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## Income Poverty in Advanced Countries

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**Income Poverty in  
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**Markus Jäntti  
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# Income Poverty in Advanced Countries <sup>★</sup>

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## 1 Introduction

The living standard of the least well-off members of society – industrialized or not – is of public policy and ethical interest. One way to examine differences between societies in this respect is to study the extent and severity of income poverty between countries and over time. While poverty can be thought of in many different ways, examining income poverty has a long tradition. This chapter reviews issues that arise in studying economic poverty in industrialized countries and examines evidence on their ranking according to poverty and its changes over time.

We review conceptual issues in Section 2. We discuss the measurement of resources, comparisons between different types of units, and what kinds of comparisons between different populations can be made. We also discuss the role of time, income sharing assumptions and the aggregation of poverty information. In Section 3, we discuss domestic evidence on poverty before turning to evidence drawn from the Luxembourg Income Study (LIS) on the incidence of relative poverty and its evolution over time. We then examine poverty orderings of countries using dominance criteria, studying the ordering by increasingly demanding conditions, and using both the poverty standard of each country and a common poverty line for all countries. We then move to examine in Section 4 the ordering of countries, using similar methods, for selected demographic subgroups of the population: children, the elderly and persons living in female-headed households.

In Section 5 we examine briefly the role of the public sector in terms of differences between market income and disposable income poverty rates, measured using the LIS. In Section 6 we examine longitudinal evidence on poverty, show some cross-national evidence on the patterns of intragenerational poverty mobility and persis-

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<sup>★</sup> Draft of Chapter 10 in *Handbook on Income Distribution*, edited by A.B. Atkinson and F. Bourguignon.

tence, and briefly discuss intergenerational poverty. A concluding section summarizes.

## **2 Conceptual and practical issues in the definition of poverty**

We begin by addressing key conceptual issues concerning the measurement of poverty. These include the space of poverty measurement, poverty lines, the income definition, the income-sharing definition, and the method of aggregation. We discuss the types of poverty comparisons that can be made, with what type of evidence and data sources, including issues, such as purchasing power parities (PPP), deflators and choices of poverty lines in inter-country comparisons.

### *2.1 A conceptual model of household income formation and poverty*

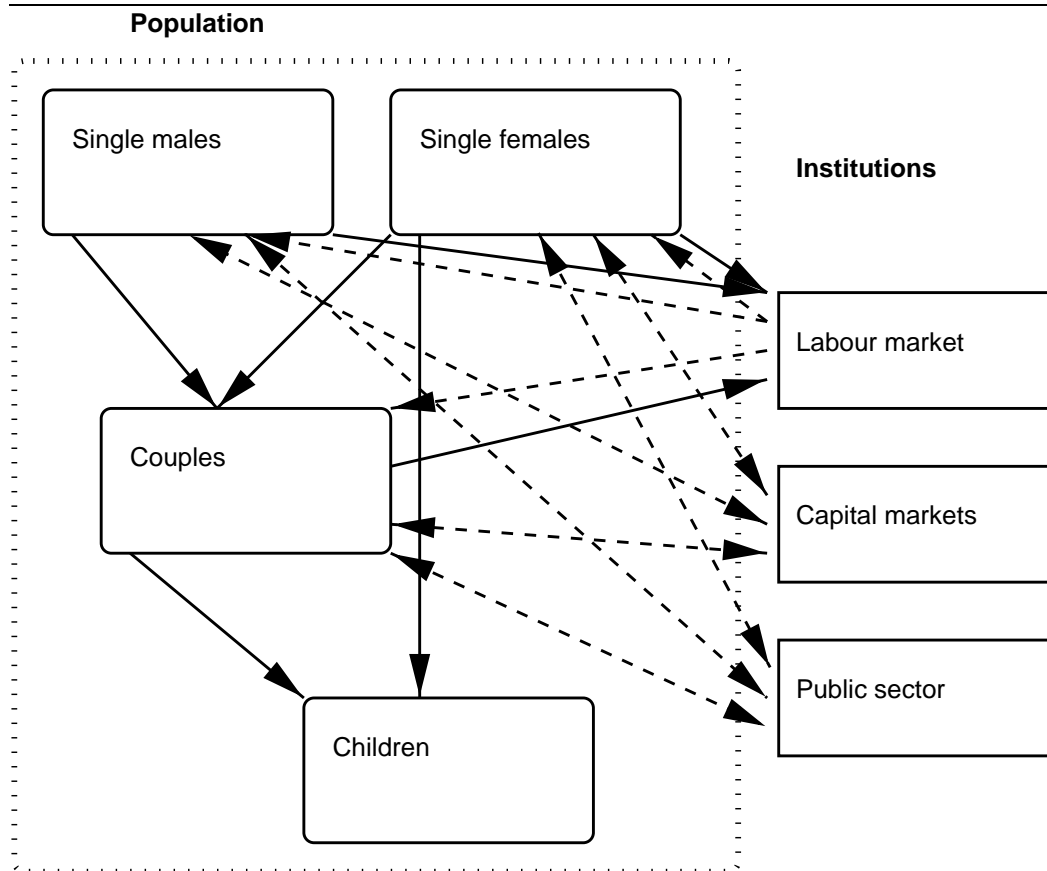
The process by which individuals form households and pool incomes involves several economic behaviors, including the labor supply of its members, their wage rates, educational attainments, unobservable characteristics, such as ability, motivation etc, the mechanisms that affect mating behavior, fertility, and their responses to public policies (taxes, transfers, support of education, health care etc). Given all of these behaviors, the likelihood that a given individual in a given household will be poor is also affected by income-sharing patterns within the household, decision-making mechanisms, household production technology and the level of the poverty line (something that in turn is determined by a great number of factors).

No empirical economic analysis of income poverty can incorporate all of these behaviors. Any analysis takes many of the behavioral factors as given, either for analytical tractability or because of data limitations. For many questions, however, analysis of only some aspects of poverty will suffice. In particular, assessing the extent of poverty and its evolution over time requires the resolution of a different set of issues than evaluating how a policy change affected the likelihood of being poor.

Figure 1 sketches out some of these issues. We denote flows of persons (solid arrows) and money flows (uni- and bi-directional dashed lines) between parts of the population and social institutions. We have not incorporated the additional (and complicated) class of arrows that specify what kind of influences on behavior are present.

The schema makes apparent that any aspect of policy, such as the tax system, can affect poverty in many ways. Economists often analyze the extent to which persons participate in the labor market and how certain factors affect that behavior. Two fac-

**Fig. 1** Household formation and labor supply



Note: Groups within the population and social institutions are drawn as boxes. Solid arrows denote flows of persons and uni- and bi-directional dashed arrow denote money flows.

tors have been emphasized in numerous studies, namely how household members' labor supply is affected by money flows between individuals and households and the public sector. First, taxes flow from households to the public sector. Second, transfers flow from the public sector to households. Most studies focus on only one flow, say taxes, and how it affects the behavior of a population subgroup – men, married men, married women, or so on. Other studies focus on the labor supply effects (or, say, job search effects) of transfers, such as unemployment benefits on unemployed men, or of welfare benefits on the labor force participation of single mothers.

Studies of the behavioral effects of public policies are reviewed in section 5 and chapter 9 of this volume. Such studies often document negative, often small, consequences on labor supply of high marginal tax rates or transfer payments. These studies, however, tend to neglect any assessment of the potential beneficial effects of social transfer payments. For example, Atkinson and Mogensen (1993) note that possible labor supply reductions that arise from redistributive taxes and transfers

should be weighed against their enhancement of other goals, such as the avoidance of social exclusion (Atkinson and Mogensen, 1993) or the promotion of social cohesion and preservation of individual dignity (Barr, 1993).

## 2.2 *Definitions of poverty*

A recurring theme in poverty research is whether poverty should be defined as a relative or an absolute concept. Although the literature is voluminous (see, e.g. Sen, 1983; 1985, and Townsend, 1985), a consensus has eluded us.

To fully distinguish between *relative* and *absolute* concepts of poverty requires substantial information. A relative view is typically one in which the rules for identifying the poor change as (some) other economic conditions change. Thus, one might assume that an absolute view of poverty would remain unchanged, regardless of any changes in economic conditions. However, many changes force us to redefine an absolute view of poverty, such as, changes in monetary systems, the industrial revolution and so on.

An “absolute” notion of poverty is fixed in terms of the relevant spaces at some point in time and, from that time on fixed in “absolute” terms in some space. If the relevant space is real income, then an absolute view implies a poverty line that is fixed in real terms (as well as one that holds constant a host of other things (e.g., equivalence scales). Although “absolute” is often treated as if it meant “fixed real income”, a constant real income standard is not the only possible absolute notion. Indeed, this very point is made by Sen (1983) in discussing what it takes to enable the same functioning in two very different societies.

There are countless ways in which we could “fix” an absolute measure of poverty. For instance, the U.S. National Research Council (1995) suggests that the *rules* by which the poverty line, as well as the equivalence scales, were arrived at could be kept constant. This “absolute” poverty standard differs from the official U.S. definition, which fixes the line in real terms, regardless of what the rules used to first define the line might imply under current conditions. However, in common parlance, a poverty concept is considered to be absolute as long as it does not vary with changes in real economic conditions.<sup>1</sup>

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<sup>1</sup> For additional references and discussion, see, among others, Sen (1979, 1983, 1992), Hossain (1990), Atkinson (1989), Hagenaaars (1986), Hagenaaars and van Praag (1985), National Research Council (1995), Townsend (1979), Townsend (1985), van Praag (1993), Nolan and Whelan (1996*b*), Ringen (1987), Hagenaaars and de Vos (1988) and Kapteyn, Kooreman and Willemse (1988).

### 2.3 The space for poverty measurement

Poverty measurement requires criteria by which to (i) *identify* who is poor and (ii) *aggregate* the information. To identify the poor, the space(s) in which to define and analyze poverty must be specified. Economists typically analyze the space of income, expenditure or possession of certain material goods. Examples of the resource measure used to distinguish between poor and non-poor households include these, singly or in combination:

- (1) (disposable cash) income
- (2) consumer expenditure
- (3) consumption
- (4) earnings capacity (Haveman and Buron, 1993b)
- (5) subjective poverty / perceived poverty (Hagenaars, 1986)
- (6) wealth
- (7) choice sets (Le Grand, 1991)
- (8) utility
- (9) capabilities. (Sen, 1979, 1983, 1992; Hossain, 1990)

The selection of a definition of resources is related to two other issues, – (i) which resources are relevant to economic well-being and (ii) who is counted as being poor. Poverty is seen as being either *socially deprived* or as being *socially excluded*.

A decision about the choice of resources can be viewed in terms of the *space* for poverty measurement. Should poverty be defined in the space of income, earnings capacity or utility? Thinking in terms of the correct or ideal space for poverty measurement forces us to be consistent (or reveals the lack of consistency). It seems appropriate, for instance, to both *identify* the poor and *aggregate* the relevant information in the same space or explain why this is not done.<sup>2</sup> Second, to talk in terms of spaces also makes relevant what kind of ethical view we hold.

Our ideal choice of space might differ from the one we *can* empirically use. For instance, we might consider life-time utility as the ethically-relevant choice for measuring poverty, but we might have to utilize a multi-year (but not life-time) income average to implement our measure. The extent to which our orderings in the conceptual space correspond to those in the measured spaces is debatable.

The idea of well-being and poverty as capability (see, e.g. Sen, 1992) suggests that in comparing the well-being of individuals, we should analyze not only what they *have* (material goods, or income) but also what they *do*, and what they *can* do.<sup>3</sup>

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<sup>2</sup> As a counter example, Haveman and Buron (1993a) examine the lower part of the distribution of earnings capacity, defining a different poverty space, but then define their aggregate poverty population as the same proportion of the population that is income poor.

<sup>3</sup> See chapter 1 in this volume.

Possession or control over material goods, services and income does not necessarily tell us what people can do with them. Ownership of a car enables certain types of *functionings*, such as travel to work or vacationing. Even if we *choose* not to use the car during our vacation, we could have done so. Sen defines this particular functioning as within our *capabilities*. If, however, we have no vacation, our having the car would make no difference. The functioning “vacation” would not be part of our capabilities.

In this approach, what matters are our *potential* functionings. Social functionings are as central as private ones. A person whose resources prevent him from participating in society on a minimally acceptable basis has, in this sense, a limited set of capabilities.

The concept of functionings clarifies some aspects of the relative/absolute debate on the nature of poverty. The means to achieve some particular functioning generally varies with physical and social circumstances. A well-known example, due to Adam Smith, is the “ability to appear in public without shame”.<sup>4</sup> This basic functioning required possession of very different material goods in the Roman Empire than in eighteenth century Britain. What in the space of functionings is absolute – to be without shame – is associated with material goods that vary with the social context. This absolute notion of functionings requires that the space of material goods be considered relative.

The achievement of functionings, thus defined, depends on the goods and services to which we have access, the society in which we live in and our inherent abilities. These abilities may change over time and may depend on our resources and other functioning achievements. Literacy, for instance, is both a valuable functioning and a means to achieve other functionings. One possible adverse consequence of being poor is that it may diminish our capacity for functioning.<sup>5</sup>

According to Sen (1992), poverty is a state characterized by levels of capabilities that are, in the view of society, unacceptably low. What unacceptably low means is not defined precisely. That a person has low income is not a sufficient indicator of poverty. Income is one type of economic means to achieve higher levels of capabilities, and very low income can contribute to unacceptably low levels of capabilities. However, people with above average abilities may function well at low levels of income, while those with greater needs (e.g. for wheelchairs) may need higher incomes to achieve the same functionings. Analysis of income alone reveals only part of the extent to which people have capabilities below acceptable levels. An analysis of well-being based on the private possession of certain goods, such as

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<sup>4</sup> The example is discussed e.g. in Sen (1992, p 115).

<sup>5</sup> Presumably, such problems become worse as the duration of poverty becomes longer. Long-term poverty would in this view be bad because poverty is by itself bad and being poor for a long time diminishes the individual’s resources, such as the self-confidence, necessary to function well socially.



automobiles, also requires consideration of the social context. For instance, possession of automobiles might increase without a corresponding increase in the number of persons having the functioning of travel to work, if the increased possession of automobiles just substitutes for declining public transport. In this case, only the same functionings can be achieved even though possessions have changed.

We now turn to the *space* in which poverty in practice is measured (Sen, 1983). Although poverty is a complex and multidimensional phenomenon, with some notable exceptions (e.g. Townsend, 1979; Mack and Lansley, 1985; Halleröd, 1995; Kangas and Ritakallio, 1995), most authors examine only income. Even the Dutch and Belgian “subjective” approaches (Deleeck, Bosch and Lathouwer, 1992; Hagenaaars and van Praag, 1985) are ways to revise the position of the poverty line and the cardinality of the equivalence scale, rather than ways to reflect the multidimensionality of poverty.

How might the choice of space matter in practice? Consider, for example, poverty measured in four different ways in Belgium and Ireland using the exact same data. In Figure 2, from Deleeck et al. (1992), all four definitions are based on household income. Two definitions involve subjective approaches to determining the poverty cut-off (CSP and SPL), whereas the other two are based on a legislative definition (Legal) and the European Community standard – adjusted household income below half the overall mean (EC).<sup>6</sup> Not surprisingly, the level of poverty varies with definition. It is more disturbing, however, that the direction of change over time also varies with the definition.

In Belgium, for instance, poverty by the subjective poverty line (SPL) decreased between 1987 and 1989. According to another subjective line, derived using the Center for Social Policy (CSP) method, poverty increased. By contrast, in Ireland poverty increased as measured by the CSP method, but decreased relative to the administrative poverty definition (Legal). Thus, even controlling for population composition – the numbers are derived from the same samples – different methods may give different trends.

To the extent that poverty is multi-dimensional, the measurement dilemma becomes more difficult. In trying to determine who the poor are, does multi-dimensionality mean that *all* criteria have to be met or that *any* or *sufficiently many* must be met? In fact, few analysts begin with the formalized version of the “poverty is multi-dimensional” thesis, such as the notion of *capabilities* advanced by Sen (1983).<sup>7</sup> This is probably due to lack of suitable data.

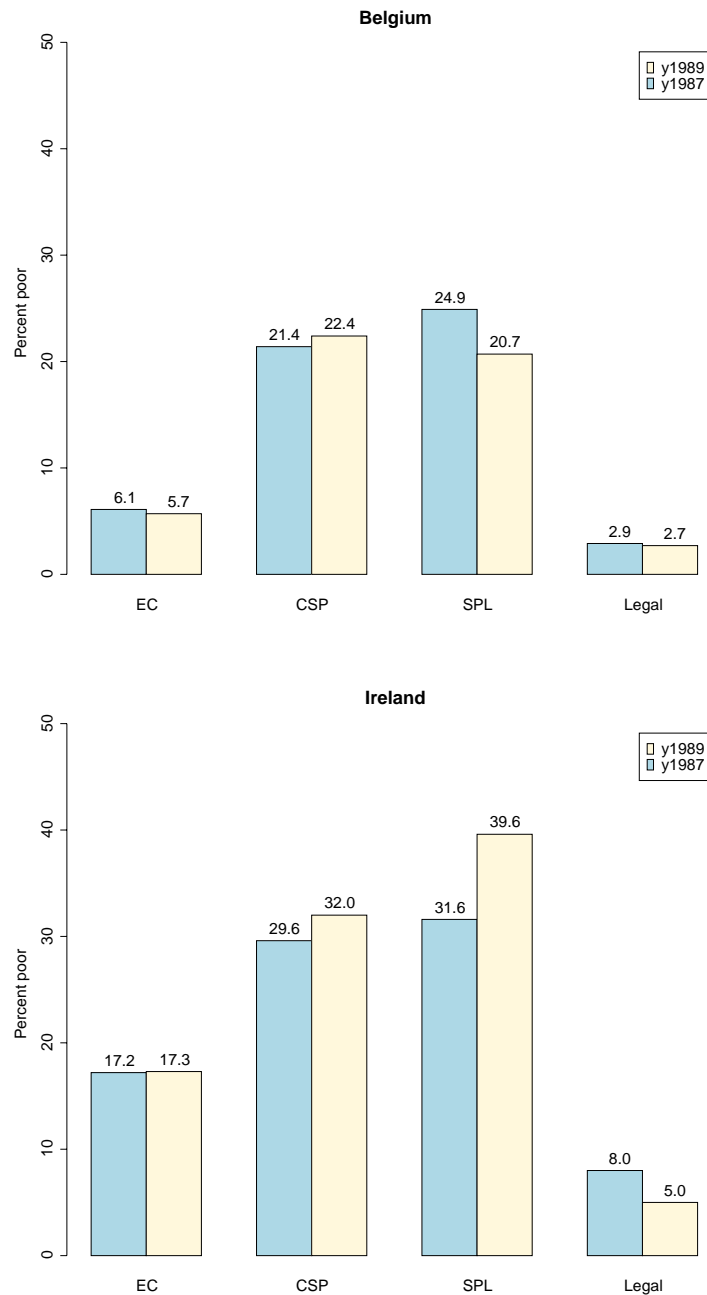
Income is the most common space used in poverty studies and is the focus of this review. Income is in advanced economies an important resource that affects the size

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<sup>6</sup> Deleeck et al. (1992, pp. 38–39) explain how the subjective approaches were implemented.

<sup>7</sup> See, however, Hossain (1990) for an analysis.

**Fig. 2** Poverty in Belgium and Ireland using alternative definitions



Note: Bars show the proportion of poor persons for following definitions. EC: OECD-adjusted income below half of mean income; CSP: Center for Policy Research subjective approach; SPL: the Leyden subjective poverty approach; Legal: income is less than the national income norm.

Source: Deleeck et al. (1992).

of people's possibility sets. Incomes are easy to measure and income information is readily available for long periods of time.

The cautious reader will prefer examining several indicators when they are available. We show, for instance, poverty rates for different fractions of median income and consumption expenditures in Finland in 1981 and 1990 (Figure 3). Although for any particular poverty cut-off, the proportion of persons poor varies with the resource concept, in this particular comparison, poverty has decreased using both definitions.

## 2.4 Equivalence scales

Poverty assessments require a comparison of the well-being of households with varying structure, i.e. the choice of an equivalence scale. In theory, an equivalence scale simply accounts for economies of scale, e.g., a family with ten members does not need five times as many kitchens and bathrooms as a family of two persons. However, there is much dispute about the extent of economies of scale and how resources are transformed to generate well-being within different types of households.

Let  $F(y, s, x)$  be the joint cumulative distribution function of income  $y$ , family size  $s$  and a  $(p \times 1)$  vector of other family characteristics  $x$ . The problem of finding the correct equivalence scale can be characterized as follows. An equivalence scale  $e(u, s, x)$  for some utility value  $u$  for a family with characteristics  $(s, z)$  is defined by the cost  $c(\cdot)$  of attaining the utility level  $u$  relative to the cost of attaining the utility level  $u$  in some reference household, indexed by 0:<sup>8</sup>

$$e(p, s, x, s_0, x_0; u) = \frac{c(s, x, p; u)}{c(s_0, x_0, p; u)}. \quad (1)$$

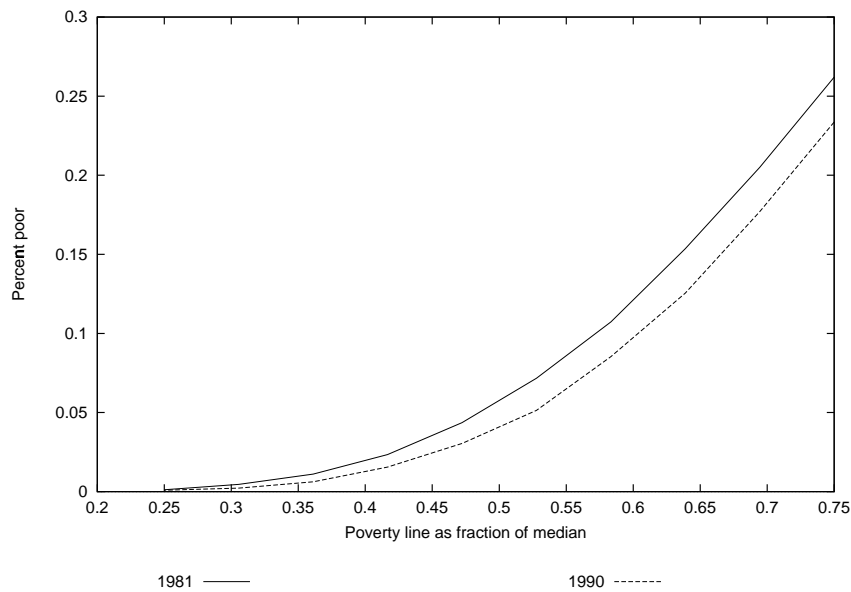
Although equivalence scales are defined in terms of some utility level (and therefore the scale can assume different values for other levels of utility), in most studies they are assumed to be constant across all characteristics other than  $(s, x)$ . Given this very strong assumption,  $F_e(y_e, s, x)$  is the distribution of equivalent income, where  $y_e = y/e(s, x)$  for a scale  $e$ . Poverty comparisons can then proceed in terms of this new distribution function.

There are at least four different ways of obtaining equivalence scales:

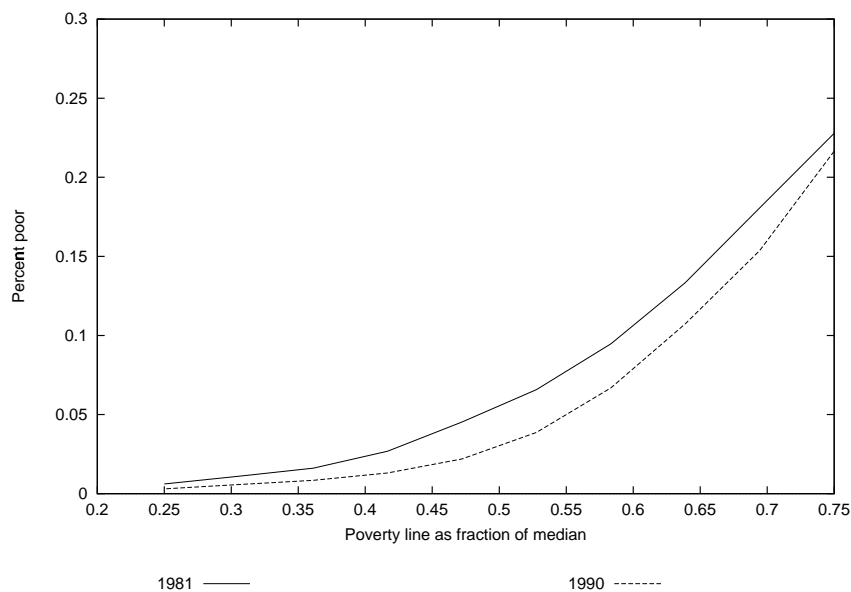
- (1) nutritional and physiological studies;
- (2) expert judgments;
- (3) demand analysis;

<sup>8</sup> See Deaton and Muellbauer (1989) for a thorough treatment of the concept of the cost function.

**Fig. 3** Percent poor using disposable income and expenditure as resource concept, Finland, 1981 and 1990



(a) Expenditure



(b) Disposable income

Note: Graph shows the head count ratio setting the poverty line at fractions of the median in 1981 and 1990 using either expenditure or disposable income as the resource variable .

Source: Authors' calculations from Finnish Household Budget Survey microdata 1981 and 1990.

(4) population judgments (so-called subjective scales).

Often scales combine all these approaches. For instance, the U.S. poverty line equivalence scale is based on nutritional studies, i.e., on the estimated cost of the food basket required for different types of families, combined with the fact that the average U.S. family, according to the 1955 Household Food Consumption Survey, spent about one-third of its budget on food (National Research Council, 1995, p. 163).

There is no optimal method for deriving an equivalence scale. Indeed, without additional assumptions, there is no way of selecting the basis for choosing an equivalence scale, let alone the correct equivalence scale, out of the multitude that have been suggested.

For instance, full equivalence scales can not be identified from budget data on demands alone.<sup>9</sup> Rather, demand data reveal the cost of living index for a household relative to the reference household,

$$e(p, s, x; u) = \frac{L(s, x, p, p_0; u)}{L(s_0, x_0, p, p_0; u)} \frac{c(s, x, p_0; u)}{c(s_0, x_0, p_0; u)}, \quad (2)$$

where  $L(\cdot)$  is the cost of living index defined by

$$L(s, x, p, p_0; u) = \frac{c(s, x, p; u)}{c(s_0, x_0, p_0; u)}. \quad (3)$$

The first term in equation 2 is the relative level of living index, which can be identified from demand data alone, whereas the second term, the equivalence scale under the base price regime  $p_0$  can not be identified without additional information and / or assumptions.

Jenkins and Lambert (1993, p. 337) note that choosing an equivalence scale embodies three different assumptions (in addition to such choices as the space for welfare):

- (1) specification of the household or family characteristics that are relevant for differentiating between levels of need (e.g., household size and composition),
- (2) agreeing upon an ordinal ranking in terms of those characteristics, and
- (3) specifying the cardinal ranking of different households by need level, i.e., specifying how much more resources one household needs in order to attain the same level of well-being as another.

Many (or most) disagreements center around the third stage above, namely the cardinalization of the scales. It is, however, possible to explore the poverty ordering of two distributions without taking this final step.

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<sup>9</sup> See Deaton and Muellbauer (1989) and, recently, Blundell (1998).

Consider, for instance, the comparison of a two-parent, single-child family with a single-mother, two-child family. Based on household demand, children are, in general, assigned a lower weight than adults. Consequently the two-parent, three-person family needs more money income if its members are to be considered as equally well-off as the single-mother, three-person family. However, this single-mother family might be less well-off, even if it had as much money income (and therefore more income per equivalent adult) as the two-parent family, because two adults have more time for home production and child care than the single mother. We are not arguing that this is the case, just that one might disagree on the ranking of households according to needs, not only the cardinalization.<sup>10</sup>

Consider the simple but popular equivalence scale

$$y_e = \frac{y}{s^e}, \quad (4)$$

where  $y$  and  $y_e$  are income and equivalent income,  $s$  is family size and  $e$  is the elasticity of equivalent income w.r.t. family size, a parameter set by the researcher that lies between zero and one.<sup>11</sup> Equivalent income decreases monotonically in both family size and in the elasticity. As Coulter et al. (1992*b*) show, the extent of measured poverty, however, is not a monotonic function of the equivalence scale elasticity, but has a U-shaped pattern.

In Figure 4, we demonstrate this phenomenon using data from the Finnish Household Budget Survey (HBS) for 1981 and 1990.<sup>12</sup> Note that although in both years the lines are U-shaped, the line drawn for 1981 is everywhere above that for 1990. The fact that the poverty index is not a monotonic function of the equivalence scale elasticity need not mean that changing the equivalence scale affects the assessed trend in poverty.

Two further popular scales are the scale (A),

$$y_e = y / \{1 + \beta(\alpha - 1) + \gamma c\}, 0 < \gamma < \beta < 1 \quad (5)$$

and (B)

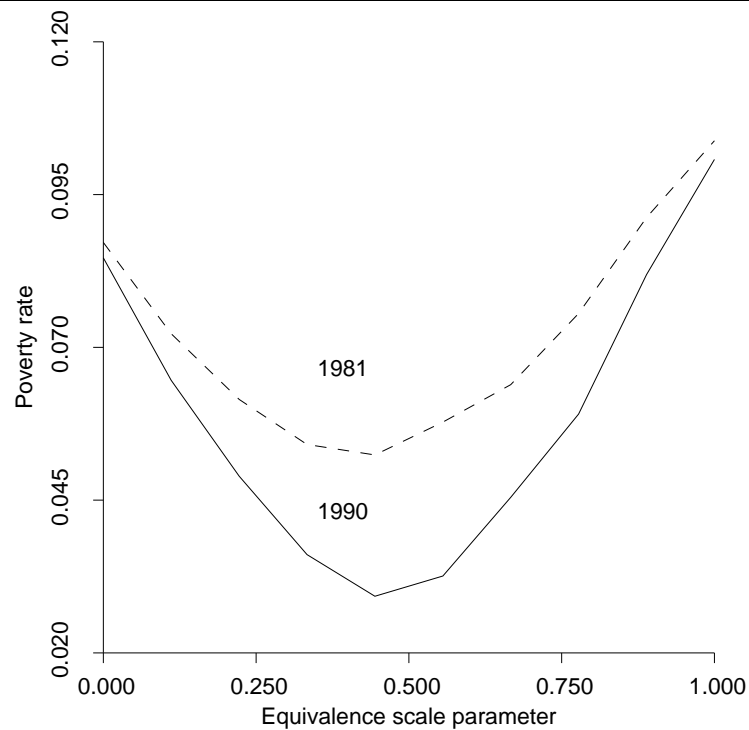
$$y_e = y / (\alpha + \gamma c)^\eta, 0 < \gamma, \eta < 1. \quad (6)$$

<sup>10</sup> These and related issues are discussed, for instance, by Danziger and Taussig (1979), Jenkins (1991), Jenkins (1994), Coulter, Cowell and Jenkins (1992*b*), Coulter, Cowell and Jenkins (1992*a*), Atkinson (1992), Atkinson and Bourguignon (1987), Nelson (1993), Fisher (1987), Buhmann, Rainwater, Schmaus and Smeeding (1988), Jenkins and Cowell (1994), Bradbury (1997), Deaton and Muellbauer (1989), Deaton (1992) and Rainwater (1990).

<sup>11</sup> This scale is used by e.g. Atkinson, Rainwater and Smeeding (1995) along with numerous other studies.

<sup>12</sup> Poverty is measured as the fraction of all persons whose equivalent disposable income is less than one half of equivalent median disposable income in the survey year.

**Fig. 4** Sensitivity of poverty rate to equivalence scale – Equivalence scale elasticity of income poverty in Finland, 1981 and 1990



The properties of these scales are discussed e.g. by Jenkins and Cowell (1994). The (A) scale in equation 5 commonly sets  $\gamma = .5$  (i.e., children are considered to need half as much as the first adult) and  $\beta = .7$  (i.e., an additional adult is considered to need 70 percent as much as the first adult). This corresponds to the so-called OECD-scale. A drawback is that this scale does not separate between two types of relativities: the needs of children relative to those of adults (how many children make up an equivalent adult?) and family size relativities (how much does a family's needs increase with the addition of an equivalent adult?). In the (B) scale in equation 6,  $\gamma$  specifies the needs of children relative to adults, whereas  $\eta$  reveals the increase in needs that the addition of an equivalent adult leads to.

### 2.5 Unit of analysis and intra-family distribution

Economists traditionally assume that the family acts as if it were a single utility maximizer and that all household members share the same level of well-being (Deaton and Muellbauer, 1989). In this case, the demand for goods is similarly affected by a change in non-labor income, regardless of who in the household controls that source. Empirical tests (e.g. family labor supply) have tended to reject the hypothesis (see e.g. Thomas, 1990, McElroy, 1990 and Schultz, 1994).

Other models of family decision making have implications for the measurement

of poverty – see Bergstrom (1996) for a review. In the bargaining model of family decision making (see, e.g. Browning, Bourguignon, Chiappori and Lechene, 1994; Bourguignon and Chiappori, 1994), the equal-sharing assumption emerges only as a special case, and the conceptual basis of equivalence scales derived from consumer expenditure surveys is called into question.

The abandonment of the equal sharing hypothesis complicates both the determination of the levels of income needed in different types of households to attain the same level of well-being (the “equivalence scale” question) and the assumption that levels of economic well-being are equal within a given household. Thus, some members of the household may be non-poor, while others are poor, even though on average the household is non-poor. It is also possible that some members in a non-poor household can be poor because of unequal sharing of resources.

Income inequality unequivocally increases in the absence of equal sharing. It is not clear what happens to poverty.<sup>13</sup> Unequal sharing in on-average non-poor households may push members into poverty, while unequal sharing in on-average poor households may allow some members to escape poverty.<sup>14</sup>

## 2.6 *The relevant accounting period*

Poverty measurement is sensitive to the choice of the time period over which resources are measured. Although most empirical studies use a calendar year as the accounting period, many researchers suggest that to be really poor requires deprivation for long periods of time.<sup>15</sup> On the other hand, viewing poverty as capability failure suggests that even short periods of poverty can be problematic.

It is often thought that temporary fluctuations in incomes are of little public concern. For example, some people receive their salary once a month and might, during a few days prior to receiving their next salary, have no money. This is not very likely to be a matter of great concern. Thus, for some “short” intervals it might not be bad to be poor in a single period, if one is non-poor over most prior and subsequent intervals.

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<sup>13</sup> A criticism against using the head-count ratio is that it decreases for every poor person lifted out of poverty even if this were to happen at the expense of pushing an already poor person deeper into poverty, as will be the case for persons removed from poverty by unequal sharing within an on-average poor household. It is not possible, *a priori*, to determine which effect will dominate. Using more informative indices to measure the extent of poverty complicates the comparison further.

<sup>14</sup> See e.g. Danziger and Taussig (1979), Jenkins (1991), Jenkins (1994) and Haddad and Kanbur (1990) for discussion.

<sup>15</sup> See National Research Council (1995, pp. 295–8) for a discussion of *short-term* poverty. See also Ruggles (1990).



Using this rationale, many economists consider long-term economic (poverty) status to be the relevant concept. However, this does not resolve the issue as to the appropriate length of the “long-term”, nor does it suggest that the “life-time” of the individual is appropriate.

Because we have an intuitive understanding of what the word poverty means, some of what we know about poverty influences our research agendas. For instance, many economists claim that well-being should be evaluated over the long-run, because many of the poor in a given year and/or at a certain stage in their life (e.g. students) will over a longer time period not be disadvantaged at all.

Short-term poverty, however, can be extremely distressing or have long-lasting effects. While a person who experiences such a shortage will quite often in life-time terms be non-poor, some acute episodes may cause health problems, especially among young children, and frequent short-term spells of poverty may erode human capital. This suggests the study of the frequency of individuals’ poverty spells, because the less resources they have, the more frequently they are likely to fall into poverty.

The emphasis on life-time income rests on many implicit, but questionable, assumptions. For instance, saying that income averaged over several years is a better measure of individual well-being implicitly assumes symmetry and implies a form of risk-neutrality in well-being. Measuring poverty by average income implies that a loss of 10 percent compared to life-time average income in one year can be compensated with an equally large gain in the next, or that being very poor for five years and non-poor for five years is just the same as being poor and non-poor in alternate years during a ten year period. This might be the case. However, if well-being is concave in money income, then the average of income over a period will overestimate actual well-being if those incomes vary from year to year.<sup>16</sup>

## 2.7 *Longitudinal aspects of poverty*

Apart from the choice of accounting period, longitudinal aspects of poverty measurement deals with at least the following:<sup>17</sup>

- the duration of poverty spells
- the distribution of poverty spells across the population
- the impact of experienced poverty spells on the likelihood (and duration) of future spells.

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<sup>16</sup> See Duncan, Gustafsson, Hauser, Shmauss, Messinger, Muffels, Nolan and Ray (1993), Ruggles (1990) and National Research Council (1995).

<sup>17</sup> See Ashworth, Hill and Walker (1994) for a lucid discussion.

The appropriate time period also has implications for cross-country poverty comparisons. For example, a population with the same value of a single time period poverty measure  $P_{t1}$  as another population, but with a lower rate of multi-period poverty  $P_{t1,t2}$  might be better off if it has a lower rate of persistence of poverty, i.e., more movements into and out of poverty.

The *distribution* of poverty spells, apart from the level of poverty and the duration of poverty spells, is also of interest. Assume there are two populations with equal poverty rates, equal two-period poverty rates, but unequal distributions of the poverty spells. That is, in both populations, a fraction  $P/2$  of the population enters the poverty population each year and stays there for two years. However, in one of them (A), the same individuals spend two years in poverty, two years out and then two years in again. There would only need to be four groups of people, each of size  $P/2$ , to keep the poverty rate and exit rate constant. A fraction  $1 - 2P$  of the population can and, in our example, will never experience a poverty spell. In contrast, think of a population (B) consisting of  $J > 4$  groups of equal size, all with positive probabilities  $q$  of entering the poverty population in period  $t$  such that the proportion poor is  $P$  in every period and the duration of every poverty spell is two years. After some number of time periods  $T$ , the distribution of poverty spells is more concentrated in A than in B, despite the fact that entry and exit as well as the level of poverty is constant across populations.

## 2.8 Poverty comparisons and sources

Let  $P_{i,t}[F(y); z]$  be some measure of poverty in population (country)  $i$  at time  $t$  for some resource  $y$  and a poverty line (in the space of the resources  $y$ )  $z$ . If the purpose of poverty measurement is to rank different populations by the poverty measure  $P$ , comparisons can be made over various dimensions:

- (1) *within* a population at two different points in time;
- (2) *between* two populations at a single point in time;
- (3) compare the change in poverty between two points in time across two populations.

Meaningful comparisons depend on a number of assumptions about resources and the poverty line. As noted above, what is meant by ‘absolute’ poverty is a comparison (in general) within a population across time, holding the value of  $z$  constant, assuming that the resources  $y$  can be compared across time. By contrast, a ‘relative’ comparison of poverty rates does not keep the value of  $z$  constant, at least not in the sense that the resources  $y$  are comparable across time (by, e.g., simply deflating by a price deflator); with a relative measure the poverty standard gets indexed by  $t$ ,  $z_t$ .

Several factors determine which comparisons are feasible, relevant and meaningful. For instance, the ranking of poverty changes (or, trends) across populations, a kind

of a ‘difference in differences’ approach, is one reliable way of comparing poverty across countries. The motivation is that comparing changes within countries over time abstracts (or differences out) factors that are constant or change only slowly *within*, but *not across* countries, such as differences in population structures or differences in sampling procedures. This argument depends not only on the *purpose* of the poverty comparison, but also on what type of poverty comparisons are made. For instance, if we adhere to a ‘strictly relativist’ view, i.e., determine the poverty line  $z_{i,t}$  separately for every country-year, the difference in differences argument might not apply because many things, including income above the poverty line, might change differently within countries. If the poverty cut-off is defined in terms of say median income, differences in the evolution in poverty may well be due not to changes in the circumstances of the poor but to changes among the non-poor.

Furthermore, we could compare poverty in terms of

- (1) a common fixed poverty line,  $z$  applied to both countries at both points in time,

$$P_{i,t1}(y; z) - P_{i,t2}(y; z) \lesseqgtr P_{j,t1}(y; z) - P_{j,t2}(y; z),$$

- (2) a poverty line that is constant within country but different between countries ( $z_i, z_j$ )

$$P_{i,t1}(y; z_i) - P_{i,t2}(y; z_i) \lesseqgtr P_{j,t1}(y; z_j) - P_{j,t2}(y; z_j),$$

or

- (3) poverty lines that vary both between and within countries

$$P_{i,t1}(y; z_{i,t1}) - P_{i,t2}(y; z_{i,t2}) \lesseqgtr P_{j,t1}(y; z_{j,t1}) - P_{j,t2}(y; z_{j,t2}).$$

There is no consensus as to which approach either *in principle* or when implemented yields the most reliable results. For instance, assume that we apply a common poverty line across all countries over all time periods. We still must adjust the poverty change to take into account the differences in purchasing power and exchange rates across countries. Although purchasing power parities (PPP) are designed to facilitate such comparisons, it is not clear that the deflators used are the appropriate ones (Rainwater and Smeeding, 1995).<sup>18</sup>

PPPs have been designed to render comparable gross national products and other aggregate variables in the national accounts. Cross-national differences in consumption that is tax-financed, as opposed to household-expenditure financed, are not taken into account. We can not be certain whether differences in PPP-adjusted incomes reflect differences in the standard of living between average persons in different countries, or rather reflect differences in relative prices or in preferences. Dowrick and Quiggin (1994), analyzing disaggregated price and expenditure information from 60 countries, found that the ranking of countries according to PPP-

<sup>18</sup> Moreover, there is question whether PPPs are appropriate for comparisons of well-being across countries. See Dowrick and Quiggin (1994) for a critical discussion.

adjusted GDP is different from that obtained by comparing levels of welfare using the revealed-preference approach. Their results suggest that PPP-adjusted income can be a very poor measure of economic well-being.

In this review, we take the view that poverty changes within a country, using similar methods, but not necessarily holding the poverty line constant, are the most plausible way to compare poverty differences across countries (or across studies within one country, for that matter).<sup>19</sup>

## 2.9 *The poverty line*

The choice of a poverty line, i.e., a point in the resource space which separates the poor from the non-poor, involves choices about many issues, including the choice of the resource space, the particular view (absolute/relative) about poverty, the choice of an equivalence scale, and so on. Although some of these choices can be resolved by “objective” methods, much judgment is still required. Methods for dealing with uncertainty about the particular point in the resource space at which the poverty threshold lies are discussed below.

There is no unambiguous single correct poverty line for any population and time period. One can use systematic methods to determine several different poverty lines and base conclusions on them all. Or one can resort to the type of dominance methods discussed below and narrow the range of possible poverty lines.

## 2.10 *Aggregation: the choice of poverty index*

The literature on the aggregation of poverty information is, apart from the contribution of Watts (1968), inspired by the seminal article by Sen (1976). He demonstrated that poverty measurement consists of (i) identifying the poor and (ii) aggregating the poverty information. There are many detailed reviews of the aggregation issue, including Foster (1984), Seidl (1988), Ravallion (1994) and Sen (1997). Davidson and Duclos (1998) briefly review different dominance criteria and derive the asymptotic properties of many estimators of poverty indices and poverty curves (for dominance conditions).

**Choosing a single index** Consider an income distribution that can be described by a cumulative distribution function  $F(y)$ ,  $y \in [0, \infty)$ . Assume that the c.d.f. is strictly monotonically increasing and that the first and second moments exist. The poverty line is a positive constant  $z$ . A poverty index is a function  $P(F; z)$  that is

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<sup>19</sup> See Sen (1979) and Atkinson (1989) for discussion.

increasing in poverty, defined on  $F$  and  $z \in Z$ , where  $Z$  is the set of poverty lines. The head count ratio, the percentage of the population who are poor is given by

$$P_H = F(z) = \int_0^z dF(y) = \int_0^\infty I[y < z] dF(y), \quad (7)$$

where  $I[\cdot]$  is the indicator function, taking the value of one if the condition in the brackets is fulfilled and zero otherwise. The normalized poverty deficit (Atkinson, 1987) is defined by

$$P_D = \int_0^\infty I[y < z](1 - y/z) dF(y). \quad (8)$$

Sen (1976) defines three basic axioms that a poverty measure (henceforth index) should satisfy:

- (1) the index should depend on poor incomes alone (Focus);
- (2) the index should be sensitive to the average income among the poor (Monotonicity);
- (3) the index should be sensitive to the distribution of income among the poor ([Weak] Transfer).

The head-count ratio fails to satisfy the Monotonicity and Transfer axioms; the normalized poverty deficit fails to satisfy the Transfer axiom. One can add additional axioms: (4) Symmetry (the poverty index is unchanged by a reordering of units); and (5) Replication invariance (the poverty index is unchanged by an identical proportional increase in the number of units with each income level). Others have suggested additional or stronger requirements and poverty indices that satisfy them. Because comprehensive reviews of poverty indices are available (Seidl, 1988; Foster, 1984; Ravallion, 1994; Zheng, 1997), we do not review them here.

Most researchers accept Sen's axioms, but few empirical studies incorporate all of them. Poverty is usually measured as the proportion of the poor in the total population (the head count ratio), violating the second and third axioms. The head count ratio is easily interpreted and it is simple to rank distributions on the basis of the difference in the head count ratios.

Another debatable question w.r.t. the Focus axiom is the common practice, followed also here, to define the poverty line,  $z$ , to be some fraction of some functional (typically the mean or median) of the income distribution. For example, the official European Union method of measuring poverty uses a fraction of *average* income as the poverty line. This definition implies that a change in the richest person's income will affect poverty. But, it does not seem reasonable to let an increase in Queen Elizabeth's income raise the poverty line and our assessment of the extent of poverty in the United Kingdom.

**Table 1** Membership of particular poverty measures in the classes  $\mathcal{P}$  and  $\mathcal{Q}$ 

Suggestion	$\mathcal{P}$	$\mathcal{Q}$	<b>AD</b>
Chakravarty (1983)	yes	yes	yes
Clark, Hemming and Ulph (1981)	yes	yes	yes
Foster, Greer and Thorbecke (1984)	yes	yes	yes
Hagenaars (1987) (Dalton type)	yes	some	no
Pyatt (1987)	yes	yes	no
Shorrocks (1995)	yes	yes	no
Watts (1968)	yes	yes	yes

Source: Jenkins and Lambert (1997).

Many poverty indices can be expressed in terms of poverty gaps  $g_y$  for income  $y$  and poverty line  $z$  as

$$g_y = \max\{z - y, 0\}. \quad (9)$$

Following Jenkins and Lambert (1997), indices that are defined in terms of  $g_y$  and that satisfy the Focus, Monotonicity, Transfer, Symmetry and Replication invariance axioms belong to the class of Generalized Poverty Gap (GPG) indices, a set denoted by  $\mathcal{P}$ .

Most poverty indices surveyed by Foster (1984) and Seidl (1988) are members of  $\mathcal{P}$ . Further, many indices in  $\mathcal{P}$  form a subset  $\mathcal{Q}$  that consists of indices defined in terms of relative poverty gaps  $\Gamma_y$ ,

$$\Gamma_y = \max\{(z - y)/z, 0\} = \max\{1 - y/z, 0\}. \quad (10)$$

An important subset of  $\mathcal{P}$  is the set of additively decomposable (**AD**) indices, which can be written as,

$$P_{AD}(F; z) = \int p_{AD}(y; z) dF(y), \quad (11)$$

where  $p_{AD}$  is a non-negative function of the poverty line and income. For decreasing and convex  $p_{AD}$ , the  $P_{AD}$  indices belong to  $\mathcal{P}$ . In Table 1, adapted from Jenkins and Lambert (1997), we list a few members of each class of indices.

**Dominance criteria** In order to avoid selecting a single index, researchers have examined under what conditions unanimous rankings can be achieved for larger

classes of indices.<sup>20</sup> The general approach in these studies is to seek conditions under which poverty orderings can be arrived at despite differences in views on some particular choices.

For instance, methods for evaluating the order of two distributions are well-established when there is no agreement on the cardinal ordering of units w.r.t. needs (but an agreement exists vis-à-vis the order of unit types), the exact position of the poverty line in income space and which of the particular members of the family of additively decomposable poverty indices should be used for the comparison. These methods are not commonly used, perhaps because they become intractable when the number of comparisons increases.

The literature on poverty dominance provides methods for addressing three types of problems:

- (1) uncertainty concerning the position of the poverty line in the resource space (for (i) a common but uncertain line, for (ii) different and uncertain poverty lines)
- (2) uncertainty regarding the most appropriate choice of a particular poverty index among classes that satisfy generally acceptable conditions
- (3) uncertainty about the cardinal ranking of different types of households.

In many cases, several of these problems are dealt with simultaneously. The generality comes at a cost. Comparing poverty in terms a single index, using a fully cardinal equivalence scale and one known (or, in fact, even two separate, but known) poverty line will lead to an ordering. Once sampling considerations are allowed for, the resulting ordering will almost surely be strict because asymptotically, the likelihood of a tie will go to zero. In the dominance approaches, the usual result is a partial ordering.<sup>21</sup>

**Dominance over a continuum of poverty lines (with one common line)** Define the binary relation **P**:

$$\mathbf{FPG} \text{ if and only if } P(G; z) \geq P(F; z) \text{ for all } z \in Z \quad (12)$$

$$\text{and } P(G; z) > P(F; z) \text{ for some } z \in Z, \quad (13)$$

<sup>20</sup> See Foster and Shorrocks (1988a), Foster and Shorrocks (1988b), Atkinson (1992), Atkinson and Bourguignon (1987), Jenkins and Lambert (1993) and Jenkins and Lambert (1997).

<sup>21</sup> See Foster and Shorrocks (1988a), Foster and Shorrocks (1988b), Atkinson (1987), Atkinson (1992), Atkinson and Bourguignon (1987), Jenkins and Lambert (1993), Jenkins and Lambert (1997), Jenkins and Lambert (1998b), Jenkins and Lambert (1998a) and Howes (1993). Shorrocks (1998) discusses connections between a few different approaches to examine profiles of the distribution of “bads”.

then  $\mathbf{P}$  defines a strict partial ordering in poverty. If  $\mathbf{FPG}$ , we say that F poverty dominates G.

Foster and Shorrocks (1988a; 1988b) and Atkinson (1987) define criteria of dominance corresponding to levels of *stochastic dominance*. Foster and Shorrocks (1988a; 1988b) explore the properties of the parametric family  $P_\alpha$  for  $z \in [0, \infty)$ , which is quite close to the problem of Lorenz dominance. Atkinson (1987) restricts interest to the **AD** class and a range of poverty lines  $z \in [0, Z] = \mathbf{Z}$ . This converts the question into one of *restricted* stochastic dominance. Atkinson also notes that lower degree dominance always implies higher degree dominance, but that the converse does not hold.

Atkinson (1987) derives the conditions which guarantee that the same ranking of a certain group of populations emerges regardless of which measure in the **AD** class is used. Denote the change in poverty on moving from distribution F to G by  $\Delta P$ . If  $\Delta P = P(G; z) - P(F; z) > 0$  for the poverty line  $z$ , there is more poverty in G than in F. The first condition is dominance according to the head count. If  $\Delta P(z) > 0 \forall z \in \mathbf{Z}$ , i.e., the c.d.f. of one distribution is above the other in a certain range (or in other words, the head count of poverty is higher for all values of the poverty line in the set  $\mathbf{Z}$ ), then we obtain the same ranking by all the measures in the AD class.

Atkinson's second condition states that if we can establish dominance by the aggregate poverty deficit, the ordering will be the same for all poverty measures in the **AD** class that satisfy the third requirement, i.e. for which  $p_{AD}$  is convex. Thus, if the normalized deficit for one distribution is lower than that for the other everywhere in the range  $z \in \mathbf{Z}$ , then this will be true for all measures in the class **AD**. Given this condition, we know that if the poverty gap gives a conclusive ranking, more complicated measures will not provide any further information.<sup>22</sup>

Foster and Jin (1998) note that there are broad and appealing classes of poverty indices whose dominance conditions have not been studied. They derive dominance results for poverty indices that can be written as functions of the utility short fall of the poor, based on the utility provided at the poverty level.<sup>23</sup>

**Sequential dominance** Recall that the choice of equivalence scale can be divided into three stages: determining the characteristics that are needs-relevant, determin-

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<sup>22</sup> Note the analogy with stochastic dominance results. First degree stochastic dominance is obtained if the 'zero' moments are unequal, no matter what the higher moments are; second degree dominance, if the means are unequal, etc. Thus, stochastic dominance of a higher degree may be obtained by merely checking for the lower order incomplete moments. In the present case, the head-count is the 'zero' moment, the normalized deficit corresponds to the mean, and so on. See Fishburn (1980).

<sup>23</sup> See Hagenars (1987) and also Spencer and Fisher (1992).



ing an ordinal ranking of units, and cardinalizing the ranking. Several authors have studied conditions under which poverty orderings are robust to the most controversial issue of the cardinalization of the differences in need (Atkinson and Bourguignon, 1987; Atkinson, 1992; Jenkins and Lambert, 1993).

Conditions for obtaining partial orderings do exist. The procedure involves checking for dominance within each population group sequentially, starting from the neediest. If, in each of these populations, one distribution dominates the other, any cardinalization of the ordinal ranking yields the same poverty ordering. An equivalent condition starts with a comparison of the neediest subpopulations and sequentially adds the next neediest group and checks for dominance only up to the next neediest group's poverty line. If, for every new group, one distribution dominates the other, all poverty indices and all equivalence scales within the specified class would yield the same ordering.

**Dominance when poverty lines vary across distributions** Jenkins and Lambert (1997, 1998*b,a*) examine conditions under which poverty rankings can be obtained for the class of generalized poverty gap indices and possibly different poverty lines in two populations. They define poverty dominance using (censored) distributions of poverty gaps (see equation 9) or normalized poverty gaps (see equation 10). The latter turns out to be useful for comparisons of poverty across distributions that arguably have different poverty lines – as will often be the case comparing two countries and even within a country across time.

The ‘TIP’ curve is defined by

$$\text{TIP}_g(p; F) = \int_0^{F^{-1}(p)} g(y; z) dF(y), \quad (14)$$

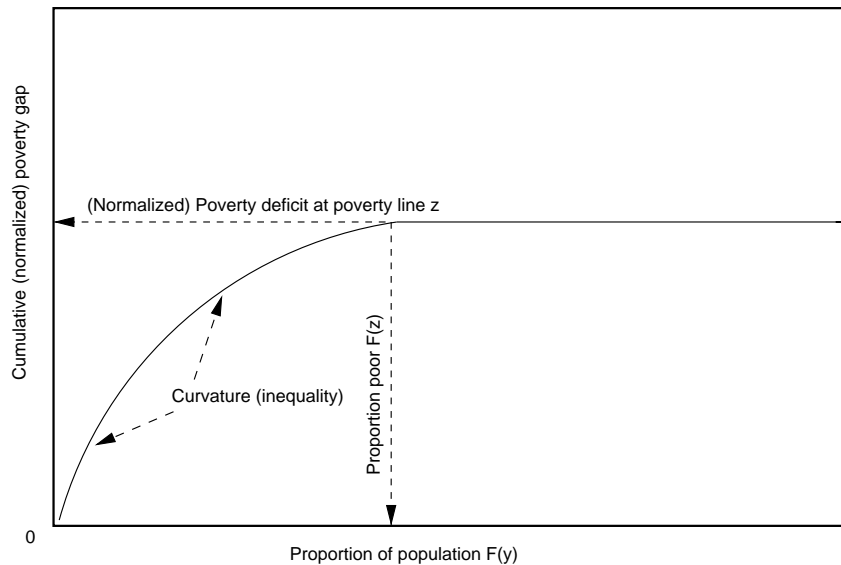
using the non-normalized poverty gap and

$$\text{TIP}_r(p; F) = \int_0^{F^{-1}(p)} \Gamma(y; z) dF(y) \quad (15)$$

for the normalized gap. A TIP curve summarizes several aspects of poverty (see Figure 5). At the point at which the graph of the cumulated (relative) poverty gap becomes horizontal, the proportion of the poor can read off the horizontal and the (relative) poverty deficit off the vertical axis. The curvature of the TIP curve prior to that point visualizes information about the extent inequality among the poor.

As shown by Jenkins and Lambert (1998*b,a*), if the TIP curve of a distribution  $F$  lies everywhere below that of distribution  $G$ , then the same ranking holds for all indices in the class  $\mathcal{P}$  for the TIP curve defined on unnormalized gaps for a common poverty line, and  $\mathcal{Q}$  for the TIP curve defined on the normalized gaps also for different poverty lines.

**Fig. 5** Example of ‘TIP’ curve



### 2.11 Measurement errors and poverty measurement

**Non-sampling errors** Cowell and Victoria-Feser (1996) examine the robustness properties of poverty indices to *data contamination*, such as would occur if a subset of income observations were erroneously coded. Taking the poverty line  $z$  to be a fixed constant, they suggest that robustness (as measured by the boundedness of the *influence function*) depends on the properties of the individual “poverty function”  $p(z; y; F)$ . If this function is “well-behaved”, as it approaches the extremes of  $z$  and 0, the poverty index will have a bounded influence function and therefore can be considered robust. Many commonly-used poverty indices, such as the Sen index or the FGT class, are robust in this sense. In many applications, the poverty line  $z$  is a fraction of some functional of the income distribution itself – typically some fraction of the mean or the median. The influence function and therefore the robustness of the poverty index depends also on the robustness of the functional on which the poverty line is based. If that is the median, the indices with well-behaved robustness properties remain robust. Non-robust statistics, however, in particular the mean, render the poverty index non-robust, i.e., the influence function is in such a case unbounded.

Howes (1996) discusses the impact of aggregation on inferring dominance relations among distributions. Under plausible assumptions about the underlying distributions, and for specific simulation examples, basing inferences of dominance on aggregated data increases the likelihood of inferring that dominance is present, even when it is not. Shorrocks and Subramanian (1994) discuss the possibility that the degree of confidence with which a unit is considered to be among the poor can assume values other than zero or one, suggesting fuzzy generalizations of many types of poverty indices.

**Sampling issues** Poverty assessments using either (possibly several different) indices or a particular dominance approach are most often conducted using samples drawn from the actual populations being studied. This raises the issue of how close to the population values the estimated indices can be expected to be. Most applications that address statistical inference rely on classical inference.<sup>24</sup>

The most common approach to estimating the sampling variability of poverty indices is to derive the asymptotic properties of the index under simple random sampling (SRS), possibly with non-stochastic but varying sampling weights. Few data sets are, however, drawn using SRS. An alternative is to employ re-sampling methods, such as a variant of the jack-knife or bootstrap methods. These methods are robust w.r.t. to variations in sampling design, the form of the index and, e.g., whether or not the poverty line is a fraction of some functional of the income distribution (such as the mean or median),

The most straightforward case estimates a single poverty index from the class **AD** using randomly sampled data, using a fixed poverty line (not estimated using the same data). Such estimators are means of simple functions of random variables and their sampling variance can be estimated using standard methods.<sup>25</sup> Data that are drawn from complex sampling designs warrant special attention. There exist well-developed methods for assessing the sampling variance of estimators in more complex designs.<sup>26</sup> Because **AD** indices for fixed poverty lines are just means of functions of random variables, there are applicable.<sup>27</sup>

The situation is more complicated when poverty statistics are based on sample estimates and also rely on an estimated fraction of the mean or median income. Preston (1995) derives the exact small and large sample distributions of the head-count ratio, again under SRS, when the poverty line is some fraction of the estimated median. The statistical properties of various estimators for poverty dominance are examined by Xu and Osberg (1998), Howes (1994*b*), Howes (1994*a*) and Jäntti (1992). Davidson and Duclos (1998) derive the sampling distribution under SRS for poverty deficit and TIP curves evaluated at a fixed set of points. The estimated versions of these variance-covariance matrices for empirical curves that are used for checking poverty dominance assist in performing statistical inference. The sampling distributions of several members of the class  $\mathcal{P}$  arise as special cases.

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<sup>24</sup> For a Bayesian approach, see Geweke and Keane (1996).

<sup>25</sup> See e.g. Kakwani (1993)

<sup>26</sup> See, for example Pahkinen and Lehtonen (1995), Skinner, Holt and Smith (1989) and Särndal, Swensson and Wretman (1992).

<sup>27</sup> Malmberg (1988) and Bishop, Formby and Zheng (1997) discuss the sampling properties of the Sen (1976) poverty index proposed when the poverty line is a known constant and data are SRS. Jäntti and Nordberg (1992) discuss its estimation when the poverty line is a fraction of the median that is being estimated simultaneously with the poverty line. See also Davidson and Duclos (1998).

These methods rely mostly on SRS. In more complex sampling settings, it may be very difficult to analytically find the variance (matrices) for estimators of poverty indices (curves). In such situations, sample reuse methods, in particular a bootstrap method, offer convenient and often the only practical options.<sup>28</sup>

### 3 Evidence about the extent of cross-sectional poverty

#### 3.1 Changes in poverty within countries over time

##### *Domestic sources*

The most common way to examine poverty is to scrutinize changes over time within particular countries. Doing this avoids many comparability problems.<sup>29</sup> Even minor variations in definitions can in specific cases generate substantial differences in results. Although the differences can generally be traced to variations in particular choices among those issues raised in section 2, they are often quite large. Deleeck et al. (1992), as discussed in section 2, estimate the poverty head-count ratio in two waves of panel data for several EU countries, using four different definitions of poverty lines. Take Ireland as a case in point. Unsurprisingly, different methods yield different levels of poverty (see Figure 2). However, the head-count ratio *increased* using two subjective definitions, remained more or less unchanged by the European Union's below half-of-average definition and *decreased* by the definition that relies on administrative rules.

Such results suggest that definitions matter. Depending on the choices that are made, poverty levels and trends can be quite different within a country even using the exact same sample of data. Thus, it is important to choose an appropriate combination of equivalence scales and poverty lines.

We summarize in Table A.1 a number of poverty head count ratio estimates, based on a host of different studies from different countries, using many different combinations of methods. Inspection of these patterns suggests there is wide variance in poverty levels and trends across countries. On the basis of varying amounts of evidence per country, it would seem that poverty increased in the 1980s and early 1990s in Australia, Germany (West), Italy, Sweden, the United Kingdom and the United States. The U.K. increase appears to be largest, followed by that in Australia. In Canada, Denmark, Finland and Spain. There was little change in Greece, Norway and Portugal and the evidence is quite mixed for Belgium, France, Ireland, Luxembourg and the Netherlands.

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<sup>28</sup> See Efron and Tibshirani (1993) for an introduction to bootstrap methods and Xu and Osberg (1998) for an application to poverty measurement.

<sup>29</sup> See Mayer and Jencks (1993) for a discussion of comparability problems across time.

Poverty rates across countries, from domestic sources as well as LIS, have been compiled by, e.g., Atkinson (1998) (European Union countries), ) and Bradshaw and Chen (1996) (the latter two mainly concerned with LIS). While the assessments in these studies vary somewhat, two conclusions are shared by them as well as our Table A.1. The country that stands out as having experienced a substantial increase in poverty is the United Kingdom. Further, there is little evidence of OECD-wide (or, advanced country wide) poverty trends in the many studies considered. This is in contrast with what has been observed about relative inequality (see e.g. Gottschalk and Smeeding, 1997).

#### *International sources (mainly LIS)*

The Luxembourg Income Study (LIS) contains several years of data on about 20 industrialized countries from varying years since the late 1960s.<sup>30</sup> In Table 2, we show the level of relative poverty, as measured by the head count ratio, in the latest cross-section of LIS, along with information on poverty changes. Poverty is defined as 50 percent of the within-country within-year disposable median income. Incomes are pooled within the family and each member is assigned the equivalent disposable or market income, equivalized using the square root of family size. We show the percentage of persons who live in households with income per equivalent adult below this poverty line.<sup>31</sup>

The LIS single-point estimates of relative poverty suggest a grouping of countries with respect to poverty. The United States has by far the highest poverty rate at 17.7 percent (and ranging from 16 to 18 percent over the years), followed by the United Kingdom, France and Australia. whose poverty rates vary between 13 and 15 percent. In addition, Canada, Ireland, Italy and Spain have poverty rates in excess of 10 percent. The Netherlands and the Nordic countries – Denmark, Finland, Norway and Sweden – have rates around 7 percent, and Belgium has the lowest point estimate at 5.4 percent.

Comparing the *level* of poverty across countries is controversial for many reasons, but comparing trends across countries is less so. If most problems of comparing poverty within a country at two points in time have been dealt with, remaining factors that induce differences in poverty levels across countries should be differenced out when trends are evaluated. Trend comparisons across countries are more reliable if they are found using similar definitions. It is not consistent, for example, to compare changes in the U.S. official poverty with changes in the poverty rate in Sweden defined by the politico-administrative line.

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<sup>30</sup> The Luxembourg Income Study is described, e.g., in Smeeding, O’Higgins and Rainwater (1990). See also <http://lissy.ceps.lu>

<sup>31</sup> We have examined the sensitivity of the LIS estimates to variations in equivalence scales. Our results do not appear to be sensitive to the choice of a common equivalence scale. In Table A.5 in the appendix we show the point estimates that underlie our trend assessments.

**Table 2** Poverty rate and recent change in poverty using LIS data

Country	Latest year		Longest Change		Latest Change	
	Year	Poverty rate	Years	Time trend	Years	Change
Australia	1989	12.2	1981–1989	0.198	1985–1989	0.113
Austria	1987	3.4		n.a.		n.a.
Belgium	1992	5.4	1985–1992	0.118	1988–1992	0.128
Canada	1991	11.3	1971–1991	-0.179	1987–1991	0.019
Denmark	1992	7.5	1987–1992	-0.586		n.a.
Finland	1991	5.7	1987–1991	0.086		n.a.
France	1989	9.5	1979–1989	0.203	1984.1–1989	-0.526
Germany	1989	5.6	1983–1989	6.456	1984–1989	-0.172
Ireland	1987	11.3		n.a.		n.a.
Italy	1991	10.3	1986–1991	-0.024		n.a.
Luxembourg	1991	4.7	1985–1991	-0.117		n.a.
Netherlands	1991	6.7	1983–1991	0.014	1987–1991	0.397
Norway	1991	6.6	1979–1991	0.209	1986–1991	-0.144
Spain	1990	10.2	1980–1990	-0.193		n.a.
Sweden	1992	6.7	1967–1992	-0.286	1987–1992	-0.196
Switzerland	1982	8.3		n.a.		n.a.
UnitedKingdom	1991	14.5	1969–1991	0.317	1986–1991	1.087
UnitedStates	1991	17.7	1974–1991	0.118	1986–1991	-0.007

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Changes are measured by the slope of the regression of poverty rate on year. Table A.5 shows the point estimates that underlie the estimated trends.

Source: Authors' calculations from LIS database.

In examining the within-country changes, the years the comparison is based on is constrained by LIS. It would be preferable to examine changes at similar stages of the business cycle, but this is not an option. We show in Table 2 the trend in poverty, as measured by the regression coefficient in a regression of the head count ratio in all LIS data sets for a country regressed against year, and the annual percentage point change between the two latest LIS years. If only two data points are available, the regression coefficient equals the annualized percentage point change in the head count rate of poverty (in that case, the regression coefficient is a *Wald* estimate).

Looking at both the time trend as measured over all the years in LIS and the latest change, the evidence does not suggest a common trend across countries. Poverty

has increased in some countries and decreased in others. For instance, poverty increased over time in Belgium and the United Kingdom, the countries with the lowest and second highest poverty rates in the early 1990s. The increase in poverty in the United Kingdom from 1969 to 1991 was by almost a third of a percentage point per year. The increase in Belgium from 1985 to 1991 was around one tenth of a percentage point per year. For another pair of low and high poverty countries, in the early 1990s, poverty decreased in Denmark and Canada

In only two of our LIS countries is the direction of change of the longest time trend and the latest change different, namely in France and in Norway. In France, poverty increased, on average, by two tenths of a percentage point per year from 1979 to 1989, but decreased between 1984 and 1989 by half a point a year. In Norway, also, between 1979 and 1991, poverty increased by .2 percentage points per year, but decreased between 1986 and 1991.

Examining poverty dominance within countries reveals the robustness of the trend assessments obtained using single indices, such as the head count ratio. We illustrate this by showing in Figure 6 three examples using the plot of the average cumulative poverty gap against the percentage of population, or the ‘TIP’ curve (Jenkins and Lambert, 1997). If TIP curves do not cross, the same poverty ordering is obtained for all GPG indices (see section 2.10). In two of the countries in LIS, Australia in 1981 and 1985 and the United Kingdom in 1986 and 1991, TIP curves cross and between the relevant years, robust conclusions can not be drawn. By contrast, in Canada the estimated TIP curves do not intersect in any of the data sets in LIS. Rather, the TIP curves suggest a steady decline in poverty that is robust with respect to the choice of relative poverty line and poverty index.

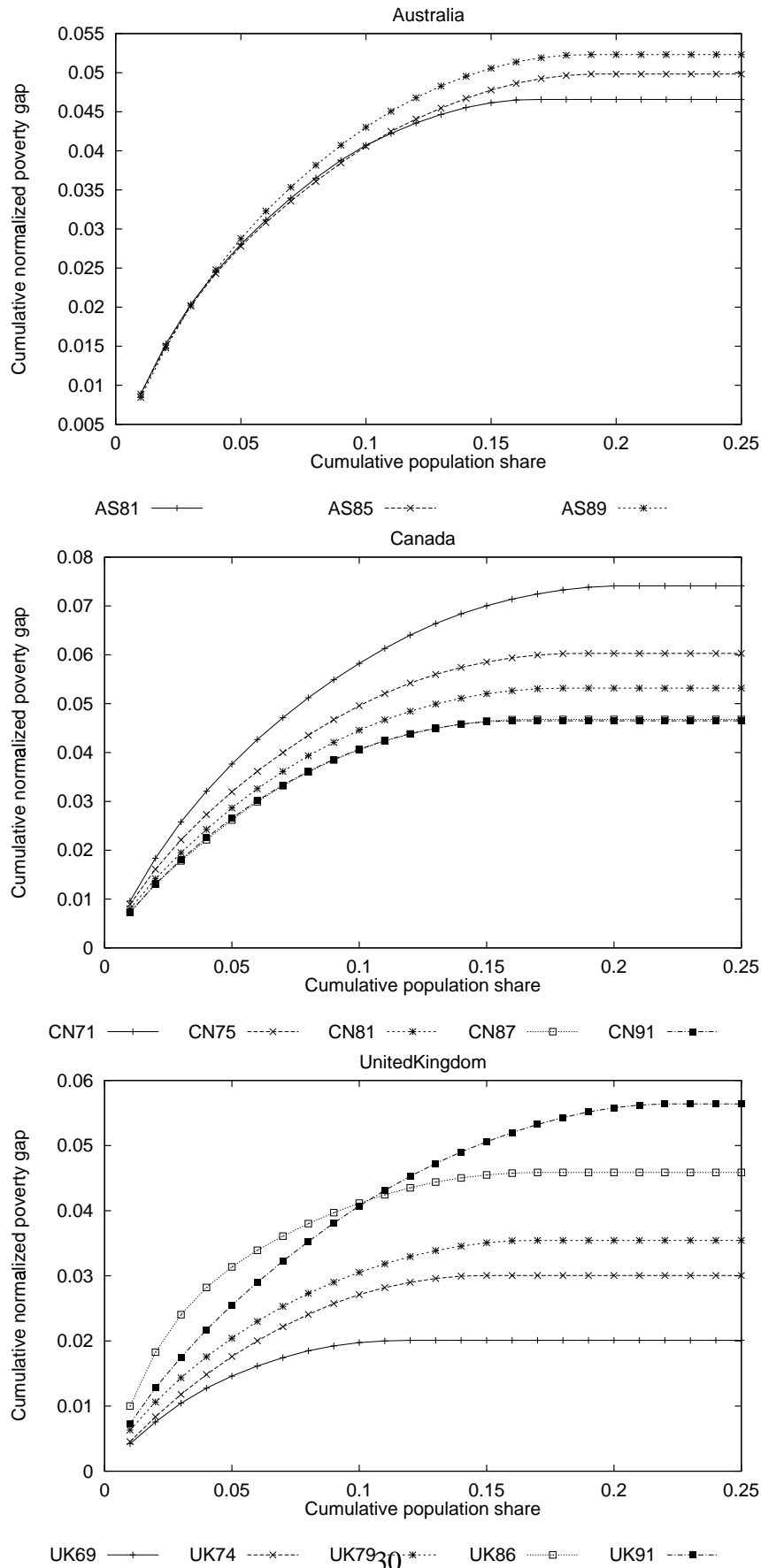
### 3.2 Poverty orderings

Once a specific view of poverty is applied, poverty orderings of countries are possible. Because use of a head-count ratio below a single poverty line may be misleading, we examine the sensitivity of the poverty ordering by examining whether there are cases of poverty dominance by the head-count ratio for a range of poverty lines from 0 up to 60 percent of the current adjusted median disposable income. If we observe poverty dominance by the head count, we know the order would be preserved for all lower poverty lines and all measures in the class **AD**.

Figures 7 and 8, as well as Tables 3-4, show first- (head count) and second-order (poverty gap) poverty dominance for relative poverty orderings for 16 advanced economies. In Table 3 we show, for the latest LIS data, the set of countries that it dominates (column 2) and the set of countries it is dominated by (column 3). This ordering of countries is also displayed as a Hasse diagram in Figure 7.

First-order poverty dominance does not produce a “tight” ordering of countries.

**Fig. 6** Examples of TIP curves



Note: The curves are the cumulative average poverty gap ('TIP' curves), using 60 percent of the current median income as poverty line, at different percentiles of the distribution of income.

Source: Authors' calculations from the LIS database.



**Table 3** First-order poverty dominance using LIS data

Country	Dominates	Is dominated by
Australia	UnitedStates	Austria Belgium Finland Germany Italy Luxembourg Norway Spain Sweden Switzerland
Austria	Australia Belgium Canada Denmark Finland France Germany Ireland Italy Netherlands Norway Spain Sweden Switzerland UnitedKingdom UnitedStates	
Belgium	Australia Denmark France Ireland Netherlands Switzerland UnitedStates	Austria
Canada	UnitedStates	Austria Finland Germany Luxembourg Norway
Denmark	France Ireland	Austria Belgium Finland Germany Luxembourg Norway
Finland	Australia Canada Denmark France Ireland Italy Netherlands Spain Sweden Switzerland UnitedKingdom UnitedStates	Austria
France		Austria Belgium Denmark Finland Germany Luxembourg Netherlands Norway Sweden Switzerland
Germany	Australia Canada Denmark France Ireland Italy Netherlands Spain Sweden Switzerland UnitedKingdom UnitedStates	Austria
Ireland		Austria Belgium Denmark Finland Germany Luxembourg Norway Sweden
Italy	Australia UnitedStates	Austria Finland Germany Luxembourg
Luxembourg	Australia Canada Denmark France Ireland Italy Spain Switzerland UnitedKingdom UnitedStates	
Netherlands	France	Austria Belgium Finland Germany
Norway	Australia Canada Denmark France Ireland Switzerland UnitedKingdom UnitedStates	Austria
Spain	Australia UnitedStates	Austria Finland Germany Luxembourg
Sweden	Australia France Ireland UnitedStates	Austria Finland Germany
Switzerland	Australia France UnitedStates	Austria Belgium Finland Germany Luxembourg Norway
UnitedKingdom	UnitedStates	Austria Finland Germany Luxembourg Norway
UnitedStates		Australia Austria Belgium Canada Finland Germany Italy Luxembourg Norway Spain Sweden Switzerland UnitedKingdom

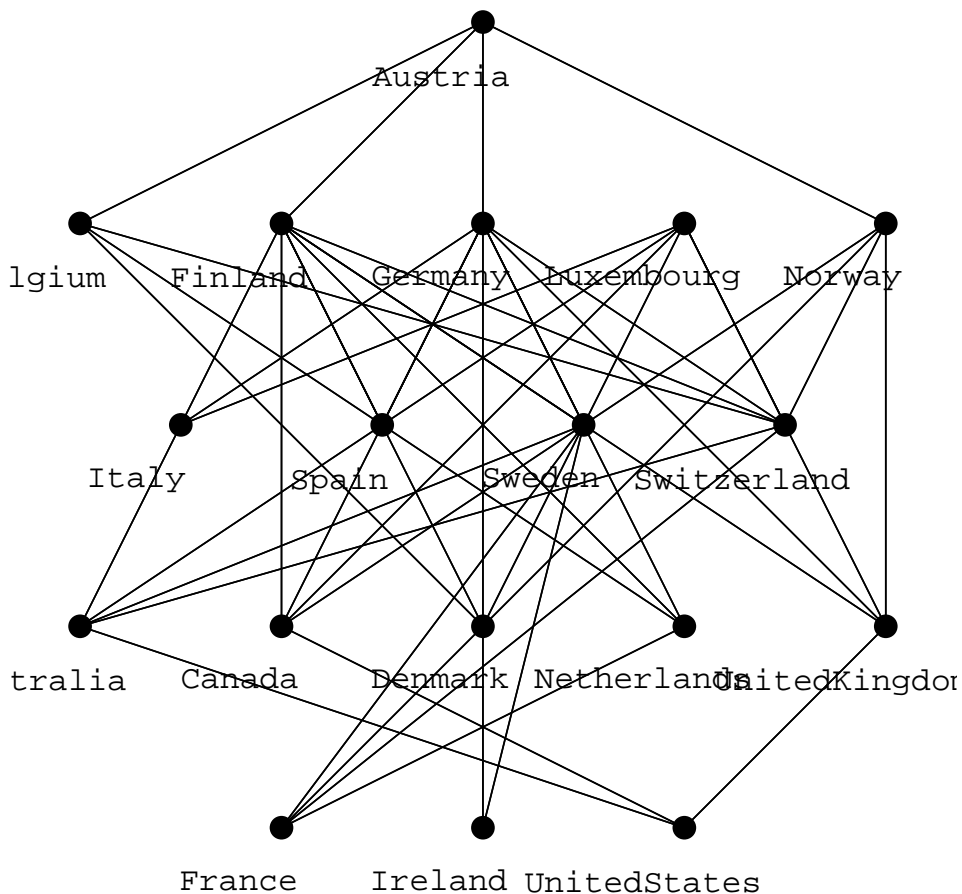
Note: The poverty line is defined as 60 percent of the adjusted median in each country within each year.

Source: Authors' calculations from LIS data

There are a large number of ties. For instance, the Netherlands is poverty dominated by Belgium, Finland, Germany and Austria and dominates in turn only France. However, in many cases, the lines cross and an unambiguous poverty ordering fails to materialize. Nonetheless, Figure 7 produces a five-tier ranking, with Austria at the top, and Belgium, Finland, Germany and Norway having the second lowest level of poverty. France, Ireland and the United States, in turn, have the highest. For example, the United States dominates no other country, but is dominated by 13 of the 18 countries.

To what extent can we find dominance w.r.t the distribution of normalized poverty gaps? We restrict the class for which the orderings are to apply to that for which

**Fig. 7** Hasse diagram of first-order poverty dominance using LIS data. Fully relative poverty



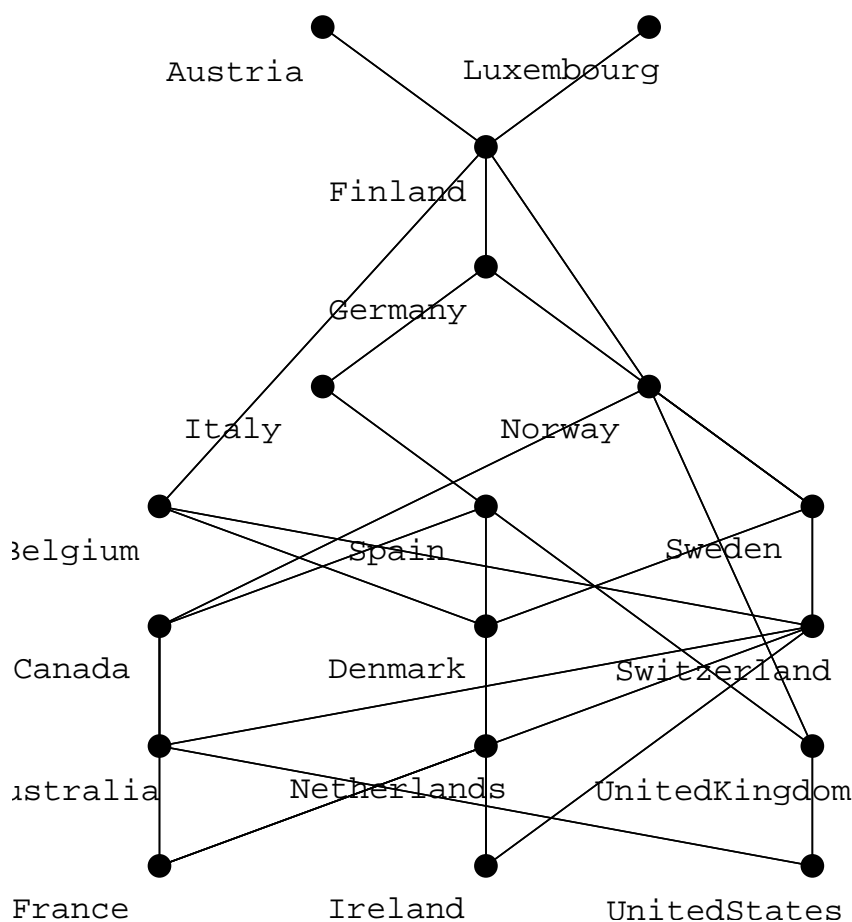
Note: The poverty line is defined as 60 percent of the adjusted median in each country within each year.

Source: Authors' calculations from LIS data

the poverty intensity function is strictly decreasing in income. As discussed in section 2.10, if the normalized cumulative poverty gap for a distribution  $F$  is everywhere above that of another, say  $G$ , then  $F$  has a greater extent of poverty by all indices that are members of  $\mathcal{Q}$ . In other words, in order for country  $A$  to 'TIP' dominate country  $B$ , the graph of the cumulative normalized poverty gap against the cumulative population share of country  $A$  must everywhere be below that of country  $B$ . In each case, we define the poverty line as 60 percent the adjusted median within each country within each year.

In Table 4, we show the results of all pairwise comparisons of normalized poverty gap dominance. The proportion of comparisons that result in a dominance relation is considerably greater than it was using the poverty rate. We show in Table 4 for each country those it dominates and those it is dominated by according to the TIP-criterion. Again, the pattern of dominance orderings is illustrated using the

**Fig. 8** Hasse diagram of normalized poverty gap (TIP) dominance using LIS data



Note: The poverty line is defined as 60 percent of the adjusted median in each country within each year.

Source: Authors' calculations from LIS data

Hasse-diagram (Figure 8).

There are fewer ties than with first-order dominance. The ranking of many countries changes compared to the first-order case. Sweden, for instance, now dominates Canada and the United Kingdom, in addition to the four countries it first-order dominated. Also, Luxembourg and Norway are now among the countries that dominate Sweden (cf. Tables 3 and 4). The reduction in ties makes the Hasse diagram simpler, but increased the number of tiers, from roughly five to eight. France, Ireland and the United States are still tied at the bottom of the diagram.

These comparisons of relative poverty rates and relative poverty gaps across countries do not account for differences in the real standard of living by country. Even though the United States has a much higher poverty rate than, say, Norway, relative to the median standard of living in each country, some of the poor in the United States may be better off than some of the non-poor in Norway because of

**Table 4** Normalized poverty gap dominance using LIS data

Country	Dominates	Is dominated by
Australia	UnitedStates	Austria Belgium Canada Finland Germany Italy Luxembourg Norway Spain Sweden Switzerland
Austria	Australia Belgium Canada Denmark Finland France Germany Ireland Italy Netherlands Norway Spain Sweden Switzerland UnitedKingdom UnitedStates	
Belgium	Australia Denmark France Ireland Netherlands Switzerland UnitedStates	Austria Finland Luxembourg
Canada	Australia France UnitedStates	Austria Finland Germany Italy Luxembourg Norway Spain
Denmark	France Ireland Netherlands	Austria Belgium Finland Germany Luxembourg Norway Sweden
Finland	Australia Belgium Canada Denmark France Germany Ireland Italy Netherlands Norway Spain Sweden Switzerland UnitedKingdom UnitedStates	Austria Luxembourg
France		Austria Belgium Canada Denmark Finland Germany Italy Luxembourg Netherlands Norway Spain Sweden Switzerland
Germany	Australia Canada Denmark France Ireland Italy Netherlands Spain Sweden Switzerland UnitedKingdom UnitedStates	Austria Finland Luxembourg
Ireland		Austria Belgium Denmark Finland Germany Italy Luxembourg Norway Spain Sweden Switzerland
Italy	Australia Canada France Ireland Spain UnitedKingdom UnitedStates	Austria Finland Germany Luxembourg
Luxembourg	Australia Belgium Canada Denmark Finland France Germany Ireland Italy Netherlands Norway Spain Sweden Switzerland UnitedKingdom UnitedStates	
Netherlands	France	Austria Belgium Denmark Finland Germany Luxembourg Norway Sweden
Norway	Australia Canada Denmark France Ireland Netherlands Sweden Switzerland UnitedKingdom UnitedStates	Austria Finland Luxembourg
Spain	Australia Canada France Ireland UnitedKingdom UnitedStates	Austria Finland Germany Italy Luxembourg
Sweden	Australia Denmark France Ireland Netherlands Switzerland UnitedStates	Austria Finland Germany Luxembourg Norway
Switzerland	Australia France Ireland UnitedStates	Austria Belgium Finland Germany Luxembourg Norway Sweden
UnitedKingdom	UnitedStates	Austria Finland Germany Italy Luxembourg Norway Spain
UnitedStates		Australia Austria Belgium Canada Finland Germany Italy Luxembourg Norway Spain Sweden Switzerland UnitedKingdom

Note: The poverty line is defined as 60 percent of the adjusted median in each country within each year.

Source: Authors' calculations from LIS data

the higher median standard of living in the U.S.

Addressing this issue requires a common metric in which to compare U.S. to Norwegian incomes. A number of so-called Purchasing Power Parity (PPP) adjusted

exchange rates have been developed for this purpose. Because such comparisons rely on average international prices, despite wide variation in relative prices across countries, Dowrick and Quiggin (1994) suggest that PPP-based welfare rankings are not firmly based in welfare economics. They propose that detailed price and consumption data be used to rank countries according to a revealed-preference approach instead, and present evidence which suggests PPP-based rankings are, indeed, inappropriate. Even if PPP-based approaches would yield well-motivated rankings, however, the commonly-used PPP adjustments are not designed for comparisons of real *disposable* income (as opposed to real *national* incomes). Nonetheless, because we have no empirical alternative, we provide poverty orderings based on PPP-adjusted incomes as an illustration.<sup>32</sup>

In particular, we use the Penn World Tables Mark 5.6 data on PPP adjusted exchange rates for consumption in the year of the LIS data and deflate the resulting current-year U.S. international dollar amounts to a common year's prices using the U.S. Consumer Price Index (CPI).<sup>33</sup> The poverty line is then taken to be half of the U.S. 1991 adjusted median disposable income (which choice leaves U.S. poverty unchanged, of course).

The Hasse diagrams of the real poverty first-order dominance ordering is shown in Figure 9 and of the second-order or TIP dominance in Figure 10. Because of its higher median standard of living, the United States now ceases to be tied at the bottom of the ordering. Ireland now shares with France and Spain the bottom tie. The relative position of Canada improves substantially, as it is dominated only by Luxembourg in either ordering. Again, the TIP ordering results in fewer ties.

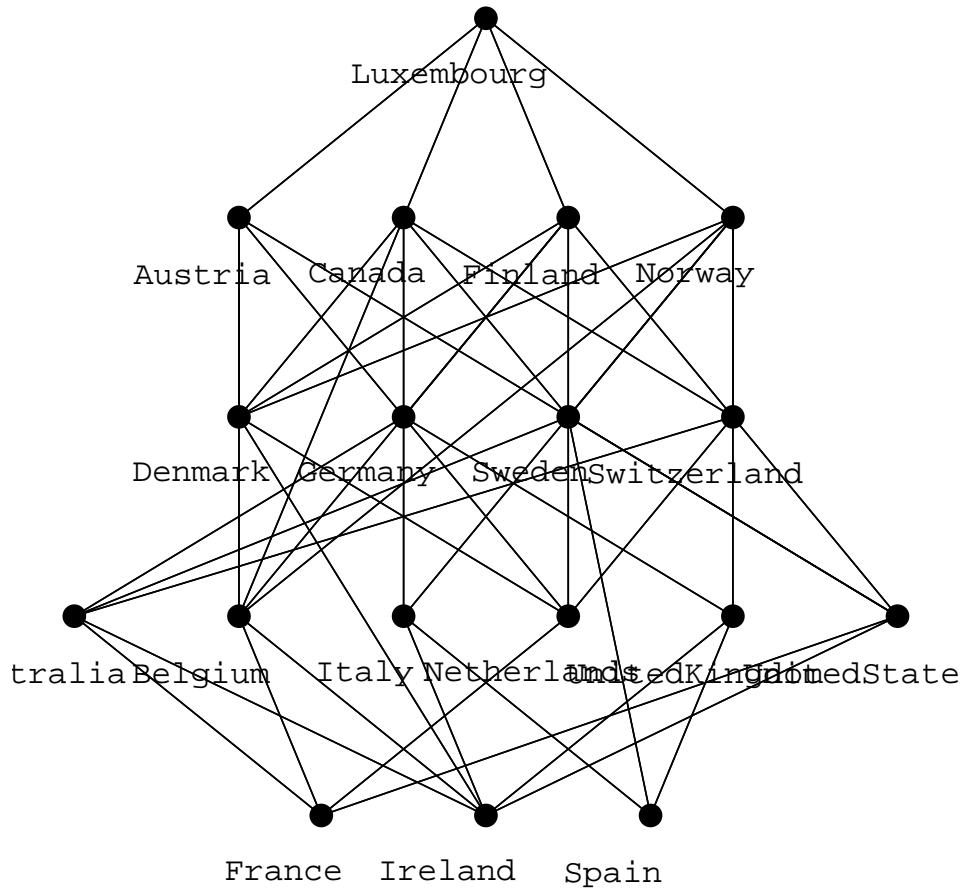
These PPP results should be viewed with caution, as there are large differences in the extent to which households in different countries actually need to purchase certain items. For example, certain spending categories, such as on health care or college education, are largely privately funded in some countries and largely publicly funded in others. PPPs, developed for national accounts purposes rather than for comparisons of household well-being, do not take this into account. Despite this caveat, many of the countries ranking highly in the PPP ranking are those with extensively provided public services, such as Germany and the Nordic countries. And the United States, despite its high level of real income, remains close to the bottom. In the TIP ordering (Figure 10), it dominates only Ireland and France and it is dominated by nine countries.

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<sup>32</sup> See section 2 for a discussion of real income comparisons.

<sup>33</sup> See Summers and Heston (1991).

**Fig. 9** Hasse diagram of first-order poverty dominance using LIS data. Real international income poverty using PPPs relative to US median



Note: The poverty line is defined as 60 percent of the adjusted US 1991 PPP median in each country within each year.

Source: Authors' calculations from LIS data

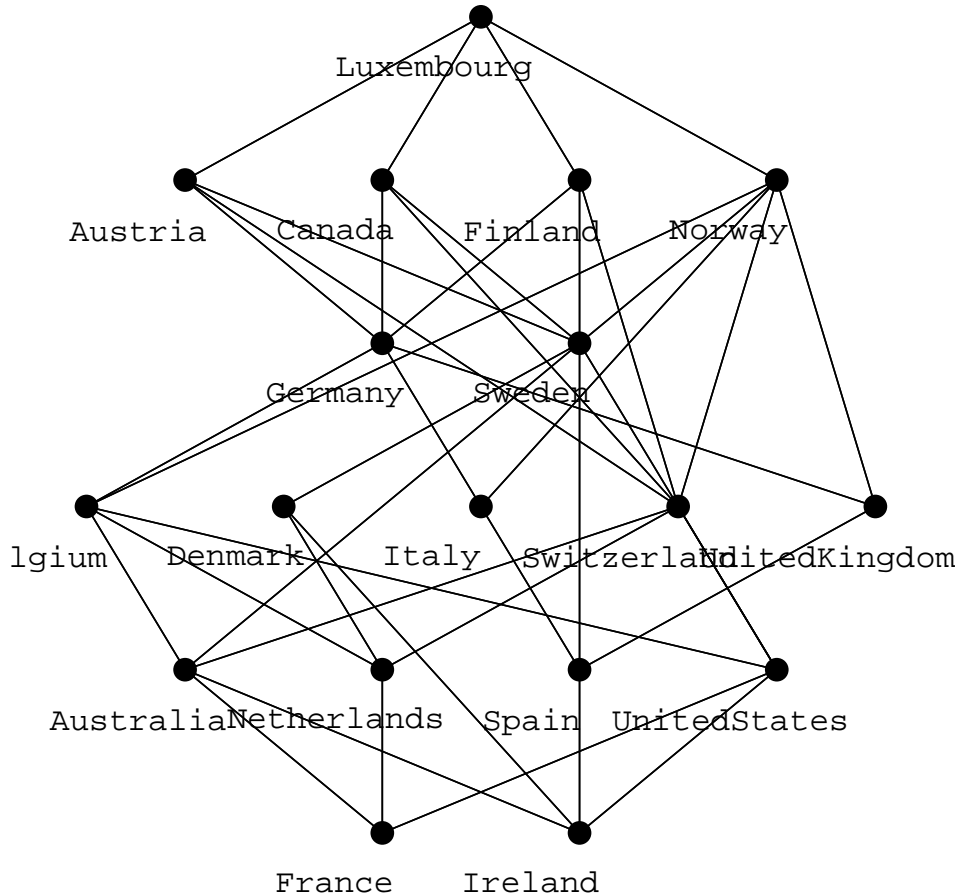
## 4 Decomposing poverty across population groups

### 4.1 Comparing poverty risks of different groups

Most studies that disaggregate poverty by various demographic characteristics do so with respect not to the individuals' characteristics, but those of the household head. For instance, a breakdown by age is typically a breakdown by the household head's age and so on.

Another troublesome aspect of sub-group poverty risks is the choice of the appropriate equivalence scales. Different assumptions about the economies of scale of household size, the consumption requirements and household production capaci-

**Fig. 10** Hasse diagram of normalized poverty gap (TIP) dominance using LIS data. Real international income poverty using PPPs relative to US median



Note: The poverty line is defined as 60 percent of the adjusted US 1991 PPP median in each country within each year.

Source: Authors' calculations from LIS data

ties of household members of different ages and sexes can dramatically affect the ordering of population groups by relative poverty risks. The choice of an equivalence scale is less likely to affect the assessment of changes in poverty rates across time, unless the population is undergoing rapid demographic change.

We examine the LIS poverty rates of

- (1) children
- (2) persons living in a household with an aged head, and
- (3) persons living in female-headed households / families

We examine both the poverty rates of these groups, how these change over time as well as their inter-country poverty ranking. We limit the analysis to these categories, not because they are the only meaningful ones, but because cross-sectional and

trend differences for these groups reflect cross-national differences in the social welfare state that are often of interest.<sup>34</sup> Our purpose is to examine the level of and trend in poverty among groups traditionally thought to be at high poverty risk.

Demographic comparisons are also sensitive to the equal-sharing within household assumption. If sharing rules vary by family type within a country or across countries, our comparisons might be misleading. For instance, might single parents sacrifice and provide more than an equal share of income for their children than do other families?

The population of children consists of all persons below the age of 18 in the LIS data. The elderly are represented by persons who are more than 64 years old. Persons living in female-headed households are so identified if the LIS household has a female head or reference person. These decompositions are not mutually exclusive, as some children and elderly live in female-headed households.

#### *4.2 Poverty rankings of different demographic groups*

In Tables 5 to 7 we show for selected demographic groups poverty rates and poverty trends, as measured by the head-count ratio relative to one-half of the adjusted within-country overall median. The rates are the proportion poor in each subpopulation and the trend is measured, as in Table 2, by both the slope coefficient in a regression of each country's poverty rate against time (starting in 1900) and by the latest change.

We also examine the TIP poverty ordering up to 60 percent of the current overall median of different population subgroups using the latest wave in LIS. Poverty among children is defined by taking the adjusted income per equivalent adult in each household with children, allocating that to every child. The elderly are defined similarly. Poverty in female-headed households, by contrast, is estimated among all persons living in such units.

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<sup>34</sup> Two reservations in the comparison of poverty across population groups should be noted. First, most data sets used to measure the extent of poverty gather information primarily about the 'household head' and, the 'spouse', if present. Rules about which household member is classified as the head vary between data sets, years and countries. In addition, if one attempts to assess, say, the excess risk of poverty due to unemployment, comparing poverty rates of persons in households whose heads are unemployed to those in the whole population will misclassify some households where a person other than the head is unemployed. That is, many breakdowns by the properties of the household head will misclassify households – the same would be the case if we were to compare poverty of the elderly and the non-elderly and we did not know the age of all persons living in the household.



## *Children*

The ordering of countries with respect to poverty among children, shown in Table 5, is broadly similar to that of all persons. The Anglo-Saxon countries have the highest rates according to this relative poverty ranking, central European ones populate the middle, and northern European and Nordic countries have relatively few children in poverty. Next we turn to the changes over time, both the long run changes, measured as above by the slope coefficient of the within-country regression of poverty rate against year, and of the latest change. There is, here as above, little evidence of an OECD-wide increase in poverty. In general, the direction of change in overall poverty and child poverty change is similar.

We also show, in Figure 11, the Hasse diagram obtained when we check for TIP dominance. Austria and Luxembourg, in the overall ordering the dominating nations, are now much lower. France rises in this ordering. The Nordic and northern European countries tend to be found at or close to the top and the Anglo-Saxon countries near the bottom of this ordering.

## *Elderly*

Another group traditionally at high risk of poverty, namely the elderly, are in the industrialized countries included in LIS no longer so exposed. The poverty risks of the elderly are, for the equivalence scale we have used, quite modest and, in many cases, lower than those of the overall population. The ordering of countries changes substantially for the elderly poverty ranking compared to both the overall and the child poverty rankings. The United Kingdom and the United States, high overall poverty risk countries, are now quite similar to the northern European and Nordic countries. Only Ireland has double-digit elderly poverty; in most countries, between 5 and 8.5 percent of the elderly are poor. Thus, differences in ranks reflect very small differences in the likelihood that the average elderly is poor between these countries. The changes in elderly poverty very closely track the changes in overall poverty.

Our Hasse diagram (Figure 6), that ranks countries using 60 rather than 50 percent of the current median and uses the TIP dominance criterion, somewhat re-shuffles the countries. Now Canada and Norway emerge at the top of the ordering, closely followed by Sweden and Luxembourg. The United States and the United Kingdom have now dropped closer to the bottom.

The similarity across countries of the poverty rates for the elderly evaluated at the 50 percent of median line, and the changes in the ordering when examined at 60, are likely due to a similarity and a difference among the countries we study. All industrialized countries have implemented a public pension system that covers the elderly (Korpi and Palme, 1997). However, the generosity of the average pension and the spread about that mean varies substantially across countries, accounting for

**Table 5** Poverty rates and poverty trends for children

Country	Latest year		Longest Change		Latest Change	
	Year	Poverty rate	Years	Time trend	Years	Change
Australia	1989	14.8	1981–1989	0.103	1985–1989	0.320
Austria	1987	6.8		n.a.		n.a.
Belgium	1992	4.3	1985–1992	0.048	1988–1992	0.198
Canada	1991	15.6	1971–1991	-0.077	1987–1991	0.214
Denmark	1992	5.1	1987–1992	0.091		n.a.
Finland	1991	2.3	1987–1991	-0.135		n.a.
France	1989	8.4	1979–1989	0.164	1984.1–1989	-0.345
Germany	1989	4.8	1983–1989	6.408	1984–1989	-0.322
Ireland	1987	13.8		n.a.		n.a.
Italy	1991	13.5	1986–1991	0.398		n.a.
Luxembourg	1991	5.4	1985–1991	0.035		n.a.
Netherlands	1991	8.3	1983–1991	0.435	1987–1991	0.791
Norway	1991	4.9	1979–1991	-0.036	1986–1991	0.104
Spain	1990	12.3	1980–1990	-0.044		n.a.
Sweden	1992	3.0	1967–1992	-0.075	1987–1992	-0.127
Switzerland	1982	4.3		n.a.		n.a.
UnitedKingdom	1991	18.5	1969–1991	0.528	1986–1991	1.189
UnitedStates	1991	24.1	1974–1991	0.322	1986–1991	-0.092

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Changes are measured by the slope of the regression of poverty rate on year. Each child (under 18) is counted once.

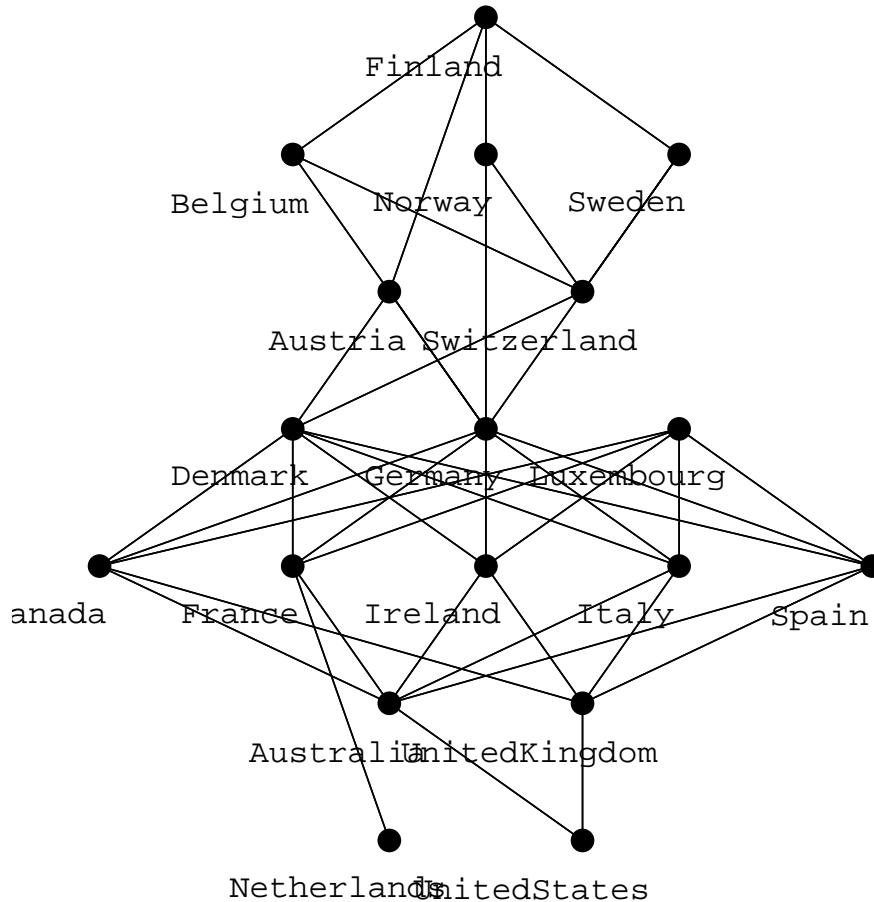
Source: Authors' calculations from LIS database.

a divergence in rates when the poverty line is raised.

### *Female-headed households*

The ranking of persons living in female-headed households by relative poverty rate, shown in Table 7, is much more similar to that found for children than that for the elderly. For all countries, the rates are much higher than for all persons. English-speaking countries have high very rates of poverty, central European ones lower and northern European ones are closest to the bottom, a pattern similar to that found for all persons. An interesting difference compared to earlier results is that Ireland has

**Fig. 11** Child poverty ordering. Hasse diagram of normalized poverty gap (TIP) dominance using LIS data. Fully relative poverty



Note: The poverty line is defined as 60 percent of the overall adjusted median in each country within each year. Each child (under 18) is counted once.

Source: Authors' calculations from LIS data

a comparatively low rate of poverty among the female-headed households.

The Hasse diagram of the TIP poverty ordering among persons living in female-headed households, shown in Figure 13, is very complex, reflecting the large number of ties that the TIP dominance comparisons result in. We exemplify this by considering how Belgium, which has a rate of 12.4 percent ends up in the bottom row, while Finland, which has a rate of 17.5 percent ends up near the top. It turns out that Belgium has in most pairwise comparisons a slight crossing with the other country close to the origin. Thus, even though Belgium has a low head-count ratio and a low average poverty gap, it ends up in the bottom row.

**Table 6** Poverty rates and poverty trends for elderly

Country	Latest year		Longest Change		Latest Change	
	Year	Poverty rate	Years	Time trend	Years	Change
Australia	1989	5.4	1981–1989	-0.446	1985–1989	-0.069
Austria	1987	1.2		n.a.		n.a.
Belgium	1992	4.5	1985–1992	0.171	1988–1992	0.310
Canada	1991	8.3	1971–1991	-0.126	1987–1991	0.125
Denmark	1992	7.3	1987–1992	-0.039		n.a.
Finland	1991	6.0	1987–1991	0.118		n.a.
France	1989	8.1	1979–1989	0.258	1984.1–1989	-0.732
Germany	1989	4.2	1983–1989	4.800	1984–1989	-0.113
Ireland	1987	11.5		n.a.		n.a.
Italy	1991	5.0	1986–1991	-0.257		n.a.
Luxembourg	1991	1.8	1985–1991	-0.226		n.a.
Netherlands	1991	5.4	1983–1991	-0.087	1987–1991	0.009
Norway	1991	4.8	1979–1991	0.118	1986–1991	0.196
Spain	1990	7.9	1980–1990	-0.237		n.a.
Sweden	1992	8.6	1967–1992	-0.346	1987–1992	-0.020
Switzerland	1982	2.7		n.a.		n.a.
UnitedKingdom	1991	7.1	1969–1991	0.258	1986–1991	0.284
UnitedStates	1991	8.4	1974–1991	-0.033	1986–1991	0.252

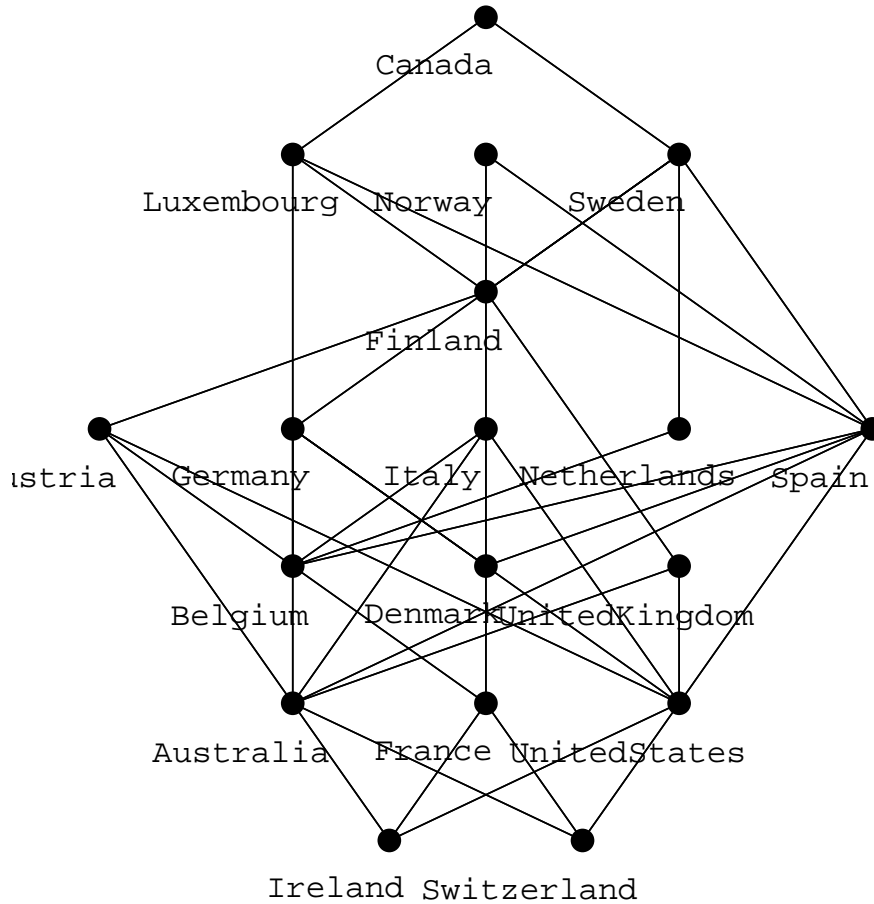
Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Changes are measured by the slope of the regression of poverty rate on year. Each elderly person (over 65) person in the household is counted once.

Source: Authors' calculations from LIS database.

## 5 The impact of public policy on poverty

We now turn to research regarding the impact of public policy on the extent of poverty. We focus primarily on accounting models, as few behavioral models have been estimated with inter-country data.

**Fig. 12** Elderly poverty ordering. Hasse diagram of normalized poverty gap (TIP) dominance using LIS data. Fully relative poverty



Note: The poverty line is defined as 60 percent of the overall adjusted median in each country within each year. Each elderly person (over 65) person in the household is counted once.

Source: Authors' calculations from LIS data

### 5.1 Measuring the impact of public policy on poverty

In thinking about how public policy affects poverty in advanced economies, we distinguish between two broad types of effects. The first starts with the simple notion that the disposable income  $y$  of a household is the sum of income obtained from 'markets' ( $x$ ) (labor and capital) less taxes paid ( $t$ ) plus transfers received ( $b$ ).

A 'first order' approach to analyzing the impact of public policy defines it as the difference between poverty based on market income and that based on disposable income (by some measure  $P$ ):

$$P_{i,t}[F(x); z] - P_{i,t}[F(y); z] = P_{i,t}[F(x); z] - P_{i,t}[F(x - t + b); z] = \Delta. \quad (16)$$

**Table 7** Poverty rates and poverty trends for persons in female-headed households

Country	Latest year		Longest Change		Latest Change	
	Year	Poverty rate	Years	Time trend	Years	Change
Australia	1989	41.6	1981–1989	0.316	1985–1989	-0.216
Austria	1987	28.9		n.a.		n.a.
Belgium	1992	12.4	1985–1992	0.067	1988–1992	-0.438
Canada	1991	31.4	1971–1991	-0.921	1987–1991	0.290
Denmark	1992	18.1	1987–1992	-0.784		n.a.
Finland	1991	17.5	1987–1991	0.661		n.a.
France	1989	19.9	1979–1989	-0.463	1984.1–1989	-0.194
Germany	1989	16.9	1983–1989	17.373	1984–1989	-0.085
Ireland	1987	14.8		n.a.		n.a.
Italy	1991	20.0	1986–1991	0.153		n.a.
Luxembourg	1991	18.1	1985–1991	1.085		n.a.
Netherlands	1991	15.6	1983–1991	0.868	1987–1991	1.581
Norway	1991	20.8	1979–1991	0.096	1986–1991	-1.468
Spain	1990	17.6	1980–1990	-0.247		n.a.
Sweden	1992	15.4	1967–1992	-0.918	1987–1992	-0.274
Switzerland	1982	20.7		n.a.		n.a.
UnitedKingdom	1991	32.5	1969–1991	0.017	1986–1991	3.792
UnitedStates	1991	42.8	1974–1991	-0.025	1986–1991	-0.127

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Changes are measured by the slope of the regression of poverty rate on year. Every person living in a female-headed household is counted once.

Source: Authors' calculations from LIS database.

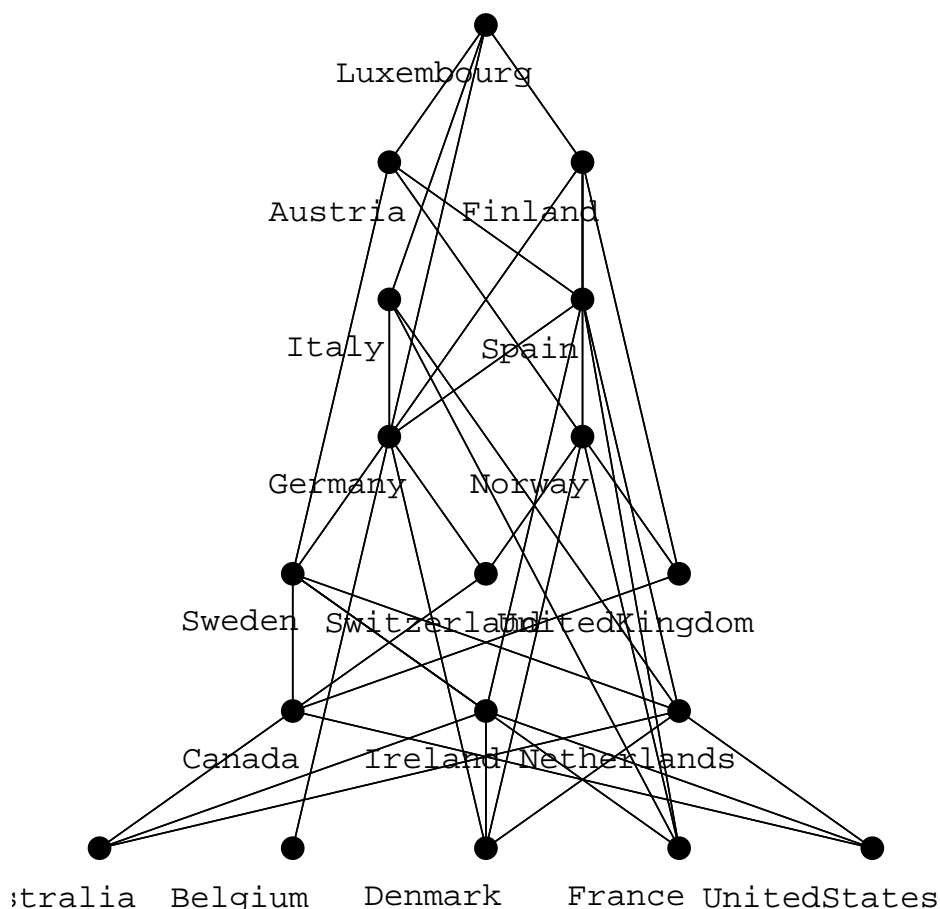
This first-order definition is the wrong answer to the equation 'what is the impact of public policy' on poverty, as the "real" impact is

$$P_{i,t}[\tilde{F}(x); z] - P_{i,t}[F(y); z] = \tilde{\Delta}, \quad (17)$$

where  $\tilde{F}$  is the distribution of market income which would prevail without the public sector intervention in question or, more often, under some other public policies. A common view is that the first-order effect  $\Delta$  overestimates the true effect  $\tilde{\Delta}$ , because the quantity

$$P_{i,t}[F(x); z] - P_{i,t}[\tilde{F}(x); z] = \Delta - \tilde{\Delta} = \bar{\Delta}, \quad (18)$$

**Fig. 13** Poverty ordering for persons living in female-headed households. Hasse diagram of normalized poverty gap (TIP) dominance using LIS data. Fully relative poverty



Note: The poverty line is defined as 60 percent of the overall adjusted median in each country within each year. Every person living in a female-headed household is counted once.

Source: Authors' calculations from LIS data

is assumed to be positive. That is, the difference in pre-public sector poverty assuming no behavioral responses vs. poverty after full behavioral response is assumed to be positive, because some individuals work and save less in response to taxes and transfers than they would in their absence.<sup>35</sup>

We consider only the current behavioral effects of the public sector that operate via direct money flows. There are other ways in which public policy can affect poverty.

<sup>35</sup> Different tax-transfer mechanisms may have different effects on, say, labor supply. For example, benefits which are independent of market income, such as universal child allowances, have only income effects, whereas benefits that depend on market income will have both price and income effects. See Danziger, Haveman and Plotnick (1981) and Moffitt (1992) for estimates of these responses to the U.S. transfer system.

For instance, beliefs about future policies regarding taxes can affect the willingness of persons to save and invest in either financial or human capital. Such longer term effects are, however, difficult to estimate, because policies change frequently during an individuals' lifetime. Thus, policy changes that were enacted during the great depression may have current impacts because they induced people to alter their educational decisions or consumption patterns from what they would have been in their absence. Tracing out the influences of recent policy changes in order to construct a credible hypothetical distribution  $\tilde{F}$  is thus very difficult.

For practical purposes, models that revise first-order estimates of the impact of policy on poverty tend to isolate a single, often contemporaneous, policy parameter in constructing the measure  $\tilde{\Delta}$ . It is not clear that this yields assessments of the public sector's role that are superior to those given by the first-order approach.

## 5.2 *Empirical evidence on the impact of public policy on poverty*

**First-order effects** In Figure 14 we show a basic measure of poverty reduction achieved by the public sector, the cross-plot of disposable and market income poverty rates. These are estimated from LIS using 50 percent of current adjusted disposable income as the income cut-off and showing the head-count ratio below that cut-off for both income variables.

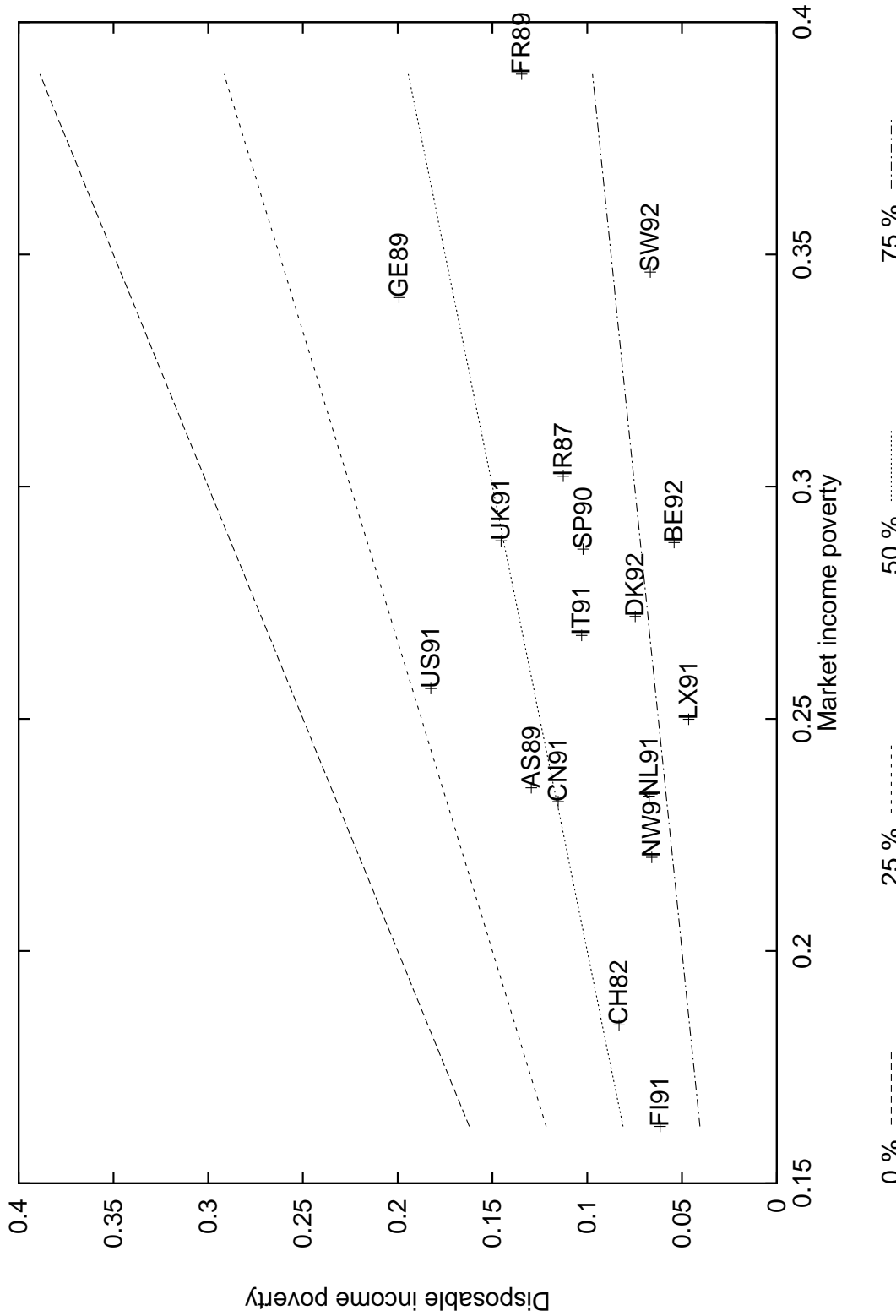
The countries toward the top of the figure have a disposable income poverty rate that is most similar to the market income poverty rate; those toward the bottom redistribute the most, hence have a greater difference between these rates. The lines that are drawn through the origin divide the countries by the percentage reduction in poverty on moving from market to disposable income, with the lines corresponding to 0, 25, 50 and 75 percent reductions in poverty. The United States, for example, has a market income poverty rate that is quite similar to that of Australia, Canada, the Netherlands, Italy, Denmark and Luxembourg. But its disposable income poverty rate is much higher because its system of taxes and transfers has such a small anti-poverty effect.

## 6 **Poverty dynamics**

We distinguish between two types of studies of poverty incidence across time, those that study the impact of a poverty spell in adulthood on future spells and those that study the impact of a poverty spell in childhood. The former are closely related to the study of poverty and income dynamics, whereas the latter are closely connected



**Fig. 14** Market and disposable income poverty at 50 percent of median (square root scale) adjusted income in LIS database



Note: The solid lines show the proportionate decline in poverty due to taxes and transfers, from top to bottom: no reduction, 25, 50 and 75 percent reduction.

Source: Authors' calculations from LIS data.

to the *intergenerational* transmission of poverty.<sup>36</sup>

### 6.1 *Intra-generational poverty dynamics*

**Domestic sources** Research on the persistence of poverty requires longitudinal data on individual and/or household or family income. The prototype data set is the Panel Study of Income Dynamics (PSID) for the United States (Morgan, Duncan, Hill and Lepkowski, 1992), in which annual data on family income has been collected starting in 1967. There are several good overviews of the U.S. experiences, including Corcoran, Duncan, Gurin and Gurin (1985), Duncan and et al (1984) and Gottschalk, McLanahan and Sandefur (1994).

A few studies that discuss some of the theoretical issues, including labor market dynamics, mating and childbearing – see (Muffels, 1992), Jenkins (1998) and especially Burgess and Popper (1998).

Many studies analyze (most often male) earnings dynamics and are motivated by and explicitly address the persistence of low income and poverty, such as Geweke and Keane (1996) and Fritzell (1996). Rodgers and Rodgers (1993) develop a way of examining poverty persistence that relies on the additive decomposability of certain poverty indices. Schluter (1997) provides evidence on poverty dynamics in Germany; Nolan and Whelan (1996a) use non-income measures of poverty in examining long- and short-run dynamics.

In Table 8 we show estimated poverty exit rates from a few national studies in Spain, the United Kingdom and the United States. The U.S. exit rates by Bane and Ellwood (1986) have served as a model for numerous other studies. The resource in all three countries is pre-tax income, but measured over different time periods. As Jarvis and Jenkins (1997, p. 131) point out, exit and re-entry rates should be examined together. High exit rates alone are compatible with income dynamics in which only a small part of the population shares all of the burden of poverty, with only short intervening spells on non-poverty. This situation would be revealed by high re-entry rates.

Differences in following rules, income and household definitions, adjustments for needs and low-income cut-offs make it difficult to compare estimates such as the above. However, the similarity of U.K and U.S. exit and re-entry estimates is quite striking.

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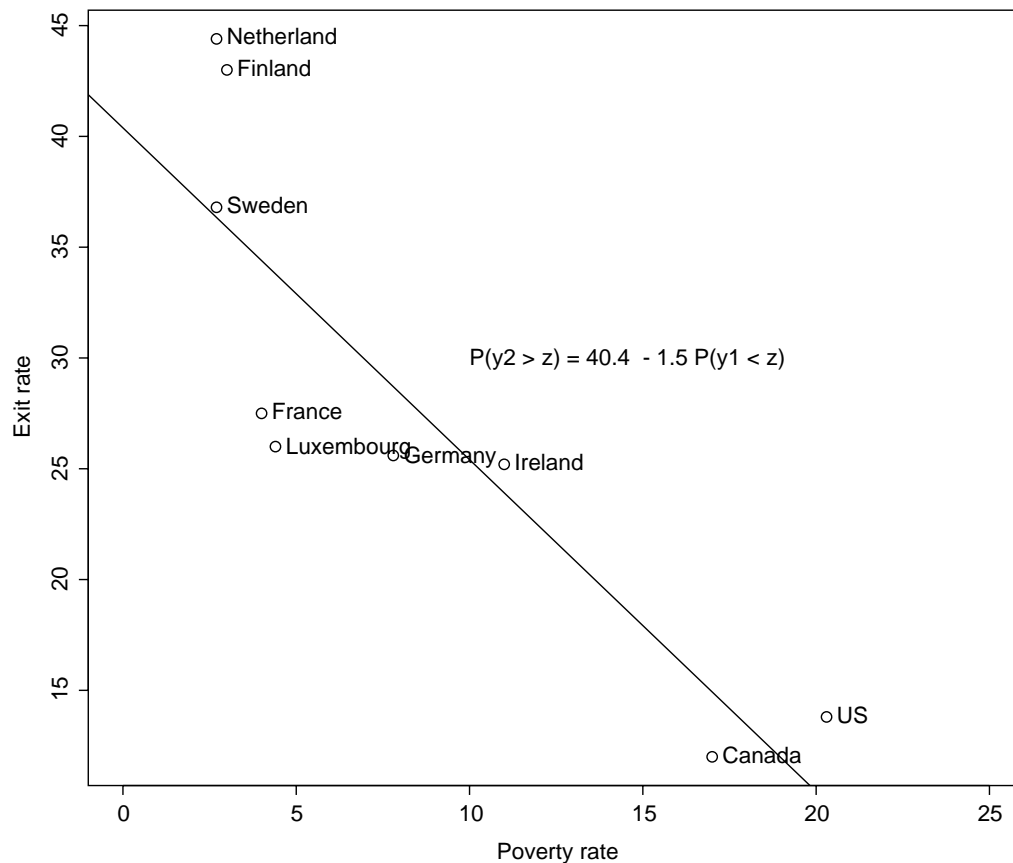
<sup>36</sup> There is considerable overlap between the two. For instance, intergenerational poverty could be studied by looking at the poverty status of the parents before the children were born, as well as studying the poverty status of the parents once the children are born.

**Table 8** Poverty exit and re-entry rates in national studies

Country	Time period	Resource	Exit rate in period		Re-entry rate in period		Source
			First	Second	First	Second	
United States	1971-81	Annual adjusted family income	.45	.29	n.a.	n.a.	Bane and Ellwood (1986)
United States	1971-87	Annual adjusted family income	.53	.36	.27	.16	Stevens (1995)
United Kingdom	1991-4	Current adjusted family income	.54	.51	.29	.11	Jarvis and Jenkins (1997)
Spain	1991:2-2:4	Quarterly per capita family income	.37 (.21 — —.45)	n.a.	n.a.	n.a.	Cantó-Sánchez (1996)

Note: Spain: Poverty is defined in terms of half of median income. Quarterly exit rates; the average, min and max rates shown. Data stem from the Spanish Household Panel Survey (ECPF). UK: Poverty is defined w.r.t half of mean income. Data stem from the British Household Panel Survey. US: Poverty defined in terms of US official poverty line. Data stem from the Panel Study of Income Dynamics.

**Fig. 15** Poverty and exit out of poverty



Note: Poverty rates are measured as having adjusted income less than half of current median in  $t-1$  and exit rates as the head count of those poor in year  $t$  with income higher than 60 percent of median. The solid line is the regression of exit rate on poverty. See equation 20 in text.

Source: Duncan et al. 1992, 1993

**International sources** There are only a few *comparative* studies of poverty dynamics. Greg Duncan has, with a number of collaborators, prepared several of them. Duncan et al. (1993) analyze the extent to which families with incomes below 50 percent of the median in  $t$  have incomes above 60 percent of the poverty line in  $t + 1$ . These are more than “exit” rates, as the families are required to move some distance above the poverty line.<sup>37</sup>

The estimates are shown in Figure 15, supplemented with data for Finland from Duncan et al. (1992). The relationship between the poverty rate and the escape rate is inverse. i.e., the countries in which a greater percentage of poor families exit out of poverty, are the countries that have lower rates of poverty.

<sup>37</sup> This explains why the U.S. exit rate in Table 8 is so much higher than in Figure 15.

Three-year cumulative survival rates for Canada, West Germany, the Netherlands and the United States, also estimated by Duncan et al. (1993, p. 223), suggest a mobility ordering of countries similar to the one in Figure 15. These results challenge the view that countries with large income differences and high poverty rates are the ones with the greatest mobility.

What kind of a relationship is to be expected between the probability of poverty exit and the poverty rate? Suppose that poverty outcomes between two consecutive years are independent and that the poverty rate is stable. It follows that the exit rate,  $\Pr(y_{t2} \geq z | y_{t1} < z)$ ,

$$\Pr(y_{t2} \geq z | y_{t1} < z) = \frac{\Pr(y_{t2} \geq z) \Pr(y_{t1} < z)}{\Pr(y_{t1} < z)} = 1 - \Pr(y < z). \quad (19)$$

Thus, the slope of a regression of  $\Pr(y_{t2} \geq z | y_{t1} < z)$  on  $\Pr(y_{t1} < z)$  would equal  $-1$  if outcomes were independent and poverty stationary. Estimating this regression using the data for the nine countries in Figure 15 yields

$$\Pr(y_{t2} \geq z | y_{t1} < z) = 40.4 - 1.5 \Pr(y_{t1} < z), R^2(\text{adj}) = 0.72. \quad (20)$$

(3.3)    (0.3)

If we ignore that the income distribution is unlikely to be stationary, the extent to which the coefficient on  $\Pr(y_{t1} < z)$  is different from  $-1$  could be used as a measure of the average persistence (in excess of independence) of two-year poverty.<sup>38</sup>

Deleeck et al. (1992) estimate two-year poverty and exit rates out of poverty for Belgium, Ireland, Lorraine and Luxembourg and the Netherlands. Exit rates are estimated (using the EC standard of poverty) to vary between 36 percent in Ireland and 59 percent in the Netherlands (p. 102). Exit rates for households with an unemployed head (in the first year) are always lower, sometimes only about one half of the exit rates of employed heads. An interesting finding is that the relative risks of entering poverty and staying there are fairly similar to the relative risks of being in poverty, as measured in a single-year cross-section. Thus, the correlates of poverty risks as assessed using cross-sections give, at least in these data, some indication of the correlates of poverty persistence.<sup>39</sup>

<sup>38</sup> Let the event that  $y_{t1} < z$  be  $A$  and  $y_{t2} < z$  be  $B$ . From simple probability definitions it follows that the difference  $\delta = \Pr(B|A) - \Pr(B)$  measures the extent to which there is more or less persistence than would be the case of  $A$  and  $B$  were independent. Suppose  $\delta = \delta_0 + \delta_1 \Pr(B)$ . Then  $1 - \Pr(B|A) = (1 - \delta_0) - (1 + \delta_1) \Pr(B)$  and, for poverty persistence ( $\delta_j \geq 0$ ) we would, indeed, observe the intercept less than one and the slope smaller than negative one. The regression in equation 20 was estimated using the nine countries poverty rate (head count ratio of adjusted incomes below half of median) and exit rate (adjusted income more than 60 percent of median) in measured in the following year.

<sup>39</sup> Some aspects of the Deleeck et al. (1992) results raise questions. For instance, only intact households are included, so that poverty spells of all individuals can not be assessed. Also, classifying people according to status in year 1 neglects the fact that they may change

There is considerable mobility in the low end of the income distribution, and patterns of mobility do vary across countries. Recent studies of income dynamics question the traditional view that large differences in incomes are associated with high mobility. Further research, using longer and larger panels and looking at individuals, where possible, rather than households is needed to gain further and more robust insights into the cross-country patterns of longitudinal poverty.<sup>40</sup>

## 6.2 *Family background and poverty*

**Domestic sources** Many studies measure the effects of family background on adult poverty outcomes for children in the United States; they are reviewed by Corcoran (1995). These studies analyze actual patterns of “transitions” between childhood and adult poverty status, measured in a multitude of ways, including welfare receipt and low incomes. Researchers have addressed various explanations for the observed correlation of adult and child poverty outcomes, in particular the effect of environmental and social influences in childhood, such as experiencing a parental divorce, growing up in a high-poverty neighborhood, and so on.

The U.S. literature was made possible by two projects – the Panel Study of Income Dynamics (PSID) and the National Longitudinal Survey (NLS) – that collect longitudinal information on socio-economic phenomena at the individual and household level and that have been running long enough for both parents and children to be observed in adulthood.

Other countries have hitherto not gathered such data or have begun to do so only recently and, consequently, little is known about their actual transmission of poverty status across generations.<sup>41</sup> Studies in these countries have relied on data on the parents that have been recalled by the children in adulthood, a source that suffers from large and possibly non-random errors. Data on background factors, such as parental education, occupation, family structure during childhood and residential location, typically entered as covariates in explaining adult outcomes, are likely to suffer from less recall error than information about parental income. Explanations

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their status between the first and second wave. Moreover, the data sometimes cover two consecutive years (NL, Lo, Lu) and sometimes two years that are one year apart. This would, if exit rates were constant across countries, generate different exit rates as measured in the panel.

<sup>40</sup> For additional references and discussion, see Duncan et al. (1992), Duncan et al. (1993) and Burkhauser, Holtz-Eakin and Rhody (1998). See also Atkinson, Bourguignon and Morrisson (1992).

<sup>41</sup> There is at least one exception to this, the U.K. National Child Development Survey, which sampled all children born in Britain during a single week in 1951. Data on the parents was collected at the time of birth and the children have since been followed up at 5 occasions. Apparently these data contain only poor information about parental income.

**Table 9** Adult outcomes by childhood poverty in the United States

Early Adult Outcomes	Childhood poverty status			
	Black		White	
	Poor	Non-poor	Poor	Non-poor
Mean schooling	12.3	12.9	11.1	13.5
Average family income (1980 USD)	16,980	22,778	22,141	33,655
Average ratio of income to needs	2.1	3.0	2.6	4.4
Percent who are poor as adults	24.9	9.6	9.3	1.2

Note: Sample: Adults aged 27 to 35 years in 1988 from the PSID. Child outcomes are observed starting in 1968 for 3–13 years before age 17 and adult outcomes for 3–11 years after age 24. n = 969 (blacks) and 1306 (whites).

Source: Corcoran (1995), Table 1, p 247.

of poverty outcomes that make use of parental background information are, therefore, likely to be more reliable than actual patterns of income and poverty mobility.

Growing up in a poor household in the United States is adversely associated with adult socio-economic outcomes. Educational attainment and average family income are worse and poverty risks are higher (Table 9). It would appear that race matters. While the outcomes for blacks are overall lower than for whites, growing up in poverty appears to be associated with larger differences compared to the non-poor for whites. This is also evident in poverty transitions between generations (Table 10). Most studies that attempt to control for background factors in a multivariate context suggest substantial parental income influences on adult outcomes (Corcoran, 1995).

Some evidence on the intergenerational transmission of poverty is available from the United Kingdom. Namely, Atkinson, Maynard and Trinder (1983) traced the adult children of the sample used by Seebohm Rowntree and associates in the 1950s in York (see Rowntree and Lavers, 1951). Using data of limited geographic coverage to gauge the bivariate distribution of parent-child income is subject to a number of limitations, as is using mainly single-year measures of income.<sup>42</sup> The authors discuss these limitations and also compare cross-sectional data from their resulting followed-up sample with nationally representative ones. While the data fall short of the ideal of a nationally representative panel with long-run income for both parents and children, Atkinson et al. (1983) carefully constructed income information and were very explicit about the possible shortcomings of the data. Moreover, the children were sampled through the follow-up at a stage in their life-cycle quite similar to that of their parents, which avoids the problem that the correlation of a

<sup>42</sup> See (Jenkins, 1987) and (Solon, 1989).

**Table 10** Transitions between childhood and early adult poverty

Childhood upbringing	Early adult outcomes		
	Percent never poor	Percent poor 1-50 % of year	Percent poor 51-100% of years
Poverty status during childhood			
	Black		
Never poor	73.8	17.9	8.3
Poor 1-50 % of years	63.3	17.0	19.8
Poor 51-100 % of years	53.7	19.9	26.4
	White		
Never poor	89.8	9.0	1.2
Poor 1-50 % of years	77.9	18.6	3.7
Poor 51-100 % of years	75.9	14.3	9.3

Note: Sample: Adults aged 27 to 35 years in 1988 from the PSID. Child outcomes are observed starting in 1968 for 3–13 years before age 17 and adult outcomes for 3-11 years after age 24. n = 969 (blacks) and 1306 (whites).

Source: Corcoran (1995), Table 2, p 248.

young persons annual income with her long-run income may be quite low (see e.g. Björklund, 1993). Examining patterns of intergenerational low income incidence is instructive. We show the  $3 \times 3$  transition matrix for the followed-up sample in Table 11.

Given the differences in income definitions, sample design and coverage, and so on, it is not easy to compare these figures to U.S. numbers. The odds of children of low income parents that remain low income rather than become comfortably off is 2.6. The odds that comfortably off children remain so rather than become low income is 1.7. While the odds of staying poor and comfortably off are quite high, there is also substantial movement across income classes.

**International sources** There exist no comparative studies that compare intergenerational poverty transitions. Indirect evidence can be inferred from work on intergenerational income correlations. As longer panel data have become available, studies that estimate the intergenerational correlation in earnings, most often of fathers and sons as young adults, have become more common.

Subject to stringent assumptions regarding functional form, estimates of the intergenerational correlations can be used to illustrate earnings outcomes. For example, in Table 12 we show the patterns of mobility between different earnings classes in



**Table 11** Intergenerational income transition matrices in the United Kingdom (York)

Parent	Children		
	Low income	Intermediate	Comfortably off
Low income	48.2	33.3	18.5
Intermediate	25.8	35.1	39.1
Comfortably off	26.5	29.1	44.1

Note: Incomes are defined as family earnings, transfers, other income less taxes, national insurance contributions, other deductions and housing costs. These are then divided by the National Assistance (Parents, 1950) or Supplementary Benefit (Children, 1975-8) scale. The observations are classified as 'low income' if they are below 1.4 times the NA/SB scale, 'intermediate' if between 1.4-1.99 and 'comfortably off' if they have more than twice the NA/SB scale. The overall sample size is 1430.

Source: (Atkinson et al., 1983), Table 5.6, p. 81. See also p. 71 for the income definitions and pp. 46-52 for sample follow-up procedures.

Sweden and the United States, given estimated correlations and the assumptions that (a) the sons' long-run earnings variance is equal to that of the fathers' and (b) the data are drawn from a bivariate log-normal distribution. The results suggest a considerably higher 'poverty' persistence in the United States relative to Sweden, a pattern that is accounted for by both the higher correlation and the higher cross-sectional variance. The assumptions that underlie the present numbers are strong. Moreover, the numbers in Table 12 refer to long-run earnings (measured quite early in the sons life). When longer panel data sets become available in other countries, further research can examine if findings such as the above persist when parametric assumptions are relaxed.

## 7 Summary

In this chapter, we have reviewed definitional issues that arise in assessing the extent of and change in poverty in western industrialized countries. Many issues must be resolved prior to (and after) analyzing empirical evidence on poverty, including the choice of resource, level of poverty line and appropriate adjustments for the size and type of the income-sharing unit. The specific choices that are made w.r.t these issues and a number of others influence the extent of measured poverty. The objective of assessing poverty is, however, often comparative: to compare the change in poverty over time within a country or across countries. We suggested that specific measurement choices are in that case less likely to affect a poverty ordering arrived at using the same methods than they are to affect the level in any country at a point



in time.

We reviewed the existing empirical evidence and presented our own estimates using the LIS database, and demonstrated that the results are sensitive to the definitional issues discussed. Depending on how resources, poverty lines and equivalence scales are defined, for instance, poverty in Ireland increased a lot, a little, did not change or decreased a lot using the same data set between two years. Nonetheless, when we apply a consistent definition of poverty to the data sets available in LIS, we find that certain countries have poverty rates that are clearly higher (or lower) than those in other countries. However, there is little evidence for a uniform trend in poverty across countries – in recent years, poverty has increased in some countries and decreased in others.

Looking at the first-order impact of the public sector suggests that countries with similar rates of market income poverty can have very different poverty rates once taxes and transfers have been received. Longitudinal aspects of poverty have been most extensively studied where suitable data are available, most often in the United States. Looking at cross-national evidence suggests that much remains to be learned about the patterns of intra- and intergenerational poverty mobility and their covariates. Given that longitudinal data that enable the study also on a cross-national basis of these issues are increasingly available, this is an area where our knowledge is likely to expand rapidly.

## A Data sources

Table A.1: Poverty rates

Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
Australia	1981, 1985	12.5, 12.3	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1981, 1985, 1989	14.4, 15.7, 16.1	disposable income	50 percent of average	OECD	Cantillon, Marx and Bosch (1996)
	1981.5, 1989.5	9.4, 15.0	Income AHC	Henderson poverty line	New York Budget Survey of 1954	Saunders (1997)
	1981.5, 1989.5	10.2, 16.4	Income BHC	Henderson poverty line	New York Budget Survey of 1954	Saunders (1997)
Austria	1987	6.7	disposable income	50 percent of median	square root	Atkinson et al. (1995)
Belgium	1985, 1988	2.9, 4.7	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1985, 1988, 1992	5.8, 6.2, 5.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1987, 1989	6.1, 5.7	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1987, 1989	21.4, 22.4	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
	1987, 1989	24.9, 20.7	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
	1987, 1989	2.9, 2.7	disposable income	legal	implied by legal standard	Deleeck et al. (1992)
	1976, 1980, 1985	7.9, 7.6, 7.2	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
Canada	1981, 1987	12.6, 12.2	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1975, 1981, 1987, 1991	10.2, 9.0, 8.1, 7.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Catalonia	1970, 1973, 1979, 1986	17.0, 10.6, 7.8, 7.1	income	US poverty level (1985 PPP)	US poverty	Blank and Hanratty (1993)
	1988	15.1	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1988	31.3	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
Denmark	1988	37.3	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
	1987, 1992	8.9, 5.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1977, 1980, 1985	12.4, 13.0, 14.7	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
EC	1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990	11.53, 11.35, 10.78, 10.15, 9.60, 10.20, 11.35, 10.87, 10.01, 10.17, 9.95, 9.06, 9.72, 9.62, 10.34	disposable income	50 percent of adjusted median	OECD	Pedersen and Smith (1996)
	1973/77, 1978/81, 1984/85	12.8, 12.6, 13.9	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
Finland	1987	5.0	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1987, 1991	5.5, 6.4	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1966, 1971, 1976, 1981, 1985	20.1, 12.8, 5.1, 4.9, 2.9	disposable income	Official (current national pension)	OECD	Gustafsson and Uusitalo (1990)
	1971, 1976, 1981, 1985, 1990, 1991, 1992, 1993	8.8, 5.1, 5.8, 3.5, 2.7, 3.6, 3.4, 3.2	disposable income	50 percent of disposable median	OECD	Jäntti and Riitakallio (1996a)
	1981, 1985, 1990	4.9, 3.5, 2.5	disposable income	50 percent of median	OECD	Jäntti and Riitakallio (1996b)
France	1979, 1984	8.2, 7.5	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1979, 1984	13.2, 11.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)

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Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
Germany	1975, 1979, 1985	19.9, 17.7, 17.5	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1984-85, 1989	12.4, 14.7	expenditure	50 percent of average	(1,.5,.3)	de Vos and Zaidi (1996)
	1984	6.5	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1978, 1983	8.2, 8.0	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1983, 1987, 1990	8.3, 7.7, 8.8	income		1,.8,.45-.9	Hauser and Becker (1993)
Greece	1973, 1978, 1985	8.8, 6.7, 8.5	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1983, 1988	8.9, 9.7	expenditure	50 percent of average	(1,.5,.3)	de Vos and Zaidi (1996)
	1988	19.9	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1988	42.6	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
Iceland	1988	42.0	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
	1974, 1981, 1985	26.6, 24.2, 24.0	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1982, 1988	18.1, 17.9	expenditure	50 percent of average	(1,.5,.3)	de Vos and Zaidi (1996)
Ireland	1986, 1988, 1989, 1991, 1992, 1993, 1995	9.8, 9.5, 8.0, 9.0, 9.8, 10.5, 12.5				Ólafsson and Sigurdsson (1996)
	1987	10.7	disposable income	50 percent of median	square root	Atkinson et al. (1995)
Italy	1973, 1980, 1987	15.9, 17.4, 21.2	disposable income	50 percent of average	1,.6,.4	Cantillon et al. (1996)
	1987, 1989	17.2, 17.3	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1987, 1989	29.6, 32.0	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
	1987, 1989	31.6, 39.6	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
	1987, 1989	8.0, 5.0	disposable income	legal	implied by legal standard	Deleeck et al. (1992)
	1973, 1980, 1985	16.4, 16.9, 22.0	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1975, 1980, 1984	10.6, 9.4, 11.7	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
Lorraine	1985, 1989	18.6, 21.1	expenditure	50 percent of average	(1,.5,.3)	de Vos and Zaidi (1996)
	1987, 1989	9.7, 10.8	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1987, 1989	26.6, 30.8	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
	1987, 1989	29.1, 26.5	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
Luxembourg	1987, 1989	5.7, 4.0	disposable income	legal	implied by legal standard	Deleeck et al. (1992)
	1985	5.4	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1987, 1989	7.6, 7.6	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1987, 1989	14.7, 14.5	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
	1987, 1989	23.2, 12.5	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
Netherlands	1987, 1989	6.4, 5.0	disposable income	legal	implied by legal standard	Deleeck et al. (1992)
	1983, 1987	6.6, 4.9	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1986, 1987, 1988	6.5, 8.3, 9.2	disposable income	legal poverty line	those implied by legal poverty line	Dirven and Berghman (1992)

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Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
	1986, 1987, 1988	12.1, 12.7, 14.7	disposable income	subjective poverty line	those implied by subjective poverty line	Dirven and Berghman (1992)
	1983, 1987, 1991	9.3, 8.3, 7.7	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1987, 1989	7.1, 7.2	disposable income	50 percent of average income	OECD	Deleeck et al. (1992)
	1987, 1989	12.4, 10.9	disposable income	CSP	implied by CSP	Deleeck et al. (1992)
	1987, 1989	8.6, 15.9	disposable income	SPL	implied by SPL	Deleeck et al. (1992)
	1987, 1989	8.5, 7.2	disposable income	legal	implied by legal standard	Deleeck et al. (1992)
	1977, 1981, 1985	6.6, 7.0, 7.4	EDI	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1980, 1988	4.7, 4.8	expenditure	50 percent of average	modified (1..5..3) OECD	de Vos and Zaidi (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	5.2, 5.0, 3.3, 4.4, 4.9, 5.6, 6.5, 5.6, 5.7, 5.9, 6.3, 5.5	disposable income	50 percent of median disposable income	OECD	Aaberge, Andersen and Wennemo (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	6.3, 6.2, 3.9, 4.9, 4.5, 5.0, 6.4, 5.8, 5.7, 5.6, 5.7, 4.5	disposable income	50 percent of over-time average median	OECD	Aaberge et al. (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	5.5, 5.6, 4.3, 4.6, 5.2, 5.1, 5.5, 6.2, 6.4, 6.5, 7.1, 5.5	disposable income	legal pension	OECD	Aaberge et al. (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	5.1, 4.5, 3.4, 3.1, 3.7, 3.7, 4.0, 4.1, 4.1, 4.6, 5.2, 5.0	net income	50 percent of median disposable income	OECD	Aaberge et al. (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	7.3, 7.3, 4.8, 3.3, 3.3, 2.5, 3.0, 3.9, 3.8, 3.9, 4.4, 4.1	net income	50 percent of the over-time average medians	OECD	Aaberge et al. (1996)
	1979, 1982, 1984, 1985, 1986, 1987, 1988, 1990, 1991, 1992, 1993	5.0, 4.4, 3.1, 2.7, 2.8, 1.9, 2.0, 3.1, 3.5, 3.3, 4.3, 3.6	net income	legal pension	OECD	Aaberge et al. (1996)
	1979, 1986	5.0, 7.3	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1979, 1986, 1991	4.8, 6.4, 5.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Portugal	1973/74, 1981, 1985	23.4, 27.8, 28.0	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1980, 1989	26.4, 24, 5	expenditure	50 percent of national average	(1..5..3)	de Vos and Zaidi (1996)
Spain	1973, 1980, 1985	20.0, 20.5, 20.0	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1980, 1990	17.5, 15.9	expenditure	50 percent of average	(1..5..3)	de Vos and Zaidi (1996)
Sweden	1981, 1987	5.4, 7.6	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1975, 1981, 1987, 1992	5.2, 4.6, 6.3, 6.0	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1975, 1978, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993	3.8, 2.7, 3.1, 3.5, 3.8, 3.9, 4.1, 4.6, 4.0, 4.3, 3.9, 4.4, 4.6, 4.8, 5.1, 5.2, 5.7	disposable income	50 percent of disposable median	OECD	Gustafsson (1996)
	1975, 1978, 1980, 1981, 1982, 1984, 1985	11.8, 9.1, 8.0, 8.2, 9.8, 10.4, 8.6	disposable income	Official (Soc.Ass guidelines of 1985)	OECD	Gustafsson and Uusitalo (1990)
Switzerland	1982	8.0	disposable income	50 percent of median	square root	Atkinson et al. (1995)
UK	1979, 1986	9.2, 9.1	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1974, 1979, 1986	11.4, 10.8, 13.0	disposable income	50 percent of average	OECD	Cantillon et al. (1996)

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Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
	1978, 1982, 1985, 1988, 1991	6.8, 7.8, 10.7, 18.3, 20.4	Income (BHC)		.61,.4,.09-.36	Goodman and Webb (1994)
	1975, 1980, 1985	6.7, 9.2, 12.0	disposable income	50 percent of average disposable income	OECD	O'Higgins and Jenkins (1990)
	1985, 1988	12.8, 14.9	expenditure	50 percent of average	(1,.5,.3)	de Vos and Zaidi (1996)
US	1979, 1986	16.6, 18.4	disposable income	50 percent of median	square root	Atkinson et al. (1995)
	1974, 1979, 1986, 1991	18.8, 18.6, 22.6, 22.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
	1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995	18.5, 18.1, 18.1, 17.2, 15.9, 15.0, 13.9, 11.8, 11.4, 10.0, 9.7, 10.1, 10.0, 9.3, 8.8, 8.8, 9.7, 9.4, 9.3, 9.1, 9.2, 10.3, 11.2, 12.2, 12.3, 11.6, 11.4, 10.9, 10.7, 10.4, 10.3, 10.7, 11.5, 11.9, 12.3, 11.6, 10.8	money income	US poverty line	US poverty line	U.S. Bureau of the Census (n.d.)
	1970, 1973, 1979, 1986	10.1, 9.5, 9.0, 11.6	income	US official poverty line	US poverty scale	Blank and Hanratty (1993)

Note:

Source:

Table A.2: Poverty rates of children

Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
Australia	1981, 1989	1985, 16.4, 17.0, 18.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Australia	1982, 1990	1986, 14.0, 13.1, 14.0	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Austria	1987	4.8	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Belgium	1985, 1992	1988, 4.7, 4.9, 4.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Belgium	1985, 1992	1988, 3.4, 3.1, 3.8	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Canada	1975, 1987, 1991	1981, 16.5, 17.9, 18.1, 17.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Canada	1971, 1981, 1991	1975, 15.2, 14.6, 13.9, 13.6, 13.5	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Denmark	1987, 1992	4.0, 3.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Denmark	1987, 1992	5.3, 3.3	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Finland	1987, 1991	3.4, 3.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Finland	1987, 1991	2.9, 2.5	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
France	1979, 1984	12.8, 13.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
France	1979, 1984	6.4, 6.5	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Germany	1978, 1983	4.9, 6.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Germany	1985, 1989	4.0, 3.2, 4.8	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Germany	1985, 1989	6.4, 6.8	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Ireland	1973, 1987	1980, 15.7, 18.5, 26.0	disposable income	50 percent of average	1.,6.,4	Cantillon et al. (1996)
Ireland	1987	12.0	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Israel	1979, 1986	8.2, 11.1	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Italy	1986, 1991	10.8, 9.6	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Luxembourg	1985	4.1	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Netherlands	1983, 1991	1987, 7.0, 8.9, 9.2	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Netherlands	1985	4.1	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Norway	1979, 1991	1985, 4.5, 6.0, 8.2	Disposable income	50 percent of median	OECD	Aaberge et al. (1996)
Norway	1979, 1991	1985, 4.1, 3.4, 5.8	Net income	50 percent of median	OECD	Aaberge et al. (1996)
Norway	1979, 1991	1986, 4.4, 3.9, 3.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Norway	1979, 1991	1986, 3.8, 3.8, 4.6	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)

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Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
Sweden	1975, 1981, 1987, 1992	2.1, 4.5, 3.1, 2.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Sweden	1967, 1975, 1981, 1987, 1992	3.3, 1.9, 3.9, 3.0, 2.7	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
Switzerland	1982	3.3	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
UK	1974, 1979, 1986	10.8, 10.7, 17.4	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
UK	1969, 1974, 1979, 1986	5.4, 7.0, 8.5, 9.9	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)
US	1974, 1979, 1986, 1991	22.8, 24.1, 30.7, 30.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
US	1969, 1974, 1979, 1986, 1991	13.1, 17.3, 18.5, 22.9, 21.5	disposable income	50 percent of median disposable income	$E I = y / ([hh\ size] \cdot 3.3 \cdot .99^{head's\ age - 45})$	Rainwater and Smeeding (1995)

Note:

Source:

Table A.3: Poverty rates of elderly

Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
over 65						
Australia	1981, 1989	1985, 29.9, 33.4, 32.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Australia	1981, 1985	30.6, 33.9	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
Belgium	1985, 1992	1988, 11.3, 10.6, 10.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Canada	1975, 1987, 1991	1981, 34.5, 24.6, 14.3, 8.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Canada	1981, 1987	22.0, 12.8	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
Denmark	1987, 1992	25.9, 6.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Finland	1987, 1991	10.1, 14.4	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
France	1979, 1984	16.0, 7.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Germany	1978, 1983	20.9, 18.8	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Ireland	1973, 1987	1980, 33.8, 24.4, 9.7	disposable income	50 percent of average	1.,6.,4	Cantillon et al. (1996)
Netherlands	1983, 1991	1987, 6.4, 2.7, 7.2	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Norway	1979, 1991	1985, 8.0, 2.9, 0.7	Disposable income	50 percent of median	OECD	Aaberge et al. (1996)
Norway	1979, 1991	1985, 8.9, 3.2, 0.8	Net income	50 percent of median	OECD	Aaberge et al. (1996)
Norway	1979, 1991	1986, 6.7, 16.4, 9.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Sweden	1975, 1987, 1992	1981, 8.6, 0.9, 4.3, 4.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Sweden	1981, 1987	5.8, 11.4	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
UK	1974, 1986	1979, 34.4, 25.9, 13.3	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
US	1974, 1986, 1991	1979, 31.4, 28.9, 28.3, 26.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
US	1981, 1985	32.1, 29.3	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)

Note:

Source:

Table A.4: Poverty rates of women

Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
<b>Women</b>						
Denmark	1976, 1985, 1990	12.93, 11.30, 11.67, 10.80	disposable income	50 percent of median	OECD	Pedersen and Smith (1996)
Norway	1979, 1985, 1991	3.3, 4.0, 4.9	Net income	50 percent of median	OECD	Aaberge et al. (1996)
Norway	1979, 1985, 1991	2.6, 3.0, 4.0	Net income	50 percent of median	OECD	Aaberge et al. (1996)
UK	1971, 1981, 1988	9, 7, -5, 1	household net (disposable) income	40 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1971, 1981, 1988	7, 6, -2, -1	household net (disposable) income	40 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
UK	1971, 1981, 1988	14, 11, 1, -1	household net (disposable) income	50 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1971, 1981, 1988	13, 11, 3, 5	household net (disposable) income	50 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
UK	1971, 1981, 1988	13, 13, 5, 4	household net (disposable) income	60 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1971, 1981, 1988	14, 13, 8, 8	household net (disposable) income	60 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	5, -1, -2, -3, -8	household net (disposable) income	40 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	5, -1, 1, 6, 6	household net (disposable) income	40 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	13, 3, 4, 6, 3	household net (disposable) income	50 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	13, 3, 7, 9, 11	household net (disposable) income	50 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	16, 9, 7, 9, 8	household net (disposable) income	60 percent of average disposable income in 1979	McClements scale	Jenkins and O'Leary (1998)
UK	1979, 1987, 1990.5	16, 9, 10, 11, 12	household net (disposable) income	60 percent of current average disposable income	McClements scale	Jenkins and O'Leary (1998)
<b>Female head</b>						
Australia	1981, 1989	39.4, 42.1, 42.5	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Australia	1981, 1985	32.9, 34.9	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
Belgium	1985, 1992	9.0, 13.8, 9.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Canada	1975, 1987, 1991	42.7, 35.4, 27.8, 26.9	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Canada	1981, 1987	29.4, 26.1	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
Denmark	1987, 1992	20.2, 13.7	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Finland	1987, 1991	15.9, 20.7	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
France	1979, 1984	23.4, 15.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Germany	1978, 1983	28.7, 22.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Ireland	1973, 1987	15.9, 17.4, 21.2	disposable income	50 percent of average	1, 6, 4	Cantillon et al. (1996)
Netherlands	1986, 1988	17.2, 16.7, 15.0	disposable income	legal poverty line	those implied by legal poverty line	Dirven and Berghman (1992)
Netherlands	1986, 1988	36.1, 38.0, 38.3	disposable income	subjective poverty line	those implied by subjective poverty line	Dirven and Berghman (1992)

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Country	Years	Poverty rate	Resource	Poverty line	Equivalence scale	Reference
Netherlands	1983, 1991	1987, 11.6, 10.9, 12.1	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Norway	1979, 1991	1986, 10.7, 26.7, 17.6	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Sweden	1975, 1987, 1992	1981, 13.9, 5.2, 13.1, 14.7	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
Sweden	1981, 1987	8.4, 17.1	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
UK	1974, 1986	1979, 36.7, 25.7, 15.7	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
US	1974, 1986, 1991	1979, 43.0, 36.8, 41.8, 40.0	disposable income	50 percent of average	OECD	Cantillon et al. (1996)
US	1981, 1985	35.9, 38.2	Gross income	50 percent of median equivalent gross income	OECD	Phipps (1994)
Single mothers						
UK	1968, 1988	17.4, 4.1	disposable income AHC	40 percent of 1988 average income	those implied by the Supplementary Benefit System	Wright (1992)
UK	1968, 1988	38.5, 9.6	disposable income AHC	50 percent of 1988 average income	those implied by the Supplementary Benefit System	Wright (1992)
UK	1968, 1988	61.5, 23.7	disposable income AHC	60 percent of 1988 average income	those implied by the Supplementary Benefit System	Wright (1992)
US	1963, 1973, 1983, 1989	1969, 58.2, 48.3, 46.3, 41.3, 48.3, 43.8	family income	US official	US official poverty	Cutler and Katz (1991)

Note:

Source:

**Table A.5** Estimated poverty head count rates for all persons using LIS data

Country	Years	Poverty rates
Australia	1981 1985 1989	10.6 11.8 12.2
Austria	1987	3.4
Belgium	1985 1988 1992	4.6 4.9 5.4
Canada	1971 1975 1981 1987 1991	15.0 13.3 12.3 11.2 11.3
Denmark	1987 1992	10.4 7.5
Finland	1987 1991	5.4 5.7
France	1979 1981 1984 (FR) 1984 (FB) 1989	8.2 7.3 7.5 12.0 9.5
Germany	1983 1984 1989	0.0 6.5 5.6
Ireland	1987	11.3
Italy	1986 1991	10.4 10.3
Luxembourg	1985 1991	5.4 4.7
Netherlands	1983 1987 1991	6.6 5.1 6.7
Norway	1979 1986 1991	4.3 7.3 6.6
Spain	1980 1990	12.2 10.2
Sweden	1967 1975 1981 1987 1992	15.3 6.7 4.0 7.7 6.7
Switzerland	1982	8.3
UnitedKingdom	1969 1974 1979 1986 1991	5.5 9.1 9.2 9.1 14.5
UnitedStates	1974 1979 1986 1991	16.0 15.9 17.7 17.7

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line.

Source: Authors' calculations from LIS database.

**Table A.6** Estimated poverty head count rates for children using LIS data

Country	Years	Poverty rates
Australia	1981 1985 1989	14.0 13.5 14.8
Austria	1987	6.8
Belgium	1985 1988 1992	4.1 3.6 4.3
Canada	1971 1975 1981 1987 1991	17.6 14.9 14.9 14.8 15.6
Denmark	1987 1992	4.7 5.1
Finland	1987 1991	2.8 2.3
France	1979 1981 1984 (FR) 1984 (FB) 1989	7.2 6.9 7.4 10.1 8.4
Germany	1983 1984 1989	0.0 6.4 4.8
Ireland	1987	13.8
Italy	1986 1991	11.5 13.5
Luxembourg	1985 1991	5.2 5.4
Netherlands	1983 1987 1991	4.8 5.2 8.3
Norway	1979 1986 1991	5.2 4.4 4.9
Spain	1980 1990	12.7 12.3
Sweden	1967 1975 1981 1987 1992	5.8 2.4 4.8 3.6 3.0
Switzerland	1982	4.3
UnitedKingdom	1969 1974 1979 1986 1991	6.0 8.0 9.0 12.5 18.5
UnitedStates	1974 1979 1986 1991	19.4 20.5 24.6 24.1

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Each child (under 18) is counted once.

Source: Authors' calculations from LIS database.

**Table A.7** Estimated poverty head count rates for elderly persons using LIS data

Country	Years	Poverty rates
Australia	1981 1985 1989	8.9 5.6 5.4
Austria	1987	1.2
Belgium	1985 1988 1992	3.3 3.2 4.5
Canada	1971 1975 1981 1987 1991	10.7 9.5 9.2 7.8 8.3
Denmark	1987 1992	7.5 7.3
Finland	1987 1991	5.5 6.0
France	1979 1981 1984 (FR) 1984 (FB) 1989	6.6 5.8 8.5 11.7 8.1
Germany	1983 1984 1989	0.0 4.8 4.2
Ireland	1987	11.5
Italy	1986 1991	6.3 5.0
Luxembourg	1985 1991	3.1 1.8
Netherlands	1983 1987 1991	6.1 5.3 5.4
Norway	1979 1986 1991	3.3 3.8 4.8
Spain	1980 1990	10.2 7.9
Sweden	1967 1975 1981 1987 1992	18.9 7.0 1.6 8.7 8.6
Switzerland	1982	2.7
UnitedKingdom	1969 1974 1979 1986 1991	1.2 3.0 4.3 5.7 7.1
UnitedStates	1974 1979 1986 1991	7.9 10.1 7.2 8.4

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Each elderly person (over 65) person in the household is counted once.

Source: Authors' calculations from LIS database.

**Table A.8** Estimated poverty head count rates for persons in female-headed households using LIS data

Country	Years	Poverty rates
Australia	1981 1985 1989	39.1 42.5 41.6
Austria	1987	28.9
Belgium	1985 1988 1992	11.7 14.1 12.4
Canada	1971 1975 1981 1987 1991	48.3 43.8 35.2 30.2 31.4
Denmark	1987 1992	22.0 18.1
Finland	1987 1991	14.8 17.5
France	1979 1981 1984 (FR) 1984 (FB) 1989	18.7 32.4 14.4 20.9 19.9
Germany	1983 1984 1989	0.0 17.4 16.9
Ireland	1987	14.8
Italy	1986 1991	19.3 20.0
Luxembourg	1985 1991	11.6 18.1
Netherlands	1983 1987 1991	8.6 9.2 15.6
Norway	1979 1986 1991	20.4 28.1 20.8
Spain	1980 1990	20.1 17.6
Sweden	1967 1975 1981 1987 1992	41.2 17.8 8.0 16.7 15.4
Switzerland	1982	20.7
UnitedKingdom	1969 1974 1979 1986 1991	23.1 30.4 22.3 13.6 32.5
UnitedStates	1974 1979 1986 1991	45.2 39.0 43.5 42.8

Note: Numbers shown are the head count ratio using 50 percent of median adjusted disposable income as poverty line. Every person living in a female-headed household is counted once.

Source: Authors' calculations from LIS database.



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