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The relationship between EU indicators of persistent and current poverty

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Abstract

The current poverty rate and the persistent poverty rate are both included in the EU's portfolio of primary indicators of social inclusion. We show that there is a near-linear relationship between these two indicators across EU countries drawing on empirical analysis of EU-SILC and ECHP data. Using a prototypical model of poverty dynamics, we explain how the near-linear relationship arises and show how the model can be used to predict persistent poverty rates from current poverty information. In the light of the results, we discuss whether the EU's persistent poverty measure and the design of EU-SILC longitudinal data collection require modification.

Keywords

Persistent poverty, income poverty, poverty, EU-SILC, Europe

JEL Codes: I32, D31

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1. Introduction

The monitoring and measurement of social protection and social inclusion in the European Union (EU) has been institutionalised over the last decade. Since the Lisbon European Council in 2000, the Open Method of Coordination (OMC) has provided a framework within which member states agree upon common objectives for the EU as a whole and a set of common indicators to assess national and EU progress towards these goals.[1] The first set of commonly-agreed indicators relating to social inclusion – the so-called Laeken indicators – was agreed in December 2001, and has been revised on a continuous basis since then. (For the most recently agreed list, see European Commission 2009.) Since the launch of the Social OMC, the at-risk-of-poverty rate – the proportion of persons with an equivalised household disposable income below 60% of the national median equivalised household income – has been the most commonly-discussed EU social inclusion indicator. It is also one of the three indicators named in the EU's Headline Targets for social inclusion agreed upon in June 2010 in the context of the Europe 2020 strategy. (For more information, see e.g. Marlier and Natali 2010.) Another of the primary indicators of social inclusion is the persistent at-risk-of-poverty rate, defined as the proportion of persons in a country who are currently income poor and who were income poor in at least two of the preceding three years.

Evidence about poverty persistence is an important complement to information about poverty prevalence at a point in time: it is widely agreed that poverty is worse for an individual, the longer he or she experiences it (more about this below). In practice, the value of the information provided depends on which persistent at-risk-of-poverty measure is used and the nature of the data that are available. In this paper, we examine the EU's persistent poverty measure in detail, illustrating our arguments using data from the EU Statistics on Income and Living Conditions (EU-SILC) database, and also drawing on statistics derived from the European Community Household Panel survey (ECHP) – the two sources that have been at the heart of cross-national poverty analysis in Europe.

We argue that one can expect there to be a near-linear relationship between countries' persistent at-risk-of-poverty and current at-risk-of-poverty measures, and we demonstrate that

[1] The European Commision's explanation of the Social OMC is available at http://ec.europa.eu/social/main.jsp?catId=753&langId=en.

this is the case in practice and that one can predict persistent poverty rates quite well from current poverty information. These findings lead us to discuss whether the EU's persistent at-risk-of-poverty measure should be supplemented or modified. Our analysis is therefore relevant to future discussions within the Social OMC about what the various indicators of income poverty should be and intimately-related questions about the nature of the EU-SILC longitudinal data module.

In the next section, we place the development of the EU's existing measures of persistent at-risk-of-poverty in context, with reference to both the EU's social indicator framework and the wider literature about poverty dynamics in Europe and elsewhere. In the third section, employing a prototypical model of poverty dynamics, we explain why we expect to find a near-linear relationship across countries between the EU's measures of persistent and current at-risk-of-poverty and the circumstances in which a near-linear relationship is likely to break down. In the fourth section, we describe the EU-SILC data that are used in our empirical analysis. In the fifth section, we use these data to demonstrate that there is a near-linear relationship between persistent and current poverty rates at the member state level, according to both EU-SILC data and earlier ECHP estimates. The sixth section shows that there is also a broadly linear cross-national relationship, though not as strong, if one focuses on subgroups within national populations. Annual poverty entry rates and retention rates are the fundamental elements of our explanation of the near-linear relationship.The seventh section provides information about these rates and how they have varied over time, and reports and assesses predictions of persistent poverty rates based upon them. The implications of our findings are discussed in the final section. For brevity, we refer henceforth to the at-risk-of-poverty rate as the current poverty rate, and the persistent at-risk-of-poverty rate as the persistent poverty rate. We refer to poverty rather than income poverty.

2. The development of the EU's persistent poverty indicator: historical context

The methodology currently used by the EU for measuring persistent poverty represents the convergence of several developments. On the one hand, there has been the growing body of evidence about poverty dynamics in Europe, first through research based on analyses of national household panel surveys and later (from the mid-1990s onwards) using data from the European Community Household Panel survey (ECHP). On the other hand, there are the

evolving ways in which the EU has measured and monitored poverty within an avowedly cross-nationally comparative social indicator framework since around 2000.

Contemporary European interest in poverty dynamics has its roots in analysis of the US Panel Study of Income Dynamics (PSID) which had its first wave of interviews in 1968. By the mid-1970s and 1980s, PSID research demonstrated that there was substantial turnover among the population of people who were poor in any given year. The majority of entrants to poverty experienced relatively short spells and relatively few experienced long spells. Much of this early US research summarised poverty persistence using counts of individuals' poverty episodes over a fixed time period, just as the EU does today: see e.g. Coe (1978), and Duncan, Coe, and Hill (1984), though their fixed time periods typically referred to eight or ten years, rather than the four that are used to construct the EU's measure.

When household panel survey data became available for European countries over the following two decades, similar findings about the nature of poverty persistence and turnover were reported. For example, reviewing the situation in the mid-2000s, Fouarge and Layte (2005) wrote that:[2]

> [c]omparative studies of income and poverty dynamics are now becoming more common, but have been confined to a small number of countries (the US, Germany, Netherlands and the UK) which have long running panel studies. These studies have shown that there is a great deal of turnover in the stock of people living in poverty and that the majority of poverty spells are rather short in duration. However, it is also clear that many of those who have left poverty return relatively quickly and a substantial minority experience persistent poverty. (Fouarge and Layte 2005: 408.)

The relevance of persistent poverty has been recognised from the start of the OMC. Following the Lisbon and Feira Councils in 2000, the European Commission's (2000) Communication on 'Structural Indicators' set out a set of indicators covering the fields of employment, innovation and research, economic reform and social cohesion. Indicator 3 among the six indicators proposed for social cohesion referred to the persistence of poverty: it was to measure 'the share of the population consistently living below the poverty line over the longer term. It gives an indication of the depth of the poverty problem and of its dynamics; the longer people remain in poverty the greater the likelihood of their permanent social exclusion.' (2000: 17). Similar points were made by the major review of social indicators accompanying the development of the 'Laeken' indicators in 2001: Atkinson et al. state that 'the longer people remain in poverty, the greater their risk of being permanently

[2] See also the book-length discussions of poverty dynamics that appeared during the 1990s, e.g. Leisering and Leibfried (1999), Leisering and Walker (1998), and Walker (1994).

excluded' and they welcome the Commission's proposal for an indicator of poverty persistence as providing a 'valuable way of focusing attention on those most likely to be at risk of social exclusion' (2002: 110).

By the late-1980s, however, US research on poverty persistence had changed its emphasis, largely as a response to the influential research of Bane and Ellwood (1986). On the one hand, their PSID-based work reiterated the importance of analysing poverty persistence as being 'of interest both for understanding the phenomenon and for developing policy. Claims about dependency and separate life styles among the poor rest on assumptions about the long-term nature of poverty. Questions about the allocation of resources can better be answered when the characteristics of the poor are understood.' (Bane and Ellwood 1986: 1–2). So, the reasons for being interested in poverty persistence are broadly the same in the USA and Europe, albeit expressed using different language. On the other hand, Bane and Ellwood were critical of using counts of individuals' poverty episodes over a fixed time period as the measure of poverty persistence (as the EU does). They argued that, in this approach, 'no attention is focused on the events which lead people into or out of poverty. It is very difficult to trace processes whereby people may gradually or suddenly escape from poverty' (1986: 4). Their main criticism, however, was that poverty counts within a fixed time period took no account of when poverty spells began or ended. They argued that ignoring these censoring issues can lead to misleading conclusions about the length of poverty spells, and the relative prevalence of short versus long spells. Instead, they proposed looking at poverty spell lengths directly and at the events associated with movements into and out of poverty.

Bane and Ellwood's critique and proposals have been influential in Europe as well as the USA, but the ability of researchers interested in cross-European comparisons to follow their advice has remained contingent on availability of suitable longitudinal data. Spell-based approaches are contingent on having relatively long runs of panel data and these were only available for individual countries (notably Germany and Britain).[3] Cross-national comparisons of EU member states that took a spell-based approach were not feasible in the early years of the multi-country ECHP (which began in 1994). Instead, researchers provided estimates of poverty persistence based on poverty counts within a fixed time period. See e.g. academic studies such as Whelan, Layte, and Maître (2002, 2003, 2004), and official reports such as Dennis and Guio (2003), Eurostat (2000), European Communities (2002), and Mejer

[3] See e.g. Jenkins (2011) who used 16 waves of British Household Panel Survey data.

and Linden (2000). Avowedly spell-based analyses based on ECHP data only came later: see e.g. Andriopolou and Tsakaglou (2011), Callens and Croux (2009), and Fouarge and Layte (2005).

The final wave of interviews for the ECHP was in 2001, and the instrument was replaced – after a gap – by the European Statistics on Income and Living Conditions (EU-SILC), from 2005, explicitly designed to deliver data specified by the Open Method of Coordination.[4] By contrast with the ECHP's 'input harmonisation' approach – data collection using a common and harmonised longitudinal survey instrument – there is now 'output harmonisation', according to which member states deliver, annually to Eurostat, data referring to harmonised lists of target variables produced according to common concepts and classifications.[5] The longitudinal statistics specified for EU-SILC refer to a four-year time period, and so substantive EU multi-country analysis of poverty persistence using a spell-based approach is severely constrained. The definition of poverty persistence in terms of number of times poor over a four-year period was proposed in the European Commission's (2000) communication on structural indicators, endorsed by the report of Atkinson et al. (2002), and remains a primary indicator ('SI-P2') after the streamlining of the indicator portfolio in 2009 (European Commission 2009).[6]

In sum, reflecting the growing interest in poverty dynamics and its own social cohesion agenda, the EU recognises that information about poverty persistence is a valuable complement to the 'headline' perspective provided by the current poverty rate and, to this end, is now employing a particular poverty-count measure of this. The issue we address in this paper is whether the EU's indicator of poverty persistence and (related) the EU-SILC longitudinal data instrument are the most appropriate ones judged according to the principles that underlie the existing portfolio, and whether and how they might be modified.

Seven principles were set out by the Social Protection Committee (2001: 9). These were further refined by Atkinson et al. (2002), who distinguish six principles that apply to

[4] For an overview of EU-SILC, see Wolff, Montaigne, and Rojas González (2010). To access further information about EU's regulations concerning the SILC, data documentation provided by Eurostat, and SILC variable lists, we recommend the EU-SILC web portal provided by the GESIS research institute at http://www.gesis.org/dienstleistungen/daten/amtliche-mikrodaten/european-microdata/eu-silc/eu-silc-further-information/.

[5] Member states have quite a lot of discretion about the data collection instruments used to derive the data: for instance, the cross-sectional and longitudinal components may come from separate sources (and the longitudinal dataset does not have to be linkable with the cross-sectional dataset even if, in practice, it is often the same source that is used for both data sets). There is also the issue of the extent to which cross-sectional and longitudinal components yield statistics for a given country and year that are consistent with one another. We return to these data issues below.

[6] See Marlier et al. (2007) for more discussion of the development of and refinements to the EU's social indicators framework over time.

individual indicators and three principles that apply to the portfolio as a whole: see Table 1 for a summary list.

<Table 1 near here>

Our analysis raises questions about robustness and especially mutual consistency. With regard to robustness, we refer later to a number of apparent problems with EU-SILC longitudinal data. With regard to mutual consistency, we analyse the extent to which the persistent poverty indicator provides sufficient complementary information to the EU's headline indicator of social inclusion, the current poverty rate. Our concern is therefore not a potential problem of inconsistency between indicators (the case that Atkinson et al. (2002) had in mind); rather it is the reverse. Redundancy is the issue. Arguably, the more that the persistent poverty rate can be predicted using other statistics relatively well, the more that the persistent poverty indicator as currently formulated is potentially redundant and hence might be modified or supplemented in order to make better use of OMC resources. Of course, any alternative indicator would have to accord with the other principles shown in Table 1. In the concluding section, we discuss the implications of our analysis for the choice of social inclusion indicators and for the design of the EU-SILC longitudinal data module per se.

3. What is the expected relationship between the EU's persistent and current poverty measures?

In this section, we analyse the relationship one would expect to find between the EU's persistent and current poverty rate measures. First, and most obviously, a member state's persistent poverty rate must be smaller than (or at most equal to) its current poverty rate because, by definition, persistently poor individuals are a subset of the individuals who are currently poor.

Second, we would expect to see a positive association between persistent poverty rates and current poverty rates across member states (in aggregate or for specific population subgroups). This is because, if the current poverty rate is relatively low (and stays low), then the chances of being persistently poor are also likely to be low, simply because the chances of experiencing a rare event repeatedly are also low. (In the limit, if the current poverty rate is zero, the persistent poverty rate must be zero too.) Conversely, if the current poverty rate is relatively large (and stays large), then the chances of repeated poverty will also be greater than for the low current poverty case.

Third, we can say more: the relationship between persistent and current poverty rates is not only a positive association but is expected to be near-linear.

The precise nature of the relationship depends on differences in annual poverty entry and annual poverty retention rates across countries. This point can be illustrated and explored further in the context of a simple prototypical model of poverty dynamics. In this model, we suppose that poverty entry and retention rates are the same for all individuals within a given country; that the chances of making a poverty transition depend only on poverty status in the base year and not in previous years (the 'first-order Markov' assumption); and that a country's 'average' transition rates remain constant over time – a 'steady-state' scenario. (We consider departures from these assumptions below.)

For each country *c*, let the annual poverty entry rate for non-poor people be denoted by E_c, and the annual poverty retention rate (one minus the exit rate) for poor people be denoted by R_c. One can show that the prototypical model implies that country *c*'s current poverty rate in the steady-state scenario, P_c, is equal to:

$$P_c = \frac{E_c}{E_c + 1 - R_c}. \qquad (1)$$

An expression for the persistent poverty rate, S_c, calculated using the EU definition, can also be derived in this case. (See the Appendix for the derivations of equations 1 and 2.) Like the current poverty rate, the persistent poverty rate depends on E_c and R_c, and is equal to:

$$S_c = \theta_c P_c, \qquad \text{where} \quad \theta_c = R_c[2E_c(1 - R_c) + R_c]. \qquad (2)$$

Expression (2) shows that, according to the prototypical model, the persistent poverty rate is a fraction, θ_c, of the current poverty rate.

If θ_c were the same for all countries, there would be a perfect linear relationship between persistent poverty rates and current poverty rates, but this cannot happen: θ_c depends on country-specific poverty entry rates and poverty retention rates. However, we would expect the relationship to be near-linear in practice as long as the cross-country dispersion of θ_c is substantially smaller than the cross-country dispersion of P_c.

There are good reasons for expecting this to be the case. The variation in θ_c is largely driven by the variation in poverty retention rates, and the variation in P_c is largely driven by the variation in poverty entry rates,[7] and we know from earlier analysis of EU-SILC

[7] This is apparent if one uses the variance of the logarithms as the measure of dispersion. Observe that $\log(\theta_c) = 2\log(R_c) + \log(1+Z)$ where $Z = 2E_c(1–R_c)/R_c$, and $\log(P_c) = \log(E_c) – \log[1+(E_c–R_c)] \approx \log(E_c) + R_c–E_c$, since $E_c–R_c$ is small. The variance of the first expression is dominated by the variance of $\log(R_c)$, and the variance of the

longitudinal data that the variation in retention rates is much smaller than the variation in poverty entry rates. According to Van Kerm and Pi Alperin (2010: Figure 4), the range for retention rates is between about 0.25 and 0.5 (a factor of 2) compared with between about 0.02 and 0.1 (a factor of 5) for entry rates. Further confirmation of these relativities in dispersion is provided later in this paper.

In practice, deviations from linearity may arise for other reasons in addition to cross-national heterogeneity in poverty entry and poverty retention rates.

One reason is that the steady-state assumption used to derive equations (1) and (2) may be a poor approximation of reality – poverty entry and retention rates may vary substantially over time – and the countries for which this is the case will show up as 'outliers' from the near-linear relationship. For example, if entry rates or retention rates this year are much larger the corresponding rates for previous years, then predictions of poverty rates based on this year's entry and retention rates will under-estimate the extent to which poverty is persistent if calculated using equations (1) and (2). Conversely, if annual poverty entry and retention rates turn out to be relatively constant, then one may predict persistent poverty rates directly from them and not go too far wrong. Countries with distinctive trends in entry and retention rates will be the exceptions for which this procedure does not work well.

The extent to which entry and exit rates vary over time is an empirical question, and we address it in analysis later. We provide estimates of annual poverty entry and retention rates for the three years 2004–7, and also compare observed current and persistent poverty rates with their counterparts predicted from the protypical model using equations (1) and (2).

A second reason why a near-linear relationship may not be observed in practice is related to issues of sample size and sampling variability. Estimates of poverty entry and retention rates may vary significantly over time, even if the underlying 'true' rates do not, simply because the estimates are derived from samples that are relatively small in size. Other things being equal, this is more likely to be the case for retention rates than entry rates, since the size of the population 'at risk' in the former case – the people who are poor – is much smaller than the population not at risk. The problem will be exacerbated if the rates are calculated for subgroups within the population since subsetting can lead to relatively small sample sizes. Also, subgroup analysis relies on individuals being correctly allocated to subgroups and this may be an additional source of error. (We provide EU-SILC examples

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second expression is dominated by the variance of $\log(E_c)$. We provide estimates of these variances later in the paper.

below.) In our empirical analysis, we therefore put greater weight on the estimates for national populations rather than those for subgroups.

A third potential problem with the prototypical model is that looking at poverty dynamics in terms of 'average' transition rates common to all individuals within a country may be too much of a simplification. To explore this issue, we generalise the prototypical model to a 'mover-stayer' model which assumes that there are two classes (types) of people within each country: 'movers' who may move into or out of poverty over time and for whom the dynamics of poverty are described by the first-order Markov model described earlier (combined with the steady-state assumption); and 'stayers' who are permanently poor and so have current and persistent poverty rates equal to 100 per cent always. (People cannot move between classes.) Our analysis of the mover-stayer model, presented in the Appendix, shows that a near-linear relationship is also predicted by it. The mover-stayer model also suggests that using the prototypical model to predict persistent poverty rates using equation (2) may lead to an under-estimation of rates (because it ignores higher poverty persistence propensities among some groups within the population), but we also argue that the effect is likely to be small because 'permanent poverty' rates are likely to be small in most countries. (The chances of under-estimation may be greater if one looks at subgroups such as elderly people more likely to contain individuals who are permanently poor.) More generally, cross-national heterogeneity in the prevalence of 'permanent poverty' is another factor that potentially loosens the tightness of the near-linear relationship between persistent and current poverty rates. We return to these issues in the empirical analysis.

In sum, there are reasons to expect to find a broadly linear relationship between persistent and current poverty rates across EU countries. Outlier countries – if there are any – are expected to be those with marked trends over time in poverty entry and retention rates, and we would predict these to be more likely to come from new member states than old member states, other things being equal, on the grounds that their economies are likely to be experiencing greater change. (Our data window is mostly before the onset of the Great Recession at the end of 2007.) We examine the veracity of these expectations in the empirical analysis.

4. Data, definitions, and estimates of persistent poverty for 21 member states

Most of our analysis is based on the longitudinal EU-SILC files (UDB 2008-1, released 2010-08-01) and on the cross-sectional files (UDB 2008-2, released 2010-08-01). We also draw on earlier ECHP-based estimates of persistent and current poverty rates in order to check our hypotheses.

The EU-SILC longitudinal files refer to data covering the four survey years 2005–2008 for 21 countries, of which 9 are new member states: see Table 2.[8] The 'old member states' label refers to members of the EU-15 plus Norway (an EU associate member state).

EU-SILC-based estimates of persistent at-risk-of-poverty rates are becoming available for most EU countries. Online summaries are available from Eurostat (Eurostat 2011). Information about persistent poverty rates are also provided, though using an earlier EU-SILC data release by, inter alia, Social Situation Observatory (2010*a*, *b*) and Van Kerm and Pi Alperin (2010). Compared to these sources, we provide greater detail about patterns of persistent poverty across EU countries, use a later year's data (which allows substantially more countries to be included), and analyse the extent to which patterns of persistent poverty rates are similar to current poverty rates in a way that has not been previously undertaken.

<Table 2 near here>

The reference period for EU-SILC income data is the calendar year (January–December) preceding the year of data collection (with two exceptions), so the four income years covered by the longitudinal data are 2004–2007. The exceptional countries are Ireland for which the data refer to the 12 months prior to the interview, and the United Kingdom for which the income reference period refers to the period around the date of interview (in 2008) with income totals subsequently converted to annual equivalents.[9] Longitudinal data collection methods differ across countries, but they can be classified broadly into those that rely on linked administrative registers (Finland, the Netherlands, Norway, Slovenia, and Sweden) and those relying on household surveys with a four-year rotating panel design (the other 16 countries).[10] All estimates are derived using the sampling weights supplied by

[8] The cross-sectional files contain data for all EU member states plus Norway and Iceland.
[9] In principle, use of a current income definition rather than an annual income definition, other things being equal, would be expected to lead to greater poverty turnover and income mobility. In practice, Böheim and Jenkins (2006) argue using British Household Panel Survey data that the two income definitions lead to similar estimates of income distribution statistics.
[10] For more extensive discussion of SILC register and survey data collection methods, see Lohmann (2011).

Eurostat in the EU-SILC files.[11] These weights are designed to adjust for biases arising from cross-sectional non-response and longitudinal attrition.

Following EU official definitions, the poverty status of an individual is determined by the equivalised household disposable income of the household to which he or she belongs. Household disposable income is the aggregate across all adult household members of all money income receipts during the reference period, with direct tax payments deducted from the total. Included is income from employment (including the imputed benefit of company cars) and self-employment, cash benefits and pensions from the government and financial transfers received from other households, and income from investments, savings and occupational pensions. Direct taxes include income taxes and employee social insurance contributions. Money incomes are equivalised using the modified OECD scale. For further details of the sources included in household income and the equivalence scale, see Eurostat (2010).

A person is counted as being poor in a given year if his or her equivalised household disposable income is less than 60 per cent of the national median equivalised household income for that year. The *current poverty rate* for a particular country or group within a country is the proportion of persons in that country or group who are poor in a given year. The *persistent poverty rate* for a particular country or group within a country is the proportion of persons in that country or group who are currently poor and who were poor in at least two of the preceding three years. In most of our analysis of EU-SILC data, the current year refers to income year 2007.[12]

In one section of the paper, we compare current and persistent poverty rates for subgroups rather than member states in aggregate. We use an exhaustive partition of the population in each country into seven subgroups defined by sex and age (at the 2008 interview). The first subgroup is children (individuals aged less than 18 years). The other six groups refer to adults aged 18–39 years, 40–64 years, and 65 or more years, also classified by sex.[13] The main reason for using this subgroup definition is that breakdowns by age and sex are the (only) ones that are mandated for the EU's persistent poverty measure in its role as

[11] We use the four-year longitudinal weights for all countries except Finland, Luxembourg, and Portugal. For these three countries, we use the Eurostat-supplied base weights since no longitudinal weights are provided in the data release.

[12] Except for Ireland and the UK: see earlier.

[13] Subgroup membership can be allocated for all individuals in the longitudinal files (except for six individuals in the data for Slovenia). We considered an alternative subgroup in which 'children' were defined to also include individuals older than 18 who were still in education. In this case, a small fraction of individuals (up to 1% in Norway and Sweden, and 2.9% in the UK) could not be allocated to a subgroup, primarily because of missing information on activity status.

one of the EU primary indicators of social inclusion. Our age categories are exactly the same as those specified in revised Laeken indicators, except that we take the opportunity to look at the middle-age group in more detail.

For our comparisons of persistent and current poverty rates at the aggregate (member state) level, and at the subgroup level within countries, we use estimates of current poverty rates derived from the longitudinal file in order to ensure that our comparisons are based on the same samples of same individuals. Poverty lines are derived from the cross-sectional datasets rather than the longitudinal datasets, since the larger sample size of the former is likely to lead to more reliable estimates of the median income.[14] Measures are computed for survey year 2008 (income year 2007). For the persistent poverty rates, this means that we count the proportion of individuals poor in 2007 as well as in at least two of the three previous years. The data release that we use is the first that allows a longitudinal analysis of this kind for a wide range of countries. Earlier EU-SILC longitudinal data releases contained four years of longitudinal data for 14 countries only (of which only one is a new member state): see Van Kerm and Pi Alperin (2010).

For each country, the estimates of aggregate and subgroup current poverty rates and estimates of subgroup population shares that are derived from the longitudinal file can be benchmarked relative to corresponding estimates from the cross-sectional file. The cross-sectional file estimates of these statistics are likely to be more reliable because sample sizes are substantially larger than for the longitudinal data, and the longitudinal data may also be affected by attrition: the four-year rotating design of the longitudinal instruments used by most countries implies that four-year longitudinal samples are typically four times smaller than samples pertaining to one cross-section year, even without taking into account any potential additional effects of attrition.

We find generally close agreement between corresponding estimates of subgroup shares and subgroup poverty rates computed from the two sources. However, detailed examination of the data led us to exclude four countries from the subgroup analysis section.[15]

Looking first at population shares, we find that for all countries population shares calculated from the longitudinal files tend to be under-estimates of the corresponding shares calculated from the cross-sectional files for children and for individuals aged 18–39 and, correspondingly, over-estimates for older groups. The extent of under-estimation is largest

[14] Eurostat includes a derived variable summarising current poverty status in the cross-sectional files but not in the longitudinal files.
[15] All comparisons refer to survey year 2008. Detailed comparisons are available from the authors on request.

for Portugal, Sweden, Norway, and especially Spain for which, for example, the estimated population share of women aged 18–39 is 16 per cent in the cross-section file but only 7 per cent in the longitudinal file. We have excluded Spain from the subgroup analysis.

Second, looking at poverty rates, we find inconsistencies for Ireland and Sweden especially and so exclude them from the subgroup analysis too. For Sweden, the estimate of the aggregate current poverty rate is 12.1 per cent in the cross-sectional file but only 7.0 per cent in the longitudinal file. For Ireland, the aggregate poverty rate is 15.5 per cent in the cross-sectional file but 20.1 per cent in the longitudinal file and estimates differ dramatically for working-age women. For example, for those aged 18–39, the poverty rates are 13 per cent in the cross-section file and 22 per cent in the longitudinal file (and zero for women aged 18–30). Austria is also omitted from our subgroup analysis because of an implausibly low subgroup persistent poverty rate: the rate is zero for adult men aged less than 30 years.

Persistent poverty rates in 2007 (survey year 2008) for the 21 European countries in our sample are shown in Table 1. The rates shown are close to those shown in Eurostat's (2011) online database in terms of levels, though coverage differs. We have data for six countries that Eurostat does not report estimates for (CZ, IE, IT, PT, SE, UK), and there are three countries for which Eurostat reports estimates but which are not included in the EU-SILC longitudinal data release (GR, MT, IS). For each of the 15 remaining countries, our estimates and Eurostat's are very close – within half a percentage point of each other.

Persistent poverty rates vary immensely, ranging from 3 per cent in Sweden to more than four times as large, 13.3 per cent, in Estonia. There are countries located throughout the range; there is no clumping at particular points. The range and variation in rates across new member states are as large as for old member states. The persistent poverty rate in the Czech Republic is almost as low as that in Sweden. There are new member states with middle-ranking rates. And the persistent poverty rate in Estonia is virtually the same as that in Portugal.

Nordic countries have relatively low persistent poverty rates (SE, NO, FI) whereas Mediterranean ones have relatively high rates (CY, ES, IT, PT). In-between are Western European countries (AT, NL, LU, BE) and Central European countries (CZ, SK, HU, SI, PL) for which rates are generally below average. In contrast, the three Baltic states have above-average persistent poverty rates (LT, LV, EE). The two Anglo-Saxon countries differ markedly: the UK's persistent poverty rate is the median rate whereas the rate in Ireland is some 50 per cent greater.

The five countries where longitudinal data are collected using administrative record linkage tend to have below average persistent poverty rates: the range is between 3.0 per cent for Sweden and 7.8 per cent in Slovenia, with the Netherlands and Finland in between. The data collection instrument may be partly responsible for this tendency (Lohmann 2011; Van Kerm and Pi Alperin 2010) but we are unable to be more conclusive because there are other features of these countries that may also be responsible for the poverty rate differences.

5. The near-linear relationship between persistent poverty rates and current poverty rates in 2007: aggregate member state level

The relationship between persistent and current poverty rates in 2007 is summarised in Figure 1 using the data for 21 member states. Observe, first, that persistent poverty rates are lower than current poverty rates in all 21 countries (as expected) and, second, they are positively associated.

<Figure 1 near here>

The third feature of Figure 1 is the near-linear nature of the relationship between persistent and current poverty rates, as predicted earlier. The cross-country Pearson correlation in rates is 0.91 (0.93 if Latvia is excluded).[16] A non-parametric regression fits an almost completely straight line through the data points, at least up to current poverty rates of around 20 per cent (see the grey line in Figure 1).[17] There are only a few outliers and these contribute greater dispersion around the regression line at higher current poverty rates. Not only does Latvia have a relatively high current poverty rate, but its persistent poverty rate is lower than would be expected (from the relationship for the other countries) on the basis of its current poverty rate. The case of Lithuania is similar. The dispersion around the fitted line, and the appearance of outliers like Latvia and Lithuania, reflects cross-national differences in poverty entry and retention rates. We investigate these in greater detail below.

[16] The Pearson correlation summarises the strength of a linear relationship. It ranges between –1 (when there is a perfect negative linear relationship and 1 (when there is a perfect positive linear relationship). It equals 0 when there is no linear relationship.

[17] The close association between a longitudinal measure of poverty and the current poverty rate is also found when other measures besides the EU's persistent poverty rate are considered. For example, the 21-country Pearson correlation between current poverty rates and persistent poverty rates calculated using a UK definition is 0.87 (0.91 if Latvia is excluded). Persistent poverty on the UK measure is defined as being poor at least three years out of four, i.e. the same as the EU measure except that there is no conditioning on current poverty status in the fourth year. (See Department for Work and Pensions 2010.) The cross-country Pearson correlation between the current poverty rate and the proportion of individuals poor in all four years is 0.76 (0.82 if Latvia is excluded).

In Figure 2, we show poverty rates for old member states and new member states separately in order to explore the extent to which the near-linearity is more apparent if one controls for this significant institutional distinction, and also because earlier evidence about the relationship (reported shortly) exists for old member states only. In these and subsequent similar charts, we have also drawn the linear regression line through the country data points.

<Figure 2 near here>

Figure 2 shows that the relationship between persistent and current poverty rates is slightly more linear among the sample of old member states (Pearson correlation = 0.94) than among the whole sample (0.91) or the sample of new member states (0.90). Put another way, the estimate of (average) θ for the new member states is 0.7 and 0.5 for old member states.[18] The different estimates for old and new member states reflect different patterns of poverty entry and retention rates, and we examine these below. In addition, the chart for the new member states highlights more clearly than does Figure 1 that there is a distinctive pattern for Lithuania and Latvia. (The third Baltic state, Estonia, also has a current poverty rate of greater than 20 per cent, but its persistent poverty rate is in line with what would be expected from other new member states.) The earlier analysis suggests that the results for Lithuania and Latvia reflect substantial short-term changes in poverty entry or retention rates (or both), and we provide evidence to confirm this below.

Does the near-linear relationship exist only for the 2004–7 period or is it a more general feature? We now show that it is the latter case while acknowledging that this robustness check can only be undertaken for the old member states because suitable data for the new member states are not available. In Figure 3, we show scatterplots in the same format as Figures 1 and 2, but taken from studies reporting estimates derived from the ECHP.

Figure 3 (top left chart), shows persistent and current poverty rates for 13 old member states in 1999, derived from statistics reported by Dennis and Guio (2003). There is a strong linear relationship, with the Pearson correlation equal to 0.98. The authors comment that '[i]n the European Union, Member States which have high income poverty rates also have high persistent income poverty rates' (2003: 2), but do not discuss the pattern further.

<Figure 3 near here>

The European Communities (2002) second report on *Social Statistics. Income, Poverty and Social Exclusion* provides two sets of comparisons for 1997. The first, shown in

[18] The least squares regression line for the old member states sample is $S_c = -1.392\ (1.14) + 0.698\ (0.078) * P_c + \varepsilon$, and $S_c = -1.385\ (1.49) + 0.479\ (0.089) * P_c + \eta$ for the new member states sample, where the numbers in parentheses are estimated standard errors. The slope terms are the estimates of (average) θ. One cannot reject the hypothesis that the intercept terms are zero, at the 95% level, consistent with equation (2).

Figure 3 (top right), uses definitions corresponding to the current OMC ones. There is a near-linear relationship between persistent and current poverty rates (Pearson correlation = 0.95). European Communities (2002) also report estimates based on a slightly different persistent poverty definition (poor in 1997 and both of the two previous years). For brevity, we don't show the chart but, again, there is a strong linear relationship (Pearson correlation = 0.95).

Figure 3 (bottom left) shows that there was a near-linear relationship in 1996 as well: the Pearson correlation is 0.96. (In this case, persistent poverty refers to being poor in 1996 and the two previous years.) The authors of the major review of the EU's social indicator framework remarked on the relationship, stating that:

> ECHP data for the EU-15 show that long-term poverty is typically 40% below poverty risk measured at a point in time. We would expect them to be associated, but the cross-country comparison shows a surprisingly high correlation between poverty risk and persistent poverty risk. Luxembourg has a higher persistent poverty rate than could be expected given its rate of poverty risk and Spain a lower one, but in the other EU-15 countries there is a close relationship between the values of the two indicators. (Marlier et al. 2007: 72).

The authors do not investigate the relationship and its implications further, however.

Our final set of estimates are taken from Whelan, Layte, and Maître (2002), and refer to the relationship in 1995, with persistent poverty referring to being poor in 1995 and in the two previous years (Figure 3, bottom right). Again there is a near-linear relationship, with the Pearson correlation equal to 0.95. The authors also report estimates of current and persistent poverty rates for the case in which the poverty line is 70 per cent of the contemporary national median (rather than 60 per cent). There is also a near-linear relationship (chart not shown), with the Pearson correlation equal to 0.96.

In sum, we believe that there is evidence of a near-linear relationship between persistent and current poverty rates for old EU member states, not only in 2007 but also in earlier years. For new member states, it is difficult to be as conclusive because data before 2007 are unavailable. However, for 2007, there appears to be a broadly linear relationship as well, while also noting that Latvia and Lithuania are outliers. All the evidence so far refers to relationships at the member state level. We now turn to see whether the near-linear relationship also pertains when one considers subgroups within the population.

6. The association between persistent poverty rates and current poverty rates in 2007: population subgroup level

Figure 4 shows scatterplots of persistent poverty against current poverty for each of the seven subgroups defined earlier. We distinguish between old and new member states, as we did in Figure 2. The main finding is that the relationships within subgroups are not so clearly linear as at the member state level, as expected from the earlier discussion.

<Figure 4 near here>

Looking at Pearson correlations for subgroups in the old member states, the largest correlations are 0.96 (children) and 0.95 (for women aged 65+) and the smallest is 0.55 (for men aged 18–39). If Norway is excluded (recall the discussion of data inconsistencies in Section 2), the correlation rises to 0.89 and 0.88 for women and men aged 18–39, compared to 0.59 and 0.55 if Norway is included. For subgroups in new member states, the largest correlations are 0.98 (women aged 40–64) and 0.97 (men aged 40–64) and the smallest is 0.76 (for men aged 18–39). More generally, and for old and new member states, the near-linear relationship is weakest for the groups containing men and women aged 18–39. The reason for this is unclear, but our earlier discussion suggests that data inconsistencies may be a contributory factor.

The case of the UK is distinctive. For almost every subgroup (excepting men and women aged 18–39), the UK's persistent poverty rate is lower than would be expected on the basis of its current poverty rate. This is most clearly the case for women aged 65+ and especially men aged 65+. In other words, there appears to be greater than expected turnover among the poor. One potential explanation for this finding is the fact that the reference period for the UK's income measure is 'current' rather than 'annual' (see Section 4), and it may well be that the observed estimates reflect greater transitory income variability than do the estimates for all the other country (each based on an annual income measure).[19] Ireland also uses a current income definition, but cannot be used to check this hypothesis as it had to be excluded from the subgroup analysis for the reasons explained earlier. If Latvia and Lithuania are excluded from the new member state sample, the correlations for all subgroups increase too, especially for children (from 0.79 to 0.93).

The other feature of Figure 4 we would draw attention to is that the data points lie closer to the 45° line in the charts for elderly people, and especially women aged 65+, than

[19] We observe that the estimates for the UK are to the 'southeast' of the implied linear regression line in Figures 1 and 2 as well.

for the other subgroups. This accords with expectations: incomes for elderly people tend to fluctuate less over time than do incomes for other groups because they are more reliant on relatively fixed sources such as pensions, and so persistent poverty rates and current poverty rates are closer together.

7. Predicted and observed poverty rates, and trends in poverty transition rates

The expectation of a near-linear relationship between persistent and current poverty rates is based on analysis of a prototypical model of poverty dynamics in which poverty entry and retention rates are fundamental building blocks as well as the assumption of a steady-state scenario. The suitability of the steady-state assumption can be assessed in part by comparing predicted persistent and current poverty rates (derived using equations 1 and 2) with their observed counterparts (calculated from the EU-SILC data). We can also look at trends in entry and retention rates directly. Information about both aspects is presented in this section.

Predicted and observed poverty rates for 2007 are compared in Figure 5 separately for old and new member states. The pair of charts in the top panel refers to current poverty rates; the pair in the bottom panel refers to persistent poverty rates. When the annual poverty entry and retention rates observed for 2006–7 are plugged into equation (1), the predictions of the 2007 current poverty rates provided by the prototypical model are remarkably good, for both old and new member states (correlation of 0.93 for old member states; 0.95 for new member states). Ireland, Latvia, and Lithuania are the outliers and when these three countries are excluded, the correlation between rates is 0.96 for both old and new member states. The comparison between rates is repeated for 2005 and 2006 in Appendix Figure A1 and, for both years, the model predicts well current poverty rates for the relevant year (and Ireland, Latvia and especially Lithuania, are less obviously outliers).

<Figure 5 near here>

The prediction of 2007 persistent poverty rates from the 2006–7 transition rates (using equation 2), summarised in the bottom pair of charts in Figure 5, is not quite as accurate as the prediction of current poverty rates but good nonetheless. (Excluding Latvia and Lithuania improves the prediction markedly.) For most countries, the model's predictions are under-estimates of the persistent poverty rates (referring to the four-year period 2004–7). This may reflect cross-national heterogeneity in poverty persistence (as suggested by the mover-stayer model) but we discount this as a major explanation for the reasons discussed earlier. More

likely to be responsible, we suggest, is changes over time in transition rates. That is, for these countries either poverty entry or poverty retention rates (or both) were markedly higher in one or more of the earlier years in the four-year period than in 2006–7. For the outlier countries (Ireland, Lithuania, and Latvia), in which case which persistent poverty rates are over-estimated by their steady-state counterparts, poverty entry or retention rates in these three countries were lower in one or more earlier years than for 2006–7.

These claims about trends in poverty transition rates over the 2004–7 period are substantiated by the evidence about the rates displayed in Figure 6, separately for old and new member states. For each country, the figure shows a triplet of estimates referring to the transition rates for 2004–5, 2005–6, and 2006–7 (arrayed from left to right). Countries are ordered in each chart by their transition rates for 2006–7. The top panel shows poverty entry rates; the bottom panel shows poverty retention rates.

<Figure 6 near here>

The three countries most often mentioned as outliers – Latvia, Lithuania, and Ireland – stand out. Latvia and Lithuania have poverty retention rates for 2006–7 that are markedly higher than for the two earlier years. Poverty entry rates for 2004–5 are also much lower than for 2006–7 for the two countries but Latvia's entry rate for 2005–6 is substantially lower than in the adjacent years, whereas for Lithuania the entry rate is in between the rates for adjacent years. The trends for Ireland's entry and retention rates mimic those for Lithuania. These patterns are consistent with the over-estimation of the 2007 persistent rates by the steady-state persistent poverty rate reported in Figure 5. Italy is an example of a country for which there was under-estimation, and Figure 6 shows that this reflects the fact that the entry and retention rates for 2006–7 were lower than the corresponding rates for the two previous years.

For the majority of countries, however, there are relatively small year-to-year fluctuations in poverty transition rates. This suggests that much of the year-to-year variation is attributable more to sampling variability rather to systematic (macro)economic factors, many of which one might expect to be common across EU member states. Consistent with this conclusion is the fact that, taking each country separately, the year-to-year variation in its retention rates is typically larger than the year-to-year variation in its entry rates in proportionate terms. (Retention rates are calculated from smaller samples than entry rates are.) Also note that the countries with the smallest sample sizes in the longitudinal data file are Estonia, Ireland, Latvia, and Lithuania.

Figure 6 also shows clearly that there is substantially greater dispersion across countries in poverty entry rates than dispersion in poverty retention rates. In numerical terms,

the cross-country variances of log(entry rate) are 0.14 for old member states and 0.29 for new member states, whereas the corresponding variances of log(retention rate) are 0.01 and 0.01. These results confirm the claims made in the third section of paper when predicting the near-linear relationship between persistent and current poverty rates from the prototypical model.

To the extent that year-to-year variations in poverty transition rates mainly reflect transitory 'noise', one might consider averaging each country's transition rates over time to get a better picture of the 'true' rate. Figure 7 illustrates this strategy. The transition rates that are used to derive the predictions of the steady-state persistent poverty rate for each country are now the average of the transition rates for the final two years of the four-year period (2005–6 and 2006–7) rather than the rates for 2006–7 (used to calculate the rates summarised in the bottom panel of Figure 5). The result is that the revised persistent poverty rate predictions are an even closer match to the observed persistent poverty rates than before. The Pearson correlation between predicted and observed rates is now 0.96 (compared with 0.85) for old member states, and 0.86 (compared with 0.71) for new member states. Ireland appears as an outlier no longer, and the outlierness of Latvia and Lithuania is reduced. It remains the case that persistent poverty rates tend to be under-estimated by the prototypical model (as suggested by the mover-stayer model), though not by a lot – around one percentage point.

<Figure 7 near here>

8. Summary and conclusions

This paper has demonstrated that there is a near-linear relationship between rates of persistent poverty and current poverty across EU countries. This relationship is apparent not only nowadays (from EU-SILC data), but has existed for a long time (according to ECHP data). We have explained how this relationship arises from the specific definition of persistent poverty that is employed and from the dependence of both current and persistent poverty rates on poverty entry and retention rates. Our explanation relies on a simple prototypical model of poverty dynamics which incorporates the simplifying assumption that a country's entry and exit rates remain constant over time – the steady-state scenario – but we have also shown that this is a reasonable working assumption in practice for most EU member states. Put differently, the few outliers from the near-linear relationship are countries with poverty transition rates that exhibit distinct trends over time (Latvia, Lithuania, and Ireland, are the prime examples). There were no major economic changes in these countries that would

explain these trends: in all three countries annual rates of real GDP growth were steady between calendar years 2004 and 2007 (falling below trend only in 2008) and, similarly unemployment rates were falling between 2004 and 2007 (before rising sharply in 2008).[20] This suggests that the fluctuations in transition rates for these member states may reflect potential problems with the SU-SILC longitudinal data. In this connection, also observe that Ireland, Latvia, and Lithuania (with Estonia) have the smallest sample sizes in the EU-SILC longitudinal data that we use.

The existence of a near-linear relationship suggests that the EU measure of persistent poverty adds relatively little additional information to that which is revealed by the 'headline' current poverty measure. We can predict that the persistent poverty rate will be below the current poverty rate for each country and, indeed, we can also predict quite well how *much* it is below. One can predict a persistent poverty rate referring to a four-year period from the poverty transition rates for one year employing the prototypical model. We have shown that for most countries the prediction for 2007 is relatively good. Having transition rate data for earlier years as well allows one to refine the prediction.

Information about trends in poverty transition rates is also useful for helping to isolate those cases in which predictions are likely to be poor. Large year-to-year changes in poverty entry and retention rates for a given country are signals of potential problems with the longitudinal data for that country since usually one would not expect very large changes in just one year. (Information about big changes brought on, for example, by major reforms to the social safety net or the economic cycle can be used to filter these signals of course.) Since the change in a country's current poverty rate between two successive years reflects the country's poverty transition rates for that period, another credibility check is to benchmark estimates of current poverty rates, and their trends, derived from longitudinal data against the corresponding estimates derived from cross-sectional data. We employed this sort of check when selecting countries for the subgroup analysis, but the same idea could also be used at the national level. More generally, it is clear that further work needs to be done to investigate the sources of the inconsistencies between EU-SILC cross-sectional and longitudindal files and to eliminate them.

Our findings concerning the near-linear relationship between persistent and current poverty rates, and longitudinal data inconsistencies, are relevant to future developments in the monitoring and measurement of poverty within the EU's Social OMC. The rationale for

[20] Data from the Eurostat portal at http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home (accessed 12 July 2012).

collecting longitudinal poverty indicators as well as cross-sectional poverty indicators is that the former adds additional information content, and the EU-SILC longitudinal data collection instruments have been largely (though not solely) developed to provide information related to the longitudinal indicators. Our findings provide prima facie evidence for some reconsideration of the persistent poverty measures that are currently employed in EU official statistics to capture the longitudinal dimensions of income poverty.

We are not arguing that longitudinal perspectives on poverty are without value and that, by implication, reliance should be on cross-sectional perspectives alone. The difficulties in the EU context arise from using a relatively short time frame (four years) over which to assess changes in people's income and (related) from using a particular measure of persistent poverty – one that counts the number of years poor retrospectively over the four-year period while also restricting attention to the individuals who are poor in the fourth year. As discussed in Section 2, there is a substantial body of analysis based on household panels with longer time windows than EU-SILC and using a range of different longitudinal measures of poverty that demonstrates that a longitudinal perspective on poverty complements and extends the cross-sectional perspective.

We are also not arguing that persistent income poverty measures derived from the longitudinal EU-SILC instruments should be discarded in favour of reliance on the information provided by measures of material deprivation derived from cross-sectional instruments. Persistent income poverty and material deprivation are distinct concepts. For example, Whelan, Layte, and Maître state that '[w]hile a substantial association is found between persistent income poverty and relative life-style deprivation, they are also tapping somewhat different phenomena (2003: 13), and 'there is clearly a great deal relating to the processes of accumulation and of erosion of resources that is not fully captured in the persistent poverty measure. In the absence of such information, … both types of indictors (sic) should be used in the formulation and evaluation of policies' (2003: 14).

What our arguments are concerned with is the specific EU measures that have come to be used to summarise the longitudinal dynamics of income poverty. Ideally, one would like to have data from long-running household panel surveys for all member states (for the reasons discussed in Section 2) – but this is an unrealistic goal. We suppose that extension of the EU-SILC's longitudinal instruments to cover periods longer than four years would not be supported by most countries (because of the additional costs and the new technical challenges that this would represent), in which case the focus of methodological reconsideration should

be the EU persistent poverty measure per se and improvement of the existing data collection instruments.

One option might be to adopt a different measure of persistent poverty such as the UK's indicator that does not restrict attention to the group of people who are also currently poor – in which case it is harder to predict a near-linear relationship using prototypical model of poverty dynamics. Another option might be to summarise the dynamics of poverty directly.

Differences in current poverty rates across countries and the length of time that people remain poor or non-poor reflect differences in poverty entry rates and poverty retention rates. In terms of the Atkinson et al. (2002) principles to guide the construction of social indicators that are summarised in Table 1, poverty transition rates have a normative interpretation through their implications for poverty persistence (Principle #1), they are easier to statistically validate than the EU's four-year measure of persistence (#2), they are responsive to policy intervention (#3), measurable and cross-nationally comparable (#4), and they are able to be produced in a more timely fashion than a four-year measure and imply lower burdens in data collection (#5, #6). Supplementation of existing poverty persistence indicators with statistics on annual poverty transition rates would be straightforward using existing EU-SILC longitudinal instruments.

We propose that consideration of these ideas be added to Eurostat's agenda for assessment of improvements to EU-SILC methodology and data (Wolff, Montaigne, and Rojas González 2010). While we have focussed on methodological and data issues and policy in this paper, there is clearly also much research to be done to explain the substantive differences across EU member states differences in persistent poverty rates, and poverty transition rates including, for example, the extent to which these relate to differences in social safety nets and labour market activation policies.

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Appendix. Derivation of poverty rate expressions from the prototypical and mover-stayer models

The prototypical model

The derivation of the expression for the current poverty rate (equation 1) begins with the identity stating that the total number of poor people this year equals the total number of people poor last year *plus* the number of people entering poverty between the two years *minus* the number of people exiting poverty over the same period. The poverty entry rate is the number of persons entering poverty divided by the number of people who were non-poor last year; the poverty exit rate (one minus the poverty retention rate) is the number of persons leaving poverty divided by the number of persons who were poor last year. Equation (1) is derived by rewriting the identity in terms of the rates of current poverty, poverty entry, and poverty retention, imposing the steady-state and first-order Markov assumptions, and then rearranging the equation.

The derivation of the expression for the persistent poverty rate (equation 2) utilises the EU's persistent poverty rate definition combined with the expression for the current poverty rate shown in equation (1). The probability of being persistently poor according to the EU definition is the probability of experiencing one of four possible four-year sequences of poverty or non-poverty. For example, the probability of being poor for four consecutive years is the probability of being poor in year 1, P_c, multiplied by the probability of remaining poor in the following three years, i.e. $P_c \times (R_c)^3$, where P_c is evaluated using equation (1). The probability of being non-poor in Year 1 and poor in Years 2, 3, and 4 is $(1–P_c) \times E_c \times (R_c)^2$, which is equal to $P_c \times (1–R_c) \times (R_c)^2$ in the steady-state case. The probabilities for the other two sequences can be derived similarly, and are each equal to $P_c \times E_c \times R_c \times (1–R_c)$. The expression for S_c in equation (2) is the sum of the four probabilities. With a sufficiently large sample size, the probabilities correspond to population proportions (rates).

A mover-stayer model

In our mover-stayer model, the poverty dynamics identity cited above has to be revised: the total number of poor people this year is equal to the number of people from the movers group who are poor *plus* the number of stayers (who are always poor). This total is equal to the

number of stayers *plus* the number of movers from non-poverty to poverty *minus* the number of movers from poverty to non-poverty. The poverty retention rate for the population as a whole reflects the combination of the poverty retention rate among the movers who happened to be poor last year and the poverty retention rate among the stayers (100 per cent). Poverty entry rates refer to the number of poverty entries among movers who were non-poor. (Stayers are not at risk of entering poverty as they are never non-poor.) We could have also supposed the existence of a third class of people – those who are never poor – but this complicates the model without adding insights regarding persistent poverty.

The expression for the current poverty rate, P_c^*, is derived by rewriting the revised identity in terms of rates of current poverty, poverty entry, and poverty retention, imposing the steady-state and first-order Markov assumptions, and then rearranging the equation:

$$P_c^* = P_c + W_c/(1 + D_c) \quad (3)$$

where P_c, E_c, and R_c are as defined as in equations (1) and (2), and now refer to rates for movers only. D_c is the ratio of the entry rate to the exit rate, $E_c/(1 - R_c) > 0$, and W_c is the proportion of stayers in the population. We argue shortly that W_c is a small number and the second term in (3) must be smaller still since $D_c > 0$.

The persistent poverty rate in the mover-stayer model, S_c^*, is equal to a weighted average of the persistent poverty rate among the movers and the persistent poverty rate among the stayers (100 per cent), where the weights are equal to proportions of movers and stayers in the population, respectively. Thus

$$S_c^* = \big(1 - W_c\big)\theta_c P_c + W_c.$$

This expression can be re-written in terms of P_C^* using equation (3):

$$S_c^* = \theta_c P_c^* + \delta_c, \text{ where } \delta_c = W_c(1 - \theta_c) \quad (4)$$

Observe that allowing for heterogeneity in poverty dynamics in this way also leads to prediction of a near-linear relationship as before, except that there is now a country-specific intercept term, δ_c, that was not present in equation (2). Since this intercept is positive, one would expect predictions of persistent poverty rates on the basis of equation (2) rather than equation (4) to produce under-estimates, other things being equal. The intuition is that reliance on current information does not take sufficient account of high poverty persistence propensities among some groups within a country. The empirical issue, and one we consider in the paper, is whether the degree of under-estimation is large or small. Our prior expectation is that the degree is small because W_c is likely to be quite small in all countries, and the other term, $(1-\theta_c)$, will not play a significant role if there is little cross-country

variation in θ_c (the hypothesis discussed in the main text). Estimates of 'permanent poverty' rates are rare because there are few very long-running household panel surveys (Section 2). However there is some UK evidence that supports our claim. Drawing on British Household Panel Survey data, the Department for Work and Pensions (2010: Table 3.1) reports that the proportion of persons with an income placing them in the poorest fifth of the population in every year between 1991 and 2008 was 3 per cent, which suggests an upper bound to W_c of around 0.03. Greater chances of under-estimation may occur if one looks at subgroups such as elderly people more likely to contain individuals who are permanently poor. More generally, cross-national heterogeneity in W_c is another factor that potentially loosens the tightness of the near-linear relationship.

Table 1. Principles to guide the construction of social indicators (Atkinson et al. 2002)

Six principles referring to the individual indicators

1. An indicator should identify the essence of the problem and have a clear and accepted normative interpretation.
2. An indicator should be robust and statistically validated.
3. An indicator should be responsive to effective policy interventions but not subject to manipulation.
4. An indicator should be measurable in a sufficiently comparable way across member states, and comparable as far as practicable with the standards applied internationally by the UN and the OECD.
5. An indicator should be timely and susceptible to revision.
6. The measurement of an indicator should not impose too large a burden on member states, on enterprises, or on the Union's citizens.

Three principles referring to the portfolio of indices as a whole:

1. The portfolio of indicators should be balanced across different dimensions.
2. The indicators should be mutually consistent and the weight of single indicators in the portfolio should be proportionate.
3. The portfolio of indicators should be as transparent and accessible as possible to the citizens of the European Union.

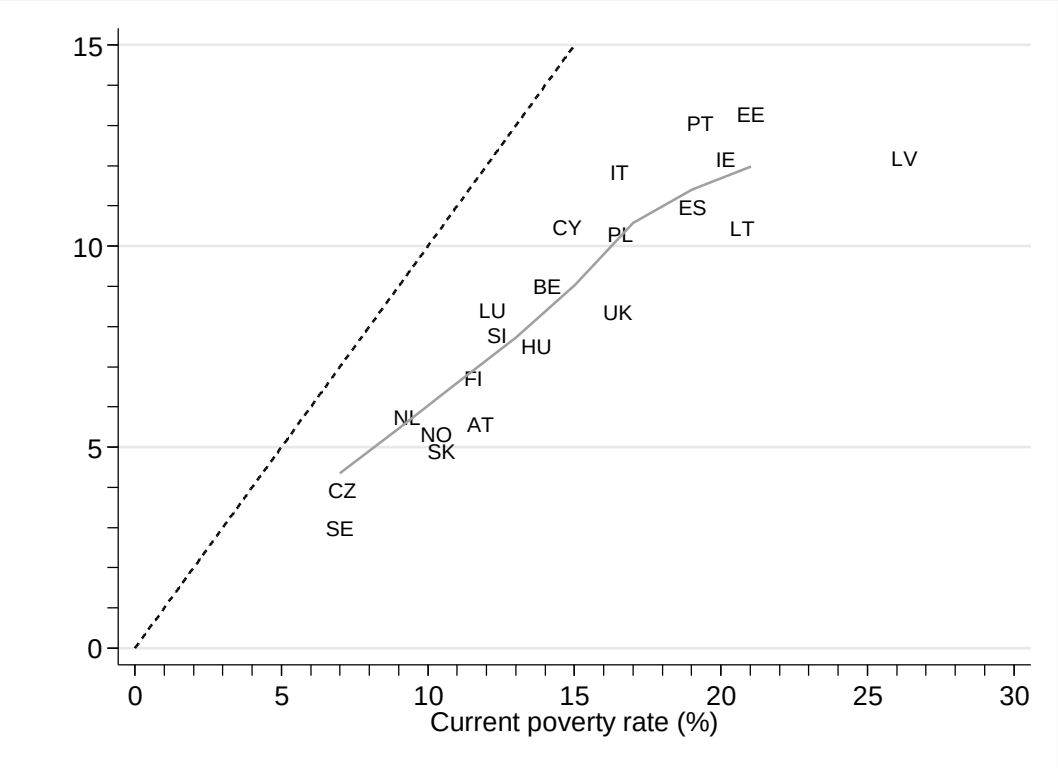
Source: Executive summary in Atkinson et al. (2002: 190).

Table 2. EU member states included in EU-SILC longitudinal files (UDB release2008-1), and their persistent poverty rates in 2007

Old member states	Persistent poverty rate (%)	New member states	Persistent poverty rate (%)
Austria (AT)	5.6	Cyprus (CY)	10.5
Belgium (BE)	9.0	Czech Republic (CZ)	3.9
Finland (FI) ‡	6.7	Estonia (EE)	13.3
Ireland (IE)	12.2	Hungary (HU)	7.5
Italy (IT)	11.9	Latvia (LV)	12.2
Luxembourg (LU)	8.4	Lithuania (LT)	10.4
Netherlands (NL) ‡	5.8	Poland (PL)	10.3
Norway (NO) † ‡	5.4	Slovenia (SI) ‡	7.8
Portugal (PT)	13.1	Slovakia (SK)	4.9
Spain (ES)	11.0		
Sweden (SE) ‡	3.0		
United Kingdom (UK)	8.4		

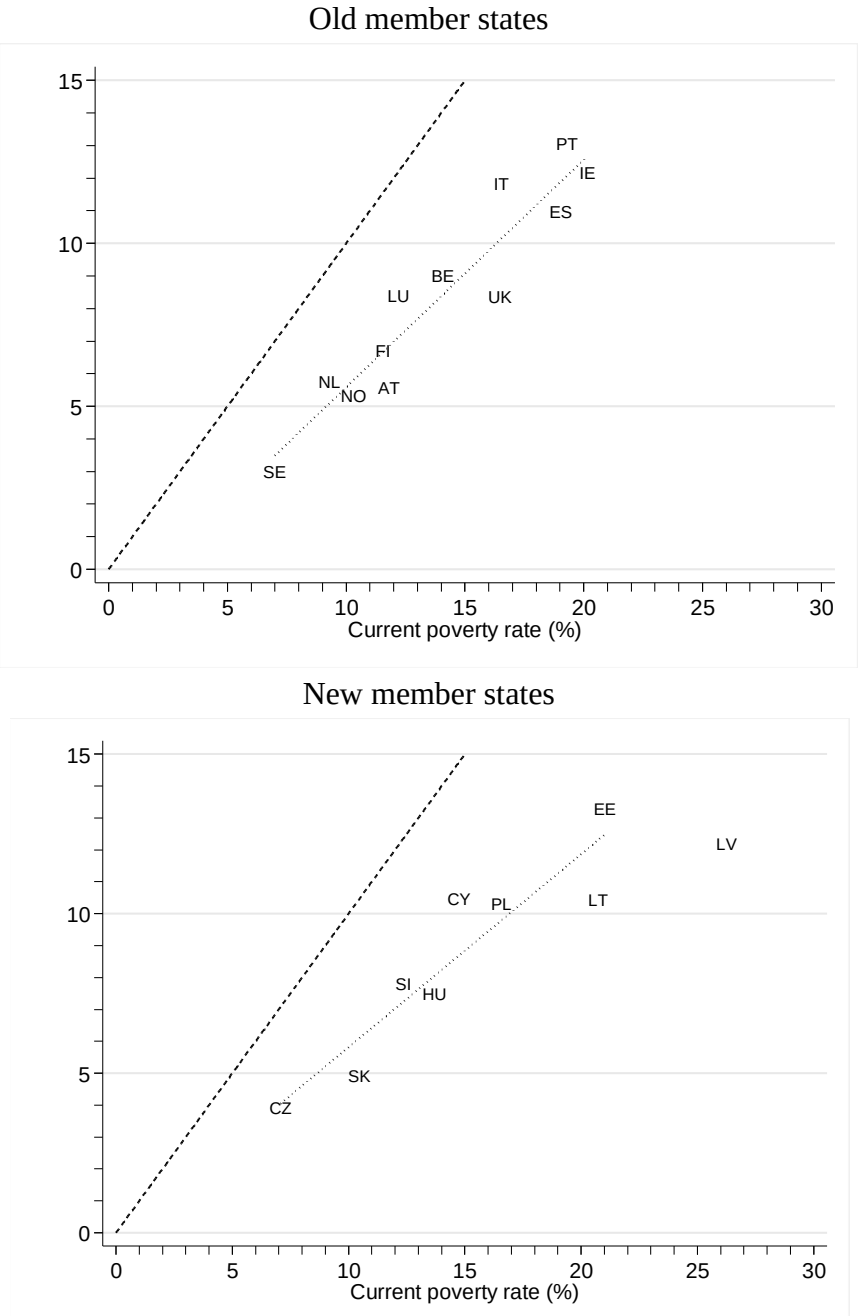
†: Norway is an EU Associate Member. ‡: data collection using linked administrative registers (see text). Longitudinal data are unavailable in UDB release 2008–1 for Denmark, France, Germany, Greece, Bulgaria, Malta, and Romania. The persistent poverty rate is defined in the main text.

Figure 1. The near-linear relationship between persistent and current poverty rates: 21 European countries, 2007



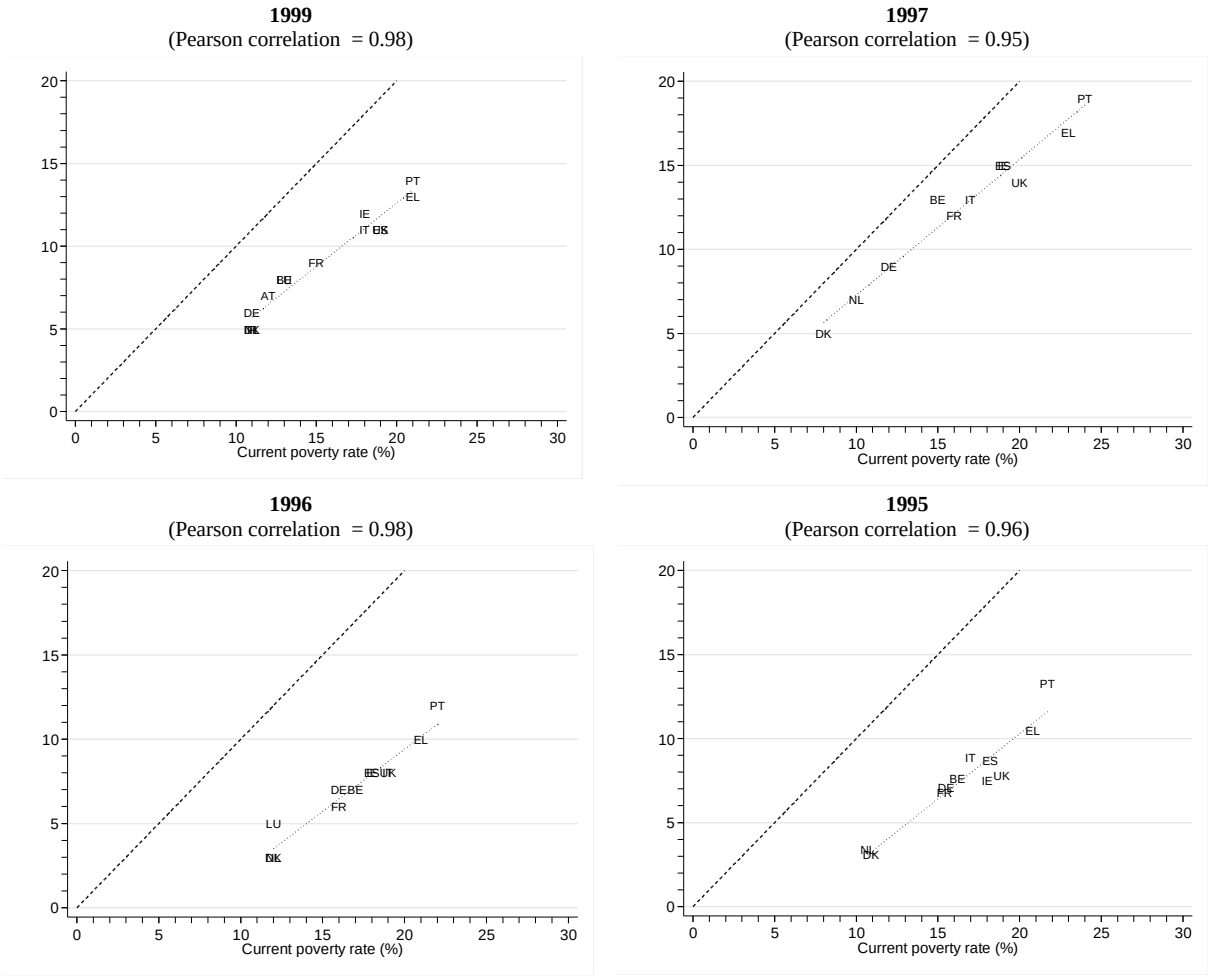
Notes. Authors' calculations from EU-SILC longitudinal files. Current poverty refers to being poor in 2007. Persistent poverty refers to being poor in 2007 and at two of the preceding three years. The poverty line is 60% of contemporary national median income. The non-parametric regression line shown in grey was derived using a local polynomial smoother of the data points for all 21 countries with the exception of Latvia. Country acronyms are explained in Table 1. The Pearson correlation between persistent and current poverty rates is 0.91 (0.93 excluding Latvia).

Figure 2. The near-linear relationship between persistent and current poverty rates, 2007: old and new member states



Notes. As for Figure 1. The Pearson correlation between persistent and current poverty rates is 0.94 for old member states and 0.90 for new member states (0.97 for new member states excluding Latvia and Lithuania). In each chart, the dotted lines show the linear regression line fitted through the country data points (excluding Latvia in the case of new member states).

Figure 3. The near-linear relationship between persistent and current poverty rates, 1999, 1997, 1996, 1995



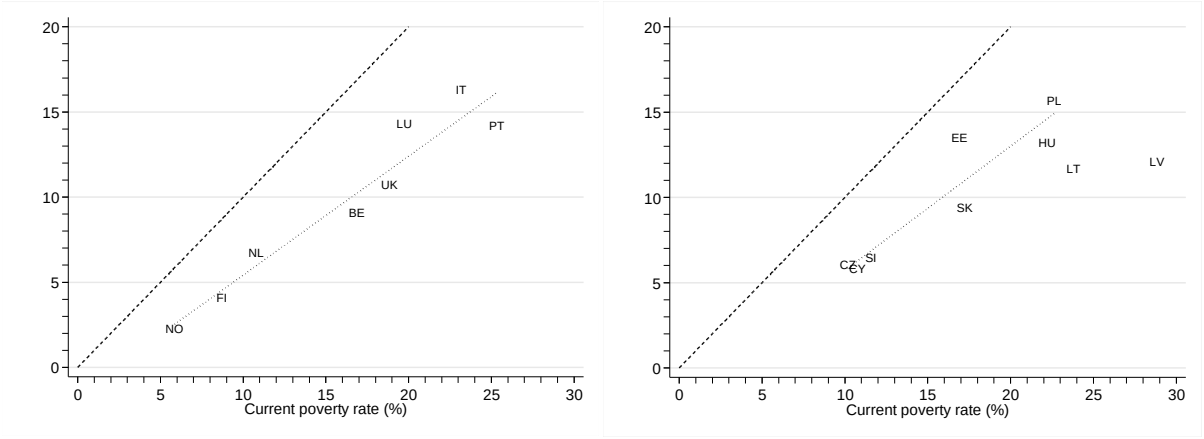
Sources: Authors' derivation from Dennis and Guio (2003) for 1999, European Commission (2002) for 1997, Mejer and Linden (2000) for 1996, and Whelan, Layte, and Maître (2002) for 1995. In each case, the original estimates were derived from the ECHP, and the poverty line is 60% of contemporary national median income.
Notes. For 1999, current poverty refers to being poor in 1999, and persistent poverty refers to being poor in 1999 and in two of the preceding three years. For 1997, current poverty refers to being poor in 1997, and persistent poverty refers to being poor in 1997 and in two of the preceding three years. For 1996, current poverty refers to being poor in 1996, and persistent poverty refers to being poor in 1996, 1995, and 1994. For 1995, current poverty refers to being poor in 1995, and persistent poverty refers to being poor in 1995, 1994, and 1993. In each chart, the dotted line shows the linear regression line fitted through the country data points.

Figure 4. Persistent and current poverty rates (%), 2007, old and new member states, by population subgroup

Old member states | **New member states**

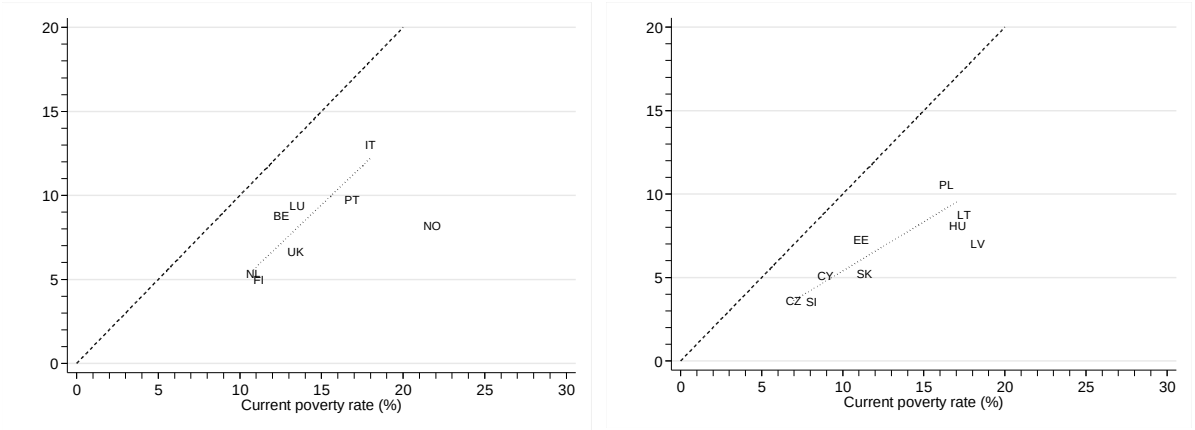
Children (aged less than 18)

(Pearson correlation = 0.96) | (Pearson correlation = 0.79; 0.93 excluding LT, LV)



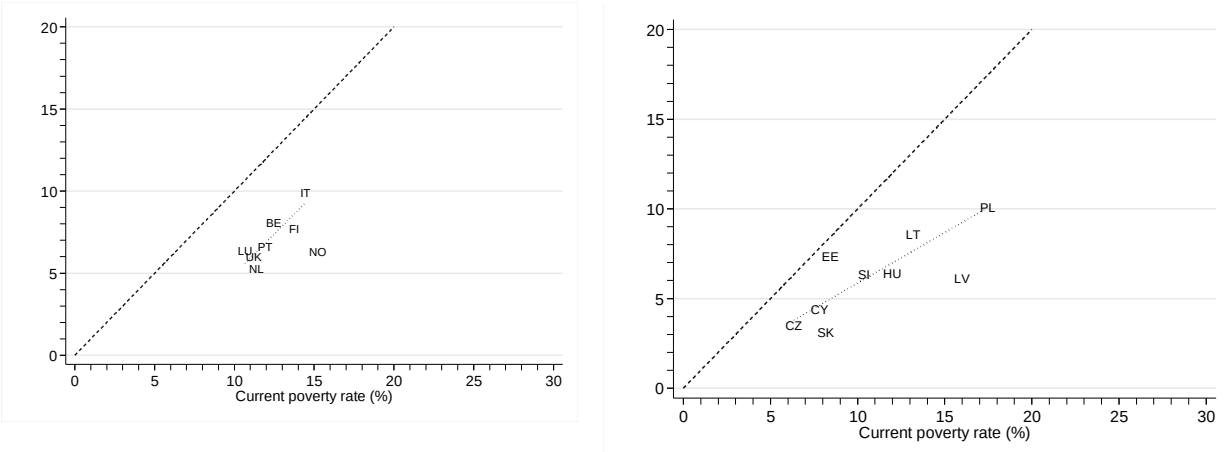
Women aged 18–39

(Pearson correlation = 0.59; 0.89 excluding NO) | (Pearson correlation = 0.87; 0.91 excluding LT, LV)



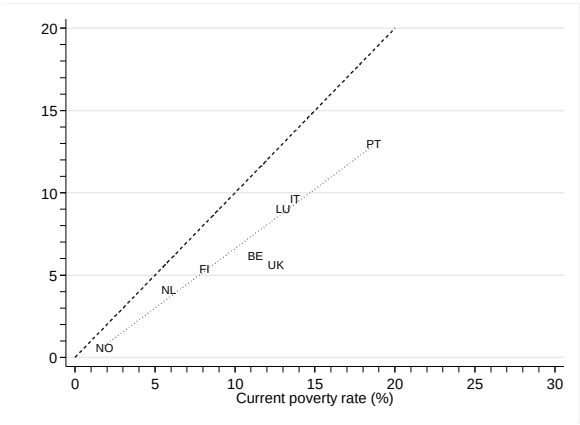
Men aged 18–39

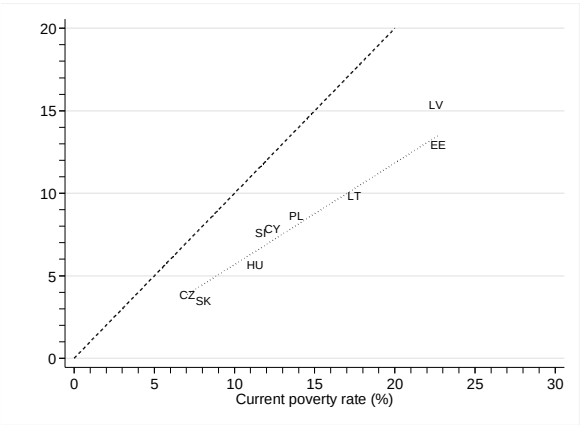
(Pearson correlation = 0.55; 0.88 excluding NO) | (Pearson correlation = 0.76; 0.86 excluding LT, LV)



Women aged 40–64

(Pearson correlation = 0.95; 0.99 excluding UK) | (Pearson correlation = 0.97; 0.97 excluding LT, LV)

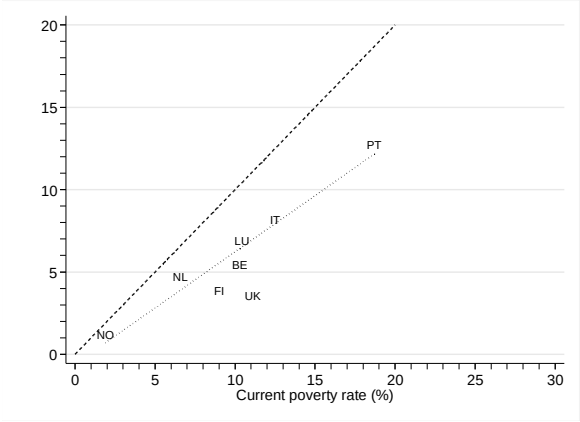


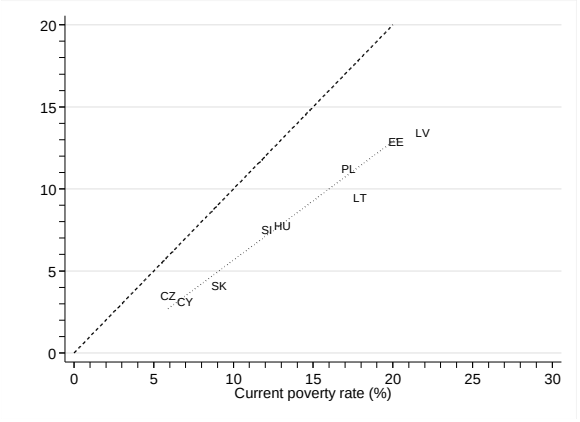


Men aged 40–64

(Pearson correlation = 0.90; 0.97 excluding UK)

(Pearson correlation = 0.98; 0.99 excluding LT, LV)

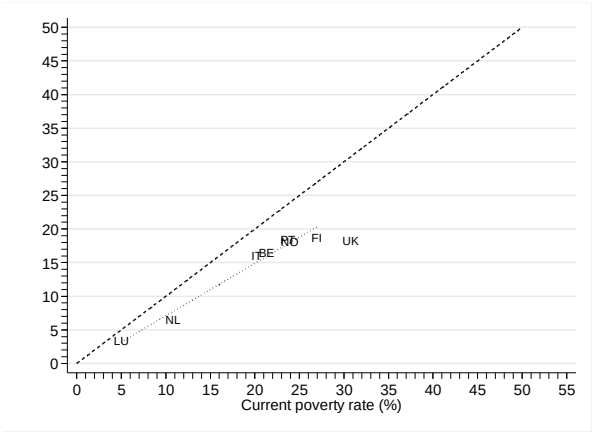


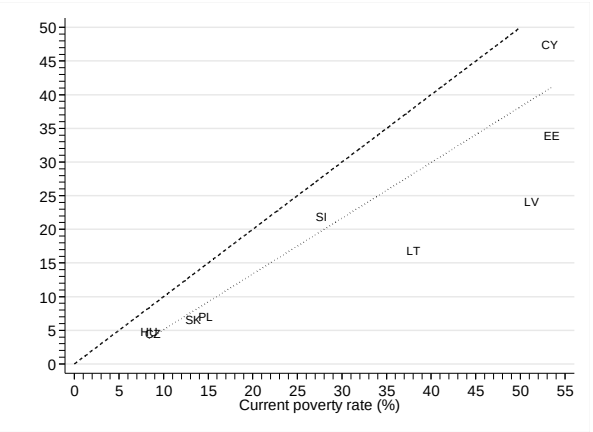


Women aged 65+

(Pearson correlation = 0.95; 0.99 excluding UK)

(Pearson correlation = 0.90; 0.97 excluding LT, LV)

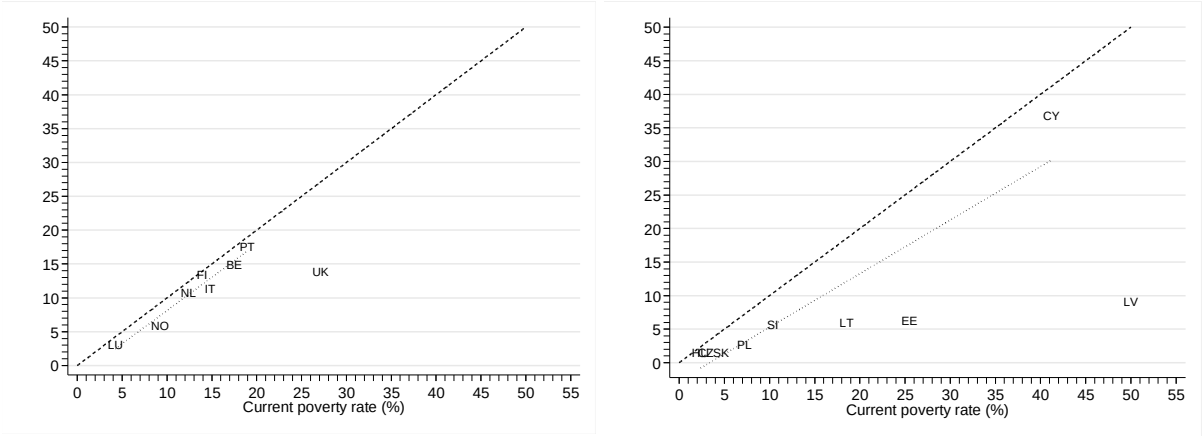




Men aged 65+

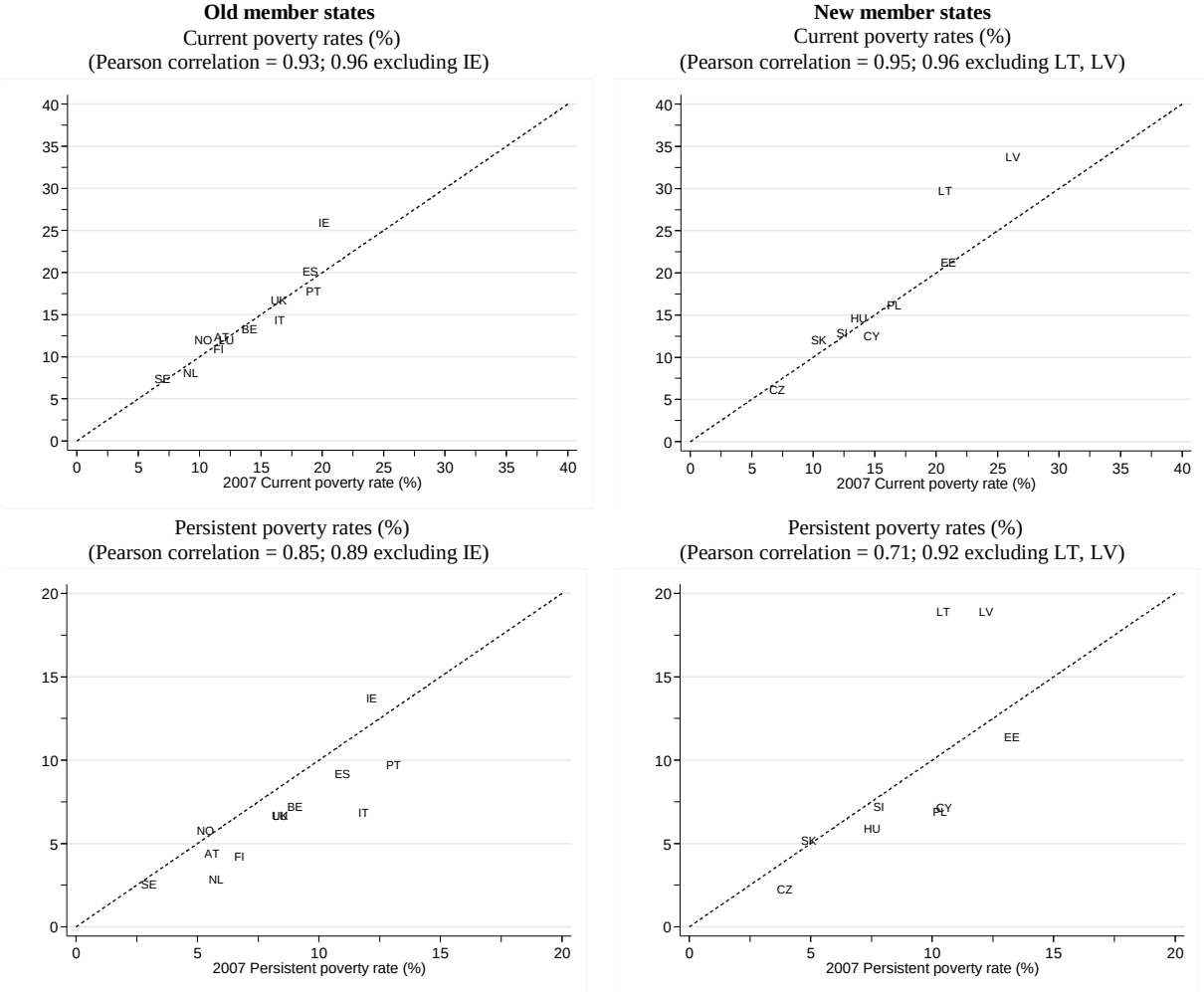
(Pearson correlation = 0.80; 0.97 excluding UK)

(Pearson correlation = 0.67; 0.90 excluding LT, LV)



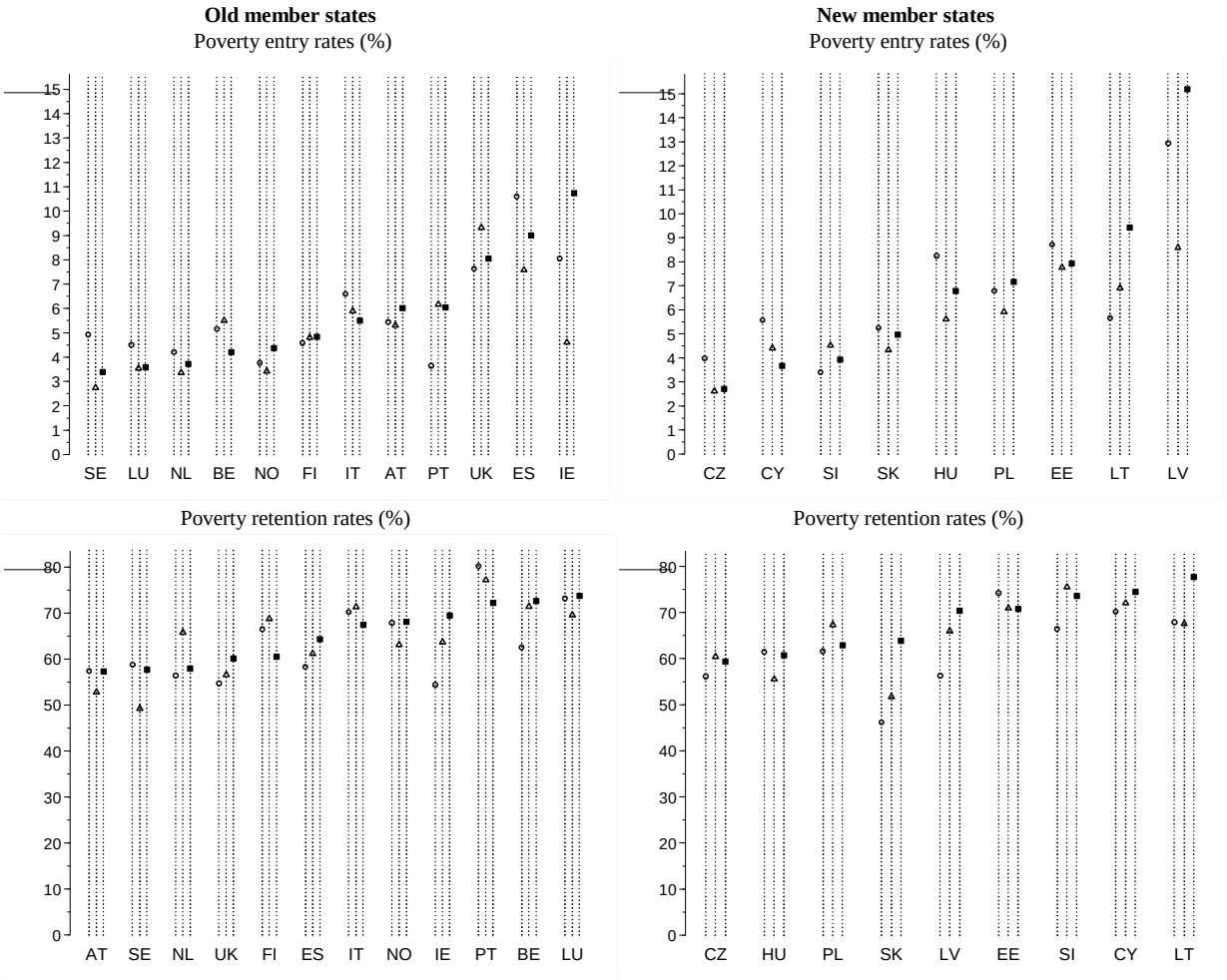
Notes. Authors' calculations from EU-SILC longitudinal files. Current poverty refers to being poor in 2007. Persistent poverty refers to being poor in 2007 and in two of the preceding three years. The poverty line is 60% of contemporary national median income. In each chart, the dotted line shows the linear regression line fitted through the country data points (with the exclusion of outlier countries indicated in the calculation of Pearson correlations, e.g. NO is excluded from the fitting of line in the case of women aged 18–39 in the old member states).

Figure 5. Predicted and observed poverty rates (%), 2007, old and new member states



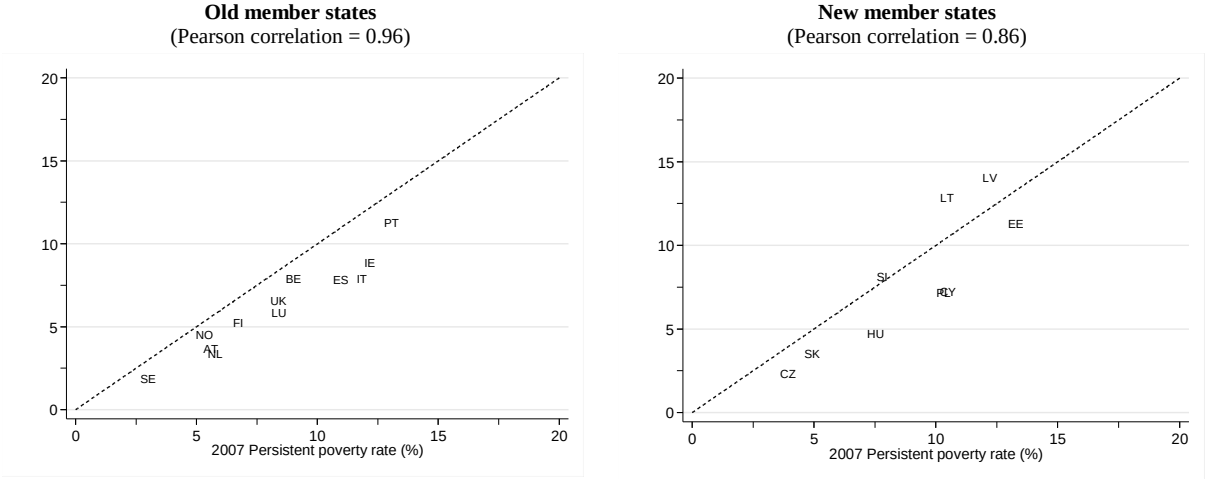
Notes. Authors' calculations from EU-SILC longitudinal files. Predicted poverty rates are calculated using equations (1) and (2) in the main text. The poverty entry and retention rates used in the calculations refer to transitions between income years 2006 and 2007.

Figure 6. Trends in poverty entry and exit rates, old and new member states, 2005–2007



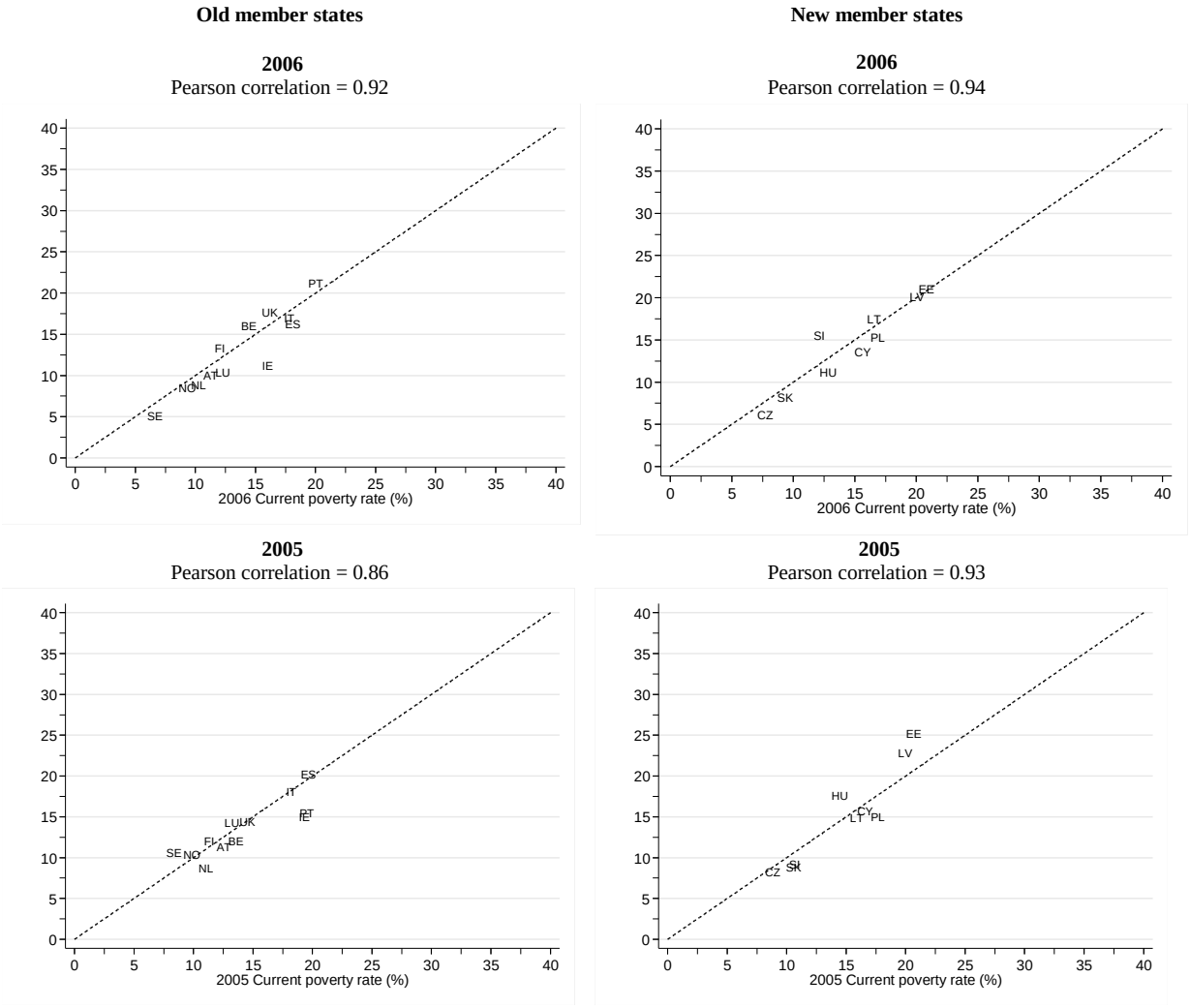
Notes. Authors' calculations from EU-SILC longitudinal files. Each chart shows, for each country, the poverty transition rate for the years *t*–1 to *t*, where *t* refers to 2005 (circles), 2006 (triangles), and 2007 (squares). Countries are ordered within each chart by the transition rate for income year *t* = 2007.

Figure 7. Predicted ('averaged transition rate' prediction) and observed persistent poverty rates (%), 2007, old and new member states



Notes. Authors' calculations from EU-SILC longitudinal files. Predicted rates are calculated using equations (1) and (2) in the main text. The poverty entry and retention rates used in the calculations refer to the average of the rates for income years 2006–2007 and 2005–2006. Cf. bottom panel of Figure 5, based on the transition rates for 2006–2007.

Appendix Figure A1. Predicted and observed current poverty rates (%), 2006 and 2005, old and new member states



Notes. Authors' calculations from EU-SILC longitudinal files. Predicted rates are derived using equation (1) in the main text. Year refers to income year. The estimates for 2007 are shown in the top panel of Figure 5.

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