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Why is it so hard to reach the EU's 'poverty' target?

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Why is it so hard to reach the EU's 'poverty' target?

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Abstract

The European Union's Lisbon strategy goal of tackling poverty was a notable failure, while the Europe 2020 strategy's poverty target is out of reach. Both strategies were based on variants of the 'at risk of poverty' indicator, which has an inappropriate and misleading name. We demonstrate theoretically and empirically by cross-section, time series and panel cointegration evidence, that the 'at risk of poverty' indicator essentially measures income inequality, not poverty. Our calculations show that even after taking into account the positive impact that expected economic growth should have on material deprivation and low work intensity, the Gini coefficient of income inequality would have to fall by 3.5 points in each EU country if the Europe 2020 poverty target is to be reached, which is implausible. Huge differences between national poverty thresholds make the EU-wide poverty aggregate pointless. We approximate the EU-wide distribution of income and use it calculate EU-wide poverty indicators. The political agreement between EU member states expressed the goal of reducing poverty, not inequality. There are good reasons to aim for lower income inequality, but a political agreement would be needed to set an inequality goal and corresponding policies.

JEL: D31, E37, I32

Keywords: Europe 2020, EU-wide distribution of income, income inequality, poverty measurement

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Miért ilyen nehéz az Európa 2020 stratégia szegénység-csökkentési célkitűzésének elérése?

Zsolt Darvas

Kivonat

Az Európai Unió lisszaboni stratégiájának szegénységcsökkentési célja súlyos kudarcot vallott, és az Európa 2020 stratégia szegénységi célkitűzése nem látszik elérhetőnek. Mindkét stratégia a „szegénységnek kitett" mutató változatain alapul, melynek helytelen és félrevezető neve van. Elméletileg és empirikusan demonstráljuk keresztmetszeti, idősoros és panelkointegrációs eredmények alapján, hogy a szegénységnek kitett mutató alapvetően a jövedelemegyenlőtlenséget, nem pedig a szegénységet méri. Számításaink azt mutatják, hogy figyelembe véve a várható gazdasági növekedésnek az anyagi nélkülözésre és az alacsony munkaintenzitásra gyakorolt pozitív hatását, a Gini jövedelemegyenlőtlenségi együtthatónak minden egyes EU-országban 3,5 ponttal kellene csökkennie az Európa 2020 szegénységi célkitűzés eléréséhez, ami valószínűtlen. A nemzeti szegénységi küszöbök közötti hatalmas különbségek az EU egészére vonatkozó szegénységnek kitett mutatót értelmetlenné teszik. Megbecsüljük az uniós szintű jövedelemelosztást, amely segítségével az EU egészére kiterjedő szegénységi mutatókat számolunk. Az EU tagállamok közötti politikai megállapodás a szegénység csökkentésére vonatkozott, nem pedig a jövedelemegyenlőtlenségek csökkentésére. Bár felhozhatóak indokok az alacsonyabb jövedelmi egyenlőtlenségre való törekvés mellett, de politikai egyetértésre lenne szükség az egyenlőtlenségi cél és az ennek megfelelő gazdasági és szociális politikák meghatározásához.

Tárgyszavak: Európa 2020, EU-szintű jövedelemeloszlás, jövedelemegyenlőtlenség, szegénységmérés

JEL: D31, E37, I32

1. INTRODUCTION

The European Union's social dimension, in particular the fight against poverty, has received increasing attention in recent decades. The EU's Lisbon Strategy, adopted in 2000, aimed to make a decisive impact in terms of the eradication of poverty (European Council, 2000). A decade later, '*Europe 2020 – A strategy for smart, sustainable and inclusive growth*' was adopted in 2010 as the EU's landmark economic and social policy strategy. It formulated EU-wide numerical targets for employment, research and development, climate/energy, education and poverty reduction/social inclusion. The 'poverty' target set by the European Commission (2010) aims to lift "*over 20 million people out of poverty*" between 2008 and 2020 in the EU27[1].

Progress to date towards these targets has been disappointing. Rather than declining, the number of people classified as 'at risk of poverty' increased by 7.2 million overall from 2000-10 in the first 15 members of the EU, highlighting the failure to meet the Lisbon Strategy goal[2]. The Europe 2020 target looks similarly out of reach: in the first 27 EU member states, the number of people 'at risk of poverty or social exclusion' increased overall by 6.3 million from 2008-12, after which it fell by 4.7 million from 2012-15, leading to a figure in 2015 that was still above the 2008 value by about 1.6 million people. The EU's apparent failure to reduce 'poverty' has received great attention, with calls for more effective measures from many quarters, including the European Commission, European Parliament, trade unions and civil society organisations.

In this paper we demonstrate that the Lisbon Strategy's key 'at risk of poverty' indicator and the Europe 2020 'at risk of poverty or social exclusion' indicator have inappropriate and very misleading names. While according to Atkinson, Marlier and Nolan (2004), the task force that helped to develop the social indicators highlighted that the 'at risk of poverty' indicator does not provide a basis for assessing people as 'poor', the European Commission and the Council subsequently agreed to label the indicator as 'at risk of poverty'. Poverty has many different definitions, as summarised by, for example, Coudouel, Hentschel and Wodon (2002), Marx, Nolan and Olivera (2015) and Weziak-Bialowolska (2016). However, a standard definition of poverty, which coincides with the everyday use of the word 'poverty', refers to a situation in which the individual has little money and few possessions. The 'at risk of poverty' indicator is used in such a context in dozens of documents from EU institutions and in the speeches of the representatives of those institutions. But we have not been able to

[1] The first 27 European Union members, predating Croatian membership.
[2] The increase from 2000-07 was 6.4 million and therefore the global financial and economic crisis, which intensified in 2008, was not a major reason for this failure.

find any EU document or speech by an EU representative that highlighted that the 'at risk of poverty' indicator essentially measures the same phenomenon as the Gini coefficient of income inequality.

We demonstrate the clear theoretical and strong empirical association between the 'at risk of poverty' indicator and the Gini coefficient of income inequality. We establish a deterministic mathematical relationship between the two variables when the income distribution is assumed to be described by the log-normal distribution, which is frequently found to be a reasonable description of actual income distributions. We then present cross-section, time-series and panel cointegration evidence showing a very strong empirical association between the two variables. Since income inequality has increased within many EU countries during the past decades, it is not surprising at all that the 'poverty' goal of the Lisbon strategy has been badly missed and there was no progress towards the Europe 2020 goal between 2008 and 2015.

Given the strong association between the two variables, we illustratively calculate that even after taking into account the positive impact expected economic growth should have on material deprivation and low work intensity (the other two components of the Europe 2020 'at risk of poverty or social exclusion' indicator), the Gini coefficient of income inequality would have to fall by 3.5 Gini points in each EU country if the Europe 2020 'poverty' target is to be reached. This would be a huge decline relative to historical variations in the Gini coefficient. Given the lack of strong policies to reduce income inequality, it is extremely unlikely that the Europe 2020 'poverty' target will be met.

We also argue that the enormous differences between 'poverty' thresholds adopted by different EU countries make the EU-wide poverty aggregate pointless. We therefore approximate the EU-wide distribution of income and calculate EU-wide poverty indicators from this EU-wide distribution.

The rest of the paper is organised as follows. Section 2 introduces the 'poverty' indicator of the Europe 2020 strategy in a historical context. Section 3 demonstrates the clear theoretical and the strong empirical association between the 'at risk of poverty' rate and the Gini coefficient of income inequality. Section 4 estimates regression models to project the expected change in material deprivation and low work intensity of those people who are not 'at risk of poverty'. Based on these projections, this section illustratively calculates the necessary reduction in the Gini coefficient of income inequality to meet the Europe 2020 'poverty' target. Section 5 discusses the problem with the aggregation of national 'at risk of poverty' indicators to EU level, and derives poverty indicators from the EU-wide distribution of income. Section 6 offers some concluding remarks and makes proposals for better measurement of poverty in the EU.

2. THE EUROPE 2020 STRATEGY POVERTY INDICATOR

2.1. HISTORICAL PRECEDENTS

There is a long-standing literature on social indicators, which have been used in various ways by the European Union and the preceding European Communities. Atkinson *et al* (2002) provide a comprehensive overview of the various indicators. The Lisbon Strategy, adopted in March 2000 by the EU heads of state and government, aimed to make Europe "*the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion*" (European Council, 2000). European Council (2000) also expressed the aim that "*steps must be taken to make a decisive impact on the eradication of poverty*" (European Council, 2000).

This Lisbon strategy included six specific indicators for social cohesion, in addition to various indicators of employment, innovation and research, economic reform and general economic background indicators. A key social cohesion indicator was the 'poverty rate', which measured the share of the population below the poverty line. This poverty lines was generally defined as 60 percent of the median equivalised disposable income[3] in each country (European Commission, 2000). While the EU's Task Force on Poverty and Social Exclusion expressed concerns that income below 60 percent of the median income should not be taken as a basis for assessing people as 'poor', the European Commission and the Council subsequently agreed to label the indicator as 'persons at risk of poverty' (Atkinson, Marlier and Nolan, 2004).

2.2 THE EU2020 INDICATOR: AT RISK OF POVERTY OR SOCIAL EXCLUSION

In its March 2010 publication of the Europe 2020 strategy, European Commission (2010) proposed that the same 'at risk of poverty' indicator should be used. In 2008 there were slightly more than 80 million people deemed 'at risk of poverty' in the then 27-member EU, and the Commission proposed to set the target in terms of this baseline: "*the number of Europeans living below the national poverty lines should be reduced by 25%, lifting over 20*

[3] The equivalised disposable income is the total income of a household, after tax and other deductions, that is available for spending or saving, divided by the number of household members converted into equalised adults; household members are equalised or made equivalent by weighting each according to their age, using the so-called modified OECD equivalence scale. See: http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Equivalised_disposable_income.

million people out of poverty", where "*the national poverty line is defined as 60% of the median disposable income in each Member State.*"

However, in subsequent negotiations, the indicator was found to be too narrow. The final indicator adopted by the European Council (2010) was the 'at risk of poverty or social exclusion' indicator, which is the combination of three indicators. It includes the total number of people that fall into one or more of three categories:

- **'**At risk of poverty': people with a disposable income below 60 percent of the national median equivalised disposable income;
- 'Severely materially deprived': people unable to afford at least four of the following: 1. rent, mortgage or utility bills, 2. adequate home heating, 3. a reserve against unexpected expenses, 4. regular meat or proteins, 5. a holiday, 6. a television set, 7. a washing machine, 8 a car, 9. a telephone;
- 'Living in a household with a very low work intensity': total number of months that all working-age household members have worked relative to the total number of months the same household members theoretically could have worked is below 20 percent.

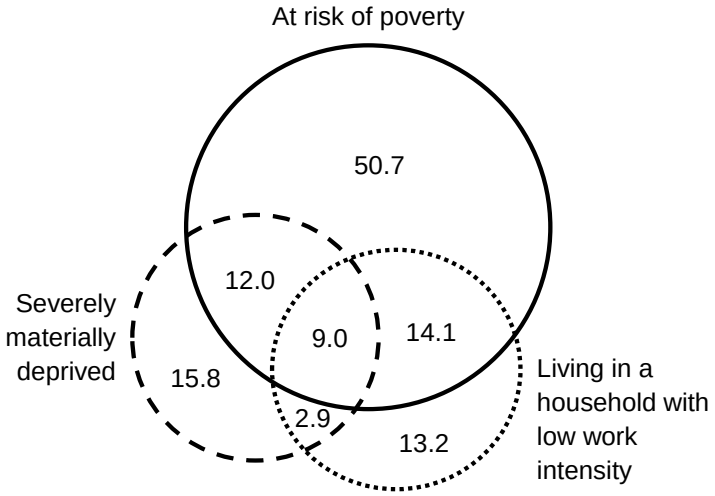
The measurement of all three subcomponents is based on the European Union statistics on income and living conditions (EU-SILC), which is an annual household survey[4].

Figure 1 breaks down this indicator according to its components in 2015, when there were 117.6 million people in the EU27 who were deemed to be 'at risk of poverty or social exclusion'. Since a person can belong to one, two or all three of its components, the overlapping areas of the circles indicate the people who belong to more than one of the components.

4 http://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions

Figure 1

People 'at risk of poverty or social exclusion' in the EU27 in 2015 (millions)



Source: prepared on the basis of the figure on page 26 of the Annex of European Commission (2014) using data from the Eurostat dataset 'Intersections of Europe 2020 Poverty Target Indicators by age and sex [ilc_pees01]'.
Note: the overlapping areas of the circles indicate the people who belong to more than one of the components. For example, there were 9.0 million people who belonged to all three components. The sum of the seven numbers indicated is 117.6 million, the total number of people in the EU27 who were deemed to be 'at risk of poverty or social exclusion' in 2015.

In 2008, there were 115.9 million people in the EU27 'at risk of poverty or social exclusion' according to these measures, which is 23.7% of population. The European Council retained the 20 million reduction target for this indicator and therefore the target for 2020 was set at about 96 million.

It is notable that while the European Council adopted the EU-wide 20 million person target, it did not share out this target among member states, but allowed them to set their own targets. The sum of member states' targets is a reduction of about 12 million people, highlighting a major discrepancy between the EU-wide target and national commitments[5].

[5] Furthermore, European Council (2010) allowed member states "*to set their national targets on the basis of the most appropriate indicators, taking into account their national circumstances*". Nine countries adopted a different indicator: Bulgaria: at risk of poverty; Germany: long-term unemployed; Denmark: persons living in households with low work intensity; Estonia: at risk of poverty; Ireland: combined poverty, defined as those severe materially deprived who are also at risk of poverty; Latvia: at risk of poverty and/or living in households with very low work intensity; Netherlands: people aged 0-64 living in a jobless household; Sweden: percent of women and men aged 20-64 who are not in the labour force (except full-time students), the long-term unemployed or

Progress to date has been disappointing. Instead of a decline, the number of people in the EU27 deemed at risk of poverty or social exclusion increased from 115.9 million to 122.2 million in 2012 and then declined to 117.5 million, still above the 2008 value and very far from the target of 96 million.

We highlight that the aim agreed by the European Council was "*promoting social inclusion in particular through the reduction of poverty*" and income inequality was not mentioned in the European Council conclusions that adopted the Europe 2020 strategy (see European Council, 2010).

2.3 THE DEFINITIONS OF POVERTY, INEQUALITY AND SOCIAL EXCLUSION

There is an extremely voluminous body of academic and policy research on poverty, inequality and social exclusion; see for example overviews in Coudouel, Hentschel and Wodon (2002) and Marx, Nolan and Olivera (2015). These concepts are defined in many different ways.

A standard definition of poverty is whether "*households or individuals have sufficient resources or abilities to meet their daily needs*", as argued by the World Bank[6]. This definition is in line with the everyday use of the word poverty[7]. In his Noble lecture, Deaton (2016) also uses the word poverty in such a context. This definition is sometimes considered as an absolute measure of poverty. Poverty has non-monetary aspects, such as health, education and subjective perceptions and is frequently measured by a multidimensional approach (Alkire and Santos, 2013; Weziak-Bialowolska, 2014).

Relative poverty is usually defined as having little in terms of a specific aspect (like income, wealth, health, or education) compared to other members of society. The way individuals perceive their position relative to other people can be an important aspect of their welfare.

Inequality refers to the extent to which a specific aspect (like income) is distributed unevenly among the population. Similarly to the concept of relative poverty, in unequal societies poorer individuals might perceive that they have fewer means than richer

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those on long-term sick leave; United Kingdom: numerical targets from the 2010 Child Poverty Act and Child Poverty Strategy 2011-14, which are in turn different versions of the 'at risk of poverty' rate (source: http://ec.europa.eu/europe2020/pdf/targets_en.pdf and the accompanying national documents). None of these nine countries made their choice on the basis of the near equivalence of the 'at risk of poverty' rate and the Gini coefficient of income inequality that we demonstrate in our paper and in fact five of the nine countries adopted a version of the 'at risk of poverty' rate.

[6] See for example the World Bank's 'Measuring Poverty' page: http://go.worldbank.org/0C60K5UK40.

[7] The Cambridge Dictionary (http://dictionary.cambridge.org) defines poverty as *"the condition of being extremely poor,"* and poor as *"having little money and/or few possessions"*.

individuals, which might affect their life satisfaction irrespective of their actual living standards.

A reasonable definition of social exclusion is "*a process whereby certain individuals are pushed to the edge of society and prevented from participating fully by virtue of their poverty, or lack of basic competencies and lifelong learning opportunities, or as a result of discrimination. This distances them from job, income and education opportunities as well as social and community networks and activities. They have little access to power and decision-making bodies and thus often feeling powerless and unable to take control over the decisions that affect their day to day lives.*" (The Council of the European Union, 2004). The Commission of European Communities (1992) explained the difficulties in measuring social exclusion, which has different manifestations, such as homeless people on the streets, the marginalisation of the very long-term unemployed, persistent poverty in certain rural areas, and the rejection of refugees and minorities.

The definitions offered above underline that there are many overlaps between these concepts:

- Poverty might lead to social exclusion.
- For a given level of average income in a country, higher income inequality implies more poverty: consider two countries with the same average income but with different levels of income inequality; in the country with a higher inequality level there will be more poor (and also more rich) than in the country with a lower level of income inequality.
- Thereby, more inequality might also lead to more social exclusion.
- Relative income poverty is a very similar concept to income inequality. When income inequality is high, the gap between the incomes of people at the top and the bottom of the income distribution is wide and thus relative income poverty is high. A possible conceptual difference between relative income poverty and income inequality is that the former focuses on the lower part of the income distribution, while the latter considers the entire population.

Furthermore, a common factor might influence all indicators simultaneously. For example, unemployment, and especially long-term unemployment, might lead to more poverty, relative poverty, inequality and social exclusion.

The fact that poverty, relative poverty, inequality and social exclusion have many different definitions, and that there are various overlaps between these concepts, necessitates careful use of the various indicators developed to measure these concepts.

The focus of this paper is on the 'at risk of poverty' component of the Europe 2020 'at risk of poverty or social exclusion' target indicator and we will analyse in the next session what it actually measures. Concerning the other two components of the Europe 2020 target indicator, we highlight that their names are clear and their interpretations are straightforward:

- 'Living in a household with a very low work intensity' correctly describes that working-age members of the household work little. People living in such households might face a significant risk of exclusion from the labour market, potentially leading to social exclusion too.
- 'Severely materially deprived' unmistakeably indicates that people belonging to this category might lack sufficient resources to meet their needs. Thanks to Europe's generally high living standards and extensive welfare states, there are hardly any people below the standard poverty thresholds that are used globally. That means there are very few people in the EU living on less than $1.25 or $2 a day. The severe material deprivation rate is therefore a relevant indicator of poverty in the European context. It might also reflect social exclusion if poor people face difficulties in terms of social integration.

However, we note that it is surprising to find 18.7 million people in the EU27 (who reside in both 'high wage' and 'low wage' countries) who were severally materially deprived in 2015, but had income higher than 60 percent of the national median equivalised income (see the part of the dashed-line circle which is outside the solid-line circle in Figure 1). We would have expected severe material deprivation for people with very low incomes, yet there are 64.8 million people below 60 percent of the national median equivalised income who are not severely materially deprived (the part of the solid-line circle which is outside the dashed-line circle in Figure 1). This highlights that the material deprivation indicator measures perceptions, and we cannot exclude the hypothesis that this indicator carries large measurement errors.

3. THE 'AT RISK OF POVERTY' INDICATOR ESSENTIALLY MEASURES INCOME INEQUALITY

The 'at risk of poverty' indicator dominates the Europe 2020 overall indicator of 'at risk of poverty or social exclusion': 73 percent of people 'at risk of poverty or social exclusion' in the EU27 were flagged up by the criterion 'at risk of poverty' in 2015 (Figure 1). We argue that this indicator has a very misleading name and we show that it essentially measures income inequality.

One issue is the interpretation of 'risk' in the name of the indicator. In principle, everyone can be considered to be at risk; even a billionaire faces the risk of losing her/his wealth. The question is the degree of riskiness. The 'at risk' part of the indicator should refer to a significant degree of risk.

Someone with income below 60 percent of national median income is not necessarily at high risk of poverty. Even Eurostat's glossary highlights that: "*this indicator does not measure wealth or poverty, but low income in comparison to other residents in that country, which does not necessarily imply a low standard of living*"[8]. That is, Eurostat uses the word 'poverty' in the common sense of someone being poor and underlines that the 'at risk of poverty' indicator does not measure poverty.

For example in a rich country like Luxembourg, the bulk of the people below the 60 percent of the Luxembourgish median income have much higher living standards than, for example, a citizen in Romania earning the average Romanian income, who is in turn in a much better position than someone with an average income in Africa.

3.1 THEORETICAL ASSOCIATION

Conceptually, the definition of the 'at risk of poverty' indicator and the explanation provided in the Eurostat glossary resemble an indicator of income inequality. In more equal societies, more people have incomes closer to the median income and consequently the share of people with income below 60 percent of the median income is low. In the extreme case of a country with perfect income equality, everyone earns the same and therefore nobody is below (and nobody is above) the median income. In a country with some level of income inequality, there are (by definition) people with incomes both below and above the median income, but when income inequality is very low, nobody may have an income below 60 percent of the median income. Therefore, in a country with a rather equal income distribution, the 'at risk of poverty' indicator could take the value of zero, even if everyone was extremely poor.

In contrast, in more unequal societies there are greater income differences and therefore more people below 60 percent of median income.

A deterministic mathematical relationship can be established between the Gini coefficient of income inequality and the 'at risk of poverty' rate if income distribution is assumed to be described by a certain statistical distribution function. We use the log-normal distribution, which is frequently found to be effective in describing income distributions (Lubrano, 2015; Darvas, 2016). A random variable has a log-normal distribution if its logarithm has a normal

[8] http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:At-risk-of-poverty_rate.

distribution. The key functions and parameters of the log-normal distribution are included in Table 1.

In our calculations, we set the mean at an arbitrary level; the theoretical relationship between the Gini coefficient of income inequality and the 'at risk of poverty' rate is independent from the value of the mean. For a particular Gini coefficient in the range of [0,50], we calculate parameter *s* using the expression in Table 1. The function for the mean allows the calculation of parameter *m*, which in turn allows the calculation of the median. We then evaluate the cumulative distribution function at 60 percent of the median.

Table 1

Key functions and parameters of the log-normal distribution

Probability density function	$f(x;m,s)=\frac{1}{x\sqrt{2\pi s^2}}e^{-\frac{(\ln x-m)^2}{2s^2}},\ x>0$
Cumulative distribution function	$F(x;m,s)=\Phi\left(\frac{\ln x-m}{s}\right),\ x>0$
Mean	$\mu=\mathrm{e}^{m+\frac{s^2}{2}}$
Median	$\nu=\mathrm{e}^{m}$
Variance	$\sigma^2=\mathrm{e}^{s^2+2m}\left(\mathrm{e}^{s^2}-1\right)$
Gini coefficient	$\mathrm{G}=2\Phi\left(\frac{s}{\sqrt{2}}\right)-1$

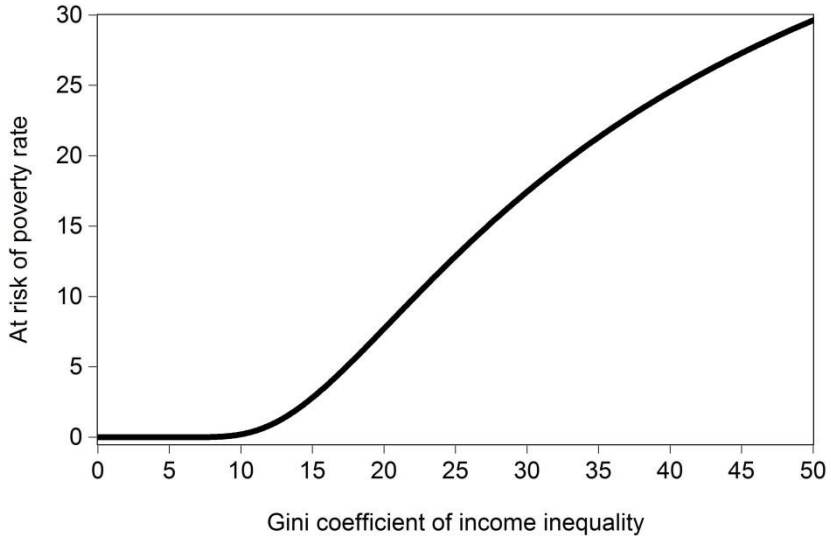
Source: Lubrano (2015) and http://mathworld.wolfram.com/.
Note: $\Phi(.)$ in expression for the cumulative distribution function and Gini coefficient is the cumulative distribution function of the standard normal distribution.

Figure 2 shows the theoretical association between the two indicators when income distribution is described by the log-normal distribution. In this case, practically nobody is deemed to be 'at risk of poverty' (that is, nobody has income below 60 percent of the median) when the Gini coefficient of income inequality is low. For example, when the Gini coefficient is 7, 8, and 9, then the 'at risk of poverty' rate is 0.002 percent, 0.016 percent and 0.070 percent, respectively. The 'at risk of poverty' rate becomes 1 percent when the Gini coefficient is 12.3. At higher levels of income inequality the 'at risk of poverty' rate increases in line with the increase in the Gini coefficient.

While the theoretical association between the two indicators is slightly non-linear when the Gini coefficient is larger than 12, it can be well approximated by a linear relationship when the Gini coefficient of disposable income inequality is in the range observed in EU countries, that is, in the range of 23-36. In this range, a linear approximation suggests that a 1 point increase in the Gini coefficient is associated with a 0.86 point increase in the 'at risk of poverty' rate.

Figure 2

The theoretical association between the Gini coefficient of income inequality and the 'at risk of poverty' rate when income distribution is log-normal



Source: Author calculations. Note: the 'at risk of poverty' rate is defined as the share of people with income below 60 percent of the national medium income.

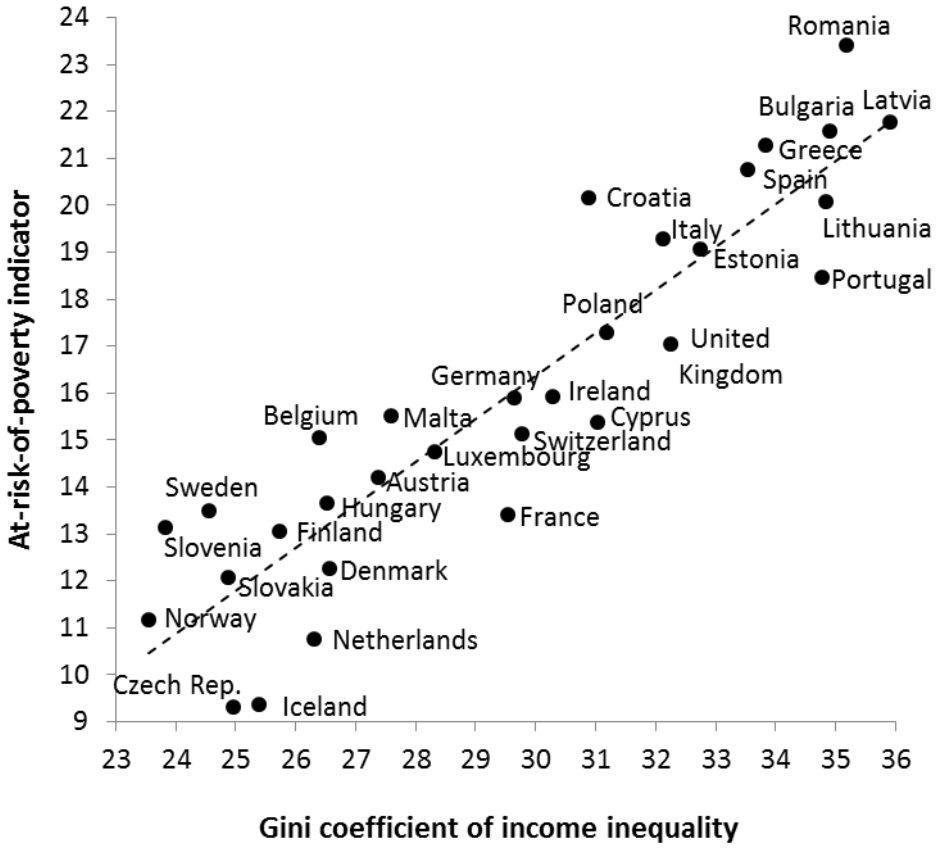
In reality, actual income distributions differ from parametrised statistical distributions and therefore the association between the two indicators is not deterministic. Moreover, the 'at risk of poverty' rate considers only the bottom part of the income distribution, while the whole distribution matters for the Gini coefficient. Different Gini coefficients might therefore correspond to the same 'at risk of poverty' rate and a particular Gini coefficient might correspond to different 'at risk of poverty' rates, as also noted by Marx, Nolan and Olivera (2015). We therefore also look at the association revealed by data.

3.2 EMPIRICAL EVIDENCE

Figure 3 highlights that the empirical cross-section association between the 'at risk of poverty' rate and the Gini-coefficient of income inequality across European countries is indeed not deterministic, but there is a very strong empirical association between them[9]. Using average values from 2008 to 2015, the correlation coefficient between the two indicators is 0.91, which is a very high value. The correlation in yearly data is similarly high in the range between 0.86 and 0.92. A simple cross-section linear regression suggests that a 1 point increase in the Gini coefficient is associated with a 0.92 point increase in the 'at risk of poverty' rate – a result very similar to what we obtained when analysing the theoretical association between the two indicators using the log-normal distribution.

Figure 3

The empirical association between the Gini coefficient of income inequality and the 'at risk of poverty' rate



Source: Updated from Darvas and Tschekassin (2015) using data from Eurostat. Note: both indicators are averaged over 2007-15. The at risk of

[9] Figure 1 in Marx, Nolan and Olivera (2015) is a similar chart for OECD countries.

poverty indicators is 'At risk of poverty rate (cut-off point: 60 percent of median equivalised income after social transfers)', while the Gini coefficient is the 'Gini coefficient of equivalised disposable income'.

The evolution of the indicators for each country also highlights the strong co-movement of the two indicators. Figure 4 shows that the Gini coefficient of income inequality and the 'at risk of poverty' rate moved in tandem in a number of countries. In contrast, the severe material deprivation rate (a useful available measure of poverty in the European context) developed in strikingly different ways in these countries, highlighting again that the 'at risk of poverty' rate is rather distinct from poverty developments.

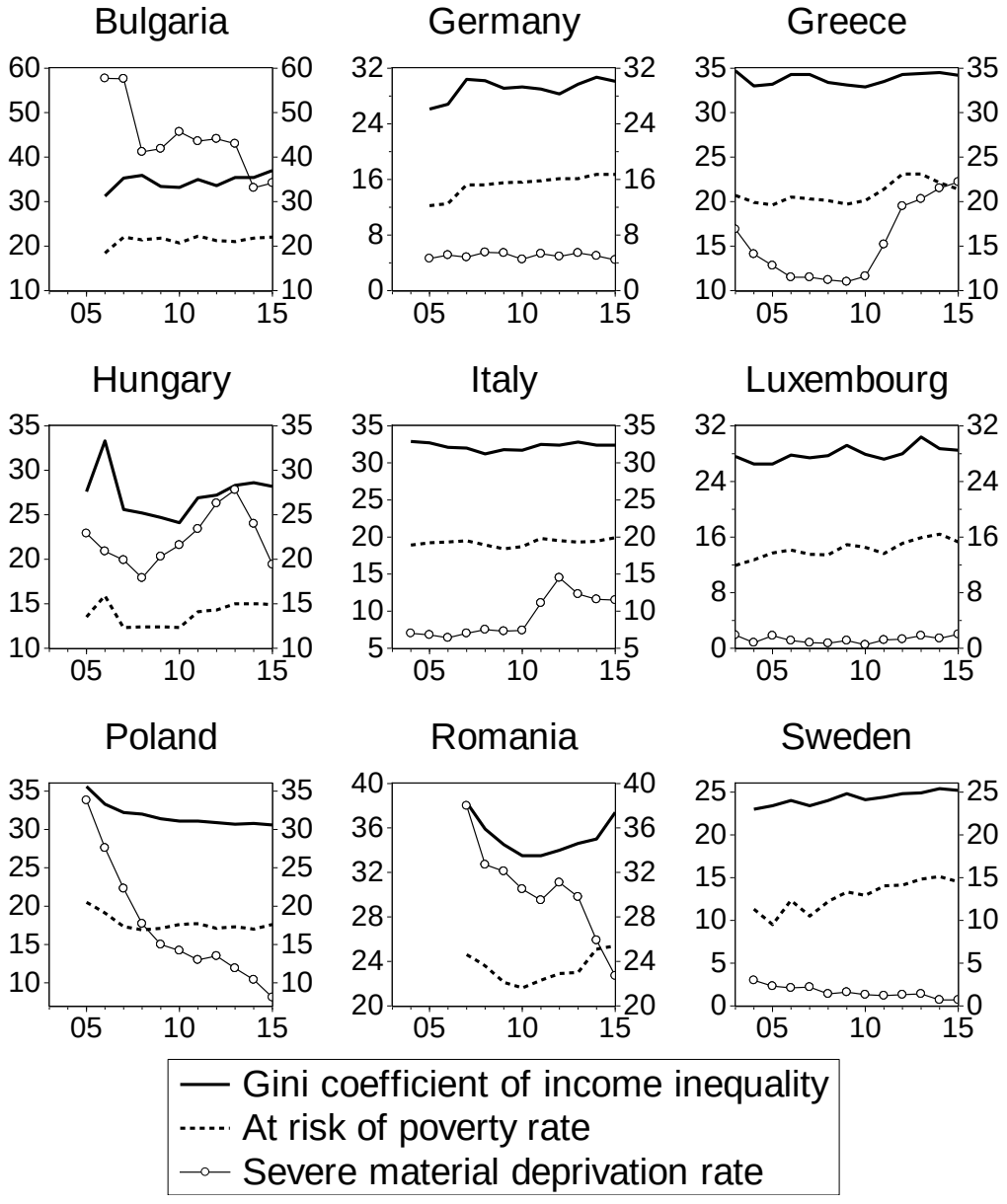
In order to test the co-movement of the Gini coefficient of income inequality and the 'at risk of poverty' rate, we adopt the panel cointegration tests. In the long-run, none of the two variables can follow an integrated process, because both variables are bounded between zero and one (or zero 100 if measured in percent or multiplied by 100). However, in finite sample these variables could be approximated by an integrated process. Since our sample period is rather short, we assess cointegration in a panel framework in order to increase the sample size.

As an initial step, we test the order of integration using a standard augmented Dickey-Fuller test for each country separately. We find that among the 30 countries considered[10], there are 22 countries for which the null hypothesis of unit root in both the Gini coefficient of income inequality and in the 'at risk of poverty' rate cannot be rejected. The results of panel unit root and stationarity tests applied to the pooled times series of these 22 countries confirm these conclusions (Table 2).

[10] The 30 countries considered include the first 27 EU member states plus Iceland, Norway and Switzerland, three countries for which Eurostat publishes the two indicators, using the same methodology as for EU countries.

Figure 4

The Gini coefficient of income inequality, the 'at risk of poverty' rate and the severe material deprivation rate in selected countries, 2003-15



Source: Eurostat's 'Gini coefficient of equivalised disposable income - EU-SILC survey [ilc_di12]', 'At-risk-of-poverty rate by poverty threshold, age and sex - EU-SILC survey [ilc_li02]' and 'Severe material deprivation rate by age and sex [ilc_mddd11]' databases.

Table 2

Panel unit root and stationarity tests

	Gini coefficient of income inequality		'At risk of poverty' rate	
Null hypothesis and method	Statistic	Probability	Statistic	Probability
Null hypothesis: Unit root (assumes common unit root process)				
Levin, Lin & Chu t	0.60	0.727	-0.66	0.255
Null hypothesis: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.24	0.594	0.15	0.558
ADF - Fisher Chi-square	43.05	0.512	41.67	0.572
PP - Fisher Chi-square	42.79	0.524	40.57	0.620
Null hypothesis: Stationarity				
Hadri Z-stat	6.80	0.000	9.05	0.000
Heteroscedastic consistent Z-stat	6.46	0.000	7.70	0.000

Source: author calculations.

Note: the sample includes annual data for 22 countries between 1995-2016, with several gaps in the data.

For the panel of 22 countries for which both the Gini coefficient of income inequality and the 'at risk of poverty' rate are found to be non-stationary, we test for cointegration using the various test statistics developed by Pedroni (2004). These tests are among the most frequently used panel cointegration tests. The various test statistics allow for heterogeneous dynamics and heterogeneous slope coefficients. Each of these tests is able to accommodate individual specific short-run dynamics, individual specific fixed effects and deterministic trends, as well as individual specific slope coefficients.

We use the version of the test which allows an intercept, but not a deterministic trend in the cointegrating vector. We exclude the deterministic trend due to the nature of our data, which in theory cannot include a deterministic trend component.

The results of the tests are reported in Table 3. All four versions of the test soundly reject the null hypothesis of no cointegration when the alternative hypothesis is common autoregressive coefficients. When the alternative hypothesis is individual autoregressive coefficients, two of the three possible test statistics reject the null hypothesis of no cointegration. Overall, Pedroni (2004) cointegration tests strongly support the hypothesis that the Gini coefficient of income inequality and the 'at risk of poverty' rate are tied together.

Table 3

Pedroni (2004) panel cointegration tests between the Gini coefficient of income inequality and the 'at risk of poverty' rate

Null Hypothesis: No cointegration		
Alternative hypothesis: common autoregressive coefficients (within-dimension)		
	Statistic	Probability
Panel v-Statistic	2.35	0.009
Panel rho-Statistic	-1.77	0.038
Panel PP-Statistic	-2.76	0.003
Panel ADF-Statistic	-3.13	0.001
Alternative hypothesis: individual autoregressive coefficients (between-dimension)		
	Statistic	Probability
Group rho-Statistic	-0.60	0.276
Group PP-Statistic	-3.75	0.000
Group ADF-Statistic	-5.15	0.000

Source: author calculations.

Note: the sample includes annual data for 22 countries between 1995-2016, with several gaps in the data.

Based on the theoretical and the empirical evidence presented above we conclude that the 'at risk of poverty' rate essentially measures the same phenomenon as the Gini coefficient of income inequality.

3.3 THE USE OF THE 'AT RISK OF POVERTY' INDICATOR IN EU POLICY DISCUSSIONS

In EU policy circles, the 'at risk of poverty' indicator is used inappropriately. It is typically used as an indicator measuring absolute poverty. The expression 'poverty reduction' is very often referred to in connection with this indicator, but we did not find any indication in EU policy documents when the clear theoretical and robust empirical associations between the Gini coefficient of income inequality and the 'at risk of poverty' indicator are mentioned. Some examples:

- When the European Commission set the target of "*lifting over 20 million people out of poverty*" in March 2010, using the 'at risk of poverty' indicator, it did not include any reference to income inequality. The European Commission's *Social Protection &*

Social Inclusion website[11] continues to state that "*the Europe 2020 strategy for smart, sustainable and inclusive growth sets targets to lift at least 20 million people out of poverty and social exclusion*", without defining poverty or highlighting the near equivalence of the poverty indicator and the Gini coefficient of income inequality.

- The European Parliament, meanwhile, adopted a resolution of 25 November 2014 on employment and social aspects of the Europe 2020 strategy, which stated that "*the EU is far from having achieved the employment and poverty reduction headline targets of the Europe 2020 strategy*", argued that "*particular attention should be paid to poverty reduction*" and used the term "*poverty reduction*" several dozen times throughout the resolution, based on information derived from the 'at risk of poverty' rate, without highlighting that it measures the same phenomenon as the Gini coefficient of income inequality (European Parliament, 2014)[12].

- The European Confederation of Workers' Cooperatives, Social Cooperatives and Social and Participative Enterprises (CECOP – CICOPA Europe), which represents national organisations in 17 countries, expressed its position on the Europe 2020 Strategy Mid-Term Review by stating that "*instead of progress in poverty alleviation as planned, a further 6.6 million people have actually fallen into poverty in the last 4 years*". Similarly, the European Anti-Poverty Network (EAPN), the largest platform of anti-poverty organisations in Europe, talked about "*the unacceptable levels of poverty and social exclusion in the EU faced by 1 in 4 of the population*" and called for "*delivery on Europe 2020 goals, particularly the poverty target*", in a letter sent to European Commission president Jean-Claude Juncker about the Commission's 2017 *Annual Growth Survey*.

Many similar examples could be listed from reports of European institutions, trade unions and civil society organisations, as well as from the speeches of key representatives of these institutions and organisations.

At minimum, the extremely misleading indicator label 'at risk of poverty' should be replaced with 'relative income poverty or income inequality', to dispel any doubts about the

[11] http://ec.europa.eu/social/main.jsp?catId=750&langId=en, accessed on 27 April 2017.

[12] We note that European Parliament (2014) also called for better measurement: "*43. Calls, therefore, for objective indicators of 'poverty' to be used for the measurement of Member States' poverty rates so as to help identify those at risk of exclusion; 44. Recalls, however, that a poverty indicator provides no direct evidence of the experience of social exclusion, and therefore calls for improved measurement of perceived social exclusion in order to reach a better understanding of the reasons for social exclusion and of which groups are particularly affected*".

correct interpretation of this indicator. Similarly, the name of the Europe 2020 target indicator 'at risk of poverty or social exclusion' should be replaced with 'relative income poverty or income inequality or potentially social excluded', which may sound convoluted, but would be better than then the current short but misleading name. A better solution would be to scrap the Europe 2020 target indicator and to design a new one, which might refer to either absolute poverty or relative poverty and income inequality, depending on political choices.

4. HOW TO MEET THE EUROPE 2020 'POVERTY' TARGET?

4.1 REGRESSION ANALYSIS

In its stock-taking report, the European Commission (2014) concluded that the recent economic crisis was primarily responsible for the divergence of the 'at risk of poverty or social exclusion' indicator from its target. While it is sadly true that the crisis increased unemployment and (absolute) poverty, a more fundamental reason for the dismal performance is that the indicator used is more an indicator of income inequality than an indicator of poverty.

In order to assess the social developments needed to reach the Europe 2020 'poverty' target, we split the indicator into two parts:

(1) All people considered 'at risk of poverty' by the respective indicator, that is, people with incomes below 60 percent of the national equivalised median income, irrespective of whether or not these people are also materially deprived, or whether they live in households with low work intensity;
(2) People not 'at risk of poverty', who are severely materially deprived and/or live in households with low work intensity, but have income above the 60 percent of the median of the national equivalised income.

Table 4 shows that the 'not at risk of poverty' component increased significantly in the EU from 2008-12, from 35.0 million to 39.1 million, a development in which the economic and financial crisis which intensified after the collapse of Lehman Brothers in September 2008 likely played a role. However, with the gradual return of economic growth to Europe, this component declined from 39.1 million in 2012 to 31.9 million in 2015, well below its 2008 value.

In contrast, the at-risk-of-poverty component, which as we have argued is an indicator of income inequality, increased both from 2008-12 and from 2012-15, meaning that this

component increased even during the period of economic recovery, in line with the increase in income inequality within many EU countries.

Table 4

The 'at risk of poverty or social exclusion' indicator: actual developments in 2008-2015 and our illustrative scenario to meet the Europe 2020 target (EU27, million people)

	2008	2012	2015	2020
At risk of poverty or social exclusion	115.9	122.2	117.6	95.9
of which:				
At risk of poverty	80.9	83.1	85.8	70.2
Not at risk of poverty	35.0	39.1	31.9	25.7

Source: Eurostat for 2008-15, author calculations for 2020.

Our hypotheses are that the non-at-risk-of poverty component is expected to be reduced when:

- Average income is higher: in higher income countries even the poorer segments of the society are typically better off than the poorer people in lower income countries and thereby the share of severally materially deprived people is typically low in higher income countries.
- Negative output gaps close: when the economy is below potential, unemployment is higher than normal, which directly influences the spectre of living in households with low work intensity, while lower income due to weak economic conditions and unemployment increases material deprivation. With the closing of the negative output gap, these disadvantages disappear.

Furthermore, economic growth used to lead to a higher average income and an upward movement of the output gap. Growth typically creates jobs and thereby the unemployed have a better chance of finding work. Even if income inequality widens with growth, the poorer segments of the society may receive a higher income and thereby material deprivation can be reduced. Even though economic growth might influence both the level of income and the output gap, it is worthwhile to assess the relevance of both indicators.

In order to test these hypotheses, we estimate regressions, both in a panel framework involving the first 27 EU member states and in a single equation framework for each member states separately. Our econometric analysis strongly confirms the hypotheses.

We use two functional forms: a linear form and a log-linear form. The panel versions of these two forms are the following:

$$noarop_{t,i} = \alpha + \mu_i + \delta_t + \beta_1 \cdot income_{t,i} + \beta_2 \cdot gap_{t,i} + \beta_3 \cdot noarop_{t-1,i} + \varepsilon_{t,i}$$

$$log(noarop_{t,i}) = \alpha + \mu_i + \delta_t + \beta_1 \cdot log(income_{t,i}) + \beta_2 \cdot gap_{t,i} + \beta_3 \cdot log(noarop_{t-1,i}) + \varepsilon_{t,i} \ ,$$

where $noarop_{t,i}$ is the difference between 'at risk of poverty or social exclusion' rate and the 'at risk of poverty' rate (both expressed as a percent of population) of country *i* in time *t*, α is the general intercept, μ_i is the country-specific fixed effect, δ_t is time-specific fixed effect, $income_{t,i}$ is mean income in country *i* in time *t* (expressed in constant-price purchasing power standards), $gap_{t,i}$ is the output gap country *i* in time *t* (expressed as a percent of potential output), $\beta_1, \beta_2, \beta_3$ are parameters to be estimated, and $\varepsilon_{t,i}$ is the error term. Our data sources are listed in the Annex.

The log-linear version ensures that the fitted and forecast values are always positive, as they should be.

Table 5 shows that in our panel regressions estimates, the parameters of both mean income and the output gap are statistically significant with the correct sign in almost every specification, irrespective of (i) the use country and time fixed effects, (ii) whether the lagged dependent variable is included or not[13], (iii) whether the untransformed variables are used or a logarithmic transformation is applied.

[13] Mean income is not significant when lagged dependent variable is included and fixed effects are not included. It is significant in all other specifications.

Table 5

Panel regression results for the 'not at risk of poverty' component of the 'at risk of poverty or social exclusion' rate

	Linear version				Log-linear version			
	Model A	Model B	Model C	Model D	Model E	Model F	Model G	Model H
Mean income	-0.56	-0.02	-0.95	-0.21	-0.90	0.00	-1.36	-0.42
[t-ratio]	[-11.1]	[-0.9]	[-7.4]	[-2.7]	[-19.6]	[0.1]	[-13.3]	[-3.2]
Output gap	-0.10	-0.20	-0.12	-0.21	-0.017	-0.021	-0.012	-0.022
[t-ratio]	[-1.4]	[-8.2]	[-2.1]	[-6.1]	[-2.4]	[-8.6]	[-2.6]	[-6.0]
Lagged noaorp rate		0.85		0.62		0.94		0.67
[t-ratio]		[17.6]		[7.7]		[33.2]		[14.1]
R-squared	0.43	0.93	0.87	0.95	0.55	0.94	0.90	0.96
Countries	27	27	27	27	27	27	27	27
Years	13	12	13	12	13	12	13	12
Observations	313	286	313	286	313	286	313	286
Fixed effects	no	no	yes	yes	no	no	yes	yes

Source: Author calculations. Note: the dependent variable is the difference between 'at risk of poverty or social exclusion' rate and the 'at risk of poverty' rate, both expressed as a percent of population. Mean income is measured in constant price purchasing power standards, while the output gap is measured as percent of potential output. For better readability of the table, we multiply the estimated parameter of mean income by one thousand in the linear version.

The country-specific regressions also largely confirm both hypotheses. There are only six countries, Austria, Belgium, Finland, Slovakia, Slovenia and Sweden, for which none of the two variables are statistically significant. For the other 21 countries one or both of the variables are statistically significant.

4.2 PROJECTIONS FOR 2016-2020

Using our estimated models, we project how much reduction is expected in the 'not at risk of poverty' component by 2020. For all but three countries[14], 2015 is the latest year for which the necessary EU-SILC related data (mean income, 'at risk of poverty' rate, 'at risk of poverty or social exclusion' rate, Gini coefficient of income inequality) are available. We use the forecasts of the European Commission (which are available for 2016-18) and IMF (which are also available for 2019-20) to project the non-at-risk-of-poverty component.

For our projections, we use the country-specific regression to allow for different sensitivity of social indicators to economic developments. For these projections, we use the version of the model which is estimated on logarithmic values (to ensure that projections are always positive), include the lagged dependent variable, and include only those explanatory variables which were statistically significant. Therefore, for the six countries for which neither mean income, nor the output gap was significant, we use a simple first order autoregressive model.

For our projections, we make the following assumptions:

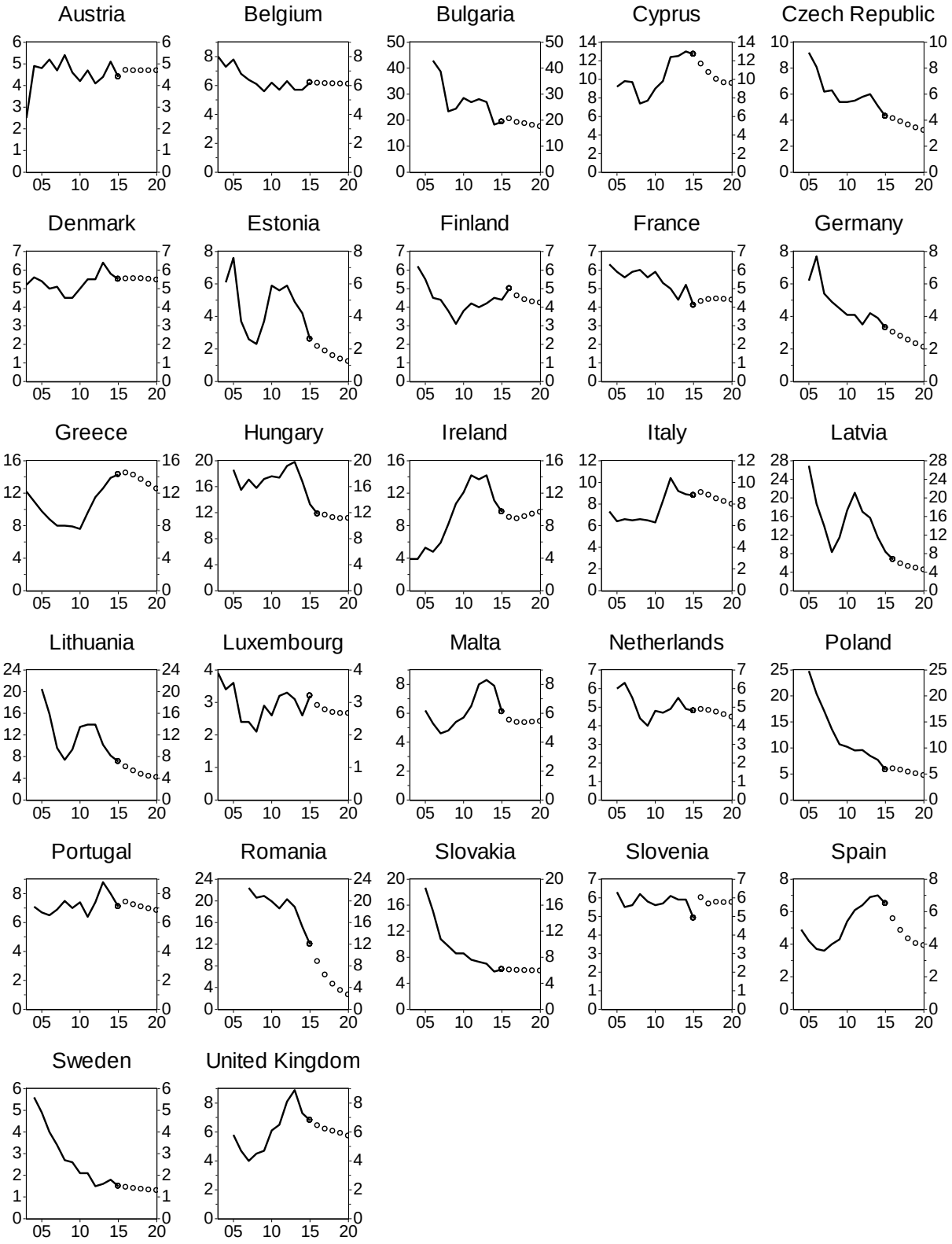
- Mean income growth rate in constant-price PPS up to 2020: the growth rate of real GDP per capita as it is projected by the European Commission May 2017 forecast for 2016-18 and the IMF April 2017 forecast for 2019-20.
- Output gap: we use the European Commission May 2017 forecast for 2016-18 and then estimate a simple autoregression to project the output gap for 2019-20 (because IMF forecast is not available for the output gap).
- Population: we approximate with the growth rate of population as it is projected by the European Commission May 2017 forecast for 2016-18 and the IMF April 2017 forecast for 2019-20.

Inserting the mean income and output gap projections to our estimated regression models we project the 'not at risk of poverty' rate up to 2020. Figure 5 shows that the projections look sensible for all countries except perhaps for Romania, where projected fall in the 'not at risk of poverty' rate might be too large.

[14] For Finland, Hungary and Latvia 2016 data is also available.

Figure 5

The 'not at risk of poverty' component of the 'at risk of poverty or social exclusion' indicator, 2003-20 (% of population)



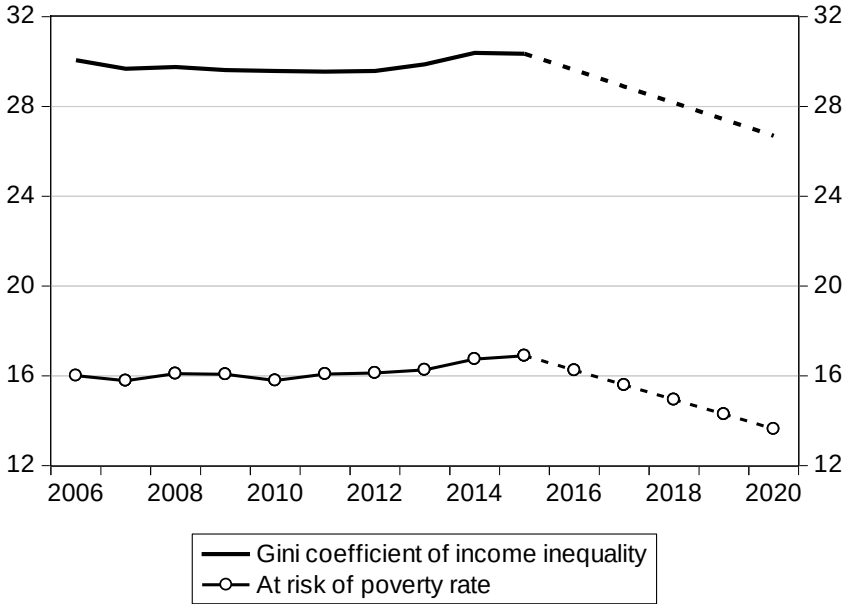
Source: Eurostat for actual data (solid line), author calculations for projections (symbols).

Population projections allow translating the rate projections into number of people projections: in the EU27, 6.2 million people with income over the 60 percent of national median equivalised income are projected to be lifted from material deprivation and/or living in low work intensity households between 2015-20.

Given this projection for the 'not at risk of poverty' component of the 'at risk of poverty or social exclusion' indicator and considering population projections, we illustratively calculate that the at-risk-of-poverty component should be reduced by 15.5 million between 2015 and 2020 in order to achieve the Europe 2020 target (see Table 4). This is equivalent to a 3.3 points decline in the 'at risk of poverty' rate in each EU country. Therefore, our calculation for the at-risk-of-poverty component is not a projection, just an illustration.

Figure 6

Illustrative scenario showing the necessary reduction in the 'at risk of poverty' rate and the Gini coefficient of income inequality to meet the Europe 2020 'poverty' target in the EU27, 2006-2020



Source: Eurostat for 2006-15; author calculations for 2016-20. Note: unweighted average of data of the first 27 EU member states.

Given the strong association between the at-risk-of-poverty rate and the Gini coefficient of income inequality, we translate the necessary reduction in the at-risk-of-poverty rate to a necessary reduction in the Gini coefficient of income inequality in each EU country using the empirical association revealed by Figure 3. We find that the a 3.5 points decline in the Gini coefficient of income inequality would be consistent with reaching the Europe 2020 'poverty' target (Figure 6).

Given relatively small historical variations in the Gini coefficient and a lack of strong policies to reduce income inequality, it is extremely unlikely that income inequality would fall to the level that would make the achievement of the Europe 2020 'poverty' target realistic.

5. EU-WIDE POVERTY INDICATORS

5.1 EUROSTAT AGGREGATION OF COUNTRY DATA TO THE EU-LEVEL

Beyond the inherent difficulties of national 'at risk of poverty' rates, the differences between the national thresholds (which are used to calculate the 'at risk of poverty rate' in each country) are so huge that they further underline the inappropriateness of this indicator for assessing poverty trends. The question can also be asked of whether adding up the number of such people in different countries to arrive at an EU-wide number makes sense.

In Romania, for example, after correcting for differences in price levels, a disposable income of €2,613 a year (after taxes and social transfers) is considered to be the threshold in 2015, while in Luxembourg the price-level adjusted threshold is €17,571. Therefore, someone with an income slightly below the national threshold in Luxembourg is regarded as 'at risk of poverty', when she or he can consume seven times more goods and services than someone in Romania slightly above the national threshold and therefore not 'at risk of poverty'.

The difference between two less-divergent countries, Austria and the Czech Republic, is also substantial: after taking different national price levels into account, someone at the national threshold in Austria can consume twice as much in goods and services than someone at the national threshold in the Czech Republic. A two-fold difference is also huge: double income means that a person can live in a twice as large house, buy a twice as expensive car or spend twice as much on a holiday. Therefore, adding up the number of people 'at risk of poverty' in Luxembourg, Romania, Austria, Czech Republic and other EU countries leads to an EU-wide aggregate that is very difficult to interpret.

It is disappointing that 60 years after the Treaty of Rome set European integration in motion, EU-wide income distribution statistics are still derived by simply adding up country-specific data, instead of considering the distribution of income within the EU as a whole. To address this problem, we calculate poverty indicators for the EU as a whole.

5.2 DERIVING INCOME POVERTY INDICATORS FROM THE EU-WIDE DISTRIBUTION OF INCOME

A large number of income poverty indicators have been proposed in the literature. Many require access to household-level data that we do not have. We therefore derive two indicators of poverty, which can be constructed using publicly-available data from Eurostat:

- Headcount: share of people living on less than 2, 5, 10 or 20 euros a day (at constant 2007 purchasing power standards).

- Poverty gap: the total combined shortfall of income less than 2, 5, 10 or 20 euros a day (at constant 2007 purchasing power standards) as a share of GDP. This is obtained by adding up all the shortfalls of the poor, e.g. for all people with income less than 2 euros a day, we add up the gaps between 2 euros and their actual income.

As highlighted by Marx, Nolan and Olivera (2015), based on the seminal works of Amartya Sen, a headcount poverty target may provide a perverse incentive to policymakers to target those who are below but close to the poverty threshold (because those people can lifted over the poverty threshold in a much easier way than the very poor). A poverty gap target may provide incentives to consider all the poor, including those who are very poor[15].

Beyond calculating these indicators for each country, we calculate these indicators for the EU27 as a whole, for which we approximate the EU-wide distribution of income. The main steps of the calculations are the following:

1. For each country, we approximate more detailed data on income distribution (i.e. all the 100 percentiles) than what is available (Eurostat publishes the following income shares data for each country: 1, 2, 3, 4 and 5 percentiles, deciles, quartiles, 95, 96, 97, 98, 99 and 100 percentiles).
2. For each country, we use a measure of mean income to approximate the income of households corresponding to the 100 percentiles.
3. Using population size, we combine approximated household incomes of each country to obtain the EU-wide distribution of income.

For the first step, we use the Lorenz curve regression method[16] of Bhalla (2002) and Kakwani (1980), which Darvas (2016) found to be the most reliable among three methods

[15] There are also measures that focus even more on the very poor. For example, by adding up the squares of individual poverty gaps places a higher weight on those households that are further from the poverty line (see Coudouel *et al*, 2002).

[16] Bhalla (2002) calls this regression method the 'Simple Accounting Procedure' (SAP), yet we find the name 'Lorenz-curve regression method' more accurate.

which are based on quantile income shares data. This method adopts a regression to approximate the Lorenz-curve in each country based on the limited number of quantile income share data available. The estimated regression proposed by Kakwani (1980) is the following:

$$\log[p_i - L(p_i)] = \beta_1 + \beta_2 \log p_i + \beta_3 \log(1 - p_i) + \varepsilon_i,$$

in which p_i represents the bottom i percent of the population, $L(p_i)$ is the corresponding share in income (i.e. the value of the Lorenz-curve at p_i), while β_1, β_2 and β_3 are parameters to be estimated and ε_i is the error term. The estimated regression is used to project the Lorenz-curve at the 100 percentiles of the income distribution for each country.

In the second step, we use mean income at purchasing power standards (PPS), adjusted by the EU28 consumer prices. Eurostat published PPS data at current prices, which is comparable across countries in a given year, but not comparable in time. We wish to fix the thresholds at their 2007 real values, which is the first year for which income distribution data is available for the first 27 EU member states. Therefore, for later years, we increase the 2007 poverty threshold values (i.e. 2, 5, 10 and 20 euros a day) by the EU28 harmonised index of consumer prices. We then compare these current-price equivalents of the poverty thresholds at '2007 price PPS' to current-price PPS income data.

And in the third step we use population size to combine the national income distributions into the EU27 distribution of income.

We note that our Bhalla-Kakwani regression approximations can be a source of measurement error. Unfortunately, income share data published by Eurostat is rounded to one digit after the decimal. At very low levels of income such rounding prohibits to get sufficient information about income shares. Therefore, we recommend Eurostat to revise its publication policy and report at least two significant digits, instead of rounding to one digit after the decimal, when publishing income shares data and other indicators with values close to zero.

As an example for insufficient information due to rounding, Table 6 shows the income shares of the lowest five percentiles of Belgium in 2011 as published by Eurostat and as approximated by our regression:

Table 6

Income shares of the lowest five percentiles, Belgium, 2011

	Data published by Eurostat	Approximated by our regression
First percentile	0.0	0.036
Second percentile	0.3	0.238
Third percentile	0.3	0.306
Fourth percentile	0.4	0.350
Fifth percentile	0.4	0.383

Source: *Eurostat (first data column), author calculations (second data column).*

For the first percentile Eurostat provides the number zero (after rounding), while presumably the true value is not exactly zero. Our regression approximates this share as 0.036 percent, which is 0.0 after rounding. For the second and third percentiles Eurostat provides 0.3 percent (again, after rounding), while by definition the income share of the third percentile must be higher than that of the second percentile. The fourth and fifth percentiles also seem to have identical income shares according to the rounded data. In this particular case of Belgium's 2011 data, four of our approximations of the lowest five percentiles income shares correspond to Eurostat data after rounding, while our approximation for the second percentile does not correspond.

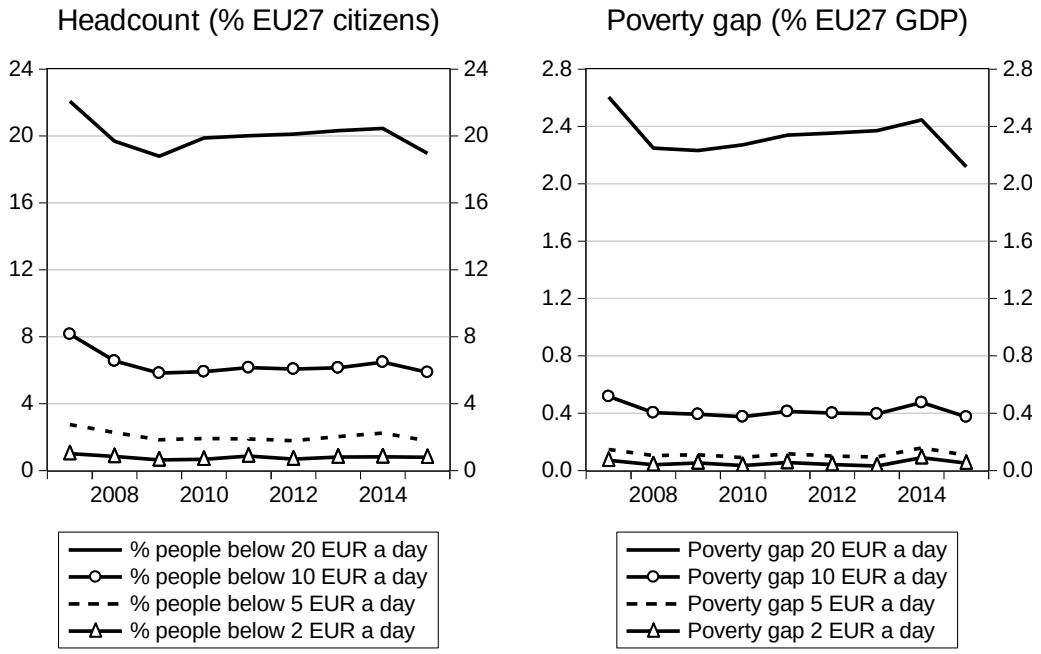
Therefore, our approximation for each country is burdened with a measurement error, which can be larger when the poverty threshold is close to the very bottom of the income distribution. Likely, the measurement error is smaller when the threshold is not too close to the bottom of the income distribution, given that more information is available to approximate those incomes. And for the EU as whole, the measurement error is likely smaller than for individual countries also for low income threshold levels, given the large income differences across countries. For example, very few people, if any, is at the bottom one percent of the EU-wide income distribution from Luxembourg, while six percent of Romanian citizens belong there, whose income is already measured with a reasonable degree of precision.

According to our calculations, less than one percent of EU citizens live on less than 2 euros a day (at 2007 PPS; Figure 7). The shares of people living on less than 5, 10 and 20

such euros are about 2 percent, 6 percent and 19 percent, respectively. The 2015 shares are all below the 2007 shares, yet there was a temporary increase in the early 2010s. The poverty gap indicator suggests that the combined income shortfall of people living on less than 2 or 5 PPS euro is very small as a share of EU27 GDP, while the poverty gap for 10 PPS euro is about 0.4 percent of EU27 GDP, and the poverty gap at 20 PPS euro is about 2.1 percent of EU GDP in 2015. The dynamics of poverty gap is similar to the dynamics of the head count, but, for example, in the case of the 5 euro threshold, the headcount fell more than the poverty gap between 2007-15, while for the 20 euro threshold the opposite result holds.

Figure 7

Poverty indicators derived from the EU27 distribution of income



Source: author calculations. Note: the poverty thresholds are measured at 2007 constant-price purchasing power standards.

6. CONCLUDING REMARKS AND PROPOSALS FOR ADEQUATE POVERTY MEASUREMENT

Increasing awareness about the EU's social problems and finding solutions to these problems are crucial tasks. The European Commission, the European Parliament and national leaders deserve praise for focusing more and more on the social aspects of the European Union and for working towards certain social targets in the context of the Europe 2020 strategy.

However, there is great confusion arising from the incorrect labelling of the key social target indicator, the 'at risk of poverty or social exclusion' rate, which stands at about 24

percent of the total EU population. This indicator, and variants of it such as the indicators applied to children, women or working age people, is widely understood a measure of 'poverty' or 'social exclusion', whereas it is actually an indicator of income inequality, as we demonstrate both theoretically and empirically in this paper. The EU faces a number of social challenges, including poverty and social exclusion among certain segments of the society, but it is not correct that 24 percent of EU citizens face a high risk of poverty or social exclusion, as the name of this indicator would suggest. This relatively high rate is mostly the reflection of the level of income inequality in EU countries, which, measured by the Gini coefficient, is about 30 on average. The multidimensional poverty indicators of Weziak-Bialowolska (2016) suggest that poverty in EU countries varies from less than one percent in Denmark and Sweden to about 15 percent in Latvia, Bulgaria and Romania, with an EU-wide average of 4.3 percent, well below the values of the 'at risk of poverty' and the 'at risk of poverty or social exclusion' indicators.

Our illustrative calculations show that a very big fall in income inequality, 3.5 Gini points, would be consistent with reaching the Europe 2020 'poverty' target, even after taking into account the expected reduction in material deprivation and low work intensity because of expected economic growth in the coming years. Such a large reduction in income inequality is improbable given the historical variations in income inequality and the lack of strong policies to reduce income inequality. Therefore, it should not be surprising that 'poverty' targets based on the variants of the 'at risk of poverty' indicators were not met in the past and will not be met in the future.

The political agreement about the Europe 2020 strategy refers to poverty and not to income inequality. It is a grave mistake to base the Europe 2020 poverty target on an indicator of income inequality and to speak about 'poverty reduction' in relation to that indicator. There are good reasons to aim for lower income inequality, not least to foster upward social mobility, as argued by Darvas and Wolff (2016). But for that to happen an EU-wide political agreement would be needed to set an income inequality goal and the toolkit would have to be adjusted to target income inequality reductions.

As for the social indicators used in the context of the Europe 2020 strategy, we recommend that the misleading indicator name 'at risk of poverty' should be replaced with 'relative income poverty or income inequality', to dispel any doubts about the correct interpretation of the indicator. Similarly, the indicator name 'at risk of poverty or social exclusion' should be replaced with 'relative income poverty or income inequality or potentially social excluded', which may sound convoluted, but would be better than then the current short but misleading name. However, because of the difficultly in interpreting this

indicator, it would be better to scrap it and design new ones, which might refer either to absolute poverty or relative poverty and income inequality, depending on political choices.

We propose the development of new social indicators. For example, Marx, Nolan and Olivera (2015) highlight that research to establish better poverty thresholds than 60 percent of the median income, such as the cost of a specific basket of goods and services, has had a quite limited impact on policy formulation. Coudouel, Hentschel and Wodon (2002) also provide many useful guidelines for the development of new indicators, some of which also consider the depth and severity of poverty. And in the EU context, EU-wide indicators should consider the distribution of income within the EU as a whole.

We also recommend that Eurostat should revise its data publication policy and report at least two significant digits, instead of rounding to one digit after the decimal, when publishing income share data and other indicators with values close to zero.

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ANNEX: DATA SOURCES

Data used in Section 1:

- The number of people 'at risk of poverty' in the first 15 members of the EU in 2000, 2007 and 2010: we multiply the 'at risk of poverty' rate with population. Sources: the 'at risk of poverty' rate in 2000, 2007 and 2010 is from the Eurostat dataset 'At-risk-of-poverty rate by poverty threshold, age and sex - EU-SILC survey [ilc_li02]' (for Sweden and Denmark the 2000 data is missing, but the 1999 and 2001 data is available, so we use the average of these two data points); population is from the European Commission's AMECo dataset (May 2017 version).
- The number of people 'at risk of poverty or social exclusion' in the first 27 members of the EU in 2008, 2012 and 2015: Eurostat dataset 'People at risk of poverty or social exclusion by age and sex [ilc_peps01]'.

Data used in Section 2.1:

- Eurostat dataset 'Intersections of Europe 2020 Poverty Target Indicators by age and sex [ilc_pees01]'.

Data used in Section 3.2:

- 'At risk of poverty rate (cut-off point: 60 percent of median equivalised income after social transfers)': Eurostat dataset 'At-risk-of-poverty rate by poverty threshold, age and sex - EU-SILC survey [ilc_li02]'.
- Gini coefficient is the 'Gini coefficient of equivalised disposable income': Eurostat dataset 'Gini coefficient of equivalised disposable income - EU-SILC survey [ilc_di12]'.
- Severe material deprivation rate: Eurostat dataset 'Severe material deprivation rate by age and sex [ilc_mddd11]'.

Data used in Section 4.1:

- 'At risk of poverty rate (cut-off point: 60 percent of median equivalised income after social transfers)': same as in section 3.2.

- ‘At risk of poverty or social exclusion’ rate: Eurostat dataset ‘People at risk of poverty or social exclusion by age and sex [ilc_peps01]’.
- Mean equivalised net income at constant price purchasing power standards: Eurostat publishes data at current-price purchasing power standards (PPS) in its dataset ‘Mean and median income by age and sex - EU-SILC survey [ilc_di03]’, which is comparable across countries in a given year, but not across time. In order to approximate mean income at constant-price PPS, we deflate current-price PPS data with the EU28 harmonised index of consumer prices using the Eurostat dataset ‘HICP (2015 = 100) - annual data (average index and rate of change) [prc_hicp_aind]’.
- Output gap: ‘Gap between actual and potential gross domestic product at 2010 reference levels (Percentage of potential gross domestic product at constant prices)’ from the European Commission’s AMECO dataset (May 2017 version).

Data on projections used in Section 4.2:

- Mean income growth rate in constant-price PPS up to 2020: the growth rate of real GDP per capita as it is projected by the European Commission May 2017 forecast for 2016-18 and the IMF April 2017 World Economic Outlook forecast for 2019-20.
- Output gap: we use the European Commission May 2017 forecast for 2016-18 and then estimate a simple autoregression to project the output gap for 2019-20 (because IMF forecast is not available for the output gap).
- Population: we approximate with the growth rate of population as it is projected by the European Commission May 2017 forecast for 2016-18 and the IMF April 2017 World Economic Outlook forecast for 2019-20.

Data used in Section 5.1:

- Eurostat dataset ‘At-risk-of-poverty thresholds - EU-SILC survey [ilc_li01]’, Single person, At risk of poverty threshold (60% of median equivalised income), Purchasing Power Standard.

Data used in Section 5.2:

- Income shares: Eurostat dataset ‘Distribution of income by quantiles - EU-SILC survey [ilc_di01]’.
- Mean equivalised net income: same as in Section 4.1.
- Population: same as in Section 1.