% in 2013-2015 respectively. This growth is driven by a pronounced wage increase (of more than 10%) accompanied by growth in employment. Growth in median incomes is also predicted to be high in Romania (11.3%), Bulgaria (10.8%), Lithuania (6.9%), Slovakia (6.9%), Poland (5.6%) and Hungary (5.5%). A 3-5% increase in median incomes is estimated for the Czech Republic, Portugal, Spain, Malta, Sweden, Germany, the Netherlands and Ireland.

Changes in the total AROP rate are relatively small and not statistically significant in thirteen of the twenty-five countries. For the remaining twelve, the countries where relative poverty is predicted to increase the most are Latvia (+1.3 ppts in 2013-2015), Romania (+0.8 ppts in 2013-2014) and the Netherlands (+0.7 ppts in 2013-2015). In all three countries poverty risk has been on the rise: in Latvia since 2010, in Romania since 2009, and in the Netherlands since 2011. A smaller but statistically significant poverty increase is also predicted for France, Germany and Sweden. The six countries where relative poverty is estimated to decrease the most - and in a statistically significant way - are Hungary (-2.2 ppts in 2013-2014) and Cyprus (-1.8 ppts in 2013-2015), followed by Bulgaria (-1.0 ppt in 2013-2015), Portugal (-0.8 ppts in 2013-2015), Slovakia and Spain (-0.6 ppts in 2013-2015 for both cases). In Hungary this development is mostly associated with the improving labour market conditions. According to the LFS data, the employment rate is estimated to increase by almost three percentage points in 2013-2014 (Figure A4). In Cyprus this poverty decrease seems to be related to the substitution of the public assistance benefit by a guaranteed minimum income scheme in 2014 and to the gradual improvement in the labour market conditions of the country since 2013. In both Hungary and Cyprus decreasing poverty risk is a fairly recent trend which started in 2012.

The results above describe the changes in the relative poverty (based on the poverty threshold calculated as 60% of the median income). Over the period 2013-2015 the median changed substantially in some countries. In such cases it is also important to look at the anchored poverty trends (i.e. with the poverty line being fixed in the initial period and adjusted for growth in consumer prices in the following periods). AROP rates calculated using a poverty threshold anchored in 2013 are predicted to decrease in all countries but Denmark. The highest decreases are expected in Estonia (-8.4 ppts), Bulgaria (-5.8 ppts), Latvia (-5.0 ppts), Hungary (-3.9 ppts), and Lithuania (-3.4 ppts). A decline in anchored AROP of more than 2 ppts is also estimated in Slovakia, Romania, Portugal, Spain, and Poland. The relative AROP rates by age group reveal important changes for certain population categories. The nowcasted estimates show that the changes in the poverty risk of elderly population are expected to be substantial in all countries except Denmark, Greece, Croatia, Hungary, Luxembourg and Slovakia. In most countries examined the relative position of the elderly in terms of income is expected to deteriorate. The member states where AROP rates among the elderly are predicted to rise the most (more than 5 ppts) are Latvia, Romania and Estonia. This finding suggests that in countries with high nominal increases in median incomes, pensions have not been able to follow given the existing indexation mechanisms. This is also found to be the case in Portugal, Ireland, Sweden, Italy, Germany, Spain, Malta, Lithuania, the Czech Republic and Bulgaria, albeit to a lesser extent. In many of these countries (especially those seriously affected by the crisis) poverty among the elderly exhibited a decreasing trend in the past as, in relative terms, the youth and working-age people were losing more from the economic decline. Once economies started to recover this decreasing trend in the elderly poverty was reversed.

In some countries the changes in the elderly poverty risk are so pronounced that they drive the poverty risk for the overall population. For example, this is the case in Latvia and Romania. In Bulgaria, on the contrary, average pensions are keeping pace with average wages, thus protecting pensioners from falling below the poverty line. While in all three countries the poverty line is rising rapidly, the risk of poverty is increasing in Latvia and Romania, but not in Bulgaria. The significant elderly poverty increase in Latvia and Estonia also explains the gender differences in the AROP rate, as approximately two thirds of this population sub-group are women.

The country where elderly poverty is estimated to decrease the most is Cyprus (-7.8 ppts in 2013-2015); during that period pensions remained relatively stable in nominal terms whereas other incomes in the economy were falling. Cyprus is the only country where the median and the poverty line are expected to fall. It is also one of the few EU countries where elderly poverty is higher than the poverty risk for children. Nevertheless, the experience of other countries shows that elderly poverty decreases only temporarily and that this trend often reverses soon after the economy starts recovering. The other three countries where the estimated decrease in relative poverty for the elderly is statistically significant are Finland (-1.3 ppts in 2013-2015), the Netherlands (-0.5 ppts in 2013-2015) and Austria (-0.3 ppts in 2013-2015).

Changes in child poverty are expected to be relatively small and not statistically significant in the majority of countries under consideration. In fact, they are estimated to be less or close to 1 percentage point in nineteen out of the twenty-five countries. Hungary is the only case where child poverty is expected to decrease substantially: by 4.2 percentage points in 2013-2014. This changes is mostly driven by the increasing employment rates in the Hungarian economy. The employment rate increased by 3.7 ppts in 2013-2014 according to the LFS, which represents the highest increase among the countries considered here. In Bulgaria and Estonia the child poverty rate is also predicted to decline by 1.4 and 1 percentage point respectively. In Estonia this positive development is partly related to the introduction of a new means-tested family benefit (in 2014) and a substantial increase in the child allowance (in 2015); in Bulgaria a means-tested chid benefit and a non-means tested benefit for bringing up a child up to 2 years old increased in 2014. In the Netherlands, Denmark and France poverty among children is expected to rise by approximately 1 percentage point. These changes are driven by complex interactions between multiple policy and labour market changes.

Finally, changes in poverty rates for the working-age population are estimated to be statistically significant for eleven out of the twenty-five EU countries (namely Bulgaria, the Czech Republic, Estonia, Spain, Croatia, Italy, Cyprus, Hungary, the Netherlands, Portugal and Slovakia). For ten out of these eleven countries the relative position of this population group in terms of income is expected to improve. In most countries this represents a reversal of the negative trend observed in the previous years. The biggest poverty reduction is expected in Hungary (-2.2 percentage points in 2013-2014), followed by Portugal (-1.9 percentage points in 2013-2015). This development is mostly related to the improving conditions in the labour market of these countries. The country where the AROP rate for the working-age population is estimated to decrease is the Netherlands (by 0.9 percentage points in 2013-2015). This development seems to be mostly driven by the decreased generosity of the care allowance in 2014 and in the slightly deteriorating labour market conditions between 2013 and 2014.

4. Discussion

The accuracy of the nowcasts depends on a number of factors. This section attempts to clarify these factors and describe the micro and macroeconomic developments that the nowcasting estimates are meant to capture. Figure 1 presents the nowcasted AROP estimates for income years 2011-2015 (or 2014) together with the actual EU-SILC indicators for income years 2011-2013. The evolution of median equivalised disposable income shown in EU-SILC and nowcasted with EUROMOD is presented in the Appendix (Figure A3).

Figure 1: At-risk-of-poverty rates (threshold: 60 % of median): Eurostat and nowcasted estimates (based on SILC 2012)

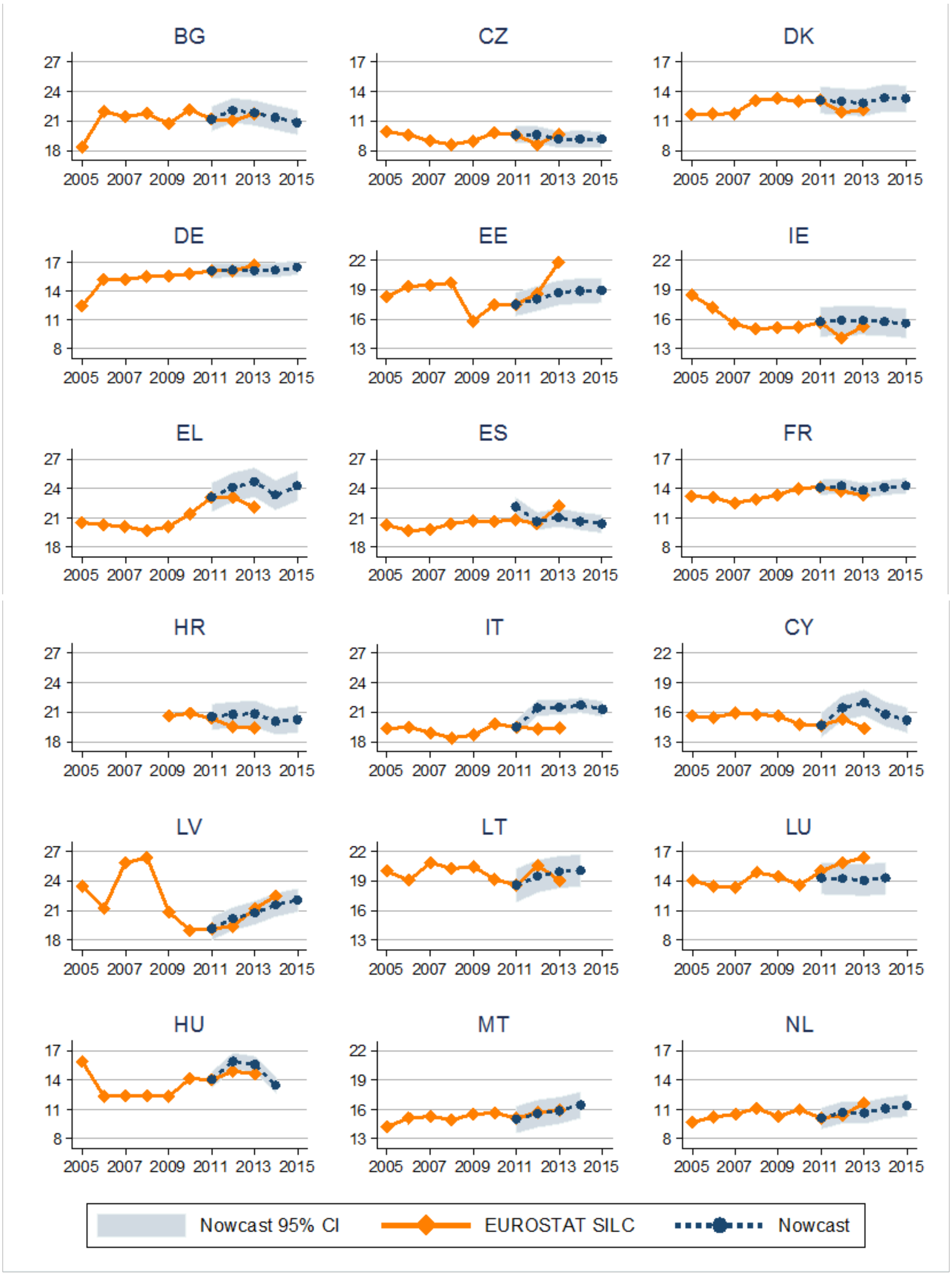


Figure 1 (cont'd): At-risk-of-poverty rates (threshold: 60% of median): Eurostat and nowcasted estimates (based on SILC 2012)

Notes: Nowcasted estimates are obtained using EUROMOD with employment adjustments and calibration. The vertical scale covers a range of 9 percentage points in all countries, starting from different initial points. The 95% confidence intervals are estimated using the DASP module for Stata. Only sampling error is taken into account. Eurostat SILC data series have structural breaks in 2007 (Austria, Cyprus, Spain, France), in 2012 (Denmark), and in 2013 (Estonia).

Source: Eurostat database: code "ilc_li02", last accessed on January 27, 2016; EUROMOD Version G3.0.

It can be seen that in most cases the two estimates follow the same trends and fall within the boundaries of the nowcasted confidence intervals. The same holds for simulated estimates of the median, presented in the Appendix (Figure A3). The countries where the AROP nowcasts substantially diverge from the actual indicator are Italy for both 2012 and 2013 and Estonia, Greece, Cyprus, Luxembourg, Romania and Sweden for 2013. In case of the median, substantial discrepancies can be observed for Croatia in 2012 and for Cyprus, Hungary and Slovakia in 2012 and 2013.

One of the reasons for the observed discrepancies comes from the external data used in order to account for labour market transitions from employment to unemployment (and vice versa) and from short-term to long-term unemployment. The total number of simulated labour market transitions in the (EU-SILC based) EUROMOD input data and their direction are determined by changes in employment as shown in the LFS. However, as noted in Rastrigina et al. (2015a), employment dynamics do not always move in the same way over time in the LFS and EU-SILC. The evolution of employment rates in LFS, EU-SILC and EUROMOD is shown in the Appendix (Figure A4). In Croatia, Luxembourg and Slovakia changes in employment rates between 2011-2012 and 2012-2013 follow different directions. This is also the case for Greece, France and Romania between 2012 and 2013. There are several reasons for the discrepancies between employment measures in the two surveys, such as differences in definitions, imputations, survey methodology, as well as operational differences that may affect the nature of non-response and sampling errors. A detailed discussion on these issues can be found in Rastrigina et al. (2015b).

Another important reason behind some of the observed discrepancies is related to the evolution of major income sources, such as earnings or pensions (see Figure A1 and Figure A2 in the Appendix). Substantial discrepancies in the nowcasted dynamics of employment income compared to what is shown by the SILC data are observed for Ireland, Greece, Croatia, Italy, Cyprus and Slovakia. The steep decrease in average employment income depicted in SILC for 2012 and 2013 in Croatia is not confirmed by the administrative data.[8] The same holds for the stagnation in pensions depicted in SILC in the case of this country.[9] The sharp drop in average employment income in SILC in Slovakia (2011-2012) and the pronounced increase in Ireland (2011-2012) are also not confirmed by external data sources, e.g. OECD average wages.[10] A plausible explanation for the employment earnings discrepancies between the nowcasts and the EU-SILC for Greece is that the official figures used for updating employment income in EUROMOD are not capturing important negative changes that occurred in the large informal sector of the economy.[11]

In the case of Luxembourg the discrepancies between the nowcasted and the Eurostat level of AROP in 2011 are caused by the fact that households with at least one international civil servant have been excluded from the EUROMOD input data (645 households), as they have a specific tax-benefit system which is different from the national one. In the case of Spain the discrepancies observed in 2011 are due to backward revisions in the EU-SILC data. These revisions were performed by the national statistical offices in order to smooth out the effects of the structural breaks that occurred in the EU-SILC data series.[12] EUROMOD results do not include such revisions, so the estimates show the evolution of income poverty had these breaks not occurred. In Estonia the discrepancies observed in 2013 are primarily caused by the fact that in EU-SILC 2014 missing values for employment income were replaced with

[8] National Croatian Bureau of Statistics: Statistical Yearbook of the Republic of Croatia 2014, Table 7-1, http://www.dzs.hr/Hrv_Eng/ljetopis/2014/sljh2014.pdf

[9] National Croatian Institute for Pension Insurance: Statističke informacije Hrvatskog zavoda za mirovinsko osiguranje, broj 2, Tablica 24, http://www.mirovinsko.hr/default.aspx?id=6364

[10] Annual average wages in national currency units available at: https://stats.oecd.org

[11] Bank of Greece, 2014 Governor's Report, Table V.10, page 106, available at: http://www.bankofgreece.gr/BogEkdoseis/ekthdkth2014.pdf

[12] The structural breaks occurred due to switching to administrative data collection in SILC 2013 and also due to revisions related to changes in the population structure revealed after the 2011 population census.

register information (which resulted in a structural break in the SILC data).

While changes in labour market states are carefully taken into account, the wages for new employees are determined in a less sophisticated manner (using average wage within the respective strata). This assumption works well when the flows into employment are relatively small. However, when employment grows fast and there are reasons to believe that the newly created jobs are different from the existing ones (e.g. are of lower quality), this approach may produce somewhat biased results.

No adjustments have been made to account for demographic changes or changes in the composition of households as usually such changes are less critical within a short-term time frame. However, in countries where the recent financial crisis has led to large emigration flows or to the formation of larger households in order to share resources (such as Mediterranean countries) the nowcast estimates have to be interpreted with caution. It should also be taken into account that in some countries population is ageing quite rapidly (see population 65+ share in Figure A5 in the Appendix). Moreover, the comparison of demographic trends between EU-SILC and official demographic statistics show some pronounced discrepancies e.g. in Estonia, Luxembourg, Romania, and Slovakia.

Finally, for the purposes of nowcasting EUROMOD results are calibrated to better match the poverty estimates from the EU-SILC. This process attempts to account for differences between EUROMOD and EU-SILC estimates of household income in the data reference year (i.e. 2011): calibration factors, equal to the absolute difference between the value of equivalised household disposable income in the EU-SILC and EUROMOD data, are calculated for each household. These are then applied to all later years based on the assumption that EUROMOD estimates for disposable income deviate from the equivalent EU-SILC estimates in a fixed way across time. This assumption does not necessarily hold for all households. However, in most cases the predicted *changes* in the AROP rates are not affected by the calibration procedure.

5. Conclusion

The main aim of this research note has been to update previous work on nowcasting the AROP indicator for a number of EU countries. Building on Rastrigina et al. (2015a), the analysis was expanded in terms of country coverage (from seventeen to twenty-five EU countries), timing of projections (by one or two additional years), the underlying micro and macro data were updated and the microsimulation-based methodology was further refined. AROP rates were estimated for 2011-2015 for twenty countries and 2011-2014 for five countries. The performance of the method was assessed by comparing the predictions with actual EU-SILC indicators for the years for which the latter are available.

The microsimulation model EUROMOD was used to simulate country-specific policy reforms. Changes in the labour market were taken into account by simulating transitions between labour market states. A logit model was used for estimating probabilities for working age individuals in the EU-SILC based EUROMOD input data. The total number of individuals that were selected to go through transitions corresponds to the relative net change in employment levels by age group and gender as shown in the LFS macro-level statistics.

The most important findings can be summarised as follows. Mean and median incomes in 2014 or 2015 are significantly different from their 2013 levels in all countries except for Greece. The highest increases in the median are predicted for Estonia, Latvia, Romania and Bulgaria. A reduction in the median is only predicted for Cyprus. Changes in relative income poverty are found to be statistically significant in twelve out of the twenty-five EU member states. The countries where the AROP rate for the total population is predicted to increase the most are Latvia, Romania and the Netherlands. The biggest decreases in the AROP rate are estimated for Hungary, followed by Cyprus, Bulgaria and Portugal. In Hungary, this seems to be the result of a significant rise in employment levels between 2013 and 2014. The rises in income poverty predicted for Latvia and Romania are mostly driven by the increased AROP rates for the elderly population. This finding suggests that in countries with high nominal increases in median incomes, pensions have not been able to follow given the existing indexation mechanisms. Changes in child poverty are expected to be relatively small and not statistically significant in the majority of countries considered in this analysis. The anchored poverty risk decreases in all countries but Denmark.

The comparison of the nowcasted results with the actual EU-SILC indicators has shown that in most cases the two estimates follow the same trends and fall within the boundaries of the nowcasted confidence intervals. In some countries where this is not the case (i.e. Estonia, Greece, Italy, Cyprus, Luxembourg, Romania and Sweden), the discrepancies are most likely to have been caused by different employment trends between the EU-SILC and the LFS data, differences in the evolution of major income sources between the EU-SILC and the nowcasting estimates (based on national macroeconomic indicators), revisions in the EU-SILC data, as well as simulation errors.

Nowcasting the main income-related poverty indicators has the potential to facilitate monitoring of the effects of the most recent changes in tax-benefit policies and macro-economic conditions on poverty risk. Given the relevance of these issues to evidence-based policy making and the encouraging results of the comparison of the nowcasting estimates with actual EU-SILC indicators, we believe that this approach constitutes a sound alternative to waiting until official statistics are made available and can provide valuable ex-ante information on potential distributional effects of contemporary economic and policy-related developments.

References

Avram, S., Sutherland, H., Tasseva, I. and Tumino, A. (2011) 'Income protection and poverty risk for the unemployed in Europe', Research Note 1/2011 of the European Observatory on the Social Situation and Demography, European Commission.

Bourguignon, F., Bussolo, M. and Da Silva, L.P. (2008) *The impact of macro-economic policies on poverty and income distribution Macro-Micro Evaluation Techniques and Tool*s, The World Bank and Palgrave-Macmillan, New York.

Brandolini, A., D'Amuri, F. and Faiella, I. (2013) "Country case study – Italy", Chapter 5 in Jenkins et al, *The Great Recession and the Distribution of Household Income*, Oxford: Oxford University Press.

Brewer, M., Browne, J., Hood, A., Joyce, R., Sibieta, L. (2013) "The Short- and Medium-Term Impacts of the Recession on the UK Income Distribution," *Fiscal Studies*, 34(2): 179–201.

Essama-Nssah, B. (2005) "The Poverty and Distributional Impact of Macroeconomic Shocks and Policies: A Review of Modeling Approaches", World Bank Policy Research Working Paper 3682, Washington, DC.

Fernandez Salgado M., Figari, F., Sutherland, H. and Tumino, A. (2014) "Welfare compensation for unemployment in the Great Recession," *The Review of Income and Wealth*, 60(S1): 177–204.

Figari, F., Iacovou, M., Skew, A. and Sutherland, H. (2012) "Approximations to the truth: comparing survey and microsimulation approaches to measuring income for social indicators," *Social Indicators Research*, 105(3): 387-407.

Figari, F., Salvatori, A. and Sutherland, H. (2011) "Economic downturn and stress testing European welfare systems*," Research in Labor Economics*, 32: 257-286.

Goedemé, T. (2010) "The standard error of estimates based on EU-SILC. An exploration through the Europe 2020 poverty indicators", Working Paper No. 10 / 09, Antwerp: Herman Deleeck Centre for Social Policy, University of Antwerp.

Goedemé, T. (2013) "How much Confidence can we have in EU-SILC? Complex Sample Designs and the Standard Error of the Europe 2020 Poverty Indicators," *Social Indicators Research*, 110(1): 89-110.

Goedemé, T., Van den Bosch., K., Salanauskaite, L. and Verbist, G. (2013) Testing the Statistical Significance of Microsimulation Results: Often Easier than You Think. A Technical Note, ImPRovE Methodological Paper No. 13/10.

Immervoll, H., Levy, H., Lietz, C., Mantovani, D. and Sutherland, H. (2006) "The sensitivity of poverty rates in the European Union to macro-level changes," *Cambridge Journal of Economics*, 30: 181-199.

Jara, X.H. and Leventi, C. (2014) Baseline results from the EU27 EUROMOD (2009-2013), EUROMOD Working Paper EM18/14, Colchester: ISER, University of Essex.

Keane C., Callan, T., Savage, M., Walsh, J.R. and Timoney, K. (2013) "Identifying Policy Impacts in the Crisis: Microsimulation Evidence on Tax and Welfare," *Journal of the Statistical and Social Inquiry Society of Ireland*, XLII: 1-14.

Leventi, C., Navicke, J., Rastrigina, O., Sutherland, H., Ozdemir, E. & Ward, T. (2013) 'Nowcasting: estimating developments in the risk of poverty and income distribution in 2012 and 2013', Research Note 1/2013, Social Situation Monitor, European Commission.

Matsaganis, M. and Leventi C. (2014) "Poverty and inequality during the Great Recession in Greece", *Political Studies Review*, 12: 209 -223.

Narayan, A. and Sánchez-Páramo C. (2012) Knowing, when you don't know: using microsimulation models to assess the poverty and distributional impacts of macroeconomic shocks, The World Bank, Washington DC.

Peichl, A. (2008) The Benefits of Linking CGE and Microsimulation Models: Evidence from a Flat Tax Analysis, IZA Discussion Paper No. 3715.

Rastrigina, O., Leventi, C. and Sutherland, H. (2015a) ‘Nowcasting: estimating developments in the risk of poverty and income distribution in 2013 and 2014’, Research Note 1/2014, Social Situation Monitor, European Commission.

Rastrigina O., Leventi, C. and Sutherland, H. (2015b) ‘Nowcasting risk of poverty and low work intensity in Europe’, EUROMOD Working Paper EM9/15, Colchester: ISER, University of Essex.

Sutherland, H. and Figari, F. (2013) “EUROMOD: the European Union tax-benefit microsimulation model,” *International Journal of Microsimulation*, 6(1): 4-26.

Appendix

Table A1: 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	Medium level of education
born_eu	Born in a another EU	dummy	Born in the country of residence
born_oth	Born in a country outside EU	dummy	Born in the country of residence
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	-
owner	Accommodation is owned by the households member	dummy	Accommodation is rented (or provided for free)
urban1	Lives in a densely populated area	dummy	Lives in a thinly populated area
urban2	Lives in an intermediate populated area	dummy	Lives in a 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 below 2 years old are excluded (unless they have positive income).*

Table A2: Logit regression coefficients: men

	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY
dag	0.275**	0.376**	0.307**	0.249**	0.167**	0.119**	0.276**	0.161**	0.406**	0.223**	0.358**	0.411**
dag2	-0.003**	-0.005**	-0.004**	-0.003**	-0.002**	-0.001**	-0.003**	-0.002**	-0.005**	-0.003**	-0.004**	-0.005**
married	0.345*	0.663**	0.167	0.878**	1.108**	0.916**	0.878**	0.973**	0.409**	0.769**	0.777**	0.535*
cohabit	0.136	0.698**	0.181	0.480**	0.743**	0.669**	0.944	0.780**	0.213	0.053	0.437*	1.083**
educ_low	-0.786**	-1.398**	-0.210	-0.316*	-0.662**	-0.423**	-0.553**	-0.531**	-0.452**	-0.968**	-0.523**	-0.392**
educ_high	0.559**	0.277	0.430*	0.890**	0.807**	0.250	0.675**	0.314**	0.482**	0.805**	0.229*	0.347**
born_eu	-1.672	-0.494	0.595			0.186		-0.618**	0.805**	0.507	-0.015	0.563*
born_oth	-1.638	-0.898	-0.200	-0.165	-0.471*	-0.468		-0.911**	-0.230	-0.122	-0.333*	-0.747**
partner_empl	0.313*	0.503**	0.906**	0.406**	0.318	0.261	0.015	0.007	0.735**	0.328*	0.226*	0.059
hh_unem	-0.538**	-0.472*	0.053	-1.197**	-0.698**	-0.979**	-0.653**	-0.708**	-0.095	-0.283*	-0.417**	-0.374**
hh_size	-0.014	-0.096	-0.302	0.152	-0.103	-0.079	-0.657**	-0.164*	-0.391**	0.202	-0.331**	-0.173
ch_n_age1	0.211	0.153	0.213	0.011	0.095	0.095	0.351	-0.054	0.316*	0.052	0.287*	-0.034
ch_n_age2	-0.038	-0.093	0.482	-0.116	-0.014	-0.104	0.542	-0.177	-0.022	-0.092	0.083	0.469
ch_n_age3	0.047	-0.060	-0.033	0.040	0.178	-0.013	0.091	0.003	-0.038	0.088	0.156	-0.149
ch_n_age4	-0.010	0.188	0.431*	0.105	-0.126	-0.180	0.291*	0.118	0.197*	-0.044	0.419**	0.011
urban1	0.085	-0.035	-0.751**	-0.327**	0.375**	0.299*	-0.817**	-0.108	-0.295**	-0.008	-0.028	-0.155
urban2	0.129	0.021	-0.163	0.052		-0.289	-0.661**	0.092	-0.383**	0.241	0.108	-0.308*
owner	-0.107	0.317*	0.392*	0.538**	0.466**	0.640**	0.054	-0.031	0.333**	0.079	0.243**	0.374**
reg_2	0.183*	0.021					0.248	-0.486*	-0.500*		-0.943**	
reg_3		-0.406					0.343	-0.131	-0.415		-1.085**	
reg_4		-0.407					0.666*	0.106	-0.277		0.084	
reg_5		-0.148					-0.003	0.762**	0.357		-0.357**	
reg_6		-0.350					0.673	0.297	-0.059			
reg_7		-0.693*					0.003	0.053	-0.450			
reg_8		-0.784**					0.407	0.146	-0.393*			
reg_9							0.636*	-0.042	0.015			
reg_10							0.102	-0.264	-0.205			
reg_11							0.414	-0.408*	-0.327			
reg_12							0.536	-0.010	-0.100			
reg_13							0.198	-0.369*	-0.228			
reg_14								0.562*	-0.363			
reg_15								-0.700**	-0.047			
reg_16								-0.249	-0.073			
reg_17								0.509	-0.117			
reg_18								1.628**	0.026			
reg_19								-0.294	0.055			
reg_20									-0.382			
reg_21									0.121			
reg_22									-0.159			
_cons	-4.189**	-4.535**	-4.310**	-3.451**	-2.320**	-2.134**	-3.494**	-1.526**	-5.235**	-4.097**	-4.632**	-6.480**
N	3,957	5,153	3,894	7,076	3,591	2,643	3,227	8,814	7,219	3,604	12,472	3,606

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

Table A2: Logit regression coefficients: men *(continued)*

	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SK	FI	SE
dag	0.145**	0.157**	0.456**	0.337**	0.490**	0.570**	0.398**	0.219**	0.179**	0.157**	0.384**	0.401**	0.474**
dag2	-0.002**	-0.002**	-0.006**	-0.004**	-0.006**	-0.007**	-0.005**	-0.003**	-0.002**	-0.002**	-0.005**	-0.005**	-0.006**
married	1.125**	0.772**	0.053	0.601**	0.891**	0.779**	0.398*	1.034**	0.391*	0.221	1.136**	0.402**	0.220
cohabit	0.765**		0.263	0.320*	-0.462	1.137**	0.277	0.558*	-0.037	0.097	0.567	0.442**	0.368
educ_low	-0.582**	-0.943**	-0.348	-1.139**	-0.063	0.139	-0.119	-0.674**	-0.372**	-0.446**	-1.304**	-0.391**	-0.501**
educ_high	0.855**	1.133**	0.542*	0.632**	1.014**	0.380*	0.397*	0.766**	0.357	0.617*	0.289*	0.553**	-0.165
born_eu		-0.145	-0.225	-0.512		-0.209	-0.209	-0.585	-0.510		-0.374	0.210	-0.136
born_oth	-0.005	-0.209	-0.599*	0.192	-0.598*	-0.876**	-0.306		-0.286	-3.017**	-0.158	-0.902**	-0.512*
partner_empl	0.177	0.386	0.332	0.650**	0.407*	0.332*	0.586**	0.054	0.617**	0.639**	0.465**	0.752**	0.825**
hh_unem	-0.611**	-0.641**	-0.179	-0.485**	-0.406	-0.590*	-0.625**	-0.457**	-0.151	-1.422**	-0.686**	-0.419*	-0.067
hh_size	-0.086	0.185	-0.162	-0.089	-0.033	0.195	-0.012	0.053	-0.277*	-0.057	-0.014	-0.277**	-0.275*
ch_n_age1	0.178	0.445	-0.159	0.102	-0.139	0.341	0.046	0.025	0.432*	0.378	0.009	0.726**	0.448
ch_n_age2	0.018	0.178	-0.189	-0.178	-0.061	-0.108	-0.117	-0.102	0.069	0.132	0.267	0.026	0.092
ch_n_age3	0.050	-0.015	-0.028	-0.250**	-0.479**	-0.189	-0.182	-0.046	0.162	-0.091	-0.055	0.012	0.142
ch_n_age4	-0.133	-0.076	0.465*	-0.033	0.052	-0.326	-0.050	0.124	0.120	0.357*	-0.274**	0.186	-0.055
urban1	-0.007	0.228	0.064	0.114	-0.087		-0.613**	-0.082	-0.150	-0.395*	0.299*	0.285	-0.035
urban2			-0.379*	0.183*			-0.276	-0.092	0.027	-0.413*	0.190	-0.036	-0.048
owner	0.274*	0.269	0.989**	0.331*	0.416**	0.570**	0.363**	0.529**	0.590**	-0.420	0.276	0.920**	0.681**
reg_2				-0.124			0.106	0.223		0.184		-0.014	-0.140
reg_3				-0.343**			0.346*	-0.024		0.045		-0.218	-0.218
reg_4								0.150		-0.314		-0.298*	
reg_5								-0.206					
reg_6								0.121					
_cons	-1.804**	-2.892**	-5.660**	-4.729**	-7.098**	-9.723**	-5.285**	-2.910**	-2.031**	-0.046	-5.963**	-6.876**	-7.348**
	3,573	3,079	3,839	6,972	3,338	7,382	3,846	8,757	3,779	4,274	4,251	7,681	4,387

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

Table A3: Logit regression coefficients: women

	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY
dag	0.403**	0.459**	0.355**	0.269**	0.283**	0.201**	0.272**	0.221**	0.458**	0.283**	0.360**	0.346**
dag2	-0.005**	-0.006**	-0.004**	-0.003**	-0.003**	-0.003**	-0.003**	-0.003**	-0.006**	-0.004**	-0.004**	-0.004**
married	0.065	0.115	-0.418*	-0.432**	-0.542**	-0.107	-0.528**	-0.547**	-0.381**	-0.216	-1.103**	-0.876**
cohabit	-0.306	-0.085	-0.635**	0.123	-0.310	0.172	-0.006	-0.369*	-0.072	-0.336	-0.354*	-0.320
educ_low	-1.140**	-1.462**	-0.682**	-0.523**	-0.425*	-0.825**	-0.105	-0.683**	-0.549**	-1.107**	-0.898**	-0.564**
educ_high	0.775**	0.680**	0.655**	0.683**	0.920**	0.652**	1.150**	0.739**	0.466**	0.843**	0.664**	0.262*
born_eu	0.365	-0.146	0.474			-0.062		-0.219	0.011	0.148	-0.188	-0.125
born_oth	-1.263*	-0.095	-0.247	-0.231	-0.209	-0.298		-0.436**	-0.728**	-0.111	-0.442**	0.325*
partner_empl	0.336*	0.264	1.032**	0.542**	0.581**	0.156	0.414**	0.328**	0.700**	0.332**	0.365**	0.274
hh_unem	-0.317**	-0.644**	0.484	-0.487**	-0.350	-0.235	-0.006	-0.132	-0.043	-0.227*	0.147	-0.140
hh_size	-0.030	-0.059	0.225	-0.134	-0.325**	-0.466**	-0.208	-0.119	-0.439**	-0.068	-0.231**	-0.186
ch_n_age1	-0.244	-3.564**	-0.190	-1.115**	-1.020**	-0.492*	0.016	0.208	-0.100	-0.192	0.028	0.195
ch_n_age2	-0.670**	-0.915**	-0.341	-0.369**	-0.218	-0.516**	0.005	-0.003	-0.219*	-0.156	-0.230*	-0.355
ch_n_age3	-0.201	-0.644**	-0.135	-0.327**	-0.380**	-0.456**	-0.016	-0.237**	-0.174*	-0.322**	-0.174**	-0.085
ch_n_age4	0.091	-0.278**	-0.247	-0.235**	0.010	-0.023	-0.055	-0.051	-0.158*	0.013	0.005	0.006
urban1	0.304**	0.268	0.039	-0.125	0.168	0.129	-0.233	0.043	-0.217*	0.522**	0.050	-0.179
urban2	0.341**	0.181	0.138	0.053		0.056	-0.340*	-0.117	-0.078	0.466**	-0.008	-0.148
owner	-0.409*	0.179	0.432**	0.366**	-0.155	0.701**	0.062	-0.294**	0.350**	-0.234	-0.043	-0.002
reg_2	0.187*	0.456					-0.217	-0.386	-0.238		-1.104**	
reg_3		0.246					-0.383	0.010	-0.778**		-1.180**	
reg_4		-0.105					-0.030	0.032	-0.649**		0.091	
reg_5		0.295					0.365	0.049	-0.610**		-0.233**	
reg_6		-0.047					0.033	0.420*	-0.601**			
reg_7		-0.120					-0.257	0.246	-0.399			
reg_8		-0.546*					-0.521*	0.324*	-0.708**			
reg_9							0.316	0.119	-0.644**			
reg_10							-0.043	-0.280	-0.791**			
reg_11							0.078	-0.269	-0.255			
reg_12							-0.071	0.392**	-0.587**			
reg_13							0.561*	-0.119	-0.100			
reg_14								0.554**	-0.203			
reg_15								-0.451**	-0.463*			
reg_16								-0.094	-0.723**			
reg_17								-1.125**	-0.231			
reg_18								-0.742*	-0.444**			
reg_19								-0.178	-0.594*			
reg_20									-0.872**			
reg_21									-0.583**			
reg_22									-0.478			
_cons	-6.668**	-6.850**	-7.027**	-3.393**	-3.608**	-2.264**	-4.765**	-3.239**	-6.359**	-4.460**	-5.116**	-4.425**
	3,701	4,563	3,748	7,580	3,377	2,722	3,228	8,944	6,814	3,413	12,398	3,687

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

Table A3: Logit regression coefficients: women *(continued)*

	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SK	FI	SE
dag	0.194**	0.327**	0.352**	0.441**	0.346**	0.487**	0.411**	0.296**	0.277**	0.173**	0.443**	0.376**	0.495**
dag2	-0.002**	-0.004**	-0.005**	-0.005**	-0.005**	-0.006**	-0.005**	-0.004**	-0.003**	-0.002**	-0.005**	-0.004**	-0.006**
married	-0.075	0.371	-1.063**	-0.042	-0.299	-0.458**	-0.470**	0.032	-0.620**	-0.800**	-0.254	-0.320*	-0.126
cohabit	-0.071		0.142	-0.222	0.426	0.316	0.099	-0.360	-0.597**	-0.865**	0.153	-0.018	0.085
educ_low	-0.555**	-1.136**	-0.202	-1.179**	-1.274**	-0.477**	-0.711**	-0.798**	-0.615**	-0.721**	-1.404**	-0.824**	-0.683**
educ_high	1.121**	1.202**	0.593**	0.879**	0.816**	0.783**	0.655**	1.258**	0.428**	1.075**	0.634**	0.740**	0.058
born_eu		1.218	0.101	0.608		-0.459	-0.305	0.701	0.192		0.218	-0.172	-0.394
born_oth	-0.207	-0.339	-0.339	0.153	-0.509*	-0.498*	-0.259		-0.030	0.441	-1.711	-0.756**	-0.778**
partner_empl	0.168	0.257	0.385*	0.590**	0.041	0.450**	0.557**	0.230*	0.724**	0.565**	0.601**	0.629**	0.575**
hh_unem	-0.340**	-0.378*	-0.110	-0.367**	-0.250	0.394	0.113	-0.044	-0.049	-0.769**	-0.384**	-0.262	0.018
hh_size	-0.184*	-0.058	-0.021	-0.117	-0.044	-0.065	-0.046	-0.044	-0.344**	-0.014	-0.065	-0.202	0.029
ch_n_age1	-0.381	-0.723	-0.197	-3.201**	-0.576*	0.163	-0.834**	-1.153**	0.240	-0.561*	-2.291**	-1.311**	0.422
ch_n_age2	-0.094	-0.479*	-0.277	-1.070**	-0.967**	-0.539**	-0.938**	-0.896**	0.109	-0.424*	-1.330**	-0.090	-0.432**
ch_n_age3	-0.024	-0.358	-0.456**	-0.760**	-0.636**	-0.490**	-0.431**	-0.229**	-0.013	-0.215*	-0.343**	-0.235*	-0.298*
ch_n_age4	-0.083	-0.287**	-0.148	-0.262**	-0.514**	-0.396**	-0.258*	-0.057	-0.156*	-0.001	-0.182**	0.037	-0.310*
urban1	0.034	0.413**	0.082	0.127	-0.123		-0.341*	0.087	0.206*	0.379**	0.256*	-0.002	-0.246
urban2			-0.083	0.163*			-0.051	-0.155	0.255*	0.393**	0.253*	-0.351*	-0.256
owner	0.091	0.237	0.216	0.204	0.024	0.505**	0.135	0.252**	0.179	0.259	0.121	0.584**	0.356**
reg_2				0.295**			-0.093	-0.252*		0.034		0.174	-0.139
reg_3				0.004			0.074	-0.122		-0.075		0.061	-0.182
reg_4								-0.070		0.050		-0.276*	
reg_5								-0.295*					
reg_6								-0.129					
_cons	-2.703**	-5.621**	-4.130**	-7.010**	-3.957**	-7.942**	-5.713**	-4.283**	-3.679**	-2.522**	-7.136**	-6.292**	-8.054**
	3,883	3,269	3,924	7,293	3,528	7,137	3,723	8,194	3,958	4,032	4,187	6,850	4,118

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

Figure A1: Average employment income: UDB SILC and nowcasted estimates (monthly amounts)

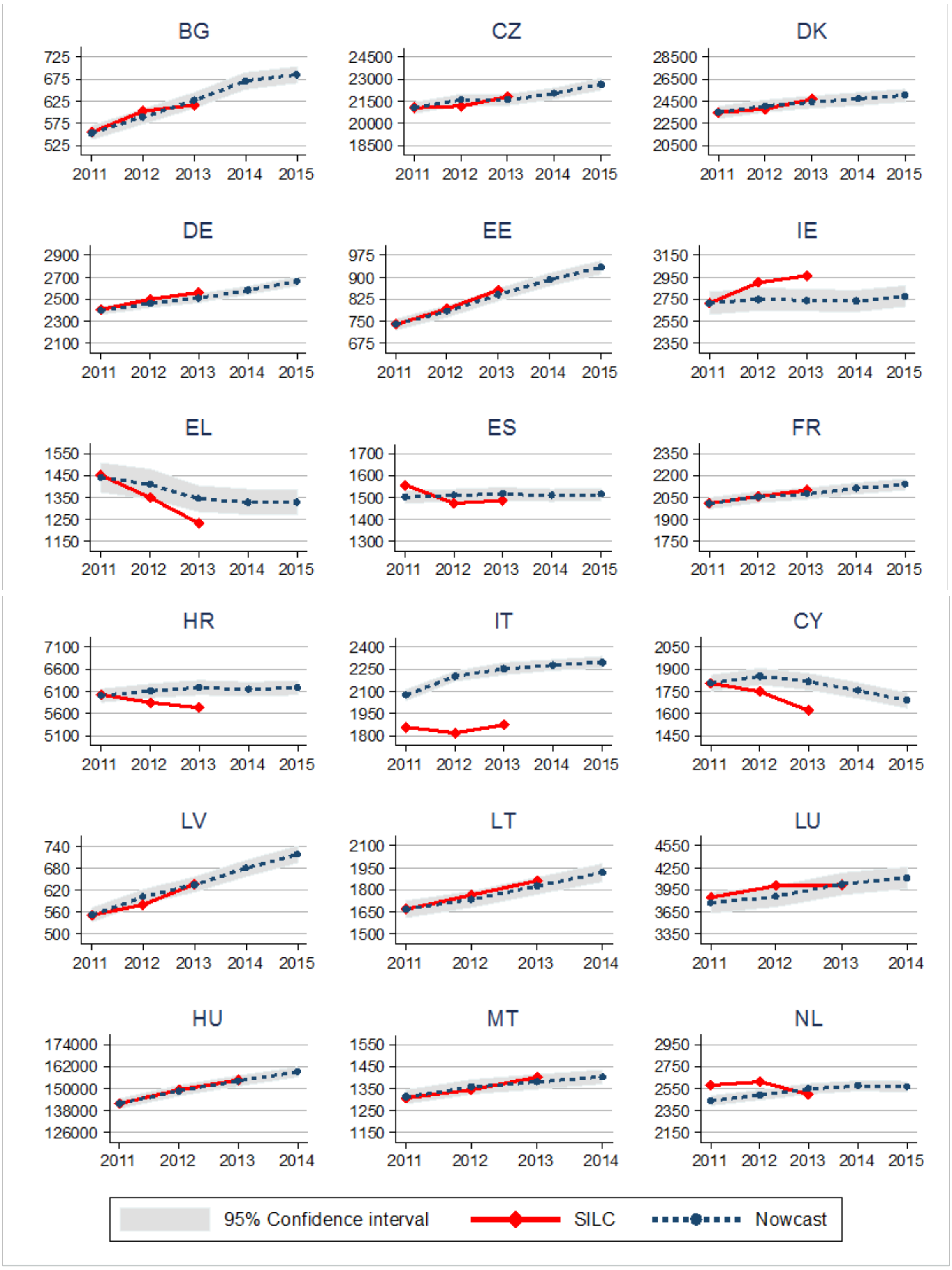
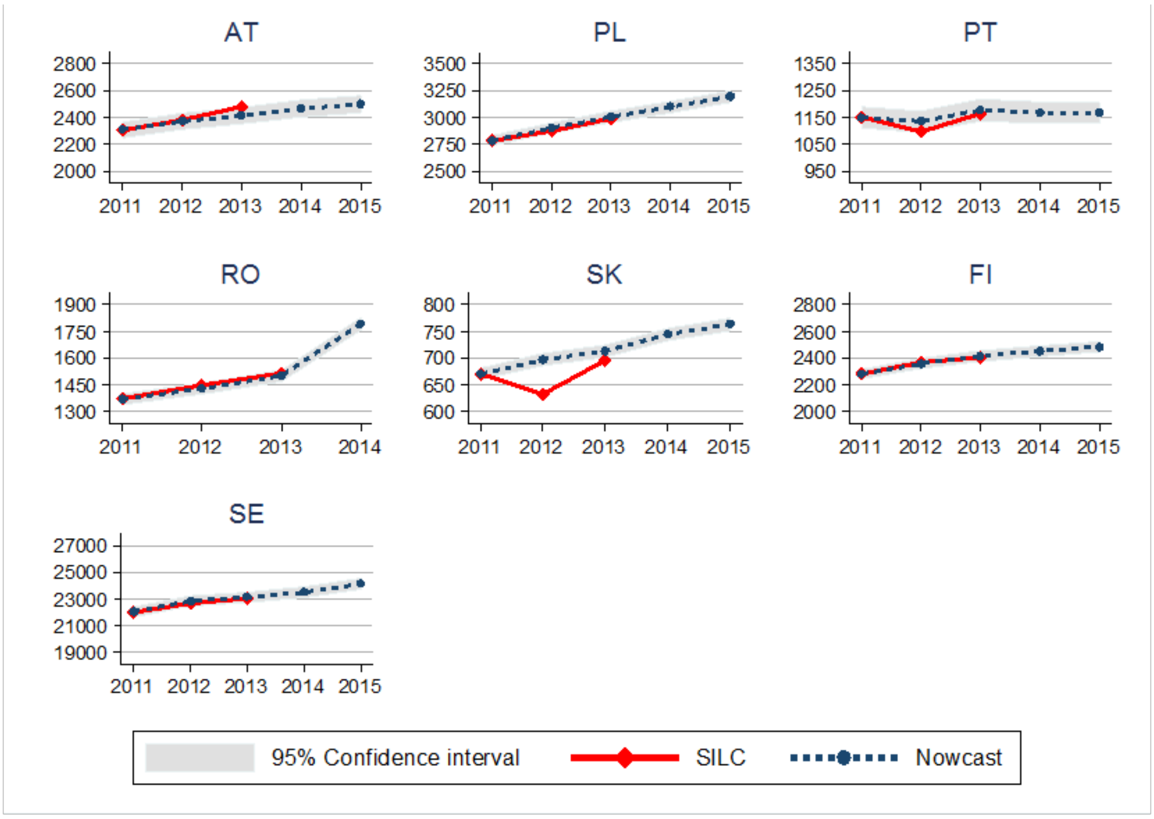


Figure A1 (cont'd): Average employment income: UDB SILC and nowcasted estimates (monthly amounts)



Notes: *Non-calibrated results. Employment income in UDB SILC is based on variable py010g. Employment income in EUROMOD is derived from the same concept but with some country-specific adjustments in place (e.g. net-to-gross imputations in Greece and Italy). The discrepancy between the 2011 estimates in Spain is due to revisions in SILC that are not part of the EUROMOD input data. In Luxembourg the households with at least one international civil servant have been excluded from the EUROMOD input data as they have a specific tax-benefit system which is different from the national one. In the Netherlands the compensation paid by the employer for the income related health insurance contributions was subtracted from py010g. Amounts are expressed in national currencies. The charts are drawn to different scales and the gridlines approximately correspond to 7% - 10% of the mean in each country.*

Source: EU-SILC 2012-4, 2013-3, and 2014-1 own calculations; EUROMOD Version G3.0.

Figure A2: Average income from pensions: UDB SILC and nowcasted estimates (monthly amounts)

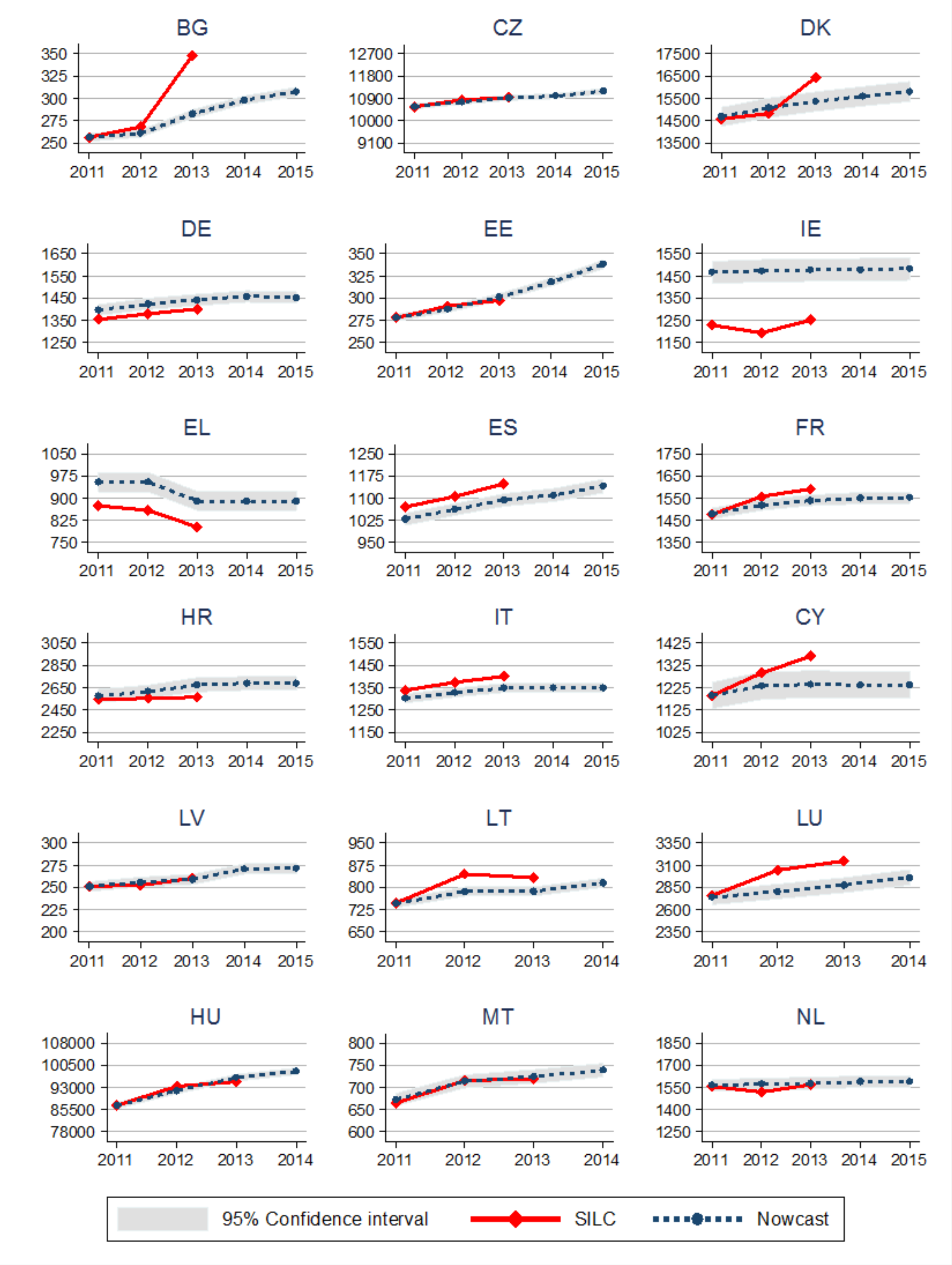
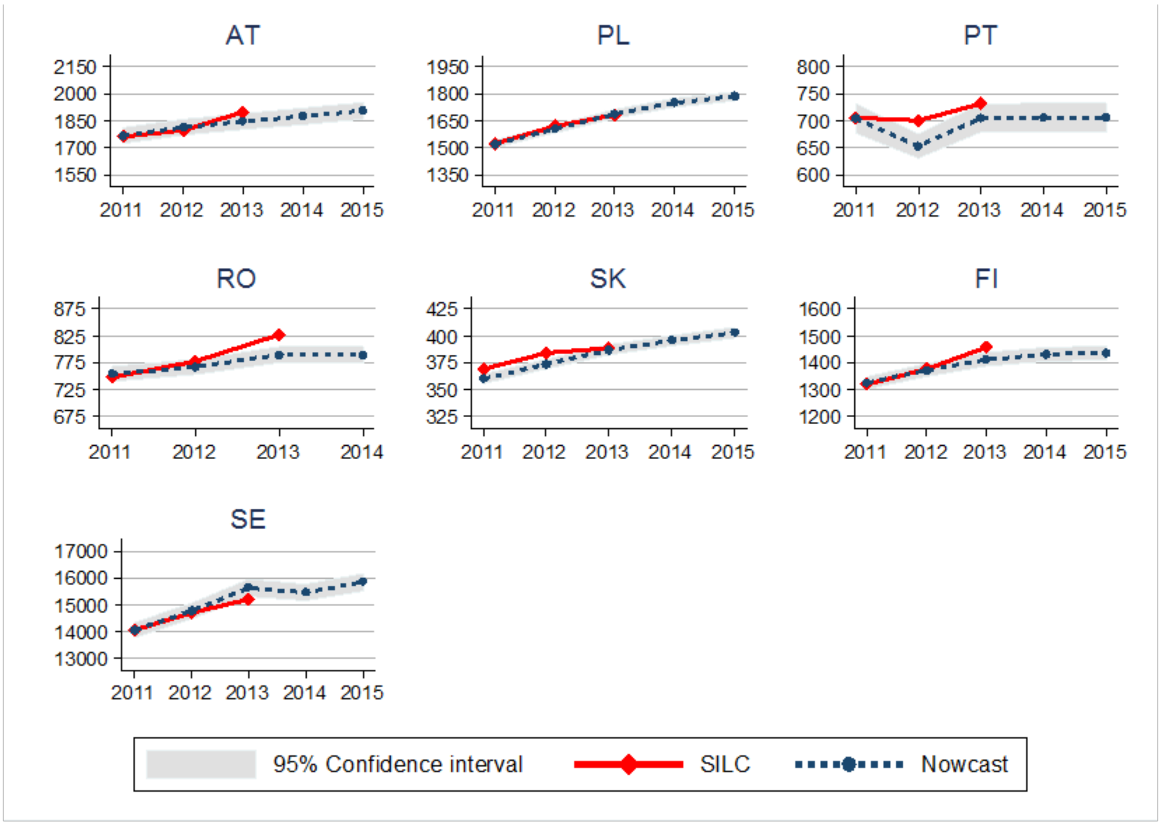


Figure A2 (cont'd): Average income from pensions: UDB SILC and nowcasted estimates (monthly amounts)



Notes: *Non-calibrated results. Pension income in UDB SILC is the sum of py100g, py110g and py130g variables. Pension income in EUROMOD is the sum of the corresponding income components defined by income lists "ils_udb_boa", "ils_udb_bsu", and "ils_udb_bdi". Discrepancies between the 2011 estimates may arise in case some of the components are simulated in EUROMOD. In Ireland, where most of these components are simulated, discrepancies also arise due to imputations intended to correct for pension underreporting and the classification of some benefit income in UDB SILC as pension income in the EUROMOD data. In Greece discrepancies are mostly due to the net-to-gross adjustments that are performed in the EUROMOD input data. Amounts are expressed in national currencies. The charts are drawn to different scales and the gridlines approximately correspond to 7% - 10% of the mean in each country.*

Source: EU-SILC 2012-4, 2013-3, and 2014-1 own calculations; EUROMOD Version G3.0.

Figure A3: Median incomes: Eurostat and nowcasted estimates (yearly amounts)

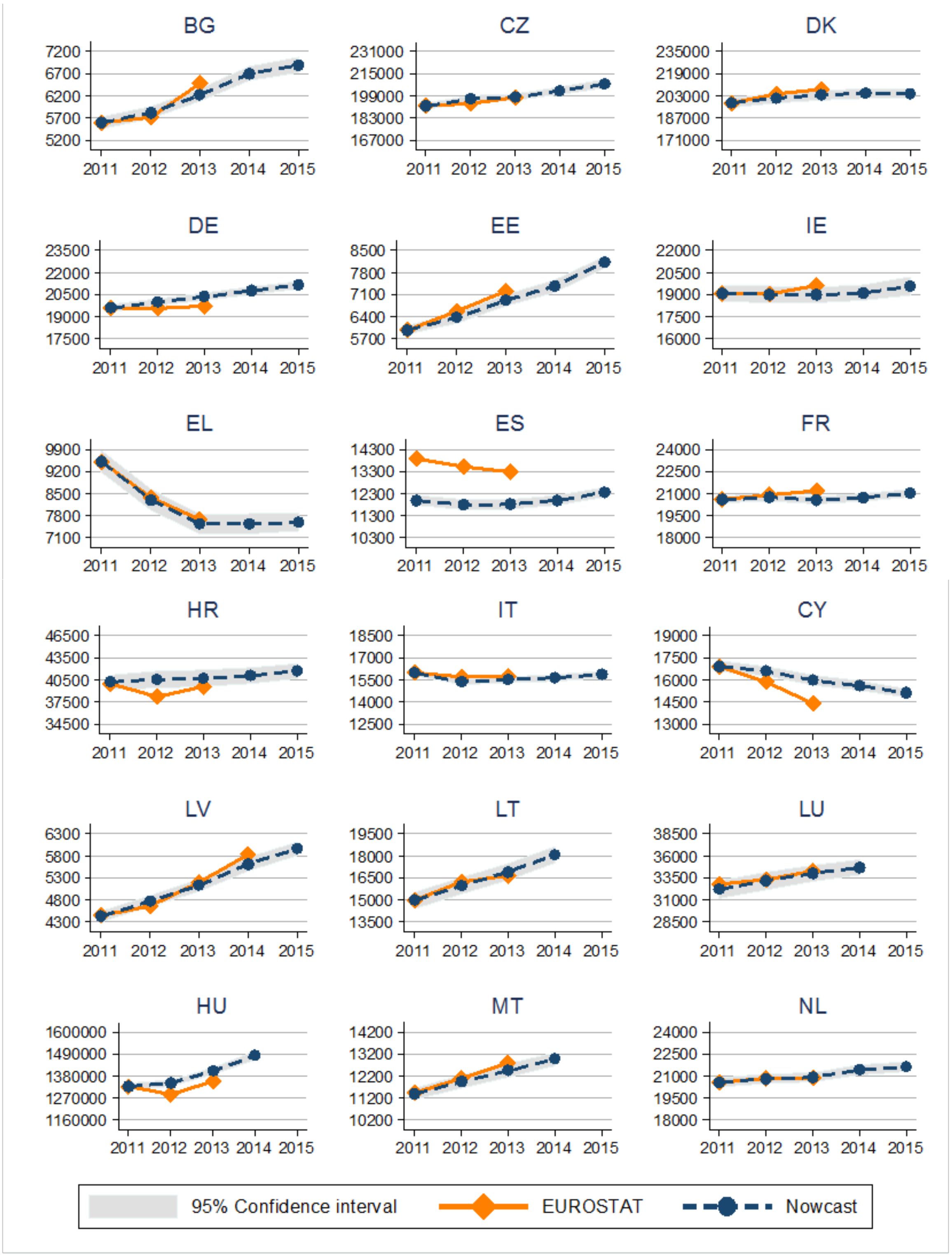
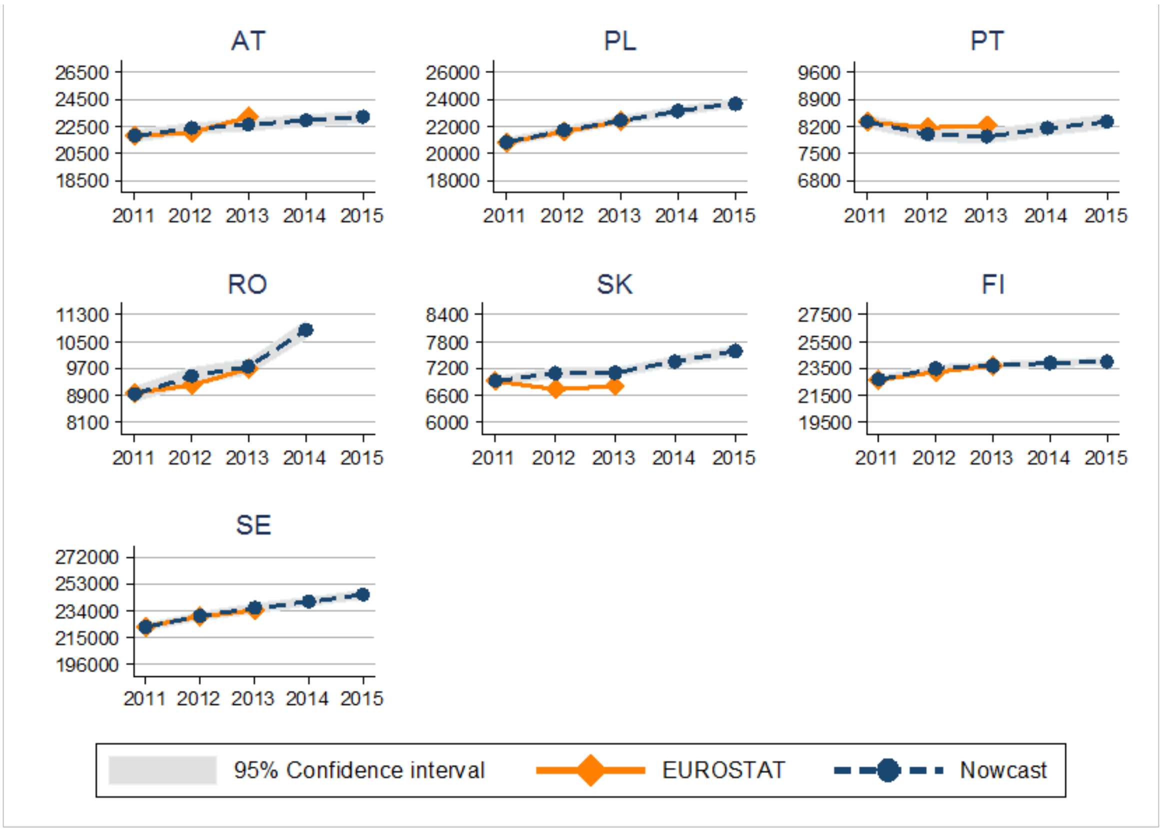


Figure A3 (cont'd): Median incomes: Eurostat and nowcasted estimates (yearly amounts)



Note: *The charts are drawn to different scales and the gridlines approximately correspond to 7% - 10% of the median in each country. Amounts are expressed in national currencies. Eurostat (ilc_di03) numbers are lagged by one year to correspond to the income reference year. The discrepancy between the 2011 estimates in Spain is due to revisions in SILC that are not part of the EUROMOD input data.*

Source: *Eurostat database: code "ilc_di03", last accessed on January 27, 2016; EUROMOD Version G3.0.*

Figure A4: Employment rates (15-64) in LFS, EU-SILC and EUROMOD (Nowcast)

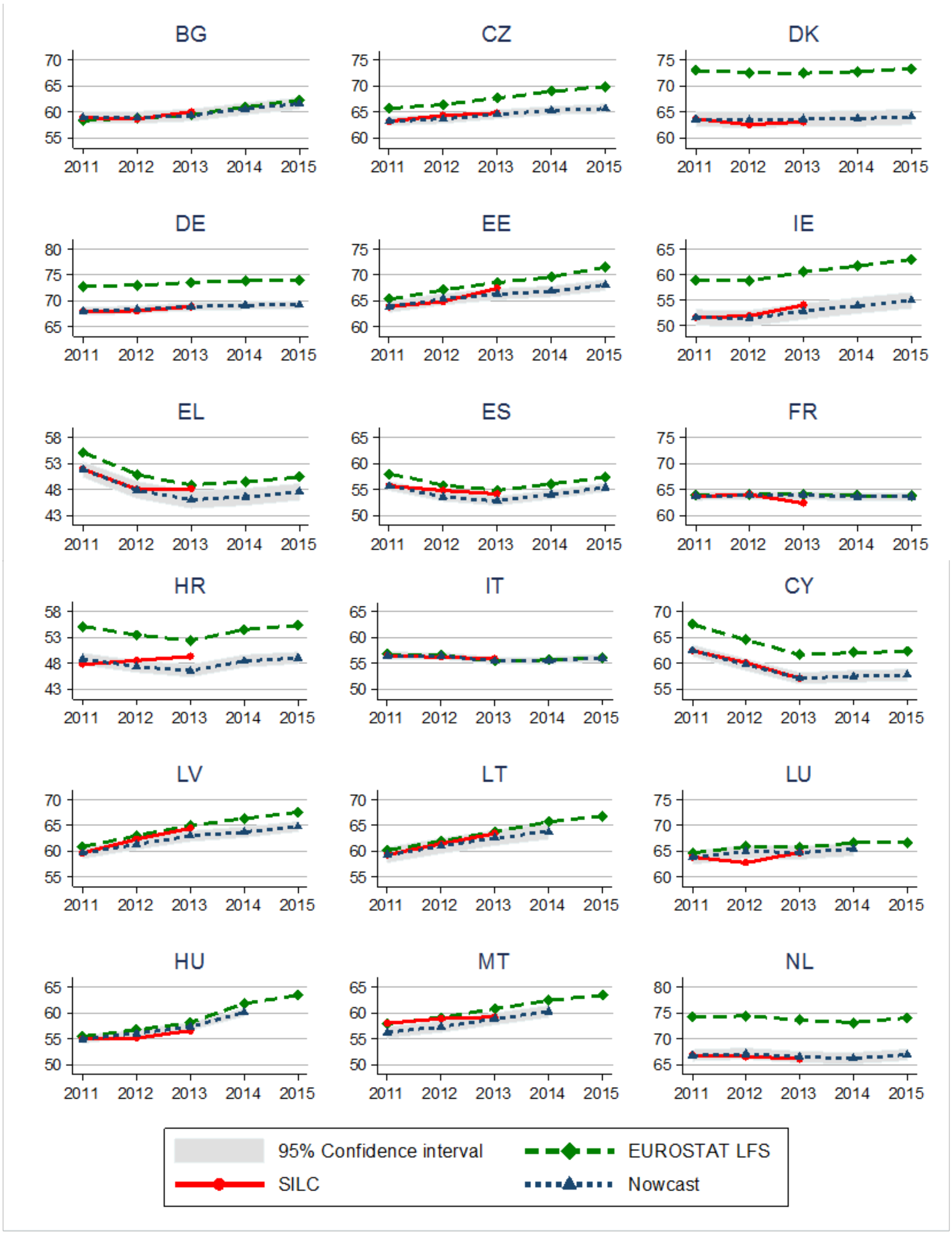
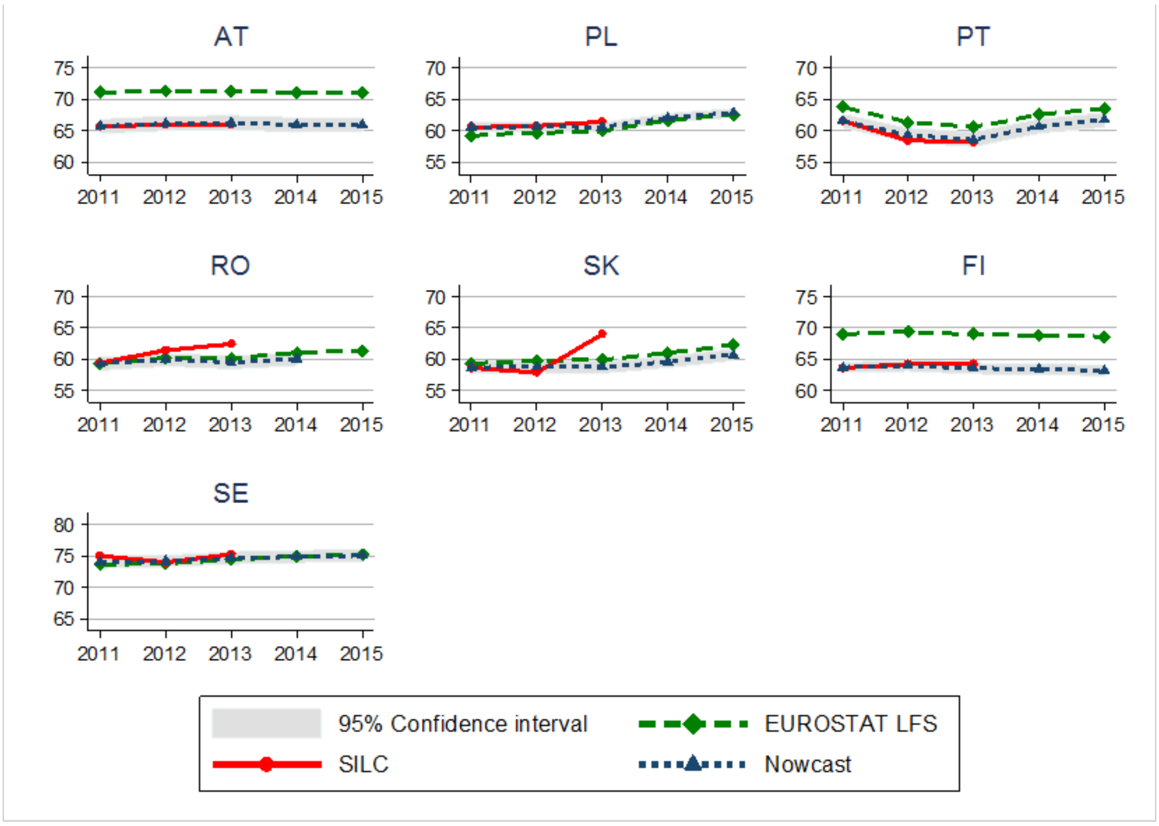


Figure A4 (cont'd): Employment rates (15-64) in LFS, EU-SILC and EUROMOD (Nowcast)



Note: *The charts are drawn to different scales and the gridlines correspond to 5 percentage points. LFS estimates for 2015 are approximated by using the average of the latest 4 quarters available. Employment rates in EU-SILC are calculated based on labour market information in the income reference period.*

Source: *Eurostat database: code "lfsa_ergaed" and "lfsq_ergaed", last accessed on January 27, 2016; EU-SILC 2012-4, 2013-3, and 2014-1 own calculations; EUROMOD Version G3.0.*

Figure A5: Population share (65+): EU-SILC, Eurostat demographic statistics and EUROMOD (Nowcast)

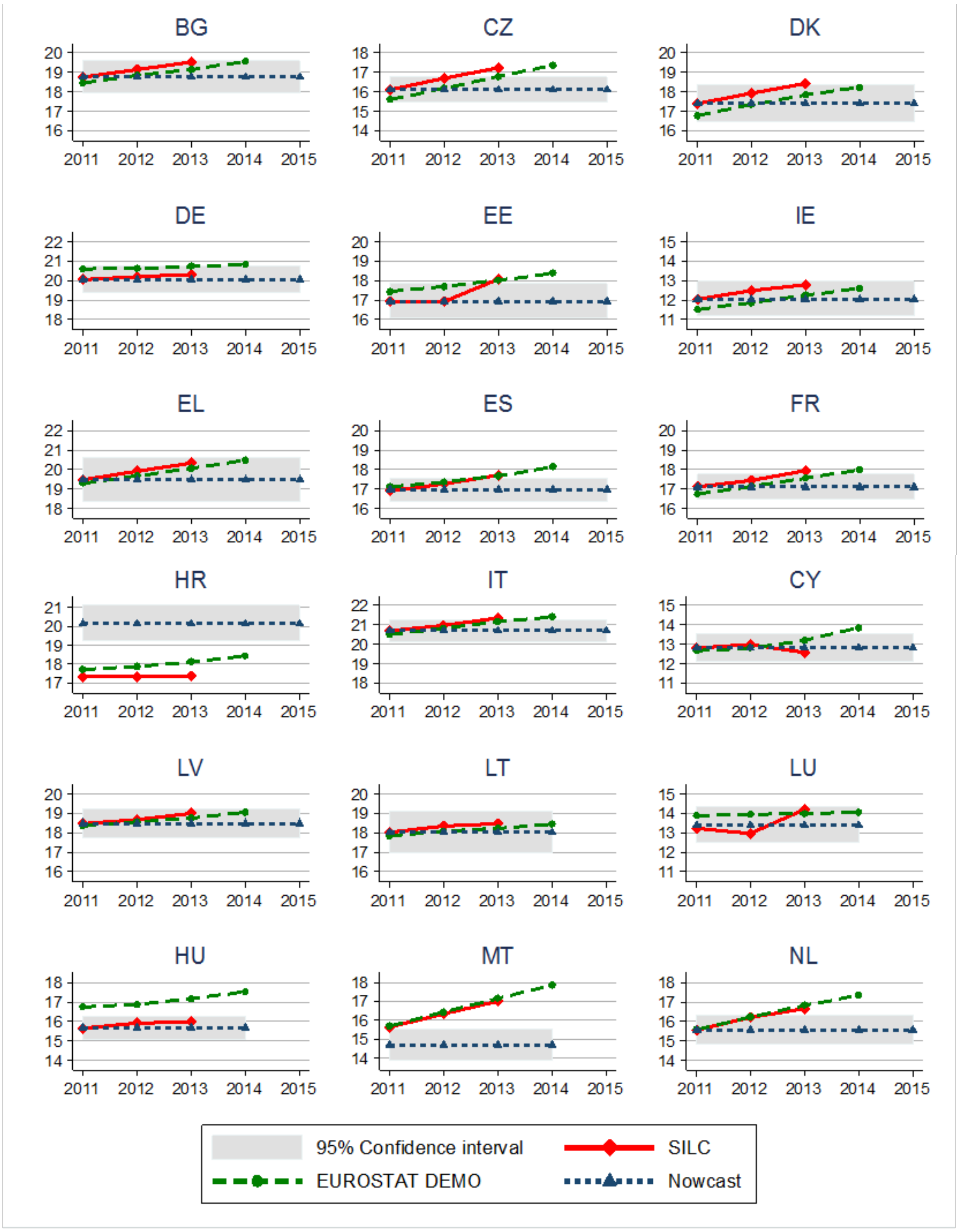
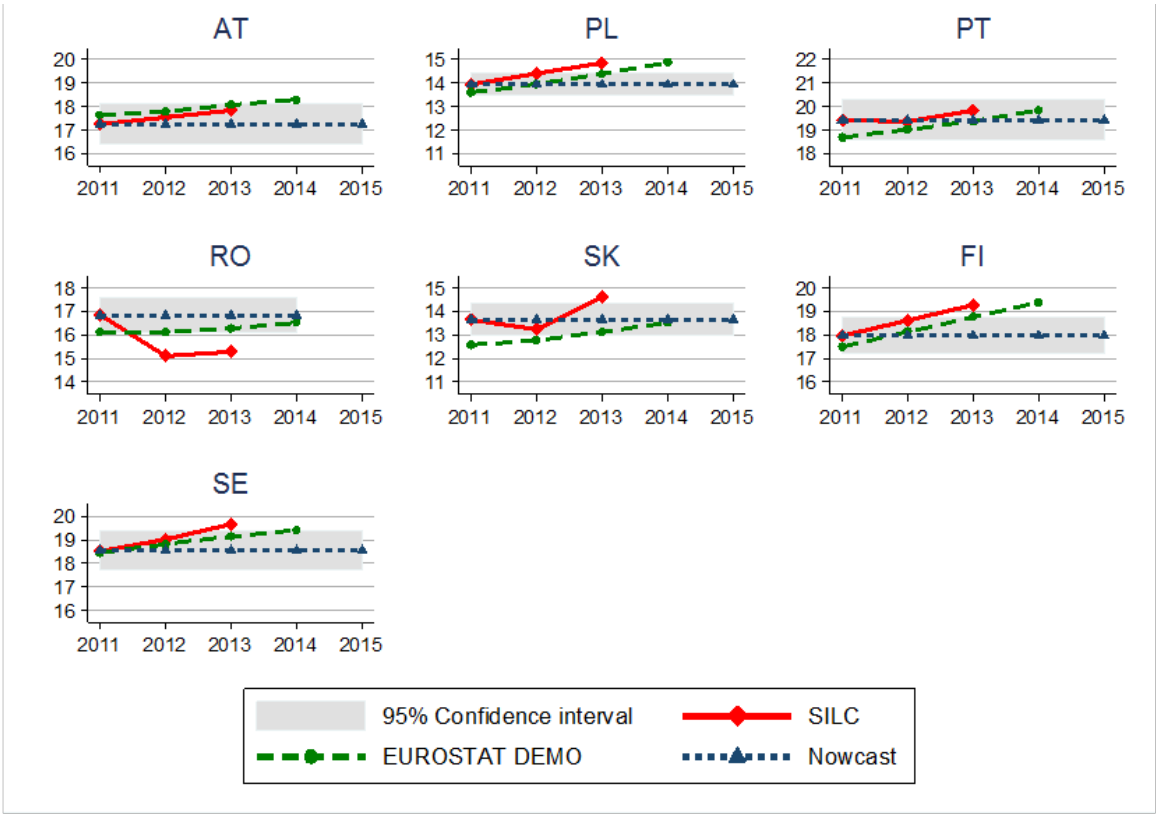


Figure A5 (cont'd): Population share (65+): EU-SILC, Eurostat demographic statistics and EUROMOD (Nowcast)



Note: *The vertical scale covers a range of 4 percentage points in all countries, starting from different initial points. The discrepancies between the 2011 estimates for SILC and EUROMOD in Croatia and Malta are due to revisions in SILC weights that are not part of the EUROMOD input data.*

Source: *Eurostat database: code "demo_pjangroup", last accessed on January 27, 2016; EU-SILC 2012-4, 2013-3, and 2014-1 own calculations; EUROMOD Version G3.0.*