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**Nowcasting: estimating developments in
the risk of poverty and income
distribution in 2013 and 2014**

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Nowcasting: estimating developments in the risk of poverty and income distribution in 2013 and 2014 ¹

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Abstract

The at-risk-of-poverty rate 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 seventeen EU Member States. AROP rates are estimated up to 2014 for ten countries and 2013 for the remaining seven 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, 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 crucial for monitoring 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 and social exclusion are released by Eurostat with a substantial time lag. For instance, micro-data from EU-SILC collected in year n , reporting incomes received in year $n-1$, is released in March in year $n+2$ and Eurostat normally publishes indicators using these data about six months earlier.² This results in the EU-SILC data being used predominantly for ex-post analysis and in policy makers making decisions while having imperfect knowledge of the present state of the economy.

The aim of this paper is to present a microsimulation-based methodology for nowcasting changes in the distribution of income over a period for which EU-SILC statistics are not yet available, and assess the implications of these changes for the proportion of the population at risk of poverty. The term 'nowcasting' refers to the estimation of current indicators using data on a past income distribution together with various other sources of information, such as macroeconomic statistics. This research extends and updates previous work on nowcasting indicators of poverty risk (Leventi et al., 2013; Navicke et al., 2013) by performing the analysis for four more countries (Bulgaria, Cyprus, the Netherlands and Slovakia), extending the timing of projections by one additional year and updating the underlying micro- and macro- data.

The 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 seventeen EU countries that are included in the note are Bulgaria, Germany, Estonia, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, the Netherlands, Austria, Poland, Portugal, Romania, Slovakia and Finland. The nowcasting method is applied to EU-SILC 2012 data (2011 incomes) for Spain, Latvia, Austria and Slovakia and EU-SILC 2010 (2009 incomes) for the rest of the countries. AROP rates are estimated up to 2014 for ten countries (namely Bulgaria, Germany, Estonia, Greece, Italy, Latvia, Austria, Poland, Romania and Slovakia) and 2013 for the remaining seven countries. The method is evaluated by comparing nowcast and Eurostat estimates for incomes in the period 2010 to 2012, when both are available.

The most important findings can be summarised as follows. With the exception of Spain, both mean and median equivalised household disposable incomes in 2013/2014 are significantly different from their 2012 levels in the countries included in the analysis. The highest increases in the mean and median income are predicted for Estonia and Latvia (approximately 14% in 2012-2014), followed by Bulgaria (10.9% in 2012-2014) and Romania (in 9.6% in 2012-2013). A substantial reduction in the median is expected in Greece (-10.2% in 2012-2014). Median income is also expected to decline in 2013 in Cyprus, Portugal and France, but by less than 3%. The countries where relative poverty is predicted to increase the most are Cyprus and Latvia, by 0.95 and 0.68 percentage points respectively. Statistically significant decreases in the AROP rate are estimated for Bulgaria, France and Germany. However, in all cases the predicted reductions are less than half a percentage point.

² For example, SILC 2012 microdata containing information on 2011 incomes were released by Eurostat in March 2014. For most Member States the indicators based on these data were available in October 2013.

The structure of the paper 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

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.³ 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.⁴ 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 nowcasting methodology presented in this paper 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.

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. Detailed information on EUROMOD and its applications can be found in Sutherland & Figari (2013).

2.1 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 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, 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).

³ 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.

⁴ A detailed review is provided in Bourguignon et al. (2008) and Essama-Nssah (2005).

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, gender and education (a total of 18 strata) 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 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.

2.2 Updating market incomes and simulating policies

After modelling (un)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 2014 (or 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 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. 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. 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) and discussed in Section 4.

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 2014. 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 exception to this rule is Greece, where policy changes after the 30th of June were taken into account in 2011-2014 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 and Italy) and benefit non take-up (in Estonia, France, Greece, Portugal and Romania). 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 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. In Portugal, non

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>).

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.

2.3 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 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 2010 (or 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 seventeen EU countries using 2009 as a starting year. For the four countries with underlying input data coming from SILC 2012 (Spain, Latvia, Austria and Slovakia), an additional estimation is done using 2011 as a starting point. We nowcast the AROP rates up to 2013 or 2014 (i.e. attempting to predict what EU-SILC 2014 and EU-SILC 2015 will show once they become available). 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 2013, referring to 2012 incomes. 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 2012-2014 and 2012-2013 respectively. The tables also report initial levels for 2012 incomes based on EU-SILC 2013.

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 2012 and 2013 (or 2014), taking into account the covariance in the data, is marked in the tables.

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

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

| | 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+) |
| Bulgaria (in BGN) | | | | | | | | |
| Eurostat level | 6,863 | 5,718 | 21.0 | 19.7 | 22.2 | 28.4 | 17.1 | 27.9 |
| Nowcast 2012-2014 | 11.2*** | 10.9*** | -0.5† | -0.4 | -0.5** | -0.1 | -0.3 | -1.4*** |
| Germany | | | | | | | | |
| Eurostat level | 22,471 | 19,582 | 16.1 | 15.0 | 17.2 | 14.7 | 16.9 | 14.9 |
| Nowcast 2012-2014 | 2.5*** | 2.5*** | -0.2† | -0.2 | -0.2 | 0.2 | -0.4** | 0.2* |
| Estonia | | | | | | | | |
| Eurostat level | 7,846 | 6,579 | 18.6 | 17.2 | 19.9 | 18.1 | 17.3 | 24.4 |
| Nowcast 2012-2014 | 13.7*** | 13.6*** | 0.2 | -0.6* | 0.8** | -0.8† | -0.5† | 3.9*** |
| Greece | | | | | | | | |
| Eurostat level | 9,303 | 8,371 | 23.1 | 22.4 | 23.8 | 28.8 | 24.1 | 15.1 |
| Nowcast 2012-2014 | -10.4*** | -10.2*** | -0.3 | 0.0 | -0.6 | -1.8* | -0.1 | 0.2 |
| Italy | | | | | | | | |
| Eurostat level | 17,864 | 15,733 | 19.1 | 18.1 | 20.1 | 24.8 | 18.8 | 15.3 |
| Nowcast 2012-2014 | 1.6*** | 2.0*** | 0.0 | 0.3 | -0.2 | -0.6 | 0.3 | -0.4** |
| Latvia (in LVL) | | | | | | | | |
| Eurostat level | 4,028 | 3,279 | 19.4 | 18.9 | 19.8 | 23.4 | 18.8 | 17.6 |
| Nowcast 2012-2014 | 13.4*** | 13.9*** | 0.7† | -0.1 | 1.4*** | -1.7** | -1.0** | 8.8*** |
| Austria | | | | | | | | |
| Eurostat level | 24,366 | 22,073 | 14.4 | 13.5 | 15.2 | 18.6 | 12.9 | 15.4 |
| Nowcast 2012-2014 | 2.0*** | 2.1*** | 0.0 | 0.1 | -0.1 | 0.5 | 0.0 | -0.7*** |
| Poland (in PLN) | | | | | | | | |
| Eurostat level | 25,007 | 21,610 | 17.3 | 17.3 | 17.3 | 23.2 | 16.7 | 12.3 |
| Nowcast 2012-2014 | 6.9*** | 7.1*** | 0.1 | 0.1 | 0.2 | 0.1 | 0.3* | -0.5*** |
| Romania (in RON) | | | | | | | | |
| Eurostat level | 10,560 | 9,213 | 22.4 | 22.3 | 22.5 | 32.1 | 21.5 | 15.0 |
| Nowcast 2012-2014 | 10.0*** | 9.6*** | -0.4 | -0.4 | -0.4 | -1.6** | -0.6 | 1.8*** |
| Slovakia | | | | | | | | |
| Eurostat level | 7,266 | 6,737 | 12.8 | 12.8 | 12.9 | 20.3 | 12.1 | 6.0 |
| Nowcast 2012-2014 | 2.7*** | 2.3*** | 0.5 | 0.6* | 0.3 | 0.7* | 0.5 | -0.1 |

Notes: Calibrated change. Estimated changes between 2012-2014 statistically significant at: † 90% level, * 95% level, ** 99% level, *** 99.9% level. Information on the sample design of EU-SILC 2010 used for calculations was derived following Goedemé (2010) and using do files Svysset EU-SILC 2010 provided at: <http://www.ua.ac.be/main.aspx?c=tim.goedeme&n=95420>. 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. The nowcast change is the difference in the EUROMOD estimates for 2014 compared with that for 2012, the income year corresponding to the latest available Eurostat SILC estimate. Mean and median equivalised household income in EUR per year, unless otherwise specified. Estimates for Latvia, Austria and Slovakia are based on SILC 2012.

Source: Eurostat database: codes "ilc_li02" and "ilc_di03", EUROMOD Version G2.30.

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

| | 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+) |
| Spain | | | | | | | | |
| Eurostat level | 15,635 | 13,524 | 20.4 | 20.9 | 19.9 | 27.5 | 20.4 | 12.7 |
| Nowcast 2012-2013 | 0.1 | 0.0 | -0.1 | -0.1 | -0.2 | -0.1 | 0.1 | -1.2*** |
| France | | | | | | | | |
| Eurostat level | 24,773 | 20,954 | 13.7 | 13.0 | 14.3 | 18.0 | 13.6 | 8.7 |
| Nowcast 2012-2013 | -2.1*** | -0.9*** | -0.4* | -0.3† | -0.4* | -0.4 | 0.0 | -1.6*** |
| Cyprus | | | | | | | | |
| Eurostat level | 19,426 | 15,873 | 15.3 | 14.1 | 16.5 | 15.5 | 14.4 | 20.1 |
| Eurostat 2012-2013 | -3.3*** | -2.6*** | 1.0* | 1.2** | 0.7* | 1.5* | 1.2** | -1.4** |
| Lithuania (in LTL) | | | | | | | | |
| Eurostat level | 19,500 | 16,223 | 20.6 | 19.4 | 21.6 | 26.9 | 19.0 | 19.4 |
| Nowcast 2012-2013 | 4.5*** | 4.3*** | -0.1 | -0.3 | 0.1 | -0.7 | -0.4 | 2.0*** |
| Netherlands | | | | | | | | |
| Eurostat level | 23,125 | 20,839 | 10.4 | 10.2 | 10.6 | 12.6 | 10.9 | 5.5 |
| Nowcast 2012-2013 | 1.0*** | 0.7** | 0.3† | 0.4* | 0.2 | 0.4† | 0.2 | 0.3† |
| Portugal | | | | | | | | |
| Eurostat level | 9,899 | 8,177 | 18.7 | 18.8 | 18.7 | 24.4 | 18.4 | 14.6 |
| Nowcast 2012-2013 | -2.2*** | -1.5** | 0.0 | 0.0 | 0.1 | 0.1 | -0.1 | 0.1 |
| Finland | | | | | | | | |
| Eurostat level | 25,901 | 23,272 | 11.8 | 11.3 | 12.3 | 9.3 | 11.3 | 16.1 |
| Nowcast 2012-2013 | 1.0*** | 1.2*** | 0.1 | 0.2 | 0.1 | 0.4 | 0.3* | -0.8** |

Notes: Calibrated change. Estimated changes between 2012-2013 statistically significant at: † 90% level, * 95% level, ** 99% level, *** 99.9% level. Information on the sample design of EU-SILC 2010 used for calculations was derived following Goedemé (2010) and using do files Svyset EU-SILC 2010 provided at: <http://www.ua.ac.be/main.aspx?c=tim.goedeme&n=95420>. 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. The nowcast change is the difference in the EUROMOD estimates for 2013 compared with that for 2012, the income year corresponding to the latest available Eurostat SILC estimate. Mean and median equivalised household income in EUR per year, unless otherwise specified. Estimates for Spain are based on SILC 2012.

Source: Eurostat database: codes "ilc_li02" and "ilc_di03", EUROMOD Version G2.30.

The results show that both mean and median equivalised household disposable incomes in 2013 (or 2014) are significantly different from their 2012 levels for sixteen out of the seventeen countries. The only exception is Spain, where the changes in nominal mean and median incomes between 2012 and 2013 are very small and insignificant. A substantial reduction in the median income is expected in Greece (-10.2%) in 2012-2014. Median income is also expected to decline in 2013 in Cyprus, Portugal and France (by 2.6%, 1.5% and 0.9% respectively). In Latvia and Estonia, as economies recover from the crisis, nominal median incomes seem to be growing by approximately 14% in 2012-2014. Growth in median incomes is also predicted to be high in Bulgaria (10.9%), Romania (9.6%), Poland (7.1%) and Lithuania (4.3%). A close to 2% increase in median incomes is estimated for Germany, Slovakia, Austria and Italy. Changes in real mean and median incomes are presented in the Appendix (Table A4). If inflation is taken into account, growth in median incomes is reduced to

9.5% in Estonia, 4.8% in Romania, approximately zero in Germany and negative in Austria (-2.2%), the Netherlands (-1.9%), Spain (-1.9%) and Finland (-1.0%).

On the other hand, changes in the total AROP rate are relatively small and not statistically significant in eleven of the seventeen countries. From the remaining six, the countries where relative poverty is predicted to increase the most are Cyprus and Latvia, by +1.0 in 2013 and +0.7 percentage points over 2013 and 2014 respectively. A slight poverty increase is also predicted in the Netherlands in 2013 (+0.3 ppt). The three countries where poverty is estimated to decrease are Bulgaria (-0.5 ppt), France (-0.4 ppt) and Germany (-0.2 ppt). However, in all cases reductions seem to be less than half a percentage point.

Contrary to the overall AROP rates, the AROP rates by age group reveal important developments for certain population categories. The nowcasted estimates show that the changes in the poverty risk of elderly people are expected to be substantial in all countries except Greece, Portugal and Slovakia. In the three Baltic countries and Romania, AROP rates among the elderly are predicted to rise the most. This finding suggests that in countries with high nominal increases of incomes and employment growth, pensions cannot follow given the indexation mechanisms in place.

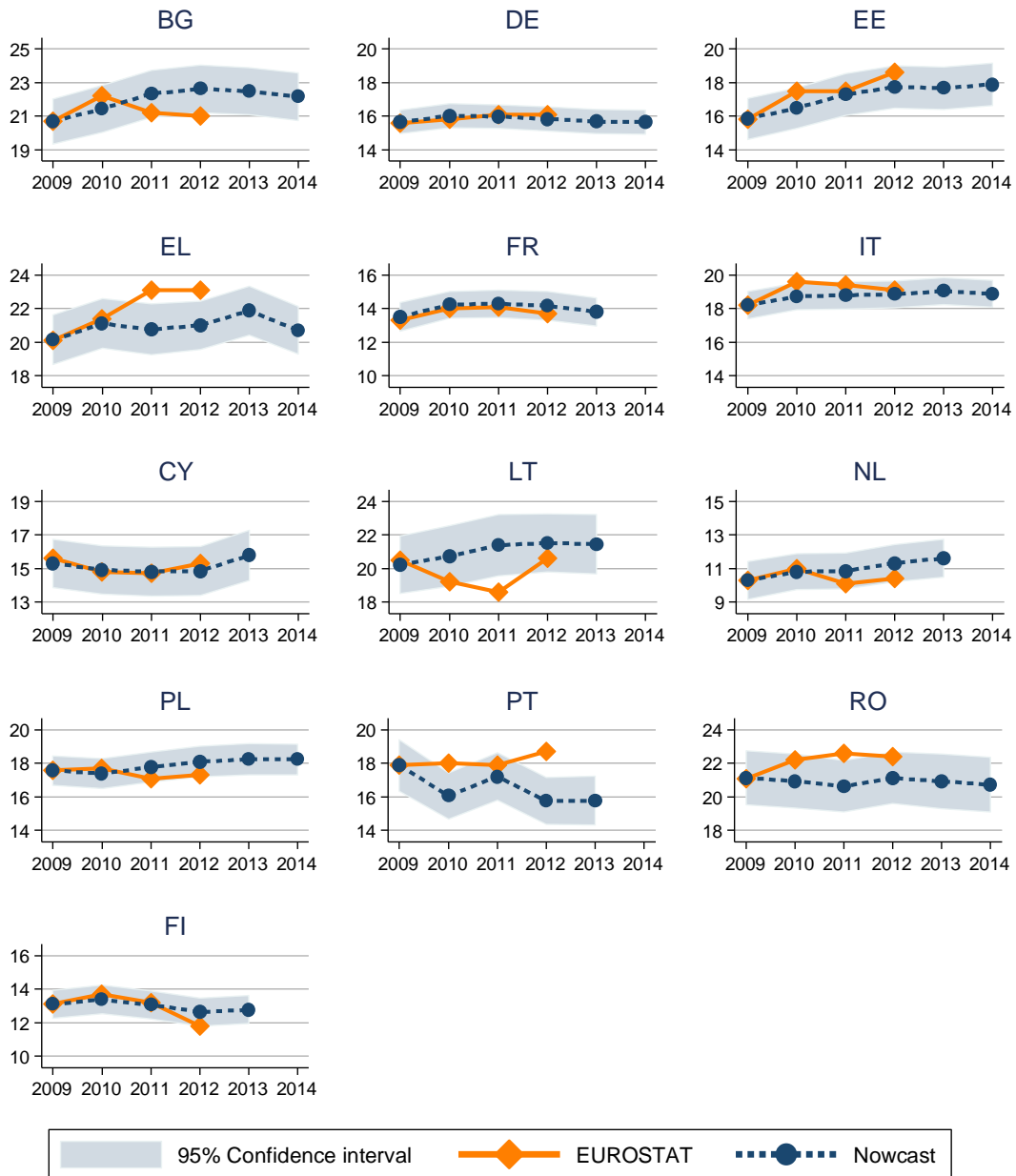
In France, Cyprus, Bulgaria, Spain, Finland, Austria, Poland and Italy the elderly are expected to improve their relative position in terms of income. In Spain small pensions (below 1,000 EUR) were indexed with a preferential rate in 2013. In Finland growth in wages was relatively slow, while pensions and some basic benefits were indexed favourably in order to compensate for an increase in VAT rate. In Bulgaria, Austria and Poland this poverty decrease also seems to be the result of favourable pension indexation. In France AROP among the elderly is falling, but in the context of a falling median. This does not seem to have an effect on AROP for working-age and children, suggesting that pensions are being maintained relative to other incomes. In Cyprus, where the poverty threshold is also falling, both child and working-age poverty rates are estimated to increase by more than one percentage point. This finding can be mostly attributed to the austerity measures affecting families with children in a context of increasing unemployment (+4 percentage points in 2012-2013).

Significant reductions in child poverty are expected in Greece, Latvia and Romania (by more than 1.5 percentage points). In Greece this outcome is mostly related to the design of a lump-sum social assistance benefit provided in 2014, which was made particularly beneficial for families with children. In Latvia this is likely to be related to the introduction of a more generous child care benefit and the removal of ceilings on parental leave benefits in 2013. Finally, income poverty in the working-age population is expected to decline in Latvia, Estonia and, to a lesser extent, Germany. In all three countries employment is on the rise.

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. Figures 1a and 1b present the nowcasted AROP estimates for income years 2009-2013 (or 2014) together with the actual EU-SILC indicators for income years 2009-2012. Table 2 shows yearly changes in AROP for the years for which the EU-SILC indicators are available. The evolution of median equivalised disposable income shown in EU-SILC and nowcasted with EUROMOD is presented in the Appendix (Figure A3).

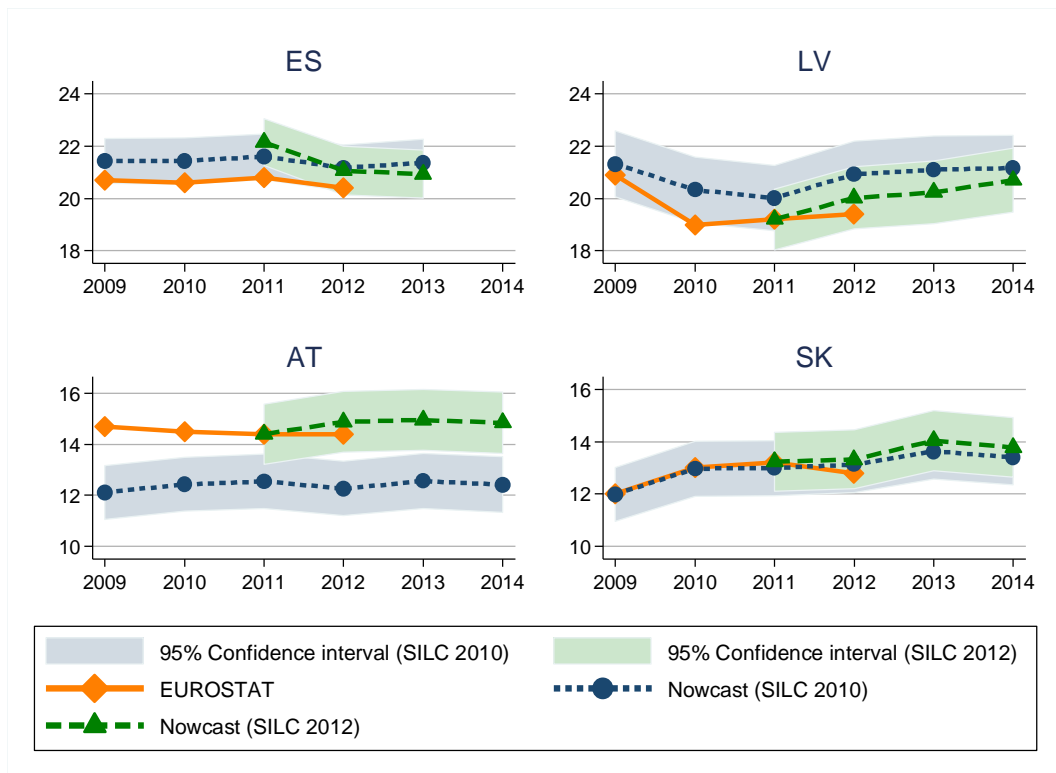
Figure 1a: At risk of poverty rates (threshold: 60% of median): Eurostat and nowcasted estimates (based on SILC 2010)



Notes: Nowcasted estimates are obtained using EUROMOD with employment adjustments and calibration. The vertical scale covers a range of 6 percentage points in all countries, starting from different initial points. Information on the sample design of EU-SILC 2010 is derived following Goedemé (2010) and using do files Svyset EU-SILC 2010 provided at: <http://timgoedeme.com/eu-silc-standard-errors/>. The 95% confidence intervals are estimated using the DASP module for Stata. Only sampling error is taken into account.

Source: Eurostat database: code "ilc_li02", EUROMOD Version G2.30.

Figure 1b: At risk of poverty rates (threshold: 60% of median): Eurostat and nowcasted estimates (based on SILC 2010 and SILC 2012)



Notes: Nowcasted estimates are obtained using EUROMOD with employment adjustments and calibration. The vertical scale covers a range of 6 percentage points in all countries, starting from different initial points. Information on the sample design of EU-SILC 2010 is derived following Goedemé (2010) and using do files Svyset EU-SILC 2010 provided at: <http://timgoedeme.com/eu-silc-standard-errors/>. The 95% confidence intervals are estimated using the DASP module for Stata. Only sampling error is taken into account.

Source: Eurostat database: code "ilc_li02", EUROMOD Version G2.30.

Table 2. EU-SILC and nowcast changes in AROP rates, 2009-2011

| | Changes in AROP between income years (in percentage points) | | |
|--------------------|----------------------------------------------------------------|--------------|---------------|
| | 2009 - 2010 | 2010 - 2011 | 2009 - 2011 |
| | | | |
| Bulgaria | | | |
| SILC | 1.6† | -1.0 | 0.5 |
| Nowcast | 0.7† | 0.9** | 1.7*** |
| Germany | | | |
| SILC | 0.2 | 0.2 | 0.4 |
| Nowcast | 0.4* | 0.0 | 0.3† |
| Estonia | | | |
| SILC | 1.6† | 0.1 | 1.7† |
| Nowcast | 0.6† | 0.8† | 1.4*** |
| Greece | | | |
| SILC | 1.2 | 1.7† | 3.0** |
| Nowcast | 1.0* | -0.4 | 0.6 |
| Spain | | | |
| SILC | 0.7 | 0.0 | 0.7 |
| Nowcast | 0.0 | 0.2 | 0.2 |
| France | | | |
| SILC | 0.7 | 0.1 | 0.8 |
| Nowcast | 0.7*** | 0.1 | 0.8*** |
| Italy | | | |
| SILC | 1.4* | -0.1 | 1.3* |
| Nowcast | 0.5** | 0.1 | 0.6** |
| Cyprus | | | |
| SILC | -0.8 | -0.1 | -0.9 |
| Nowcast | -0.4 | -0.1 | -0.5 |
| Latvia | | | |
| SILC | -1.9* | 0.2 | -1.7† |
| Nowcast | -1.0** | -0.3 | -1.3*** |
| Lithuania | | | |
| SILC | -1.0 | -0.6 | -1.6 |
| Nowcast | 0.5 | 0.7 | 1.2† |
| Netherlands | | | |
| SILC | 0.7 | -0.9 | -0.2 |
| Nowcast | 0.5** | 0.0 | 0.6** |
| Austria | | | |
| SILC | 0.5 | - | - |
| Nowcast | 0.3 | 0.1 | 0.4 |
| Poland | | | |
| SILC | 0.1 | -0.6 | -0.5 |
| Nowcast | -0.2 | 0.4*** | 0.2 |
| Portugal | | | |
| SILC | 0.1 | -0.1 | 0.0 |
| Nowcast | -1.8*** | 1.2** | -0.7 |
| Romania | | | |
| SILC | 1.1 | 0.4 | 1.5 |
| Nowcast | -0.2 | -0.3 | -0.5 |
| Slovakia | | | |
| SILC | 1.0 | 0.3 | 1.2 |
| Nowcast | 1.0*** | 0.0 | 1.0*** |
| Finland | | | |
| SILC | 0.6 | -0.5 | 0.1 |
| Nowcast | 0.3† | -0.3* | 0.0 |

Notes: The estimated changes are statistically significant at: † 90% level, * 95% level, ** 99% level, *** 99.9% level. Information on the sample design of EU-SILC 2010 used for calculations was derived following Goedemé (2010) and using do files Svyset EU-SILC 2010 provided at: <http://www.ua.ac.be/main.aspx?c=tim.goedeme&n=95420>. Standard errors around AROP indicators are based on the Taylor linearization using the DASP module for Stata. Only sampling

error is taken into account. The estimated changes are based on EU-SILC microdata and nowcasts (using SILC 2010 as a starting point). The changes for Austria between 2009/2010 and 2011 are not computed because of the structural break. The numbers are in bold if discrepancy between nowcast and SILC is more than 1 p.p.

Source: Own calculations based on EU-SILC microdata (releases: 2010-5, 2011-3, 2012-2), EUROMOD Version G2.30.

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. In some countries where this is not the case (most notably in Spain, Latvia, Lithuania and Austria), the discrepancies are most likely to have been caused by backward revisions in the EU-SILC data.⁷ This is also the reason for the discrepancies between the nowcasted and the Eurostat level of AROP in 2009. 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.⁸ EUROMOD results (based on SILC 2010 data) do not include such revisions. In these cases the estimates show the evolution of income poverty had these breaks not occurred.

For three out of the four above-mentioned countries (i.e. Spain, Latvia, and Austria) the EUROMOD input datasets based on SILC 2012 are also available. Figure 1b presents the nowcast results for these countries and Slovakia based on both SILC 2010 and SILC 2012. In case of Latvia and Austria the latest input datasets contain all the revisions. Thus, there are no discrepancies between the nowcasted and the Eurostat level of AROP in 2011 once the new input datasets are used. In Spain this is not the case, because the new dataset does not include the adjustments due to switching to administrative data collection in SILC 2013. In Slovakia, where there were no methodological changes between SILC 2010 and 2012, the two nowcasted series lie very close to each other.

It also can be noticed that the accuracy of predictions diminishes in countries with large sampling errors (more than 0.8 percentage points) and hence wide confidence intervals around poverty estimates. Examples of such countries include Bulgaria, Greece, Latvia, Lithuania, Portugal and Romania. Therefore, it might be the case that some of the poverty dynamics observed by SILC in these countries are driven by sampling variation between years, which cannot be predicted using the nowcasting methodology. Moreover, two of these countries, namely Greece and Lithuania, also have large dispersion in cross-section weights provided in the UDB EU-SILC microdata (DB090 and RB050 variables). Observations with extreme values of weights can substantially affect the estimates of poverty rates. Selection of such observations for employment transitions (or failure to select them) may considerably alter the nowcasting outcomes. AROP standard errors and standard deviations of weights are reported in the Appendix (Table A5).

The method that we have adopted attempts to account for the transitions that are likely to explain a major part of changes in the income distribution over the period 2009-2014: 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. (2014), 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 the Netherlands and Portugal changes in

⁷ Nowcasts based on SILC 2010 do not include revisions. For Spain, nowcasts based on SILC 2012 do not include any revisions either.

⁸ In Austria the structural break occurred in SILC 2012 due to switching to registry data. In Latvia and Lithuania the revisions were related to changes in the population structure revealed after the 2011 population censuses. In Spain both types of revisions took place.

employment rates between 2009 and 2010 follow different directions. This is also the case for France, Italy and Poland, although to a smaller extent. The magnitude of changes differs significantly in the cases of Greece, Cyprus, Bulgaria and Spain. 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. (2014).

While changes in the labour market are carefully taken into account, no similar adjustments are made to account for demographic changes or changes in the composition of households. Usually such changes are less critical within a short-term time frame, as major shifts are unlikely to happen. However, in Latvia and Lithuania (where the recent financial crisis has led to large emigration flows) and in Greece and Spain (where the composition of households has shifted towards the formation of larger households in order to share resources) the nowcast estimates have to be interpreted with caution.

Using a tax-benefit microsimulation model allows us to simulate the distributional effects of tax-benefit policy changes with a high degree of accuracy. And yet, for all the effort put into capturing as much detail as possible, aspects remain which may still be too simplified. For example, an important factor that needs to be captured in a detailed way is the change in the average levels of major income sources, such as earnings or pensions. During periods of crisis wages might follow different trends across regions, sectors, occupations, firms, etc. However, statistics on wage dynamics at such level of detail are usually not available or are available with a significant delay. As can be seen in Figure A1 of the Appendix, substantial discrepancies in the nowcasted dynamics of employment income compared to what is shown by the SILC data are observed for Bulgaria. The stagnation in average employment income of individuals depicted in SILC in 2009-2011 does not correspond to the statistics on average salaries from the Bulgarian Statistical Institute (+12.5% increase in 2009-2011) and the macro-level statistics on the compensation per employee⁹, in which an increase of around 17% is shown during the same period. The decrease in average income from pensions depicted in SILC for 2010 in Bulgaria is also not confirmed by the administrative data on average pension per pensioner.¹⁰ The discrepancies in the dynamics of pension income in Portugal in 2011 (shown in Figure A2 of the Appendix) are likely to be due to the fact that pensions in EUROMOD were updated according to the statutory indexation rules. Hence, changes related to differences in the composition of the population of pensioners over time were not taken into account. The increase in average pensions in Latvia shown in SILC for 2010 also seems to overstate the average growth in pensions observed in the National Latvian Statistics.¹¹ A plausible explanation for the discrepancies between the nowcasted and the EU-SILC AROP estimates for Greece is that the official figures used for updating employment and self-employment income in EUROMOD are not capturing important negative changes that occurred in the large informal sector of the economy or in areas of activity that are not covered by official collective bargaining agreements.

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

⁹ Annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs:
http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

¹⁰ National Social Security Institute, Main Macroeconomic Indicators and the State Social Security Indicators, data on average pension per pensioner:
<http://www.noi.bg/en/abouten/statistics>

¹¹ State social security agency, derived from monthly data on average old-age pension per recipient: <http://www.vsaa.lv/lv/budzets-un-statistika/statistika>

data reference year (i.e. 2009 or 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 aim of this paper has been to assess how microsimulation can be used to estimate more timely indicators of income distribution for all EU countries in a comparable setting. As a demonstration of this method, AROP rates were estimated for 2009-2014 (or 2013) for a total of seventeen EU 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. Building on Leventi et al. (2013) and Navicke et al. (2013), 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, gender and education as shown in the LFS macro-level statistics.

The most important findings can be summarised as follows. Mean and median incomes in 2013 or 2014 are significantly different from their 2012 levels in all countries, except for Spain. A substantial reduction in the median income is expected in Greece (-10.2%) in 2012-2014. Smaller reductions are also predicted for 2013 in Cyprus, Portugal and France. The highest increases in the mean and median income are predicted for Estonia and Latvia. Growth in mean and median incomes is also predicted to be high in Bulgaria, Romania, Poland and Lithuania.

The country where relative poverty is estimated to increase the most is Cyprus, by 0.95 percentage points. This seems to be the result of the significant rise in unemployment, combined with an unemployment benefit with a maximum duration of six months and cuts in child and student benefit programmes. Smaller increases in relative poverty are nowcasted for Latvia and the Netherlands. In Latvia, this development is driven by a substantial increase in the AROP rate among the elderly (by almost 9 percentage points). Significant increases in elderly poverty are also predicted for the other two Baltic countries and Romania. On the other hand, considerable reductions in child poverty are expected in Greece, Latvia and Romania.

The comparison of the nowcasted results with the actual EU-SILC indicators has shown that in the majority of cases the two estimates follow the same trends and fall within the boundaries of the nowcasted confidence intervals. In some countries where this is notably not the case (i.e. Spain, Latvia, Lithuania and Austria), the discrepancies are most likely to have been caused by backward revisions in the EU-SILC data. The accuracy of predictions also depends on the reliability of employment adjustments, the precision of simulations, and the comparability of external macroeconomic indicators to the actual trends observed in the EU-SILC data. While the first two are under the direct influence of the authors, the latter depends critically on the consistency of different sources of statistics within countries. The existence of observations with very large weights also affects the comparability and accuracy of estimates.

Despite certain limitations, 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, 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.

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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 | |
| born_eu | Born in another EU country | dummy | Born in the country of residence |
| born_oth | Born in a country outside 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 | - |
| urban1 | Lives in a densely populated area | dummy | Lives in a thinly populated area |
| urban2 | Lives in an intermediate populated area | dummy | |
| 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 | DE | EE | EL | ES | FR | IT | CY | LV |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| dag | 0.295** | 0.266** | 0.196** | 0.297** | 0.222** | 0.387** | 0.280** | 0.495** | 0.132** |
| dag2 | -0.004** | -0.003** | -0.003** | -0.004** | -0.003** | -0.005** | -0.004** | -0.006** | -0.002** |
| married | 0.370* | 1.020** | 1.097** | 1.543** | 0.667** | 0.440** | 0.777** | 0.894** | 0.866** |
| cohabit | 0.444* | 0.330* | 0.837** | 0.932 | 0.313* | 0.385* | 0.465** | 0.727 | 0.664** |
| educ_low | -0.676** | -0.039 | -0.719** | -0.290 | -0.934** | -0.382** | -0.446** | 0.017 | -0.445** |
| educ_high | 0.490** | 0.770** | 0.779** | 0.390* | 0.011 | 0.652** | 0.074 | 0.318 | 0.789** |
| born_eu | -1.166 | | | 0.012 | -1.057** | -0.047 | 0.025 | 0.093 | |
| born_oth | 0.195 | -0.747** | -0.275 | -0.503 | -0.843** | -0.360* | -0.084 | -0.872** | 0.341* |
| partner_empl | 0.447** | 0.508** | -0.057 | -0.103 | 0.093 | 0.670** | 0.010 | -0.087 | 0.069 |
| hh_unem | -0.491** | -1.106** | -0.491** | -0.721** | -0.486** | -0.073 | -0.688** | -0.218 | -0.458** |
| hh_size | -0.136 | 0.410** | -0.178 | -0.306 | -0.123 | -0.330** | -0.272** | 0.033 | -0.021 |
| ch_n_age1 | 0.145 | -0.352* | -0.193 | -0.284 | 0.166 | 0.228 | 0.074 | 0.151 | -0.235 |
| ch_n_age2 | 0.123 | 0.208 | 0.018 | -0.114 | 0.091 | -0.012 | 0.244 | -0.220 | 0.205 |
| ch_n_age3 | -0.023 | -0.337** | -0.047 | -0.094 | -0.123 | 0.076 | 0.260* | 0.019 | -0.100 |
| ch_n_age4 | -0.130 | -0.076 | 0.085 | -0.060 | 0.071 | 0.335** | 0.261** | -0.008 | -0.046 |
| urban1 | 0.344** | -0.140 | 0.123 | -0.686** | -0.376** | -0.499** | -0.218* | 0.394* | -0.091 |
| urban2 | 0.252 | 0.336** | | -0.492* | -0.197 | -0.297* | -0.107 | 0.386* | |
| reg_2 | 0.121 | | | 0.498** | 0.191 | -0.221 | -0.857** | | |
| reg_3 | | | | 0.251 | -0.338 | -0.126 | -0.767** | | |
| reg_4 | | | | 0.135 | 0.157 | 0.088 | 0.091 | | |
| reg_5 | | | | | 0.222 | -0.153 | -0.206* | | |
| reg_6 | | | | | 0.225 | 0.045 | | | |
| reg_7 | | | | | 0.167 | -0.296 | | | |
| reg_8 | | | | | 0.116 | -0.553** | | | |
| reg_9 | | | | | 0.105 | -0.394 | | | |
| reg_10 | | | | | -0.259 | -0.320 | | | |
| reg_11 | | | | | -0.504* | 0.437 | | | |
| reg_12 | | | | | 0.003 | -0.030 | | | |
| reg_13 | | | | | -0.270 | -0.165 | | | |
| reg_14 | | | | | 0.282 | 0.007 | | | |
| reg_15 | | | | | -0.444** | -0.011 | | | |
| reg_16 | | | | | -0.202 | -0.358 | | | |
| reg_17 | | | | | 0.232 | -0.410 | | | |
| reg_18 | | | | | 0.242 | -0.233 | | | |
| reg_19 | | | | | -0.225 | -0.422 | | | |
| reg_20 | | | | | | -0.823** | | | |
| reg_21 | | | | | | 0.113 | | | |
| reg_22 | | | | | | -0.710 | | | |
| _cons | -4.105** | -4.178** | 2.492** | -3.363** | -2.099** | -4.762** | -2.661** | -7.924** | -1.666** |
| N | 4,571 | 7,133 | 3,401 | 4,281 | 9,945 | 6,700 | 12,319 | 2,863 | 3,711 |

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

Table A2: Logit regression coefficients: men (continued)

| | LT | NL | AT | PL | PT | RO | SK | FI |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| dag | 0.186** | 0.531** | 0.348** | 0.245** | 0.190** | 0.267** | 0.344** | 0.359** |
| dag2 | -0.002** | -0.007** | -0.005** | -0.003** | -0.003** | -0.003** | -0.004** | -0.004** |
| married | 0.598* | 0.492* | 0.443* | 0.914** | 0.890** | 0.300 | 0.830** | 0.580** |
| cohabit | | 0.508* | -0.231 | 0.557* | 0.163 | -0.387 | -0.022 | 0.373* |
| educ_low | -0.700** | -0.082 | -0.180 | -0.598** | -0.573** | -0.588** | -1.594** | -0.402** |
| educ_high | 1.153** | 0.472** | 0.588** | 0.862** | 0.185 | 0.250 | 0.688** | 0.619** |
| born_eu | -0.087 | 0.254 | 0.338 | -1.493* | 0.258 | -0.477 | -0.401 | 0.144 |
| born_oth | -0.034 | -0.703** | -0.628** | -0.199 | -0.334 | | -1.781 | -1.208** |
| partner_empl | 0.228 | 0.793** | 0.706** | 0.244* | 0.280 | 0.362 | 0.694** | 0.517** |
| hh_unem | -0.438** | -0.159 | -0.637** | -0.454** | -0.480** | -1.421** | -0.232 | -0.166 |
| hh_size | 0.354* | 0.196 | 0.271* | 0.034 | -0.039 | -0.122 | -0.149 | -0.102 |
| ch_n_age1 | 0.020 | 0.706* | 0.184 | 0.079 | -0.044 | -0.395 | 0.399 | 0.353* |
| ch_n_age2 | 0.092 | -0.661 | -0.370 | 0.031 | 0.167 | -0.216 | -0.150 | 0.138 |
| ch_n_age3 | -0.668** | -0.068 | -0.103 | 0.024 | 0.091 | -0.158 | -0.277 | 0.056 |
| ch_n_age4 | 0.071 | 0.382* | -0.074 | -0.006 | -0.011 | 0.089 | -0.025 | 0.114 |
| urban1 | 0.243 | | -0.485** | -0.199* | -0.445** | -0.023 | 0.186 | 0.085 |
| urban2 | | | -0.144 | -0.060 | -0.164 | -0.219 | 0.322** | -0.328** |
| reg_2 | | | 0.133 | 0.208 | | 0.388* | | 0.444** |
| reg_3 | | | 0.333* | -0.324** | | 0.139 | | 0.438** |
| reg_4 | | | | -0.028 | | -0.061 | | 0.144 |
| reg_5 | | | | -0.250 | | | | |
| reg_6 | | | | -0.136 | | | | |
| reg_7 | | | | | | | | |
| reg_8 | | | | | | | | |
| reg_9 | | | | | | | | |
| reg_10 | | | | | | | | |
| reg_11 | | | | | | | | |
| reg_12 | | | | | | | | |
| reg_13 | | | | | | | | |
| reg_14 | | | | | | | | |
| reg_15 | | | | | | | | |
| reg_16 | | | | | | | | |
| reg_17 | | | | | | | | |
| reg_18 | | | | | | | | |
| reg_19 | | | | | | | | |
| reg_20 | | | | | | | | |
| reg_21 | | | | | | | | |
| reg_22 | | | | | | | | |
| _cons | -3.802** | -8.518** | -4.712** | -2.723** | -1.191 | -2.321** | -4.883** | -6.269** |
| N | 3,359 | 7,252 | 3,824 | 8,536 | 3,138 | 4,406 | 4,528 | 8,262 |

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

Table A3: Logit regression coefficients: women

| | BG | DE | EE | EL | ES | FR | IT | CY | LV |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| dag | 0.374** | 0.229** | 0.200** | 0.212** | 0.252** | 0.412** | 0.318** | 0.307** | 0.298** |
| dag2 | -0.005** | -0.003** | -0.002** | -0.003** | -0.003** | -0.005** | -0.004** | -0.004** | -0.004** |
| married | -0.185 | -0.418** | 0.015 | -0.515** | -0.584** | -0.152 | -0.720** | -0.861** | -0.155 |
| cohabit | -0.563** | -0.004 | 0.081 | -0.618 | -0.251 | 0.066 | -0.059 | -0.164 | -0.366* |
| educ_low | -0.883** | -0.443** | -0.407* | -0.318* | -0.698** | -0.665** | -0.918** | -0.496** | -0.705** |
| educ_high | 0.930** | 0.740** | 0.609** | 1.096** | 0.530** | 0.376** | 0.607** | 0.610** | 0.750** |
| born_eu | 1.145 | | | -0.044 | -0.362* | -0.089 | -0.507** | -0.411* | |
| born_oth | 0.474 | -0.348** | -0.557** | -0.210 | -0.256* | -0.671** | -0.257 | 0.130 | -0.135 |
| partner_empl | 0.560** | 0.646** | 0.079 | 0.451** | 0.208* | 0.553** | 0.113 | 0.165 | 0.197 |
| hh_unem | -0.129 | -0.479** | -0.160 | -0.142 | -0.109 | -0.121 | -0.167 | 0.327 | -0.102 |
| hh_size | -0.332** | 0.155 | -0.373** | 0.020 | -0.101 | -0.154 | -0.318** | -0.189 | -0.058 |
| ch_n_age1 | -0.179 | -1.202** | -0.537* | -0.869** | -0.379* | -0.444* | -0.094 | -0.218 | -0.398 |
| ch_n_age2 | -0.351* | -0.672** | -0.023 | -0.228 | -0.220* | -0.245* | -0.141 | -0.152 | 0.063 |
| ch_n_age3 | -0.011 | -0.471** | -0.272* | -0.291** | -0.172** | -0.257** | -0.262** | -0.147 | -0.076 |
| ch_n_age4 | -0.012 | -0.295** | 0.085 | -0.104 | -0.017 | -0.087 | 0.023 | -0.036 | -0.203** |
| urban1 | 0.268** | 0.162 | 0.243* | 0.085 | 0.117 | -0.101 | -0.152* | 0.290* | -0.202* |
| urban2 | 0.183 | 0.211* | | -0.072 | -0.001 | 0.014 | -0.055 | 0.136 | |
| reg_2 | 0.201* | | | 0.149 | -0.227 | -0.383 | -1.082** | | |
| reg_3 | | | | -0.222 | -0.071 | -0.499* | -1.047** | | |
| reg_4 | | | | 0.008 | 0.117 | -0.729** | 0.065 | | |
| reg_5 | | | | | 0.467* | -0.551** | -0.261** | | |
| reg_6 | | | | | 0.286 | -0.087 | | | |
| reg_7 | | | | | 0.276 | -0.360 | | | |
| reg_8 | | | | | 0.220 | -0.834** | | | |
| reg_9 | | | | | -0.007 | -0.777** | | | |
| reg_10 | | | | | -0.260 | -0.411 | | | |
| reg_11 | | | | | -0.287 | -0.443 | | | |
| reg_12 | | | | | 0.263 | -0.557** | | | |
| reg_13 | | | | | -0.152 | -0.466* | | | |
| reg_14 | | | | | 0.509** | -0.221 | | | |
| reg_15 | | | | | -0.396** | -0.446* | | | |
| reg_16 | | | | | 0.015 | -0.350 | | | |
| reg_17 | | | | | -0.702 | -0.231 | | | |
| reg_18 | | | | | -0.022 | -0.290 | | | |
| reg_19 | | | | | -0.190 | -0.638* | | | |
| reg_20 | | | | | | -0.808** | | | |
| reg_21 | | | | | | -0.480** | | | |
| reg_22 | | | | | | -1.138** | | | |
| _cons | -5.740** | -3.157** | -2.457** | -3.230** | -3.273** | -5.820** | -3.839** | -3.345** | -4.439** |
| N | 4,203 | 7,557 | 3,276 | 4,276 | 10,079 | 6,330 | 12,145 | 2,999 | 3,944 |

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

Table A3: Logit regression coefficients: women (continued)

| | LT | NL | AT | PL | PT | RO | SK | FI |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| dag | 0.339** | 0.475** | 0.373** | 0.227** | 0.224** | 0.117** | 0.440** | 0.396** |
| dag2 | -0.004** | -0.006** | -0.005** | -0.003** | -0.003** | -0.001** | -0.005** | -0.004** |
| married | 0.176 | -0.474** | -0.678** | -0.010 | -0.564** | -0.597** | -0.283 | 0.030 |
| cohabit | | 0.473* | -0.064 | -0.080 | -0.740** | -1.439** | 0.308 | 0.107 |
| educ_low | -0.730** | -0.513** | -0.447** | -0.941** | -0.517** | -0.736** | -1.709** | -0.675** |
| educ_high | 1.266** | 0.706** | 0.523** | 1.099** | 0.906** | 1.181** | 0.677** | 0.565** |
| born_eu | 0.782 | -0.394 | -0.157 | -3.218** | -0.268 | -3.331** | 0.120 | 0.049 |
| born_oth | -0.360 | -0.569** | -0.354* | -0.867 | 0.146 | | 0.512 | -1.070** |
| partner_empl | 0.301 | 0.700** | 0.728** | 0.122 | 0.405** | 0.434** | 0.769** | 0.461** |
| hh_unem | -0.355 | 0.345 | -0.241 | -0.343** | -0.146 | -0.792** | -0.215 | -0.145 |
| hh_size | -0.006 | -0.103 | 0.107 | -0.038 | -0.026 | -0.142 | -0.205* | 0.018 |
| ch_n_age1 | -0.645 | -0.460 | -0.961** | -1.098** | 0.456 | -0.604* | -2.807** | -0.653** |
| ch_n_age2 | -0.027 | -0.361* | -0.679** | -0.587** | 0.038 | -0.423** | -0.817** | -0.167 |
| ch_n_age3 | 0.177 | -0.313** | -0.479** | -0.311** | -0.291** | -0.308** | -0.272* | -0.188 |
| ch_n_age4 | -0.171 | -0.367** | -0.186* | 0.019 | -0.194* | -0.033 | -0.127 | -0.192* |
| urban1 | 0.055 | | -0.190 | 0.008 | 0.033 | 0.283** | 0.383** | 0.066 |
| urban2 | | | -0.105 | 0.026 | -0.024 | 0.554 | 0.355** | -0.143 |
| reg_2 | | | -0.122 | -0.425** | | -0.117 | | 0.127 |
| reg_3 | | | 0.255* | 0.060 | | -0.137 | | 0.053 |
| reg_4 | | | | -0.406** | | -0.097 | | -0.020 |
| reg_5 | | | | -0.291* | | | | |
| reg_6 | | | | -0.183 | | | | |
| reg_7 | | | | | | | | |
| reg_8 | | | | | | | | |
| reg_9 | | | | | | | | |
| reg_10 | | | | | | | | |
| reg_11 | | | | | | | | |
| reg_12 | | | | | | | | |
| reg_13 | | | | | | | | |
| reg_14 | | | | | | | | |
| reg_15 | | | | | | | | |
| reg_16 | | | | | | | | |
| reg_17 | | | | | | | | |
| reg_18 | | | | | | | | |
| reg_19 | | | | | | | | |
| reg_20 | | | | | | | | |
| reg_21 | | | | | | | | |
| reg_22 | | | | | | | | |
| _cons | -5.784** | -7.439** | -5.295** | -2.436** | -2.636** | -0.486 | -6.668** | -6.984** |
| N | 3,405 | 7,000 | 3,721 | 7,916 | 3,305 | 4,145 | 4,336 | 7,390 |

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

Table A4. Real changes in nowcasted mean and median equivalized household income (%), 2009-2013/2014

| Country | Years | Mean | Median | Inflation (HICP) |
|-------------|-------------|------|--------|------------------|
| Bulgaria | 2012 - 2014 | 12.5 | 12.3 | -1.2 |
| Germany | 2012 - 2014 | 0.1 | 0.1 | 2.4 |
| Estonia | 2012 – 2014 | 9.6 | 9.5 | 3.7 |
| Greece | 2012 – 2014 | -8.4 | -8.1 | -2.2 |
| Spain | 2012 – 2013 | -1.7 | -1.9 | 1.5 |
| France | 2012 – 2013 | -3.1 | -1.9 | 1.0 |
| Italy | 2012 – 2014 | 0.1 | 0.5 | 1.5 |
| Cyprus | 2012 – 2013 | -3.7 | -3.0 | 0.4 |
| Latvia | 2012 – 2014 | 13.2 | 13.7 | 0.7 |
| Lithuania | 2012 – 2013 | 3.3 | 3.1 | 1.2 |
| Netherlands | 2012 – 2013 | -1.5 | -1.9 | 2.6 |
| Austria | 2012 – 2014 | -1.8 | -2.2 | 3.6 |
| Poland | 2012 – 2014 | 6.0 | 6.1 | 0.9 |
| Portugal | 2012 – 2013 | -2.7 | -1.9 | 0.4 |
| Romania | 2012 – 2014 | 5.2 | 4.8 | 4.6 |
| Slovakia | 2012 – 2014 | 1.9 | 2.3 | 1.4 |
| Finland | 2012 – 2013 | -1.1 | -1.0 | 2.2 |

Notes: Real changes in income are computed using Harmonized Index of Consumer Prices (HICP).
Source: Eurostat database: codes "prc_hicp_aind", EUROMOD Version G2.30.

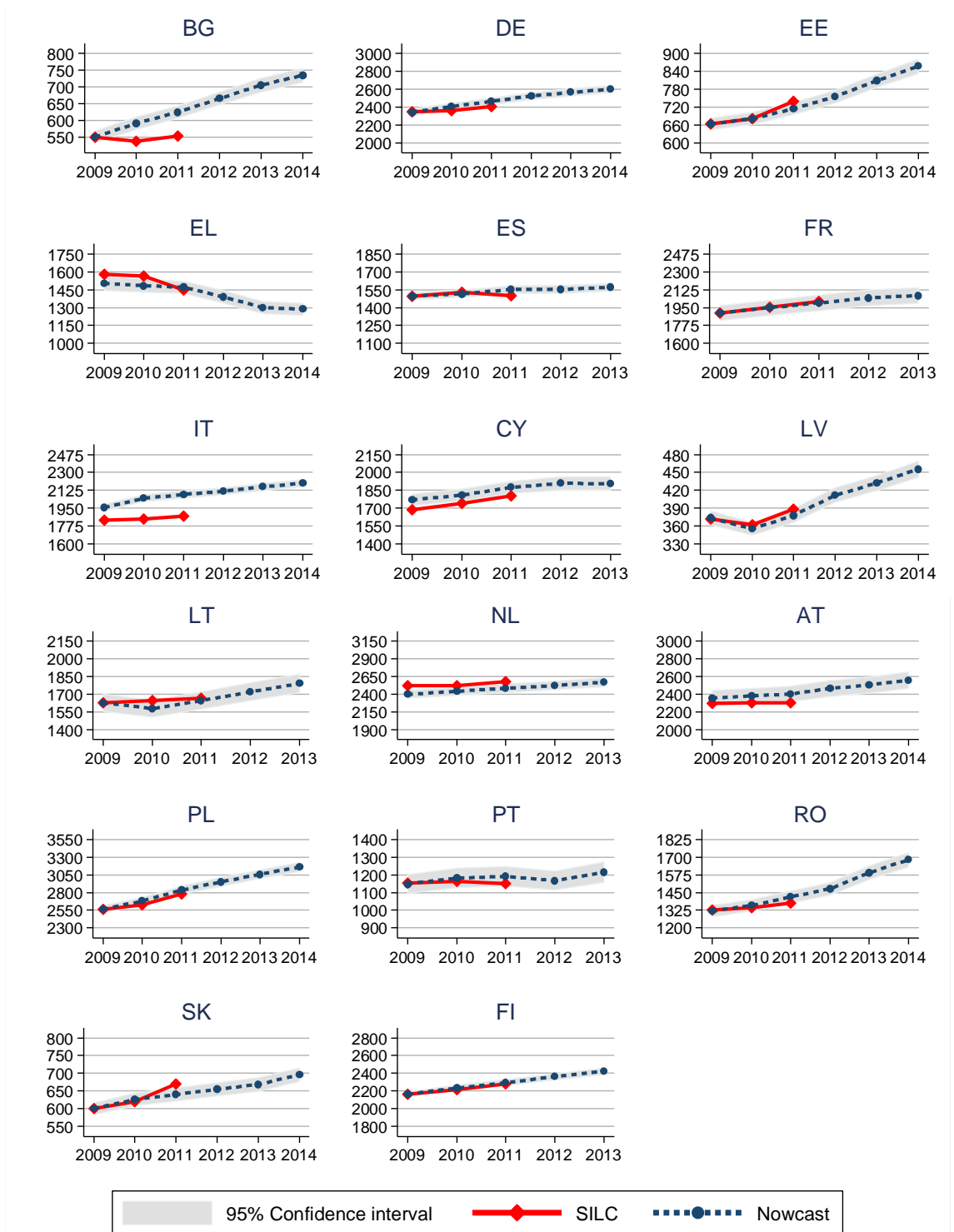
Table A5: Standard errors (SE) around at risk of poverty rates and standard deviation (SD) of cross-sectional weights

| | SE around AROP | SD of weights (adjusted) |
|-------------|-----------------------|---------------------------------|
| Bulgaria | 0.85 | 0.60 |
| Germany | 0.30 | 0.39 |
| Estonia | 0.61 | 0.83 |
| Greece | 0.90 | 1.25 |
| Spain | 0.53 | 0.82 |
| France | 0.43 | 0.56 |
| Italy | 0.43 | 0.72 |
| Cyprus | 0.71 | 0.63 |
| Latvia | 0.90 | 0.51 |
| Lithuania | 1.02 | 1.23 |
| Netherlands | 0.67 | 0.94 |
| Austria | 0.57 | 0.51 |
| Poland | 0.47 | 0.69 |
| Portugal | 0.93 | 0.73 |
| Romania | 0.91 | 0.75 |
| Slovakia | 0.57 | 0.35 |
| Finland | 0.40 | 0.85 |

Notes: Cross-sectional weights refer to household (DB090) or individual (RB050) weights. For cross-country comparability these weights are adjusted by dividing each individual weight by the country mean.

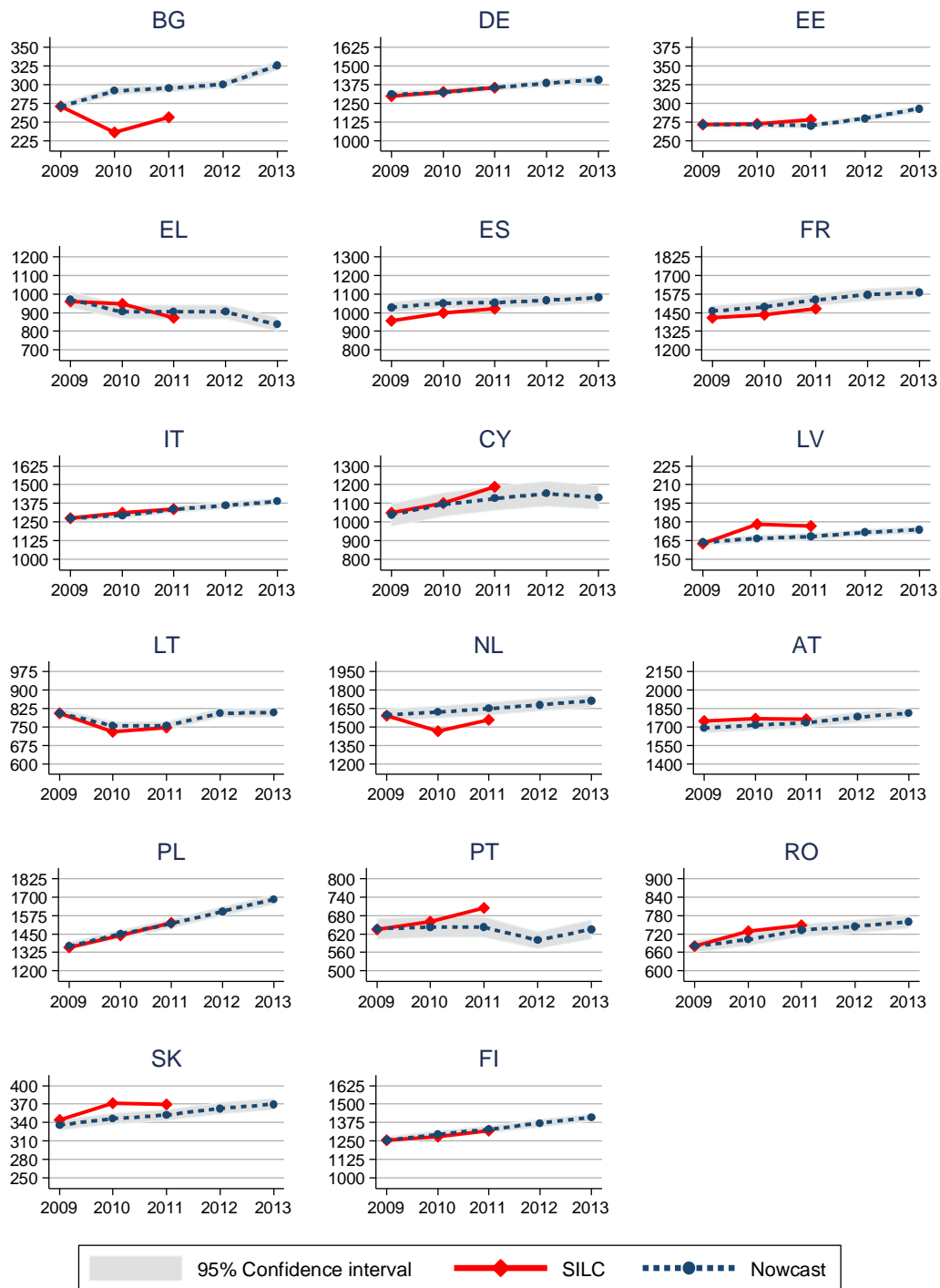
Source: AROP standard errors are from 2010 Comparative EU Intermediate Quality Report (except France which is based on own estimates). Standard deviation of weights are own estimates based on UDB SILC 2010 from March 2014.

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



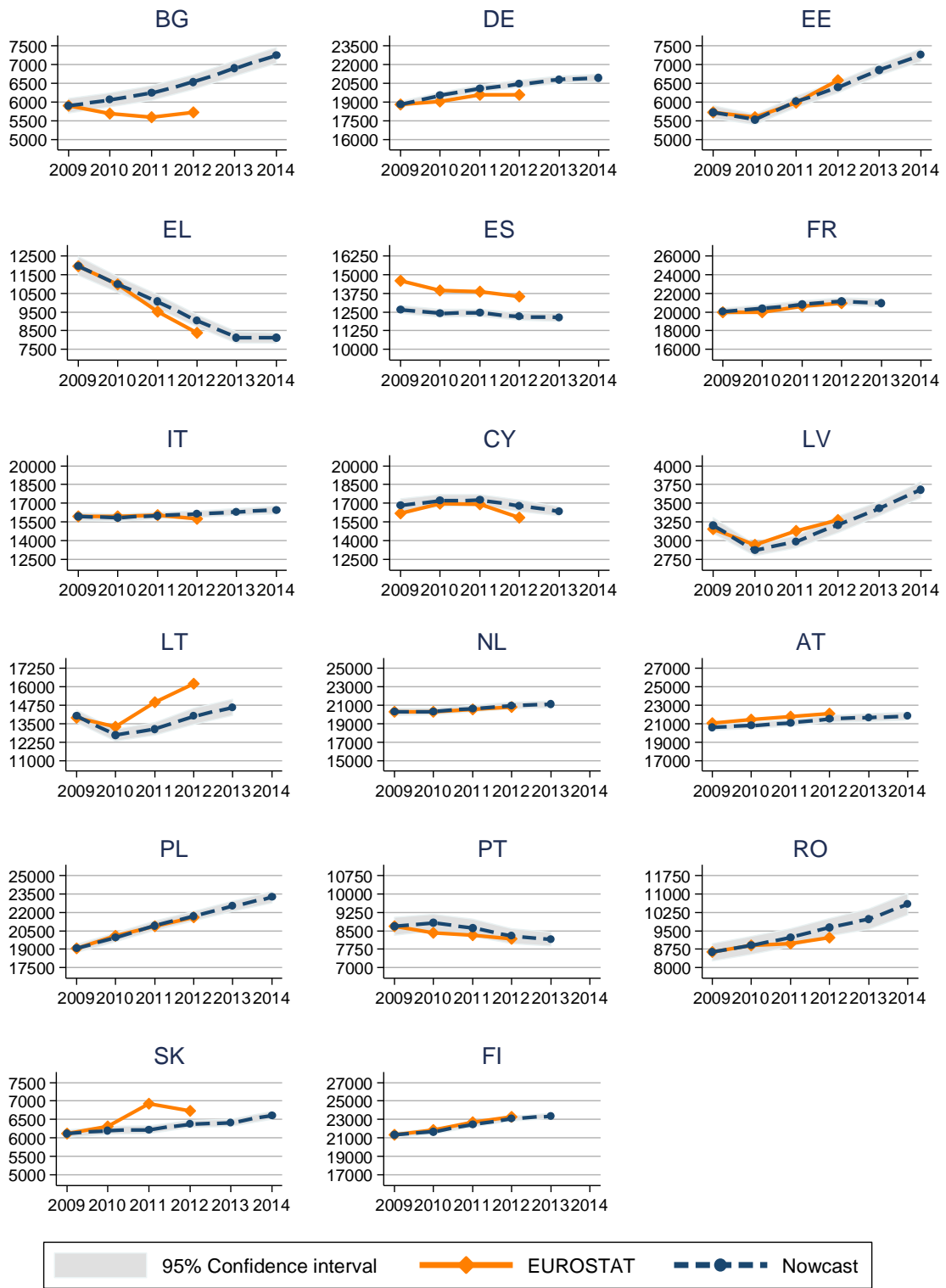
Notes: Non-calibrated results. Employment income in UDB SILC is based on variable *py100g*. Employment income in EUROMOD is derived from the same concept but with some country-specific adjustments in place (e.g. net-to-gross imputations in Greece and Italy; subtraction of income from military service in Austria and Cyprus). Amounts are expressed in national currencies. The charts are drawn to different scales and the gridlines approximately correspond to 8% - 10% of the mean in each country.

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



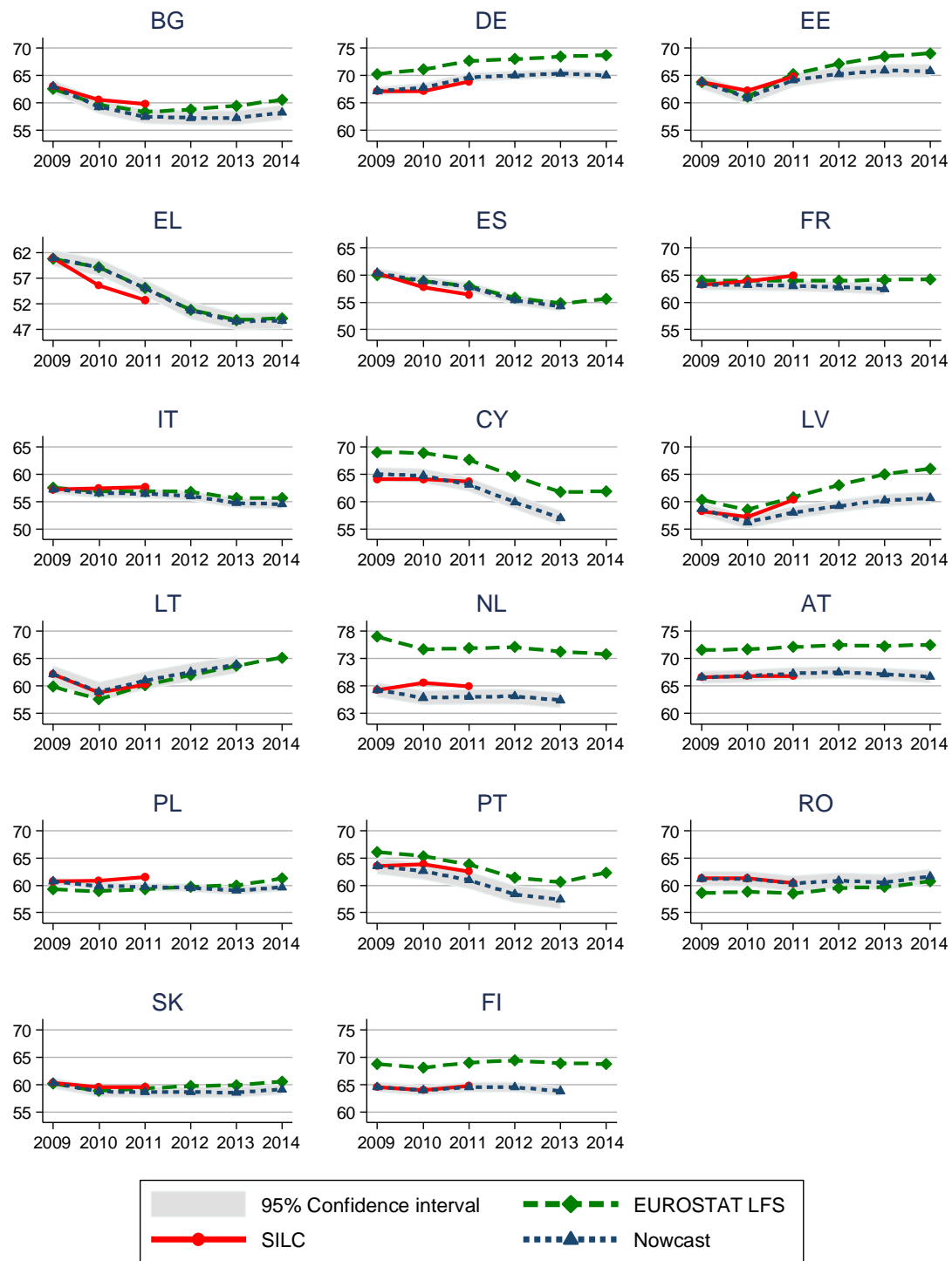
Notes: Non-calibrated results. Pension income in UDB SILC is the sum of *py100g*, *py110g* and *py130g* variables. Pension income in EUROMOD is taken from the income list "ils_pen". Discrepancies between the 2009 estimates may arise in case some of the components are simulated in EUROMOD or if some -usually small- components of aggregate UDB variables are split in EUROMOD and classified as benefits (rather than pensions). Amounts are expressed in national currencies. The charts are drawn to different scales and the gridlines approximately correspond to 8% - 10% of the mean in each country.

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



Note: The charts are drawn to different scales and the gridlines approximately correspond to 8% - 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.

Figure A4: 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.