

Session Number: 6A Continued
Session Title: Measures of Poverty and Social Exclusion
Paper Number: 4
Session Organizer: Stephen Jenkins
Discussant: Ann Harding

*Paper Prepared for the 26th General Conference of
The International Association for Research in Income and Wealth
Cracow, Poland, 27 August to 2 September 2000*

THEORETICAL DEFINITION AND EMPIRICAL MEASUREMENT OF
WELFARE AND POVERTY: A MICROECONOMIC APPROACH

WOLFGANG STRENGMANN-KUHN

For additional information please contact:

Wolfgang Strengmann-Kuhn
Goethe-Universität Frankfurt/Main
Fachbereich Wirtschaftswissenschaften
Professur für Verteilung und Sozialpolitik
Mertonstr. 17
60325 Frankfurt/Main

Email: strengmann@wiwi.uni-frankfurt.de
Telephone: ++49 69 798-22671
Fax: ++49 69 798-28287

This paper is place on the following websites: www.stat.gov.pl
www.econ.nyu.edu/dept/iariw

<i>Introduction</i>	<i>1</i>
<i>The Production of Individual Welfare in Microeconomic Theory</i>	<i>2</i>
<i>Measurement of Individual Welfare</i>	<i>6</i>
Direct or indirect measurement of welfare?	6
Indirect measurement of welfare	8
Direct measurement of welfare	15
<i>The Poverty Line</i>	<i>18</i>
Indirect measurement of poverty	19
Direct measurement of poverty	22
<i>Summary</i>	<i>24</i>
<i>References</i>	<i>25</i>

Introduction¹

The discussion about poverty measurement can be divided into two different issues. The first is the problem of identification, i.e., the issue of deciding who is poor and who is not. Besides the problem of defining poverty on the micro-level, there is also the problem of finding a poverty measure for society as a whole. This is called the aggregation problem. A typical aggregate measure of poverty is the head-count ratio. In a pioneering article, Amartya Sen (1976) develops a number of axioms for aggregate poverty measures. He showed that head-count ratios and poverty gaps satisfy these axioms only in part and developed his own poverty measure, known subsequently as the Sen measure. This article provoked intensive discussion, especially in the economic literature (see Foster/Greer/Thorbecke 1984, Seidl 1988: 89ff.). This paper, however, will deal with the identification problem.

Numerous concepts of poverty definitions and manifold possibilities of poverty measurement exist. These include indirect, direct, relative, absolute, income-based, deprivation-based, consumption-based, budget-standard, primary, secondary, tertiary, consensual, political, subjective, and objective poverty lines, to name a few. This list of poverty definitions, while incomplete, shows that the questions: What is poverty? and How could/should it be measured? cannot be answered unambiguously.

The possibilities of measuring poverty can be presented by working through the list above and describing and discussing the different poverty lines one after the other, or better: one dimension after the other. This is the usual method found in the relevant literature. This paper takes an alternative route. Starting from a very general definition of poverty, different ways of specifying this general definition and of differentiating among the various poverty measures will be discussed.

Thus initially a general definition of poverty is sought which holds for all (or nearly all) poverty definitions. Two elements are common to all poverty definitions. First, poverty is a dichotomous concept: all can be divided between “poor” and “not poor”. This implies the existence of a poverty line, or at least of criteria to distinguish between poor and not poor. Second, all poverty definitions describe a lack. Generally, what is regarded to be lacking is “well-being” or “welfare”: “Poverty is the counterpart of well-being. Hence poverty may also be defined as lack of welfare” (Hagenaars/van Praag 1985: 140).

Assuming that (individual) welfare can be measured as a one-dimensional quantity, then poverty can be defined as follows: someone whose individual welfare lies below a

¹ Acknowledgements: I would like to thank Gero Lipsmeier, University of Bielefeld, and Richard Hauser, University of Frankfurt, for many helpful comments and Susan Kutcher for correcting my English.

minimum welfare threshold is “poor”. This definition can be written formally as:

$$W_i < W_{\min} \Leftrightarrow i \in P \quad \mathbf{1}$$

W_i is the welfare of individual i , W_{\min} is the welfare below which a person is considered to be poor and P is the set of poor individuals. i is poor if (and only if) i 's individual welfare W_i is lower than W_{\min} , and is not poor if W_i is greater than W_{\min} . The (identification) problem of poverty measurement therefore can be separated into two steps. The first decision is how to measure welfare and the second is to define or to measure a welfare threshold which separates the poor from the non-poor.

The first section below describes how welfare is dealt with in microeconomic theory. Secondly, this microeconomic overview is followed by a presentation of how welfare can be measured and how it is measured in empirical studies of poverty and distribution. It will be shown that there is a strong parallel between the production of utility in microeconomics and poverty measurement. Finally, the issue of defining the poverty threshold will be discussed. In this section, empirical examples from the European Community Household Panel (ECHP) are given. The ECHP is a data set provided by EUROSTAT, collected in the countries of the European Union since 1994. The ECHP is a panel study, i.e. the same households are interviewed each year. The first three waves of this panel are available at present. In 1994 the twelve countries that were then EU members were included; Austria was added in 1995 and Finland in 1996. Data for Sweden have not yet been integrated. The aim of the ECHP is to acquire comparable data for all countries using a similar questionnaire. The advantage of this survey as regards poverty research is that it includes detailed data on income and a number of additional indicators which can be used for poverty measurement. This paper analyses the data from 1996, the third wave.

The Production of Individual Welfare in Microeconomic Theory

In microeconomic theory it is generally assumed that the goal of the economic behaviour of households is to maximise their welfare or to maximise the individual welfare of the household members. Instead of welfare, the terms “satisfaction” and “well-being” can be used, or, the typical economic term, “utility”. “*Satisfaction* and *utility* are two terms economists use to describe the overarching goal of households. *Well-being* is a term more commonly used by sociologists and home economists but it refers to the same goal” (Bryant 1990: 1). In this paper all these terms are treated as synonyms for the same concept.

The typical task of microeconomic theory is to explain human behaviour. It is assumed that people act to maximise their utility function. Utility can be increased by material

things as well as by immaterial things such as health, friendship, social contacts, leisure, employment and others. All of these factors which influence the utility function are called *goods*. For the investigation of economic behaviour, it is only necessary to measure utility on an ordinal scale. This implies that utility is conceived of as a one-dimensional quantity of which individuals or households can have a greater or smaller amount. For distribution analysis, the assumption that utility is measured (only) as an ordinal is not sufficient (Cooter /Rappoport 1984, Van Praag 1994). To identify poverty, at least one point on the welfare function must be fixed: the point indicating the poverty threshold.

In microeconomic theory individual behaviour can be compared with the decision-making process of firms. The utility ‘production’ process model is similar to that of the production process of goods. Inputs to this process are the resources of a household, while the output is utility (or pleasure, satisfaction, well-being, welfare). There are exactly two stages of the production process. First, utility-raising goods are produced; second, these goods are input to produce welfare. Upon closer observation, this production process can be divided into further stages. These will be described below, starting with resources.

In the simplest case, the resources of a household are understood to be the income which the household can use in any given period. However, income itself is a result of economic behaviour and dependent on other resources. Economics distinguishes between human and physical resources, which include disposable time (Bryant 1990: 6) as well as human, physical and financial capital (Barr 1998: 130). These types of capital may be attained through social capital (Bourdieu 1983, Coleman 1988) or cultural capital (Bourdieu 1983). The resources available are then used to produce goods which provide satisfaction. Resources also may be consumed or utilised directly.

Goods can be obtained in three ways. They can be bought, they can be produced or they can be received as private or social (in kind) transfers or as public goods. Neglecting the latter possibilities in the assumption that goods must be bought, the necessity of monetary income arises. Monetary income is the result of a process in which resources are transformed into money and money is used to buy goods, which then create well-being. This is the simplest microeconomic model of the household, the one presented to students in introductory courses. This model, of course, can be specified and amended in manifold ways.

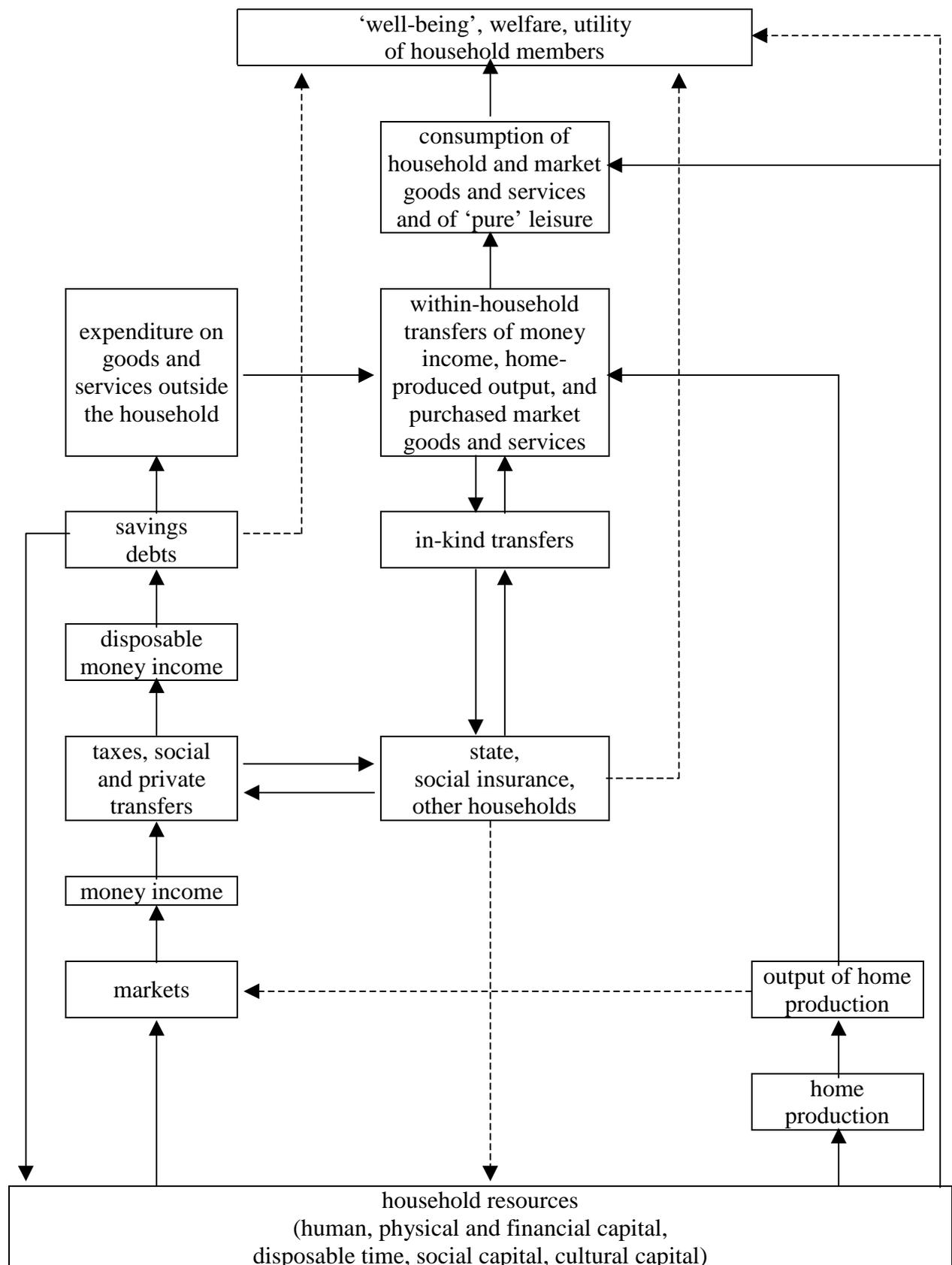
For the time being, let us continue to think of income only as money. In this case income can be derived from resources (human, physical or financial capital) by selling them on the labour market, capital market or goods market. Additional money flows between households and between the household and the state. To calculate the disposable income

which can be used for buying goods, these flows must be taken into consideration. But even this disposable income is not necessarily used only for consumption. Part of it may be saved. Another possibility is that households have the opportunity to borrow or to reduce their capital. Disposable income plus debt or minus savings yields the amount of money that can be used for consumption. It is important to note that the (current) consumption may not be the only factor relevant to well-being. Saving, for example, is merely a shift of consumption into the future. Similarly, contributions to social security systems are an equivalent chronological consumption shift. For taxes, too, one might say that there is a parallel in the welfare-increasing effects of public goods, although these effects are certainly less direct than those of social insurance contributions. Even private transfers of income to other individuals can be considered to increase the welfare of the donating household; it is not necessarily the case that every gift is a loss of welfare. As stated above, goods can be obtained not only through purchase but also through in-kind transfers and through household production. Household resources can be used to produce goods or services directly without buying them on the market.

Thus far the unit of investigation has not been discussed: is this the individual, the household or the family? In typical microeconomic theory the household is treated like an individual. In reality, however, households usually consist of more than one person who share resources and divide goods. Furthermore it can be argued that the unit should be the family, which may be split among two or more households. The issue is the extent to which resources and goods are shared. This question can hardly be answered because it is so difficult to distinguish between independence and dependence when family members live in multiple households. If resources and goods are divided, the subsequent question arises of how goods and resulting welfare are distributed within a family or a household.

In summary, individual welfare is produced by the following process (see Figure 1). Resources of a household are used to derive monetary income. Added to this are any monetary transfers the household receives from the state or other households; subtracted are any private transfers given to other households and taxes paid to the state. The result is the disposable income which can be used for consumption and saving. Besides buying goods, it is also possible to receive goods from other households or the state, or to produce goods within the household. All of these goods together determine the welfare of the individuals of the household. In all stages of this welfare production process it is possible to measure welfare and poverty, as will be demonstrated below.

Figure 1: The household Production of Welfare²



² Based on Figure 1 of Jenkins 1991 (459)

Measurement of Individual Welfare

Direct or indirect measurement of welfare?

In the following section, various possibilities of measuring welfare for use in research on empirical distribution and poverty are described. For this purpose the welfare production process is analysed in greater detail and more formally, always maintaining a focus on empirical measurement.

If poverty is defined as a lack of welfare, the first simple question is whether welfare (or satisfaction or utility) can be measured directly. Indeed, some surveys include questions about satisfaction or the value placed on household income and other components of welfare. The ECHP, for example, includes questions about satisfaction with work or professional activity, financial situation, housing situation and amount of leisure time. There are also questions about satisfaction with current job (earnings, job security, type of work, working hours, working conditions and travel distance). Additionally there is the question of whether the household can make ends meet. Leaving measurement problems aside, in theory a general welfare level could be derived from this information. To measure poverty, one would need only to define a minimum welfare level and then compare this with the welfare measured. However, this is not what is usually understood as poverty.

Identifying poverty is not a question of subjectively evaluating a current situation. Rather, whether an individual is poor is decided by general social criteria, not by the individual defining him- or herself as poor or less satisfied. Poverty is socially assigned. This point was recognised by the German sociologist Simmel as early as 1908 (see Coser 1965). “Following Simmel’s lead, poverty will be dealt with as a social category that emerges through societal definition” (Coser 1965: 140). The (social) decision of whether there is a lack of welfare may differ from the subjective judgement of an individual. The individual welfare function W in (1) is thus socially defined and may differ from a person’s individual utility function. Thus what is sought is a socially-defined individual welfare function which can be measured or estimated in terms of observable characteristics.

In microeconomics the individual welfare W is dependent on a bundle of goods, an array c , which also includes services and material and immaterial goods:

$$W_i = W_i(c_i) \quad 2$$

This welfare function may differ among individuals and among circumstances. The same bundle of goods can produce different levels of welfare. Therefore the welfare function depends not only on the bundle of goods c , but in some cases also on age, health, employment

status and other factors. If these characteristics are designated as x_i , then (2) can be formalised more accurately as:

$$W_i = W (c_i; x_i) \quad 3$$

In (3) it is assumed that a socially-defined welfare function W exists which gives each individual i a value of individual welfare W_i for every bundle of goods c_i , under consideration of additional factors x_i .

Suppose that the relevant bundle of goods as well as the characteristics x_i can be observed, and that the individual welfare W_i can be calculated. Drawing conclusions from this with respect to poverty is still problematic. The leading opinion in poverty research is that the question of whether someone is poor is measured not by the observable living standard but by the possibilities, or resources, an individual has. If a lower standard of living (measured in terms of the socially-defined welfare function) is due (only) to preferences and not based on the restrictions an individual faces, then the individual generally is not considered to be poor. Accordingly, (3) can be rewritten as:

$$W_i = W \{ c_i^* (r_i); x_i \} = W (r_i; x_i), \quad 4$$

where the resources of individual i are called r_i . Welfare then is directly dependent on a bundle of goods c_i^* , which is dependent on resources r_i . The bundles of goods c_i^* may not necessarily be identical to the observable bundle of goods c_i , as preferences of the individual may differ from those preferences implied by the welfare function W defined by society. c_i^* is the result of maximising the socially-defined function W_i subject to the available resources r_i . Relevant for poverty definitions is this value of W_i which depends on an optimisation process theoretically restricted by available resources. In other words: "Poverty is a situation in which the welfare, derived from command over resources of a household falls below a certain minimum welfare level, called the poverty threshold." (Hagenaars 1986: 10) This is the well-known resource definition of poverty. Poverty measurement based on this definition is called indirect, because welfare is indirectly dependent on resources. The direct measurement of poverty, in contrast, is based on observations of the endowment of goods (see Ringen 1988).

However prevalent this resource definition may be, there are also arguments for defining poverty on the basis of the observable bundle of goods rather than on the basis of resources. The core arguments for direct or indirect measurement of welfare for poverty research can be found in Sen (1981). He follows the previous argumentation for indirect measurement:

If one were to look merely for the ability to meet minimum needs without being bothered by tastes, then one would of course, set up a cost-minimizing programming problem and simply check whether someone's income falls short of that cost solution (Sen 1981: 27).

The resource definition implies the assumption that the consumption bundle is the result of rational economic choice. Then a "low level" of goods is the result of either preferences or a low level of resources. But, what about people who are not able to use their resources in an economically rational way? Addressing this question Sen argues that: "the direct method is superior to the income method, since the former is not based on particular assumptions of consumption behaviour which may or may not be accurate" (1981: 26). Nevertheless, he does not argue for one or the other kind of measurement, but stresses that the " 'direct method' and the 'income method' are not, in fact, two alternative ways of measuring the same thing, but represent two alternative *conceptions* of poverty" (27f.).

Indirect measurement of welfare

In order to implement the resource definition of poverty empirically, first must be determined what the resources are, and, second, how these resources influence welfare. Using the broad definition of resources given above is empirically not feasible. For starters, data about financial and physical capital are limited and excluded from most surveys (including the ECHP). Measuring human capital or even social or cultural capital is even more complicated. In most empirical studies, income is the only indicator used for resources. One exception to this is the Swiss Poverty Report (Leu et al. 1997), which combines information about income with information about financial wealth. Their resource indicator R is (Leu et al. 1997: 28):

$$R = Y_{HH} + a \cdot V - Z , \quad 5$$

where Y_{HH} is household income, from which Z_i , compulsory deductions including taxes, contributions and others, is subtracted. To this, a share a of wealth V is added. In general the share a lies between 0 and 1. Leu et al. assigned values between 1/5 and 1/15 mainly as a function of age (see Burri 1998: 15f.).

If (only) income is used, what income is must be defined first. In the simplest version, income is the sum of labour income and other monetary income. In addition, it makes sense to consider non-monetary income as well. An example of non-monetary income is the rental value of owner-occupied housing, which is included in some surveys, but not in the ECHP. Home production could also be added. Because this is typically not asked in surveys, it must be estimated. Although the exclusion of home production is regarded as a shortcoming of poverty measurement (Piachaud 1987), it is rarely implemented. One study including household production was performed by Jenkins/ O'Leary (1996), who investigated the

distribution of an extended income E of a couple (Jenkins/O'Leary 1996:403):

$$E = Y_{HH} + \lambda_f \cdot H_f + \lambda_m \cdot H_m, \quad 6$$

where Y_{HH} is household income, H_f and H_m are hours of household work by the members f and m respectively, and λ_f and λ_m are estimated shadow prices. This approach is not possible with the ECHP, as data about the time spent working at home is not available, except for child care and taking care of others.

One problem with using income as an indicator for resources is that the amount of income may depend on preferences. This is similar to the problem discussed above: consumption is dependent on preferences and different consumption choices can be made in spite of the same resources. The same is true for income, because income itself is an output of a production process where other resources are inputs. In a basic microeconomic standard model, these inputs are time and human capital which can be used to sell labour on the labour market. Presume a model with only leisure and work as possible uses of time (i.e., a model without household production) and with a constant hourly wage rate dependent on the human capital of the worker. Presume furthermore that an individual can choose his or her working hours in terms of preferences about consumption/income and leisure time. Thus those with a high preference for consumption will have a high income and those with a high preference for leisure time will have a low income, even though the underlying resources (time and human capital) are identical. To avoid this problem, the "full income" can be used (Jenkins/ O'Leary 1996: 402, Bryant 1990: 125, Barr 1998: 130ff.). This term stems from Gary Becker (1965)³: "This income could in general be obtained by devoting all time and other resources of a household to earning income with no regard to consumption" (Becker 1965: 497f.). In the simple model stated above, the full income F is:

$$F = Y_0 + w \cdot T, \quad 7$$

where Y_0 is non-labour income, w is the constant hourly wage rate and T is total disposable time. In empirical practice a number of problems must be solved before applying this function. One has to specify what the total disposable time is, especially if there are children in the household. Do children reduce this time, and if so, by how much? The second problem is to estimate the wage rate for those who are not employed. For this issue standard econometric methods exist and are used in labour supply analysis. A third problem arises

³ More accurately, this term was the result of a discussion between Gary Becker with Milton Friedman (Becker 1965: 497)

from the assumption that the wage rate is constant. Using more realistic assumptions then makes the calculation of full income much more complicated. Nevertheless, studies have been performed based on the idea of a full income (see Garfinkel et al. 1997, Bird 1991).

In spite of the limitations of income as a resource indicator, it is commonly used in poverty research. To use income as a criterion for poverty, one then must answer a couple of questions. The first question is about the income period. Monthly or annual income are typical periods, but from the point of view of welfare it can be argued that longer periods should be considered, because future income also influences the welfare function:

$$W_i = W_i(y_t^i, y_{t+1}^i, y_{t+2}^i, \dots) \quad \mathbf{8}$$

Students, for example, often are not treated as poor. One argument is that they will receive a high income in the future. However, it also can be claimed that an expected high income is of no advantage to a poor individual in the present. This argument may be the main reason that, typically, monthly or annual income is used in poverty research. Regarding a welfare function:

$$W_i = W_i \{ w_t^i(y_t^i), w_{t+1}^i(y_{t+1}^i), \dots \} \quad \mathbf{9}$$

in which the total welfare W is dependent on period welfare functions w_t , it is the period welfare functions w_t which are relevant for poverty research, and not the total welfare function W . For distribution analyses, longer periods may be appropriate. Burkhauser et al. (1997) therefore examine different measures for well-being, annual income, permanent income (operationalised by the average over a six-year period) and wealth.

The second question with regard to income measurement is which kind of income should be measured, i.e. what should be included and what should be left out. Gross income is generally calculated as the sum of monetary labour income, monetary capital income (to the extent that this is feasible) and monetary social transfers. Monetary private transfers are usually added, too. In addition, non-monetary incomes should be included, especially for farmers, but also for house owners. Private and in-kind social transfers should not be neglected either. Unfortunately, indicators for non-monetary income are rare in surveys.

Next, it must be decided what should be subtracted from this gross income. Typically, taxes and social insurance contributions are subtracted. However, as argued above, even this practice is questionable, as taxes and social insurance contributions can be regarded as a means of raising welfare. This is more suitable in the case of social insurance, of course, as beneficiaries effectively receive a return on their contributions; the case for taxes is not so

simple. In dealing with taxes, the problem is particularly complicated by international comparison. Assume that one country has a large public sector and, accordingly, high taxes, while another country has a high level of privatisation. The countries may enjoy the same welfare level, but net incomes are lower in the first. This problem is eliminated, of course, if the investigation concerns only the distribution as related to national standards. For social insurance contributions the problem arises even in within-country comparisons, as some of the population usually is exempted from obligatory social insurance contributions. All of these factors argue for using gross income rather than net income. On the other hand, the effects of taxes on welfare are quite indirect and unbalanced, and returns to social contributions generally are realised only in the long-term (although the consequent reduction of uncertainty may have a welfare effect in itself, see Bird 1993). Moreover, the same arguments apply as for short income periods. That is, social insurance contributions may not effect the total welfare function W , but they can reduce the period welfare function w_t . For this reason social insurance contributions usually are subtracted as well. But then another problem arises: should a hypothetical contribution be deducted for those who don't pay social insurance?

Besides taxes and social insurance contributions, there may be other payments that should be subtracted from gross income, for example private transfers, payments for child care or rental payments. The question is always the extent to which these payments are voluntary, in which case they should be treated more like consumption goods; or involuntary, in which case they have the character of a tax.

The next issue is which income unit to use. For this question, two aspects of the production process of welfare are relevant, as discussed above. The first is that resources generally are shared among individuals. Therefore, which individuals share resources must be defined. The typical income unit for investigations is the household income. The second issue is how to determine the welfare function: Does the household have a unique welfare function or does each household member have his or her own welfare function? The question of whether a household welfare function exists is discussed at length in the context of labour supply decisions of household members (see Killingsworth 1983: 29ff., Ott 1992, Bourguignon/ Chiappori 1994), for which both household utility functions and separate individual utility functions are used.

The typical answers to these questions in poverty research are first, the pool assumption: that resources/incomes are pooled within a household; and second, the assumption of equal distribution of welfare within the household: that all outcomes are so

distributed that every household member has the same welfare level (Hauser 1996)⁴. The latter assumption is often criticised, especially from the feminist perspective: “The crucial question of poverty research is to what extent all household members share the same level of welfare” (Ruspini 1998: 294). The assumption contrary to equal distribution of welfare is that no transfers occur within the households, which is, of course, equally untenable. To present the whole range between these poles, both can be analysed: poverty based on “equal sharing” and poverty under the “no transfers” assumption, as Ruspini (1998) demonstrated. For all suppositions between these extremes, additional assumptions about within-household transfers are necessary. This problem can be divided into two sub-issues. The first is how to treat transfers to children, and the second is what assumptions can be made about transfers between and among adults. For the latter it is possible to use information about the individual incomes. This is not a satisfying solution for the former, however, since children usually have no income or only insufficient income. One possibility is to assume that children always receive the minimum income required and that the rest is distributed among the adults, either equally or in other ways. Of course, this has the consequence of excluding the possibility of child poverty.⁵ Discussions of different assumptions about intra-household transfers and estimations of their consequences can be found in Jenkins (1991) and Burri (1998: 184ff.).

The relation between income and welfare has not yet been discussed in this paper. Obviously, the same income does not yield the same welfare. Welfare depends on household size, the age of household members and other circumstances, such as whether any member of the household requires stationary medical care. The typical way of accounting for this problem is to use an equivalent income rather than household income. This equivalent income can be interpreted as a welfare function. Buhmann et al. (1988), for example, presented a welfare function that is dependent only on disposable income Y_{HH} and household size n (Buhmann et al. 1988: 119):

$$W_i = \frac{Y_{HH}}{n^\theta} \quad \mathbf{10}$$

The disposable household income is divided by n^θ , where θ is called “equivalence elasticity” and usually lies between 0 and 1. For $\theta = 1$, W is per capita income; for $\theta = 0$, W is household income. Obviously, household income is a misleading indicator of welfare. But the more logical measure, per capita income, is also unsatisfactory, because it ignores economies of

⁴ It must be emphasised that as a consequence the investigation unit of poverty research is the individual, even though the income unit is household income.

⁵ With the exception of households with an insufficient household income for the children alone.

scale which can mean, for example, that a two-person household enjoys a welfare level equal to that of a one-person household with less than double the income.

The “Buhmann scale” n^θ presented in (10) depends only on household size and the single parameter θ , but more information is often used. Generally, an equation representing equivalence income can be written as:

$$W_i = \frac{Y_{HH}}{\sum_{i=1}^n ew_i}, \quad 11$$

where Y_{HH} is any measure of household income and ew_i is the equivalent weight of household member i , which typically lies between 1 and 0. The sum of all weights is then usually less than or equal to the number of household members n . It is theoretically possible that some weights are greater than one, for example, for people with exceptional needs.

There are several ways of determining these weights. The first possibility is to use equivalence scales typically used by other researchers. This has the advantage of comparability, but the disadvantage that the weights are not necessarily “true”. Typical equivalence scales of this type are a) the original OECD scale, where the weight of one adult is one, the weight of other persons aged 15 or older 0.7, and each child under 15 years is weighted as 0.5; b) the “modified OECD scale” (Hagenaars et al. 1994: 18) with weights of 0.5 for each additional adult and 0.3 for children; and c) “Buhmann”-type equivalence scales, where $\theta = 0.5$ is commonly used (for example OECD 1995). The second possibility is using equivalence scales implied by social security regulations; an equivalence scale is, for instance, implicit in the rules for German social assistance (Faik 1997). A third possibility is to estimate the equivalence scale on the basis of consumption expenditure data (Merz/Faik 1995). Finally, it is possible to estimate the equivalence scale on the basis of subjective judgements acquired in surveys. Here two main methods of estimation are distinguished. The first is based on the “income evaluation question” and the second on the “minimum income question”. Both were developed especially for the measurement of poverty (Goedhart et al. 1977).

The poverty line based on the income evaluation question is called LPL (Leyden Poverty Line, for the University in which it was developed). For example, the following question is asked in the German Socio-Economic Panel (GSOEP): “Which monthly household income after tax would you in your situation consider to be very bad? Bad? Insufficient? Sufficient? Good? Very Good?” (Plug et al. 1997: 72). Furthermore an explicit welfare function is assumed, whose parameters are estimated using the data. This welfare function is (Hagenaars/ Van Praag 1985: 145):

$$W_i(y_i) = \Lambda(y_i; \mu, \sigma) = N(\ln y_i; \mu, \sigma), \quad 12$$

where Λ is the lognormal distribution function and N the normal distribution function. μ is the mean value and σ the variance, where μ is (at least) dependent on family size n and (net or disposable) household income (Plug et al. 1997: 73):

$$\mu = \beta_0 + \beta_1 \cdot \ln n + \beta_2 \cdot \ln y_{HH} + \varepsilon, \quad 13$$

The second variant based on the minimum income question, the ‘‘SPL’’ (Subjective Poverty Line) makes no assumption about an underlying welfare function. It is simply assumed that the (logarithm of the) answer to the minimum income question is dependent on at least some variables, for example (Plug et al. 1997: 73):

$$\ln y_{\min} = \alpha_0 + \alpha_1 \cdot \ln n + \alpha_2 \cdot \ln y_{HH} + \varepsilon, \quad 14$$

The parameters are estimated econometrically and are identical for all individuals. Because the estimation is based on individual subjective evaluations of the entire population, the LPL and SPL approaches are also called consensual.⁶

Table 1: Results of SPL Estimation

	D	DK	NL	B	L	F	UK	IRE	IT	GR	S	P	A	FIN
equivalence elasticity $\theta = \alpha_1 / (1 - \alpha_2)$	0.40	0.58	0.23	0.42	0.32	0.42	0.48	0.52	0.45	0.57	0.57	0.63	0.46	0.56
factor for a two-person household 2^θ	1.32	1.50	1.17	1.34	1.24	1.34	1.39	1.43	1.37	1.48	1.49	1.55	1.38	1.47
intercept α_0	3.35	2.75	3.53	5.72	6.11	3.96	2.29	3.09	5.05	7.41	6.69	5.98	6.15	5.35
household size α_1	0.18	0.19	0.11	0.23	0.18	0.19	0.18	0.26	0.30	0.34	0.33	0.32	0.30	0.36
household income α_2	0.55	0.67	0.51	0.45	0.43	0.55	0.63	0.50	0.34	0.41	0.43	0.50	0.34	0.36
R^2	0.57	0.61	0.24	0.49	0.36	0.54	0.69	0.53	0.41	0.60	0.57	0.58	0.38	0.46
n	8565	4717	9121	5984	1828	12783	6551	7371	17294	11586	15333	11501	7072	7722

Source: European Community Household Panel, wave 3 (1996), non-weighted OLS estimation

The following minimum income question is included in the ECHP: ‘‘In your opinion, what is the very lowest net monthly income that your household would require in order to make ends meet?’’. The results of estimating (14) are shown in Table 1. It is apparent that the equivalence elasticity usually lies between 0.4 and 0.6, with the exceptions of Luxembourg and the Netherlands, where it is lower, and Portugal, where it is slightly higher. The meaning of these equivalence scales may be illustrated more clearly by the factor for a two-person household, also listed in Table 1. The equivalence elasticity of 0.4 in Germany, for instance, means that a two-person household requires 132% of the income of a single household.

⁶ The term consensual is misleading, however, because there is no consensus about these functions.

Direct measurement of welfare

A pioneering work for the development of direct measures of poverty was the study “Poverty in the United Kingdom” (Townsend 1979). For Townsend, poverty is dependent on the typical life-style in a society. In Townsend (1979), life-style is measured by a list of 60 items, comparable to the bundle of goods in our theoretical model. In his survey, questions ask whether a household has an item or can do without it, respectively. On the basis of these answers, a deprivation index is calculated. Townsend simply uses the sum of items possessed:

$$DI_i = \sum_{j=1}^K d_{ij}, \quad 15$$

where d_{ij} indicates that individual i lacks item j . The number of items used in the index is K . It is worth mentioning that Townsend does not define poverty in terms of this deprivation index, but rather uses the index to derive an income poverty line (see the next section).

This approach subsequently was developed further. Townsend (1979) himself defined which items were relevant. Mack and Lansley (1985) also predetermined a list of items, but they asked survey subjects which of them were necessary. The items used in the calculation of the deprivation index were only those deemed necessary by the majority of the subjects asked.

Desai and Shah (1988) formulated this approach more generally. Initially they argued that not only the issue of having or not possessing an item is important for deprivation. They suggested using the frequency of an “event” like having a meal. Thus they found it “tempting (...) to define a utility function in terms of events which are themselves defined over goods” (Desai/Shah 1988: 509). This utility function should not only account for those things of which an individual is deprived, but also for those of which an individual has more than others. In other words, not only deprivation but also affluence should be taken into account. The way they proposed to do this is by computing a disparity function $\delta(\theta_{ij}, \theta_j)$, where θ_{ij} is the number of events j of person i and θ_j is the typical frequency of event j (Desai and Shah proposed the mode value). Furthermore, Desai and Shah argued that the simple sum index used by Townsend (1979) and Mack and Lansley (1985) was not appropriate because several items should be weighted differently. For this weighting they argued that the more people have a good in society, the more a person suffers from being deprived of not having it. Therefore they proposed using the following deprivation index (Desai and Shah 1988: 511):

$$DI_i = \sum_{j=1}^K \lambda_j \cdot \delta_{ij}, \quad 16$$

where λ_j is the share of people who have a δ_{ij} larger than the modal value δ_j . Since they were

using Townsend's data, the empirical translation of the model was simpler and lost a number of features. For calculation they used:

$$DI_i = \sum_{j=1}^K \lambda_j \cdot d_{ij}, \quad 17$$

which is only a modest variation of the Townsend measure in (15). The only new element was the introduction of a scheme to weight the items. In relation to their theoretical model, firstly it lost the "amount" character of a good, as the dummy d_{ij} is used instead of δ_{ij} , and, secondly the compensatory character disappeared: in terms of microeconomics, there was no possibility of substituting a good of which one is deprived with a good which one has in surplus.

Muffels (1992) picked up two points of the approach of Desai and Shah in particular. The first was the weighting scheme, which he developed further, and the second was the inclusion of the compensatory character. He developed the following deprivation index:

$$DI_i = \sum_{j=1}^K \mu_j \cdot \lambda_j \cdot d_{ij} - \sum_{j=1}^K \mu_j \cdot (1 - \lambda_j) \cdot (1 - d_{ij}) \quad 18$$

The first sum is, except for the weighting factor μ_j , identical to the deprivation index (17) used by Desai and Shah. The second sum represents that deprivation is decreased if someone has a good. Muffels argued that the utility of having a good increases as the share of individuals in society who have that good decreases. Therefore the "haves" are be weighted with $1 - \lambda_j$. In addition to the weighting by λ , Muffels argued that weighting depends on the share of individuals who hold an item to be necessary; this is represented by μ_j . The weighting of items depends whether or not the individual has the item and whether or not it is deemed necessary (Muffels 1992: 36). This weighting scheme is subject to criticism (see Van den Bosch 1996), but its importance with respect to welfare measurement is that needs as well as non-necessities are included in his index. Therefore, he argued that the deprivation index also can be interpreted as an index for welfare, which Muffels called the "consumption welfare scale" (CWS):

$$CWS_i = DI_i^{-1} \quad 19$$

This index was then used to estimate a welfare function:

$$\ln W_i = \alpha_0 + \alpha_1 \cdot \ln CWS_i + \sum_k \alpha_k \cdot \ln X_{ik}, \quad 20$$

where welfare is dependent on the consumption welfare scale and on other variables X including age, sex, income and other factors which can influence welfare. (20) is quite similar to (3), with CWS as an indicator for the bundle of goods c in (3).

This welfare function (20) differs from the standard utility functions used in microeconomic theory. One commonly used function is the Cobb Douglas function:

$$W_i = A \cdot \prod_k c_{ik}^{\alpha_k} \Leftrightarrow \ln W_i = \alpha_0 + \sum_k \alpha_i \cdot \ln c_{ik} \text{ with } A = e^{\alpha_0}, \quad 21$$

where c_{ik} is the amount of good k available to person i . The advantage of such a welfare function is that the substitution process is better reflected than with a simple weighted or non-weighted sum of dummies. Unfortunately, the quantity of goods generally is not available in surveys. This is true for the survey used by the authors discussed as well as for the European Household Panel. Nevertheless, below a welfare function similar to (21) will be developed and estimated with the Europanel, utilising investigations of the ECHP by Layte et al. (1999). The Europanel includes several indicators which can be used to calculate a deprivation scale. Layte et al. (1999) showed that it is possible to split these items into a couple of categories, each of which forms its own dimension of deprivation. The categories distinguish between basic life-style deprivation, secondary life-style deprivation, housing facilities, housing deterioration and environmental problems. For each of these dimensions a separate deprivation index can be calculated. Layte et al. (1999) simply used sum indices. Each of these dimensions then can be interpreted as one “good” and their indices used as variables in the welfare function. To do this the deprivation indexes are simply transformed into welfare indices:

$$WI_j = 1 + K_j - DI_j, \quad 22$$

where j is the deprivation dimension, K_j is the number of goods in this dimension and DI_j is the corresponding deprivation index. Thus WI_j is 1 if all items of one dimension are missing. The welfare function can then be written as:⁷

$$W_i = A \cdot W_{1i}^{\alpha_1} \cdot W_{2i}^{\alpha_2} \cdot W_{3i}^{\alpha_3} \cdot W_{4i}^{\alpha_4} \cdot \prod_{j=5}^M X_{ij}^{\alpha_j}, \quad 23$$

or the equivalent:

$$\ln W_i = \alpha_0 + \sum_{j=1}^4 \alpha_j \ln W_{ij} + \sum_{j=5}^M \alpha_j \ln X_{ij}, \quad 24$$

where M is the number of variables used. It is easy to estimate (24) empirically using the information about satisfaction with one’s financial situation as an indicator for W_i . Used as variables are age X_{ij} , household income Y_{HH} and family size n . However, it is important to emphasise that these items were developed for the measurement of deprivation and not for welfare in general (see Layte et al. 1999: 6f.). Therefore the relevant bundle of goods is

incomplete and the measurement of welfare limited. This is the reason why income also is included in the function. The results of the estimations are shown in Table 2. The most important values of α_1 through α_4 are all between 0 and 1. The highest welfare effect generally is associated with the basic dimension. Housing indicators have the least influence on welfare; in some countries they are not even statistically significant.

Table 2: Estimation of Individual Welfare Functions

		D	DK	NL	B	L	F	UK	IRE	IT	GR	S	P	A	FIN
intercept	α_0	-3.14	-2.69	-2.65	-3.33	-4.39	-2.49	-2.16	-2.69	-2.75	-2.72	-2.99	-1.19	-2.52	-2.40
basic	α_1	0.49	0.83	0.86	0.59	0.25	0.55	0.51	0.74	0.35	0.27	0.40	0.19	0.57	0.63
secondary	α_2	0.22	0.31	0.33	0.36	0.45	0.33	0.22	0.16	0.21	0.12	0.17	0.08	0.25	0.31
housing	α_3	0.13	*	*	*	<i>0.17</i>	*	<i>0.16</i>	0.18	0.15	*	<i>0.07</i>	0.08	*	<i>0.13</i>
environment	α_4	0.15	0.10	0.08	0.10	*	0.15	0.13	*	0.14	0.19	0.13	0.15	0.17	0.09
age	α_5	0.21	0.19	0.11	0.12	0.15	0.08	0.13	0.20	0.14	0.08	0.17	*	0.09	0.14
household income	α_6	0.22	0.11	0.14	0.18	0.30	0.17	0.15	0.15	0.23	0.20	0.18	0.13	0.16	0.10
household size	α_7	-0.13	-0.07	-0.04	-0.09	-0.14	-0.12	-0.11	-0.09	-0.11	-0.09	-0.14	-0.08	-0.13	-0.07
R^2		0.27	0.30	0.39	0.25	0.24	0.27	0.29	0.24	0.27	0.29	0.23	0.17	0.19	0.30
n		8552	4835	9218	5991	1902	12938	6093	6502	17699	11323	15261	11601	7248	7450
$\theta = -\alpha_7 / \alpha_6$		0.57	0.65	0.28	0.50	0.46	0.73	0.73	0.59	0.48	0.46	0.79	0.66	0.81	0.69
θ from SPL estimation		0.40	0.58	0.23	0.42	0.32	0.42	0.48	0.52	0.45	0.57	0.57	0.63	0.46	0.56

Source: European Community Household Panel, wave 3 (1996), non-weighted OLS estimation

italic: not significant at the 1% level

*: not significant at the 5% level

Interestingly enough, an equivalence elasticity also can be computed from this estimation.

The factor in (23):

$$Y_{HH}^{\alpha_6} \cdot n^{\alpha_7} = \frac{Y_{HH}^{\alpha_6}}{n^{-\alpha_7}} = \left(\frac{Y_{HH}}{n^{-\alpha_7/\alpha_6}} \right)^{\alpha_6} \quad 25$$

can be interpreted as the effect of equivalence income with $\theta = -\alpha_7 / \alpha_6$. In Table 2 it is apparent that equivalence elasticity based on (24) lies between 0 and 1, but is typically higher than that based on SPL estimation.

The Poverty Line

After choosing the criteria for welfare measurement and determining the welfare function, the final step in poverty measurement is the determination of a threshold separating the poor from the non-poor. Just as in the decision about the welfare function, there are several ways to do this: the threshold can be chosen by experts, dictated by social security regulations or based on surveys on either consumption information or subjective evaluations. In any case, the determination of the welfare function and the determination of the poverty

⁷ The indices for “housing facilities” and “housing deterioration” are combined in one index.

threshold may be based on different sources.

Since the question of defining the poverty threshold is discussed at length in the literature (e.g., Hagenaars 1986: 15ff., Van den Bosch 1993, Nolan/Whelan 1996: 14ff.) the variety of poverty lines is outlined only briefly in the following. Instead, I focus on a number of possibilities illustrated by empirical examples from ECHP data.

Indirect measurement of poverty

First, indirect measures of poverty are investigated in the form of income poverty lines. The simplest way to define an income threshold is to set it at a certain amount of money, for example, x EURO monthly per-capita income.

$$i \in P \Leftrightarrow y_i < y_{\min}, \quad 26$$

where P is the set of poor persons. Obviously, this is not a satisfactory poverty threshold. Nevertheless, such poverty lines are used frequently. The World Bank, for example, defines poverty in developing countries as a per-capita income below 1\$ per day at purchasing power parity of 1985 (United Nations Development Program 1997: 32).

Historically, the first kinds of poverty thresholds for developed countries have been based on budget standards (Rowntree 1997 [1922]). A poverty line is calculated in two steps. First the minimum bundle of goods c_{\min} must be determined; then this value must be multiplied by a vector of prices p :

$$i \in P \Leftrightarrow y_i < y_{\min} = p' \cdot c_{\min}(x_i) \quad 27$$

Determining the minimum consumption bundle is not an easy task, as it is dependent on personal and household characteristics x_i . The question of which prices should be used is equally difficult to answer. Generally the prices of goods are not unique prices, and prices also may differ according to personal characteristics (in the case of discounts for students and families, for instance) and even may depend on income. In recent years a “rediscovering” (Bradshaw 1993b) of the budget standards approach has taken place (see also Bradshaw 1993a).

A third version of income poverty lines, one best described as “political poverty lines”, are based on social security regulations, in particular, on those which stipulate the level of social assistance. This approach is attractive in the sense that poverty is defined by society, and politicians can be regarded as representatives of society. However, it has the disadvantage that the extent of poverty acknowledged is dependent on policy decisions, and counter-intuitively at that. Social assistance is increased to reduce poverty, but the mere act

of increasing social assistance involves raising the poverty threshold. Conversely, decreasing social assistance generally entails lowering the official poverty threshold to re-define the poor as non-poor.

The most frequently used poverty line is the 50% threshold. This poverty threshold is defined as half of the average equivalent income or, since equivalent income can be interpreted as individual welfare, half of the average individual welfare:⁸

$$i \in P \Leftrightarrow W(y_i) < 0.5 \cdot \bar{W} = 0.5 \cdot \frac{1}{n} \cdot \sum_{i=1}^n W(y_i) \quad 28$$

Obviously, this line is completely arbitrary as there is no theoretically convincing argument why this should separate poor from non-poor. On the other hand, the 50% line is widely accepted internationally, suggesting that it is appropriate for a couple of countries at least in the view of poverty researchers. Furthermore, in some countries it is closely related to social policy regulation. In Germany, for example, the 50% line is not far from the average level of social assistance; thus it has the advantage of political poverty lines without the disadvantage described above. Nevertheless, 50% is quite arbitrary, and there is no reason why this percentage should be identical in each country.

To address the critique of the 50% threshold, the subjective poverty lines LPL and SPL were developed. The way in which the welfare function is defined in these approaches was described in the previous section. For the measurement of the poverty *threshold* there are two different approaches. For the Leyden Poverty Line (LPL) based on the question of the evaluation of income, the welfare function is explicit: it is the lognormal distribution function. Here the evaluation scale is constructed such that the threshold between poor and non-poor lies exactly in the middle of this scale. Thus, the estimated μ of the lognormal distribution function can be used directly for the identification of poverty.

The subjective poverty line (SPL) is based on minimum income. In calculating the poverty threshold, the assumption is that poor people underestimate the poverty threshold while non-poor overestimate it. The consequence is that the poverty threshold is set exactly at the point where the stated minimum income is identical with the actual income. That is, the poverty threshold can be calculated by equalising y_{\min} and y_{HH} and substituting the α 's with the estimated values $\hat{\alpha}_i$ in (14):

$$(1 - \hat{\alpha}_w) \cdot \ln y_{\min} = \hat{\alpha}_0 + \hat{\alpha}_1 \cdot \ln n \Leftrightarrow \ln y_{\min} = \hat{\alpha}_0 / (1 - \hat{\alpha}_2) + \hat{\alpha}_1 / (1 - \hat{\alpha}_2) \cdot \ln n, \quad 29$$

⁸ In (28) as average the arithmetic mean is calculated, but it is also possible to argue for other measures of the average (see Hagenaars et al. 1994: 12f.). Besides the mean the median is commonly used.

In Table 3 different income poverty lines for one-person households are compared based on monthly income. For the 50% line, four different equivalent scales or welfare functions are used: the original OECD scale, the modified OECD scale and two variants of the Buhmann scale with a) θ based on the SPL estimation and b) θ based on the estimation of the welfare function. Note that since θ is estimated for each country separately in both cases, the welfare functions differ among countries.

Table 3: Poverty Thresholds for Single Households (in ECU)

	D	DK	NL	B	L	F	UK	IRE	IT	GR	S	P	A	FIN
50% line														
old OECD	500	468	437	438	741	426	483	315	333	255	315	229	470	334
new OECD	575	540	504	511	866	496	563	379	394	304	382	276	554	387
θ (SPL)	683	543	697	606	1155	587	628	424	472	320	410	272	652	399
θ (welfare f.)	589	513	664	565	997	440	500	392	461	362	316	265	456	355
SPL														
threshold	756	488	598	835	1108	955	641	665	1282	1113	950	1103	815	586
% of mean	55	45	43	69	48	81	51	78	136	174	116	203	63	74
purchasing power parities	2.13	9.29	2.21	40.3	39.7	7.31	0.71	0.74	1.70	246	133	144	14.6	6.84

Source: European Community Household Panel, wave 3 (1996)

Table 3 demonstrates clearly that poverty thresholds differ widely not only among countries, but also for different welfare functions. The lowest thresholds for single households are those calculated using the original OECD scale. With the new OECD scale the thresholds for one-person households are higher. This is not surprising because the weight for each additional person is lower than for one person, typically resulting in higher poverty thresholds for small households and lower poverty thresholds for larger households. With the Buhmann scale this effect is even larger: here the weight of additional persons is not only smaller than one, but even decreases for each person added. The result is that the highest thresholds for single persons are attained using the Buhmann scale. The highest thresholds for the 50% line can be found in Luxembourg (between approximately 750 and over 1100 ECU). Typically the threshold for a single person lies between 400 and 600 ECU. The lowest values are for Portugal, where not even single-person household with a monthly income of just over 300 ECU is identified as poor.

The corresponding poverty rates are shown in Table 4. It is apparent that the kind of welfare function does not have a major influence on the poverty rate, but some countries differentiate between poverty rates based on monthly income and those based on annual income. In Germany, the Netherlands, Belgium and Austria poverty rates based on annual income are higher than those based on monthly income, while in Finland the poverty rate based on monthly income is higher.

In addition to the different types of 50% lines, the Subjective Poverty Line also is included in Table 3. For a better comparison, the percentages of the SPL in relation to the mean equivalent income (using the Buhmann scale with θ based on the SPL estimation) are also given. Using these percentages one can distinguish among three groups of countries. In the first group (Germany, Denmark, the Netherlands, Luxembourg and the UK) the SPL is about 50% of the average, which again suggests that the 50% line may be a good estimation of the poverty threshold for these countries at least. In the second group (Belgium, France, Ireland, Austria and Finland) the poverty threshold is higher, between 60% and 80% of the average. For the final four countries (Italy, Greece, Spain and Portugal) the SPL is even higher than the average equivalent income. The consequence is that the poverty rates for these countries, too, are implausibly high. They are between 71% (Spain) and over 90% in Greece and Portugal. Thus it can be assumed that the corresponding survey questions are misleading or at least misunderstood. In France and Ireland, which belong to the second group, the poverty rates are also extremely high at over than 40%. Lower poverty rates are found in the other countries: Denmark, the Netherlands and Luxembourg have rates of only 5% or so and the intermediate poverty rate in Germany is about 10%, while Belgium, the UK, Austria and Finland have slightly higher poverty rates of somewhat over 20%.

Direct measurement of poverty

In this section the extent to which deprivation indices can be used for poverty measurement will be discussed. This question is not answered unambiguously in the literature. There are four points of view.

The first is that of Townsend (1979), who used the deprivation scale to find an income threshold of poverty. His idea was that the deprivation index increased rapidly below a certain income threshold.

$$i \in P \Leftrightarrow W(y_i) < W(y_{\min}) \text{ with } W(y_{\min}) \Leftarrow DI = f\{W(y)\} \quad \mathbf{30}$$

Townsend followed the indirect, or “resource” definition of poverty, but used the deprivation index to calculate the poverty threshold in terms of (equivalent) income.

In contrast, Mack and Lansley (1985: 172f.) argued for using the deprivation index to determine the poverty threshold directly, defining poverty as:

$$i \in P \Leftrightarrow DI_i < DI_{\min} \quad \mathbf{31}$$

The deprivation index of Mack and Lansley was the sum of goods lacking which were deemed necessary by the majority. But what is the number of goods DI_{\min} that an individual

can do without and still not be considered poor? It may be argued that this number should be one, as only necessary goods are counted. On the other hand, individuals may opt to substitute a good counted as necessary with another good. To solve the problem of the minimum deprivation index, Mack and Lansley added conditions to determine the poverty threshold (Mack and Lansley 1985: 176f.). The two main conditions were: a) deprived persons also lack non-necessary goods and b) income usually is low.

A third point of view is presented by Muffels (1993), who argued that the deprivation index is an argument of the econometrically-estimated welfare function. He chose a quite straightforward welfare level as a poverty threshold:

$$i \in P \Leftrightarrow W(DI_i, y_i, x_i) < W_{\min} \quad 32$$

Consequently, the problem of determining the minimum welfare level arises. Muffels used values of 5.5 and 6.0 on a scale from 1 to 10, because in “the Dutch school system the schoolmark 6 is supposed to represent the verbal qualification ‘sufficient’” (Muffels et al. 1992: 196). However appropriate this might be for the Netherlands, in general other “welfare” levels are equally valid. For an empirical estimation using ECHP data and the welfare function (22), the average welfare level is selected at which households state that they have difficulties or great difficulties making ends meet. Thus the following poverty definition is used:

$$i \in P \Leftrightarrow \hat{W}(DI_i, y_i, x_i) < W_{\min} = \frac{1}{n_D} \sum_{i \in D} \hat{W}(DI_i, y_i, x_i), \quad 33$$

where D is the set of all persons living in households who have (great) difficulties making ends meet and n_D is the number of these persons. Table 4 shows the results of this “welfare-function-based poverty line” (WPL). It can be seen that the magnitude of poverty rates so calculated is similar to the 50%-line poverty rates. In most countries it falls within the range of relative-income poverty rates (Germany, the Netherlands, Luxembourg, France, Italy); in some it is higher than relative-income poverty rates (Denmark, Belgium, Ireland, Greece, Spain and Finland) and for the UK and Portugal it is lower than all income poverty rates. In all countries, however, the differences are not very large. From this can be concluded that this kind of poverty line might offer an alternative to income poverty lines.

Table 4: Poverty Rates

	D	DK	NL	B	L	F	UK	IRE	IT	GR	S	P	A	FIN
50% line														
annual income														
old OECD	13.5	7.9	11.7	10.9	12.8	14.9	18.6	15.0	19.0	22.7	18.0	28.3	11.8	8.1
new OECD	12.5	8.5	10.4	10.9	10.7	13.7	18.8	15.2	18.0	21.6	18.2	28.2	11.6	8.0
monthly income														
old OECD	7.8	6.8	9.8	8.1	11.3	15.8	20.0	17.4	16.9	25.4	18.7	31.4	9.8	12.2
new OECD	6.6	7.9	8.3	7.9	7.7	15.0	20.1	15.2	15.6	24.2	18.6	32.1	9.9	11.0
θ (SPL)	6.8	7.9	9.3	7.4	7.5	14.1	20.9	13.9	14.3	23.3	19.2	31.9	10.6	10.6
θ (welfare f.)	6.5	7.0	9.0	7.4	7.4	15.3	20.1	14.2	14.1	23.9	18.6	32.0	10.6	11.2
SPL	10.3	5.2	4.6	23.4	6.5	42.9	21.4	44.2	81.4	92.3	71.2	94.3	20.7	24.8
WPL	9.2	10.2	8.9	12.0	7.8	14.5	12.2	18.5	15.5	32.9	24.3	26.7	14.8	16.0

Source: European Community Household Panel, wave 3 (1996), non-weighted estimation

The final point of view is that deprivation indices should not be used for an exact determination of poverty. There are three main arguments. The first is that there is no clear-cut threshold separating the poor from the non-poor. Obviously, this would be also an argument against the use of a poverty line for indirect poverty measurement. The second point is that deprivation is itself multidimensional and should not be transformed into a one-dimensional measure, but that it is a useful means of describing the situation of the poor when poverty is measured in terms of income (Nolan/Whelan 1996). A third argument concerns the political consequences of poverty definitions. These are obvious when a resource definition is used: people should be endowed with resources which enable them to make ends meet. Using a poverty definition in terms of a deprivation index instead, the political conclusions are not so clear:

... a poverty line serves a purpose if the definition of poverty is *indirect*, i.e. poverty is understood to be a lack of resources. The poverty line can be applied straightaway in these cases or can at least be used as guidance in social policy programs but the value of the poverty line diminishes if poverty is defined directly (Halleröd et al. 1997: 217).

Summary

This paper served three objectives. The first was to show that there are three main issues to address in the measurement of poverty: the criteria for welfare measurement, the welfare function and the way in which the poverty threshold is defined. The second aim was to present a theoretical framework for a) criticism and evaluation and b) improving and developing poverty measures, and the third aim was to provide empirical examples by presenting different answers to the three questions. It was explicitly not my aim to find or develop the one and only or “best” poverty measure. Such a measure does not exist. Each poverty measure has its advantages and disadvantages. The framework presented, however, may serve as a tool to elucidate these advantages and disadvantages.

References

- Barr, N. (1998): *The Economics of the Welfare State*, 3rd ed. Oxford: Oxford University Press.
- Becker, G. (1965): A Theory of the Allocation of Time. *Economic Journal*, 85, 493-517.
- Bird, E. J. (1991): Income Variation among West German households. in: Rendtel, Ulrich/ Wagner, Gert (eds.): *Lebenslagen im Wandel: Zur Einkommensdynamik in Westdeutschland seit 1984*. Frankfurt/Main: Campus.
- Bird, E. J. (1993): *The Welfare Cost of Income Uncertainty*. Frankfurt: Campus, Boulder: Westview.
- Bourdieu, P. (1983): Ökonomisches Kapital, kulturelles Kapital, soziales Kapital. in: Kreckel, Reinhard (ed.): *Soziale Ungleichheiten. Soziale Welt Sonderband 2*. Göttingen: Schwartz.
- Bourguignon, F./Chiappori, P.-A. (1994): The collective approach to household behaviour. In: Blundell, R./ Preston, I. / Walker, I. (eds.): *The Measurement of Household Welfare*. Cambridge University Press
- Bradshaw, J. (ed.) (1993a): *Budget standards for the United Kingdom*. Aldershot: Avebury.
- Bradshaw, J. (1993b): Rediscovering budget standards. In: Berghman, J. / Cantillon, B. (eds.): *The European Face of Social Security*. Aldershot: Avebury.
- Bryant, W. K. (1990): *The Economic Organisation of the Household*. Cambridge: Cambridge University Press.
- Buhmann, B. / Rainwater, L., Schmaus, G./ Smeeding, T. M. (1988): Equivalence Scales, Well-Being, Inequality and Poverty: Sensitivity Estimates Across Ten Countries Using the Luxembourg Income Study (LIS) Database. *The Review of Income and Wealth*, 34, 2, 115-142.
- Burkhauser, R./ Frick, J./ Schwarze, J. (1997): A Comparison of Alternative Measures of Economic Well-Being for Germany and the United States. *Review of Income and Wealth*, 43, 2, 153-171.
- Burri, S. (1998): *Methodische Aspekte der Armutforschung*. Bern, Stuttgart, Wien: Haupt.
- Coleman, J.S. (1988): Social Capital in the Creation of Human Capital. *American Journal of Sociology*, 93, 95-100.
- Cooter, R./ Rappoport, P. (1984): Were the Ordinalists Wrong About Welfare Economics. *Journal of Economic Literatur*, Vol. XXII, No. 2.: 507-530.
- Coser, L. A. (1965): The Sociology of Poverty. To the Memory of Georg Simmel. *Social Problems*, 13, 2, 140-148.
- Desai, M. /Shah, A. (1988): An Econometric Approach to the Measurement of Poverty. *Oxford Economic Papers*, 40, S. 505-552.
- Faik, J. (1997): Institutionelle Äquivalenzskalen als Basis von Verteilungsanalysen - Eine Modifizierung der Sozialhilfeskala. In: Becker, I./ Hauser, R. (eds.): *Einkommensverteilung und Armut. Deutschland auf dem Weg zur Vierfünftel-Gesellschaft?* Frankfurt/Main: Campus.
- Foster, J./ Greer, J./ Thorbecke, E. (1984): A Class of Decomposable Poverty Measures. *Econometrica*, 52,3, 761-766.
- Garfinkel, I./ Haveman, R.H./ Betson, D. (1977): *Earnings capacity, poverty and inequality*. New York: Academic Press.
- Goedhart, T./ Halberstadt, V./ Kapteyn, A./ van Praag, B.M.S. (1977): The poverty line: concept and measurement. *The Journal of Human Resources*, 12: 503-520.
- Hagenaars, A. J.M. (1986): *The Perception of Poverty*. Elsevier.
- Hagenaars, A. J.M./ van Praag, B.M.S. (1985): A Synthesis of Poverty Definitions. *Review of Income and Wealth*, 31, 2, 139-154.
- Hagenaars, A.J.M./ de Vos, K./ Zaidi, M.A. (1994): *Poverty Statistics in the late 1980s: Research in micro-data*. Luxembourg: Eurostat.
- Halleröd, B./ Bradshaw, J. / Holmes, H. (1997): Adapting the consensual definition of poverty. In: Gordon, D. / Pantazis, C. (eds.): *Breadline Britain in the 1990s*. Aldershot.: Ashgate
- Hauser, R. (1996): Zur Messung individueller Wohlfahrt und ihrer Verteilung. In: Statistisches Bundesamt (ed.): *Wohlfahrtsmessung - Aufgabe der Statistik im gesellschaftlichen Wandel*. Band 29 der Schriftenreihe Forum der Bundesstatistik, Stuttgart, S. 13-38.
- Jenkins, S. (1991): Poverty Measurement and the Within Household Distribution: Agenda for Action. *Journal of Social Policy*, 20, 4, 457-483
- Jenkins, S./ O'Leary, N. C. (1996): Household Income plus Household Production: The Distribution of Extended Income in the U.K. *Review of Income and Wealth*, 42, 4: 401-420.
- Killingsworth, M. (1983): *Labor Supply*. Cambridge University Press.
- Layte, R./ Maître, B. / Nolan, B./ Whelan, C. (1999): *Income, Deprivation and Economic Strain: An Analysis of the European Community Household Panel*. Paper for the 4th European Sociological Association Conference in Amsterdam. Economic and Social Research Institute (ESRI), Dublin.
- Leu, R. E./ Burri, S./ Priester, T. (1997): *Lebensqualität und Armut in der Schweiz*. Bern: Haupt.
- Mack, J./ Lansley, S. (1985): *Poor Britain*. London.
- Merz, J./ Faik, J. (1995): Equivalence Scales Based on Revealed Preference Consumption Expenditures. The Case of Germany. *Jahrbücher für Nationalökonomie und Statistik*. Bd. 214/4: 425-447.
- Muffels, R. (1993): *Welfare Economic Effects of Social Security. Essays on Poverty, Social Security and Labour Market: Evidence from Panel Data*. Tilburg.

- Muffels, R./ Berghman, J./ Dirven, H.-J. (1992): A multi-method approach to monitor the evolution of poverty. *Journal of European Social Policy*, 2, 193-213.
- Nolan, B. / Whelan, C. (1996): Resources, Deprivation, and Poverty. Oxford: Clarendon Press.
- OECD (1995): Income Distribution in OECD Countries. Evidence from the Luxembourg Income Study. Prepared by A. B. Atkinson, L. Rainwater and T. M. Smeeding. Social Policy Studies No. 18. Paris: OECD.
- Ott, N. (1992): Intrafamily bargaining and household decisions. Berlin: Springer.
- Piachaud, D. (1987): Problems in the Definition and Measurement of Poverty. *Journal of Social Policy*, 16, 2, 147-164.
- Plug, E.S./ Krause, P. / Van Praag, B.M.S./ Wagner, G. (1997): Measurement of Poverty - Exemplified by the German Case. In: Ott, N./ Wagner, G. (eds.): Income Inequality Poverty in Eastern and Western Europe. Heidelberg: Physica.
- Ringen, S. (1988): Direct and Indirect Measures of Poverty. *Journal of Social Policy* 17, 3: 351-365.
- Rowntree, B.S. (1997 [1922]): Poverty. A study of town life. London: Routledge.
- Ruspini, I. (1998): Women and Poverty Dynamics: The Case of Germany and Britain. *Journal of European Social Policy*, 8, 4, 291-316.
- Seidl, C. (1988): Poverty Measurement: A Survey. In: Bös, D./Rose, M./Seidl, C. (eds.) Welfare and Efficiency in Public Economics. Berlin et al.: 71-147
- Sen, A. K. (1976): Poverty: An Ordinal Approach to Measurement. *Econometrica*, 44, 219-231.
- Sen, A. K. (1981): Poverty and Famines. An Essay on Entitlement and Deprivation. Oxford: Clarendon Press.
- Townsend, P. (1979): Poverty in the United Kingdom. Berkeley/ Los Angeles.
- United Nations Development Program (1997): Human Development Report 1997. New York, Oxford: Oxford University Press.
- Van den Bosch, K. (1993): Poverty Measures in Comparative Research. In: Berghman, J./ Cantillon, B. (eds.): The European Face of Social Security. Aldershot: Avebury.
- Van den Bosch, K. (1996): A Note on the Subjective Deprivation Scale (SDS). Centre for Social Policy. University of Antwerp. Unpublished Paper.
- Van Praag, B.M.S. (1994): Ordinal and cardinal utility: an integration of the two dimensions of the welfare concepts. In: Blundell, Richard/ Preston, Ian/ Walker, Ian (eds.): The Measurement of Household Welfare. Cambridge University Press