

A Microeconomic Theory of Poverty Measurement with Empirical Examples Based on the European Community Household Panel

1 Introduction

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. So far, there is no general theory about what is poverty and how it should be measured. It is the aim of this paper to present a theoretical framework for poverty measurement and I will show that a microeconomic view on poverty measurement can be very useful for a) criticism and evaluation and b) improving and developing poverty measures. Although it seems to be mostly an microeconomic approach there are also some useful sociological amendments and ingredients in this theory. This framework will be presented in the first section below. One result of this part is that there are two crucial questions for poverty measurement. The first one is to define or measure an individual welfare function and the second one is to define or to measure a poverty threshold.

In the following parts of this paper I will show how these two question will be answered for a selection of poverty lines. The first are the standard relative income poverty definitions which are the typical measures for poverty in empirical research. This is followed by a description of the so called ‘Subjective Poverty Line’ (SPL) which is an example for a more theoretical based income poverty line, for which both, the underlying welfare function as well as the poverty threshold, are empirically estimated. Nevertheless, the results based on this SPL are not very convincing, which might be one reason, why it is not broadly used for poverty measurement.

Finally, I will present a theoretically based poverty measure, which gives reasonable results and can serve as an alternative to the standard income poverty measures. For this measure, which I call welfare function based poverty line (WPL), there is an explicit underlying welfare function which is empirically estimated. In contrast to the SPL this welfare function is not only dependent on income but also on direct indicators of welfare, so called deprivation indices.

For all this poverty measures I will present empirical results to show that the decision about the poverty measure not only change some results, but also lead to different

consequences for social policy. These empirical results are based on the 2001 wave of the European Community Household Panel (ECHP). The ECHP is a data set provided by EUROSTAT, collected in the countries of the European Union since 1994. In 1994 the twelve countries that were then EU members were included; Austria was added in 1995 and Finland in 1996. 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. From 1997 Luxembourg, Germany and the UK stopped collecting data based on the ECHP questionnaire, but data from national panel studies are included in the ECHP, which is also the case for cross-sectional data from Sweden from 1997 to 2001. Thus, I can present results for all member states of the European Union. But some poverty measures can only be calculated for a subset of countries.

2 A microeconomic theory of poverty measurement

In the following I will start from a very general definition of poverty, and then 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 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.

2.1 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 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.

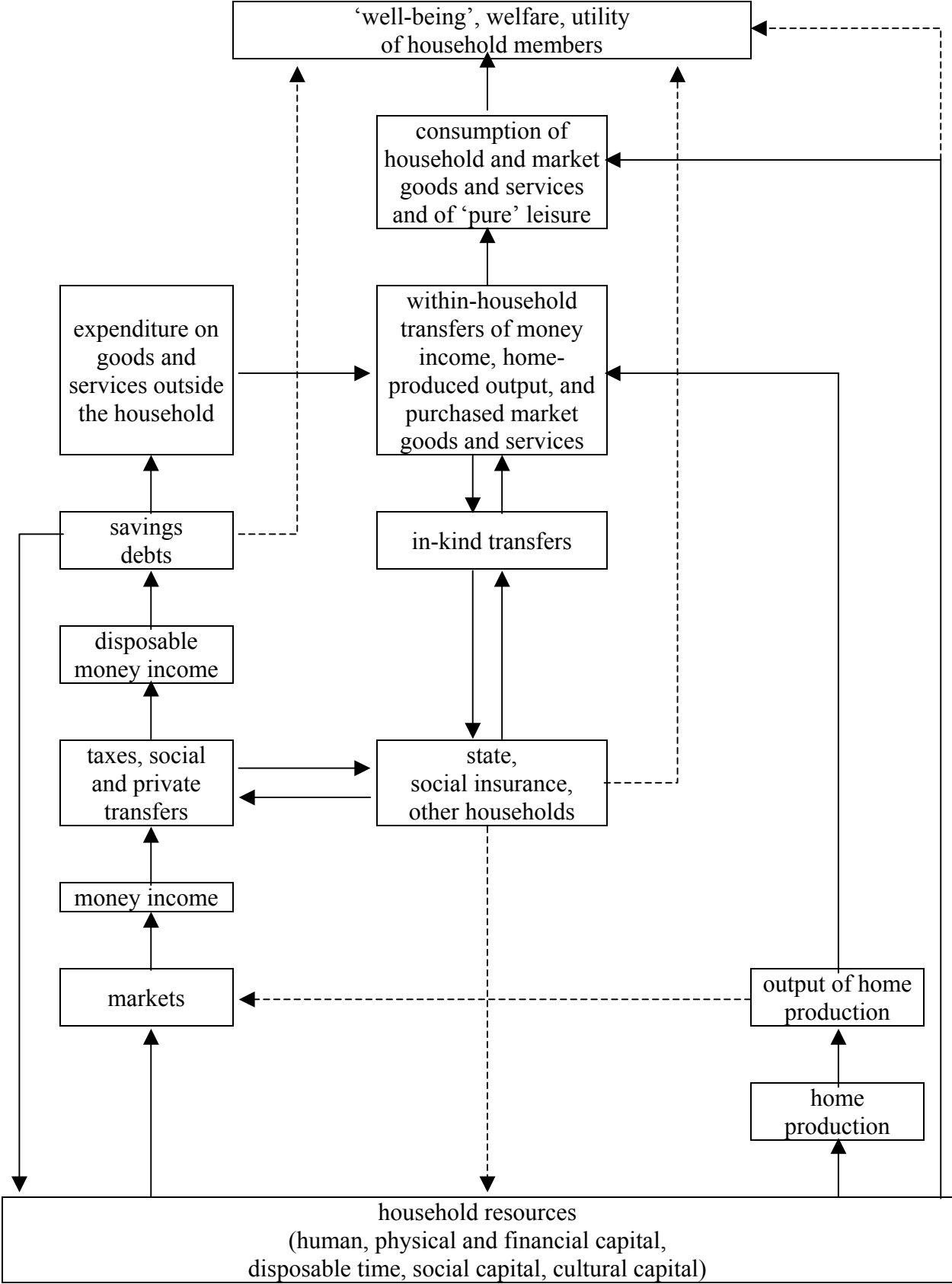
For the time being, let us continue to think of income only as money. In this case income can be derived from resources (human, physical or financial capital) by selling them on the labour market, capital market or goods market. Additional money flows between households and between the household and 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. At all stages of this welfare production process it is possible to measure welfare and poverty.

Figure 1: The household Production of Welfare



2.2 *Measurement of Welfare*

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. Referring to the definition above, one might think that to measure poverty, one would only need 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 .

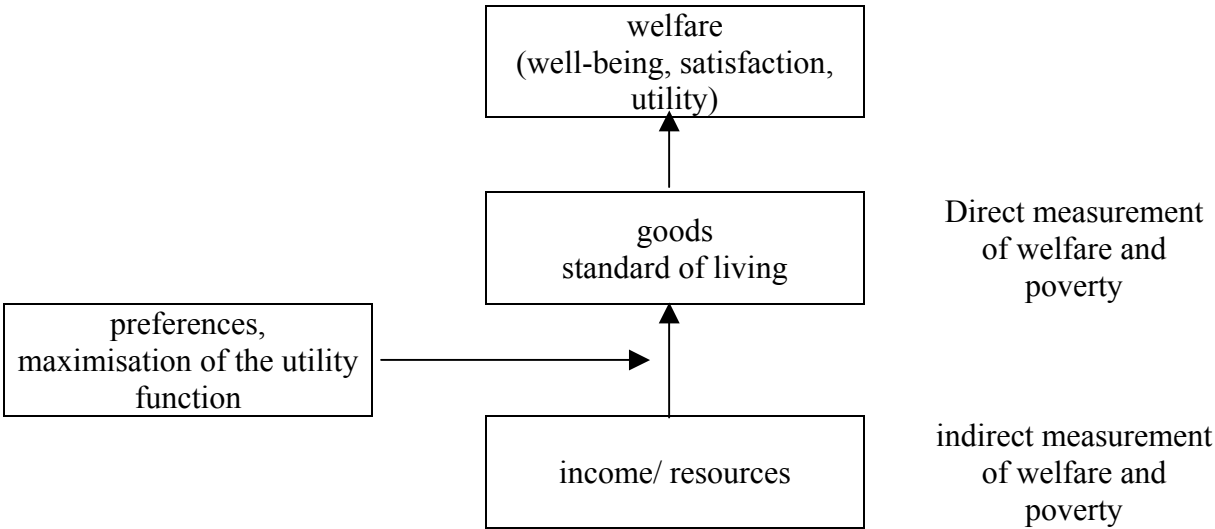
Suppose that the relevant bundle of goods as well as the characteristics x_i can be observed, and that the individual welfare W_i can be calculated. Drawing conclusions from this with respect to poverty is still problematic. The leading opinion in poverty research is that the question of whether someone 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). This difference is illustrated by figure 2, which can be seen as a simplified version of figure 1.

Figure 2: direct and indirect measurement of welfare and poverty



The core arguments for direct or indirect measurement of welfare for poverty research can be found already 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).

In the following, we discuss first the more usual indirect measurement of poverty and come to the direct method in the next chapter. 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)¹: “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 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:

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

¹ More accurately, this term was the result of a discussion between Gary Becker with Milton Friedman (Becker 1965: 497)

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:

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

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 excepted 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)². 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

² 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.

child poverty.³ 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):

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

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 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:

³ With the exception of households with an insufficient household income for the children alone.

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

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”. 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 (see Van den Bosch 1999). The latter approach is also used in section 4 and 5.

3 Standard relative income poverty measures

3.1 Welfare function

For the typically used relative income poverty measures the equivalence scale is not measured, but determined by the researcher or by political institutions. The most frequently used are the original and the modified OECD scales, for which the underlying welfare function is:

$$W_i = \frac{Y_{HH}}{1 + \alpha_1(1 - N_1) + \alpha_2 N_2}, \quad 12$$

where N_1 is the number of persons aged 15 or older and N_2 is the number of children under 15 years. So, for both the original and the modified OECD-scale the weight of one adult is one, but the weights of other persons aged 15 and older α_1 and for each child under 15 years α_2 are different. Using the original OECD-scale α_1 is 0.7 and α_2 is 0.5, while they are 0.5 and 0.3 using the modified OECD-scale. This modification has been firstly used by Hagenaars et al. (1994), who argued that empirical estimations of the equivalence scale, particularly estimation of the SPL for the Netherlands, usually show lower equivalence weights than the original OECD scale. On the first view it seems that these two scales are very similar, but as will be shown below they lead to very different results.

3.2 Poverty thresholds

The standard income poverty measures are using typically a threshold which is calculated as a percentage of the mean or median income. For this, three points must be clarified. The first is whether national averages are used or a Europe-wide standard (see Atkinson, 2000, pp27ff.; Vos/Zaidi, 1998). Typically poverty is defined by a national standard, which corresponds to the poverty definition used by the Council of the European Union. There are several possibilities to calculate the average, each of which has advantages and disadvantages (see Hagenaars et al., 1994). Usually the median or the (arithmetic) mean is used; other possibilities are the mode or the geometric mean. The median is the point at which exactly 50 per cent have an income above and 50 per cent below. The mean is the income of equal distribution. One standard argument for the median is a statistical one, because it is less sensible to measurement errors for low and high income. Besides that, the median and the mean have differences in respect to changes over the time. While the mean changes with the general income development, the question how the median changes depends on how a general growth will be distributed. One extreme case is, if only people in the richest half of a society benefit from a growth. Then the median would not change. The final question

refers to the percentage of the average to be used. Typical are 40, 50 or 60 per cent. For the decision which one to use one has to take into account that for income distributions the median is lower than the mean. Therefore, the percentage using the median must be higher to get the same poverty line in terms of income. Using the mean, the 50%-threshold is the most common poverty line. For the median, the 50% as well as the 60% threshold are used, where 50% of the median are lower than 50% of the mean and 60% is usually a bit higher than 50% of the mean (see figure A.1).

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 :

$$i \in P \Leftrightarrow y_i < y_{min} = p' \cdot c_{min}(x_i) \quad \mathbf{13}$$

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 second alternative to relative income poverty lines are poverty thresholds, 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. Nevertheless, if a poverty line is too far from these political poverty lines, then this is an indication that the poverty measure might be not appropriate.

3.3 Poverty rates

Taking the EU poverty line (60% median, modified OECD scale) as a standard for comparison, there are low poverty rates in the Scandinavian Countries, in Germany, in the Netherlands and in Austria, and high poverty rates in the southern European countries and in Ireland. Changes to the equivalence scale result in only slight changes, as can be seen in figure A.2 in the appendix. The grouping is the same when the 50% mean poverty line is used, but there are some differences in the rank. Again, only slight changes can be attributed to the equivalence scale (see figure A.3).

The 50% mean poverty rates usually lie between the 60%-median and 50%-median poverty rates, with Portugal being the only exception (see figure A.4). Interesting to note is that in countries with low poverty rates, 50% mean rates are typically closer to 50% median rates, whereas in countries with high poverty rates, the 50% mean is closer to the 60% median. Again, there are only slight changes in ranking with the exception of Ireland, which has the highest poverty rate based on the 60% median but is in sixth place based on the 50% mean threshold.

4 Subjective Poverty Lines

An alternative method to measure income poverty is to estimate the equivalence scale and the poverty threshold 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” (Goedhart et al. 1977). The latter is included in the ECHP questionnaire while the first is not.

4.1 Welfare function and poverty threshold

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):

$$W_i(y_i) = \Lambda(y_i; \mu, \sigma) = N(\ln y_i; \mu, \sigma), \quad 14$$

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):

$$\mu = \beta_0 + \beta_1 \cdot \ln n + \beta_2 \cdot \ln y_{HH} + \varepsilon, \quad 15$$

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 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):

$$\ln y_{\min} = \alpha_0 + \alpha_1 \cdot \ln n + \alpha_2 \cdot \ln y_{HH} + \varepsilon, \quad 16$$

The parameters are estimated econometrically and are identical for all individuals in one country. Because the estimation is based on individual subjective evaluations of the entire population, the LPL and SPL approaches are also called consensual.⁴

To calculate 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):

$$(1 - \hat{\alpha}_w) \cdot \ln y_{\min} = \hat{\alpha}_0 + \hat{\alpha}_1 \cdot \ln n \Leftrightarrow \ln y_{\min} = \hat{\alpha}_0 / (1 - \hat{\alpha}_2) + \hat{\alpha}_1 / (1 - \hat{\alpha}_2) \cdot \ln n, 17$$

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.

Table 1: Results of SPL Estimation

	DK	NL	B	F	IRE	IT	GR	S	P	A	FIN
intercept α_0	2.98	5.35	5.63	4.24	2.98	4.95	7.99	7.02	5.72	5.16	4.50
household size α_1	0.23	0.23	0.21	0.20	0.20	0.23	0.30	0.28	0.22	0.25	0.34
household income α_2	0.65	0.30	0.47	0.52	0.54	0.38	0.37	0.41	0.53	0.45	0.44
equivalence elasticity $\theta = \alpha_1 / (1 - \alpha_2)$	0.66	0.32	0.39	0.43	0.43	0.37	0.48	0.47	0.47	0.45	0.60
factor for a two-person household 2 ^θ	1.58	1.25	1.31	1.34	1.34	1.29	1.40	1.39	1.39	1.37	1.52
factor for a four-person household 4 ^θ	2.50	1.56	1.72	1.81	1.81	1.67	1.95	1.92	1.92	1.88	2.31
R ²	0.74	0.15	0.47	0.55	0.51	0.38	0.15	0.48	0.55	0.49	0.52

Source: European Community Household Panel, wave 8 (2001), non-weighted OLS estimation

The equivalence elasticity usually lies between 0.39 and 0.47, while it is much higher Denmark (0.66) and Finland (0.6). That means that for larger household sum of equivalence weights is usually lower than even using the modified equivalence scale, which is for a two-person household 1.5, and a family with two adults and two children 2.1) and for Denmark

⁴ The term consensual is misleading, however, because there is no consensus about these functions.

and Finland it lies between the original and modified scale. The original equivalence scale factors are 1.7 (two adults) and 2.7 (two adults, two children). The very lowest equivalence elasticity is estimated for the Netherlands, which is interesting because as stated above the modification of the OECD scale was mainly based on estimations of the equivalence scale in this country, which seems to be an extreme case.

4.2 Poverty rates

It is remarkable that this measure of the poverty rate is completely insufficient for some countries, particularly Greece, Italy, Portugal with poverty rates of more than 70%, and to some extent Spain and France (see figure A.6). There are two possible reasons for this. For one, it could be argued that the European standard would be a more appropriate measure than the national standard. However, the counter-arguments are that, first, this is not true for Italy and France; and second, the subjective poverty lines are the highest in Italy and Portugal even in absolute terms (see figure A.5). Therefore it is more likely that these peculiar results have something to do with cultural differences – all of the countries for which the SPL fails are Mediterranean countries – such that the question is understood differently there than in the northern countries.

5 Welfare function based poverty Line (WPL)

All poverty lines discussed above are based on the resource definition of poverty. 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. Besides the general arguments of Sen (1981) stated above, there are two main points of critique. The first one is based on the fact that income is only a limited indicator for all resources of an individual. Secondly, the form of the welfare function can be criticised. As shown above, there exist a lot of possible functions for the link between income and welfare

and it is not clear which one is the most appropriate. Therefore as an alternative to indirect measures of poverty methods of direct measurement of poverty are developed since the late 1970s. Besides that, particularly the question of the relevant welfare function is addressed by the development of poverty lines based on subjective evaluations like the Subjective Poverty Line (SPL). In the following I present a method to identify poverty which follows and integrates both lines of critique and development. This poverty line, which I call welfare function based poverty line (WPL), gives, in contrast to the SPL, quite reasonable results.

5.1 *Welfare function*

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:

$$DI_i = \sum_{j=1}^K d_{ij}, \quad 18$$

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):

$$DI_i = \sum_{j=1}^K \lambda_j \cdot \delta_{ij}, \quad \mathbf{19}$$

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:

$$DI_i = \sum_{j=1}^K \lambda_j \cdot d_{ij}, \quad \mathbf{20}$$

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:

$$DI_i = \sum_{j=1}^K \mu_j \cdot \lambda_j \cdot d_{ij} - \sum_{j=1}^K \mu_j \cdot (1 - \lambda_j) \cdot (1 - d_{ij}) \quad 21$$

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):

$$CWS_i = DI_i^{-1} \quad 22$$

This index was then used to estimate a welfare function:

$$\ln W_i = \alpha_0 + \alpha_1 \cdot \ln CWS_i + \sum_k \alpha_k \cdot \ln X_{ik}, \quad 23$$

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).

However, the welfare function (20) is not fully convincing, especially the simple weighted sum used to calculate the CWS. In microeconomic theory, typically the quantity of a good is taken into account, and the possibility to substitute one unit of a good A by units of good B without changing utility depends on the amount of goods A and B a subject has. The usual micro-economic assumption is, that the additional quantity of good B that is necessary to give the same welfare than a loss of one unit of good A is the higher, the less one has of good A and the more one has of good B. The underlying reason for this is that the marginal utility of one good decreases with its amount. One commonly used micro-economic utility function, which takes these assumptions into account, is the Cobb Douglas function:

$$W_i = A \cdot \prod_k c_{ik}^{\alpha_k} \Leftrightarrow \ln W_i = \alpha_0 + \sum_k \alpha_i \cdot \ln c_{ik} \text{ with } A = e^{\alpha_0}, \quad 24$$

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 I present a Cobb-Couglas welfare function similar to (21) which I estimate with the Europanel. For this I take use of work of the ESRI. The Europanel includes several indicators which can be used to calculate a deprivation scale similar to those discussed above. 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 (see table 2). For each of these dimensions a separate deprivation index can be calculated. Layte et al. (1999) simply used sum indices.

Table 2: Indices for four dimensions of deprivation

basic goods	Secondary goods	housing	Environment
warm home holidays furniture clothes meat, chicken or fish invitation of friends arrears	car colour TV video recorder microwave oven dish-washer telephone second home home computer	<u>housing facilities:</u> bath of shower indoor flushing toilet hot running water <u>housing deterioration:</u> leaking roof damp home rot in home	shortage of space noise not enough light pollution vandalisme
K=7	K=8	K=6	K=5

Source: Layte et al. (1999)

The main idea based on this categorisation, that makes it possible to use a more appropriate utility function than a simple sum index, is to interpret each of these dimensions as one “good”; and the lower the deprivation index of this dimension is, the higher is the amount of that good. These “amounts” can be put into a Cobb-Douglas-function. But before that one has to transform the deprivation indices, also used by the ESRI into welfare indices. That can be done simply by:

$$WI_j = 1 + K_j - DI_j, \quad 25$$

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 at least 1 and is exactly 1, if all items of one dimension are missing. This is done because for the empirical estimation the logarithm of these welfare indices is used. It is important to emphasise that the relevant bundle of goods is incomplete and the measurement of welfare limited. Therefore it is necessary to include also income in the welfare function. This is done by adding household income y_{HH} and household size n , so that the underlying equivalence scale is also estimated empirically. Finally, the entire individual welfare function can then be written as:⁵

$$W_i = A \cdot W_{1i}^{\alpha_1} \cdot W_{2i}^{\alpha_2} \cdot W_{3i}^{\alpha_3} \cdot W_{4i}^{\alpha_4} \cdot y_{HH}^{\alpha_5} \cdot n^{\alpha_6}, \quad 26$$

or the equivalent:

$$\ln W_i = \alpha_0 + \sum_{j=1}^4 \alpha_j \ln W_{ij} + \alpha_5 \cdot \ln y_{HH} + \alpha_6 \cdot \ln n, \quad 27$$

As an indicator for individual welfare I use the information about “satisfaction with one’s financial situation”. There are also questions about other dimensions of satisfaction, but satisfaction with the financial situation is the one which is most close to poverty. Now, equation (26) can easily be estimated empirically. 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, which means that the assumption, that marginal utility decreases is satisfied. 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, which is also the case for the environment variable in Ireland. Besides these exceptions all other direct indicators have highly significant effects on individual welfare. Thus, satisfaction with financial situation is not only influenced by income but also on direct indicators of welfare.

Table 2: Estimation of Individual Welfare Functions

		DK	NL	B	F	IRE	IT	GR	E	P	A	FIN
Intercept	α_0	-3.07	-2.57	-3.59	-2.31	-1.80	-1.98	-2.35	-2.66	-1.31	-2.65	-2.08
basic	α_1	0.89	0.49	0.31	0.66	0.77	0.36	0.22	0.36	0.19	0.47	0.52
secondary	α_2	0.38	0.77	0.61	0.31	0.31	0.10	0.09	0.10	0.16	0.27	0.41
housing	α_3	0.32	0.15	0.22	*	*	0.18	0.08	0.26	<i>0.03</i>	*	0.11
environment	α_4	0.13	0.09	0.19	0.10	*	0.14	0.11	0.12	0.25	0.20	0.09
household income	α_5	0.12	0.12	0.21	0.16	0.14	0.22	0.21	0.19	0.11	0.23	0.14
household size	α_6	-0.15	-0.05	-0.14	-0.12	-0.19	-0.11	-0.12	-0.18	-0.06	-0.22	-0.11
R^2		0.24	0.23	0.19	0.26	0.17	0.24	0.31	0.19	0.19	0.16	0.27

Source: European Community Household Panel, wave 8 (2001), non-weighted OLS estimation
italic: not significant at the 1% level, *: not significant at the 5% level

5.2 Poverty threshold

Finally, for the identification of poor households, it is necessary to define or to estimate a poverty threshold. Before I explain how I do it for the WPL, I will discuss how

⁵ The indices for “housing facilities” and “housing deterioration” are combined in one index.

deprivation indices are used for poverty measurement in general. 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.

$$i \in P \Leftrightarrow W(y_i) < W(y_{\min}) \text{ with } W(y_{\min}) \Leftarrow DI = f\{W(y)\} \quad \mathbf{28}$$

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:

$$i \in P \Leftrightarrow DI_i < DI_{\min} \quad \mathbf{29}$$

The deprivation index of Mack and Lansley was the unweighted sum - that is the number - 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. Using these two additional conditions they come determine a the poverty line by 3 items.

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:

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

30

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 the WPL I follow Muffels by choosing a threshold in terms of “welfare” like in equation (29), but I don’t predetermine a minimum value of welfare, but estimate the welfare threshold empirically. For that I tried the following. I calculate the estimated welfare using the estimated parameters and using the observed deprivation indices, household income and household for the subgroup of people who state that they have difficulties or great difficulties making ends meet, which should be a good reference group for poverty. Then I used the mean of estimated welfare of this group as a poverty threshold in terms of welfare. Finally, I calculate the estimated welfare for all households and define all people as poor, who live in a household with a welfare below the average of welfare of people who have (great) difficulties to make ends meet:

$$i \in P \Leftrightarrow \hat{W}(DI_i, y_i, x_i) < W_{\min} = \frac{1}{n_D} \sum_{i \in D} \hat{W}(DI_i, y_i, x_i), \quad 31$$

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. Notice, that the individual welfare does not depend on the actual level of “satisfaction with financial situation”, but is calculated with a welfare function, which is identical for all members in one country and which depends only on the endowment of goods, household income and household size.

A fourth possibility of using deprivation indices for the identification of the poor is to calculate in a first step an income poverty rate and find in a second step the same number of

the most deprived persons. Of course this not an alternative to get different poverty rate, but one can investigate of direct measurement and indirect measurement lead to the same people to be identified as poor. Interestingly the overlap is relatively small (Layte et al. 2001). Furthermore, exactly this overlap can be defined as “the truly poor” (Halleröd 1995) or the “consistent poor” (Layte et al. 2001), which gives an alternative measure also for the number of the poor.

5.3 Poverty rates

In contrast to the SPL, the WPL gives plausible results. Compared to the 60%-median threshold, poverty rates are a bit higher in Portugal and Greece, very close in Spain and Denmark, and lower in the other countries (see figure A.7). Interesting is that the WPL gives much more similar results when compared to 50%-mean poverty rates than when compared to 60% median rates, with nearly no changes in the ranking (see figure A.8). The most striking difference is for Greece, which might be because the number of people with difficulties making ends meet, the reference group for the poverty line, is exceptionally high.

6 Does Measurement Matter? Four Examples

As shown above, the overall poverty rates, at least the general ranking and grouping of countries, are not very much affected by poverty measurement. However, the structure of the poor can change significantly. To describe the effects or non-effects of measurement, I will give four examples: the older population, women, the working poor and the self-employed.

Although the choice between the original and the modified OECD equivalence scale does not have any large effect on general poverty rates, this is not the case regarding the older population. For the EU as a whole, people over 65 have an above-average poverty rate using the modified scale, and a below-average rate using the original scale; in every country the poverty rate is much higher using the modified scale (see figure A.9). When the SPL is used,

the shares of the elderly are typically even higher than when the modified equivalence scale is used, with the Netherlands as an extreme case (see figure A.10). On the other hand, in Denmark and Finland the shares of the elderly among the poor are even lower than when the original OECD scale is used. All of these results are a clear consequence of the estimated equivalence scales.

When the WPL is used, for many countries (DK, B, F, IRL, P, A, FIN) the rates are lower than when the original equivalence scale is used, while the results for Italy, Greece and Spain are close to those based on the modified OECD scale (see figure A.11). Only in the Netherlands is the share of the elderly among the WPL poor higher than when income poverty lines are used. These results are the consequence of two effects. The first is the fact that the underlying equivalence scale for the WPL is based on subjective judgements, which leads to results similar to those of the SPL approach for the Netherlands, Denmark and Finland. The second is that, because income has a lower importance for the elderly, the WPL poverty rates are usually lower than income poverty rates.

In contrast to the elderly, results on poverty among women change only slightly and the observed differences correspond to the effects on poverty of the older population (see figures A.12 to A.14). That is because in many countries the share of single women among the poor over 65 is very high. For each country the standard result – independent of measurement – is that the majority of the poor are women: between 50% and 65%.

Similarly, the share of the working poor also remains stable when different poverty measures are used. In most countries at least half of the poor in their prime are working, while the lowest rate is found in Ireland, where only about 40% of the 25 to 55-year-old poor work (see figures A.15 to A.17). What is interesting is how poverty measurement affects the share of the self-employed among the poor. At first, using different equivalence scales has almost no effect (see figure A.18). That suggests that household structure is not important. However,

when the WPL is used, the shares of self-employed among the working poor decreases dramatically (see figure A.20). There are two reasons for this: first, as for the elderly, the measured current income is of lower importance for the self-employed; second, direct indicators play a more important role in identifying the poor.

7 Conclusion

Poverty measurement is a field with a dearth of theory and the typically 50% of mean or 60% of median equivalent income poverty lines are not really convincing from a theoretical point of view. With this paper I present a microeconomic theory of poverty measurement, which can serve as framework for developing and improving poverty measures and can be used to develop answers to a lot of open theoretically questions, like: what are the determinants of individual welfare, what is the relevant individual welfare function, where is the poverty threshold, how is individual welfare distributed within a household and so on. Although the presented theory is the result of a mostly micro-economic point of view, it also makes use of sociological theories and ideas about poverty measurement which leads to the presented poverty measure, the WPL.

This poverty line can still be criticised in manifold ways, for example the kind of welfare function, the empirical estimation method, the measure of the welfare threshold. Nevertheless this crude measure already gives reasonable results and for some groups additional information to the common relative income poverty measures. Thus, it makes sense to put more effort to develop a poverty measure, which is better than the standard poverty measures with regard to three points: it should be more based on theory, it should take use of subjective information to have a better basis to find the relevant welfare function and it should use direct indicators of welfare as well as income.

8 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. (1995): The Truly Poor: Direct and Indirect Measurement of Poverty in Sweden. *Journal of European Social Policy*, 5,2, 111-129.
- 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.

- Layte, R./ Maître, B. / Nolan, B./ Whelan, C. (2001): Persistent and Consistent Poverty in the 1994 and 1995 Waves of the European Community Household Panel Survey. *Review of Income and Wealth*, 47, 4, 427-451.
- 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

Appendix

Figure A.1: Relative income poverty lines in Euro per month for a single household for different poverty thresholds (modified OECD scale)

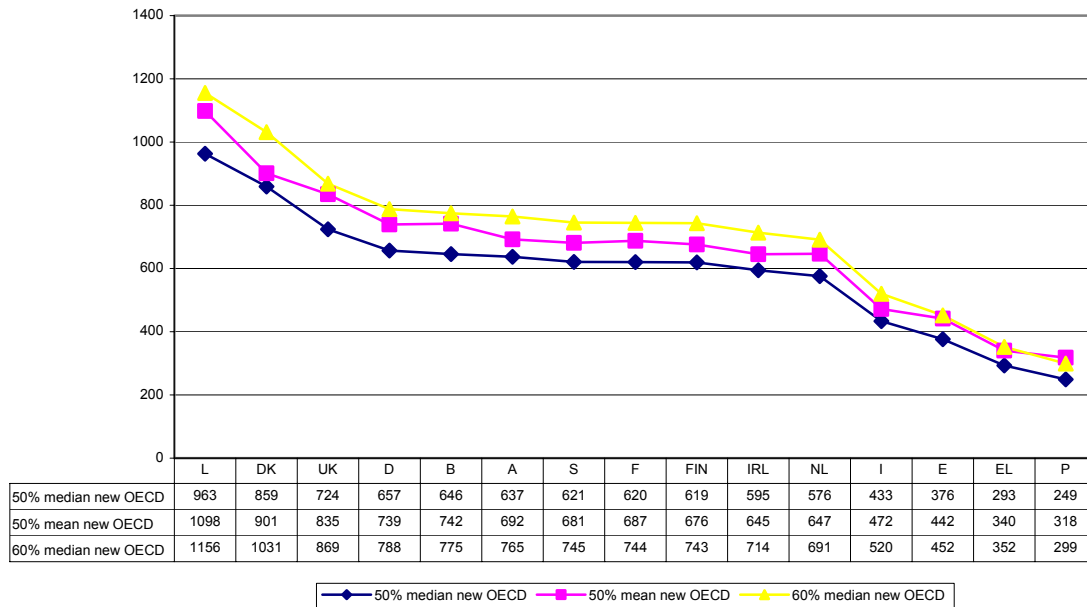


Figure A.2: Effect of changing the equivalence scale on poverty rates (60% median)

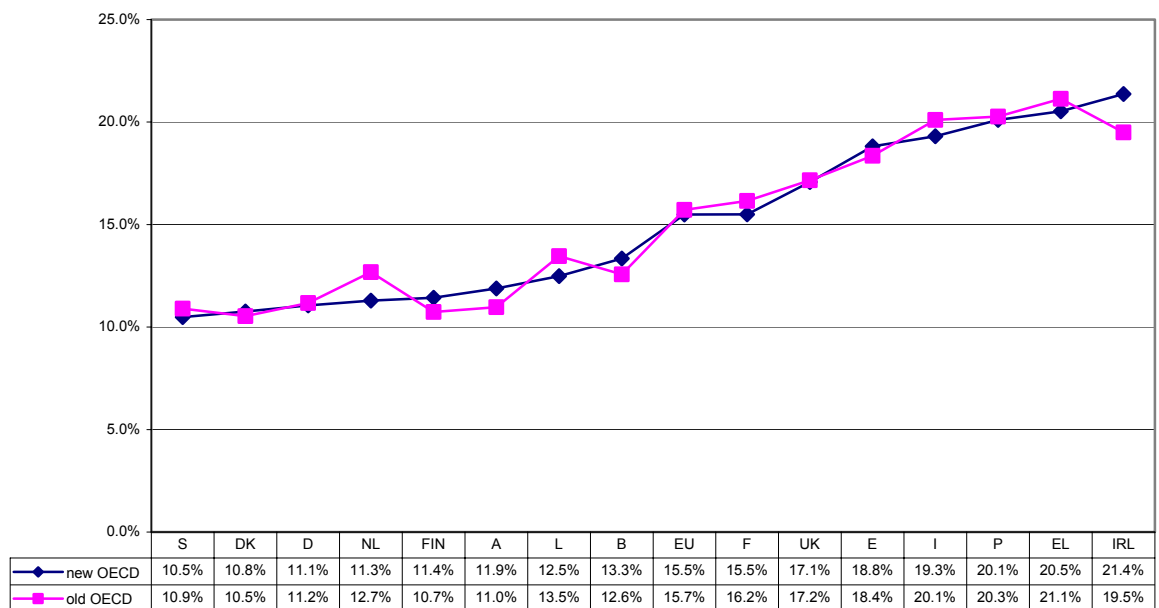


Figure A.3: Effect of changing the equivalence scale on poverty rates (50% mean)



Figure A.4: Effect of changing the poverty threshold on poverty rates (new OECD scale)

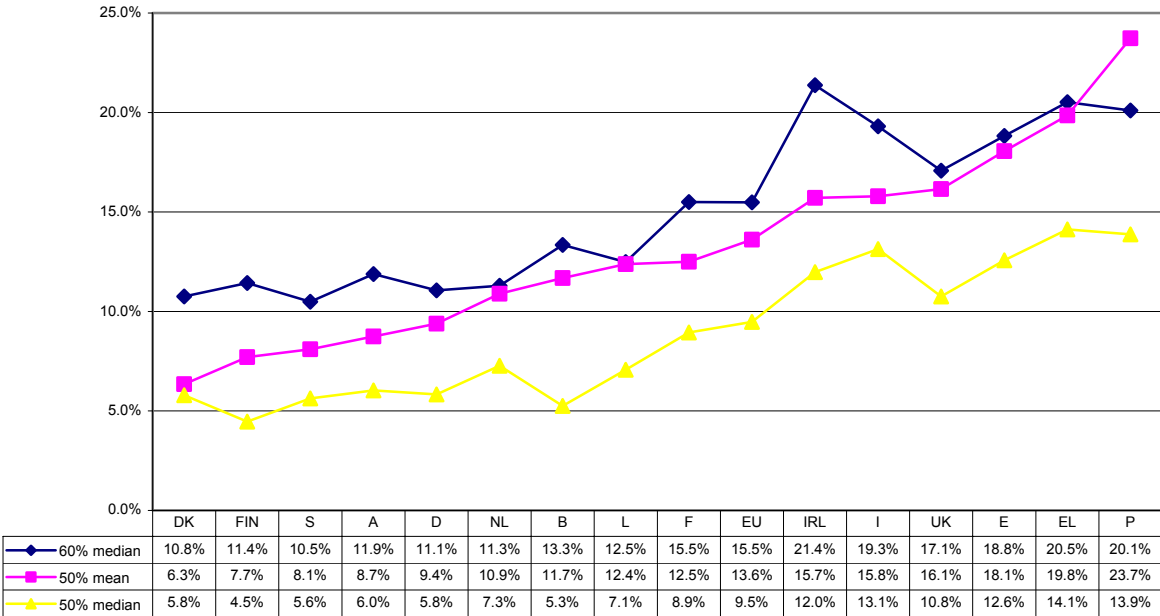
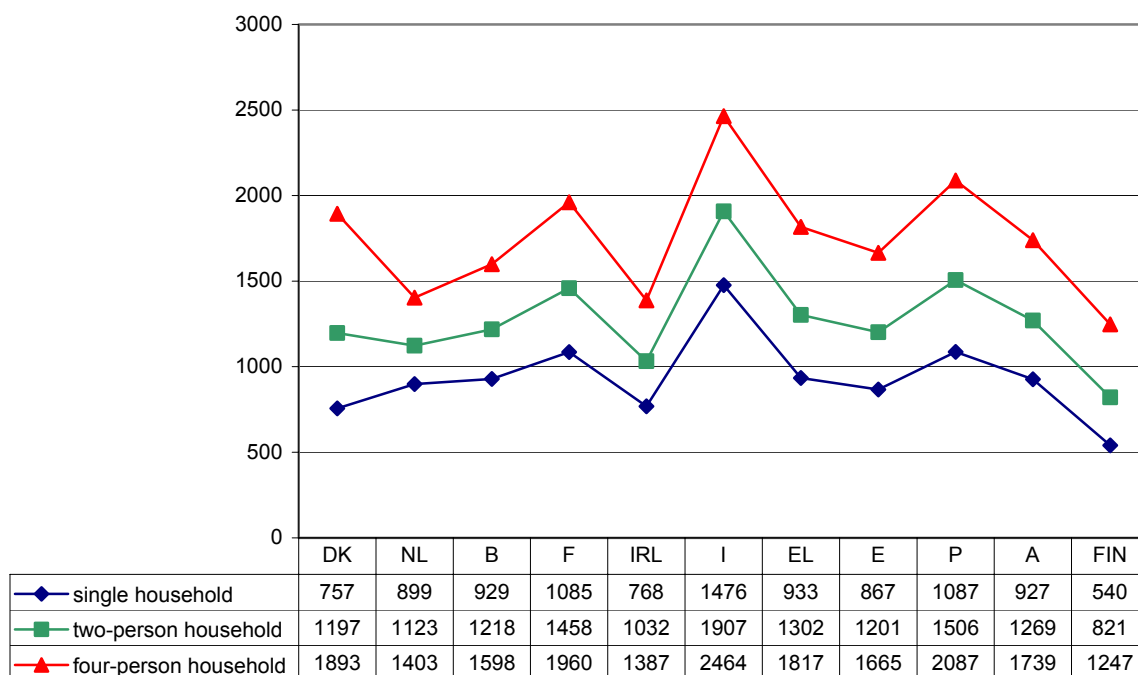
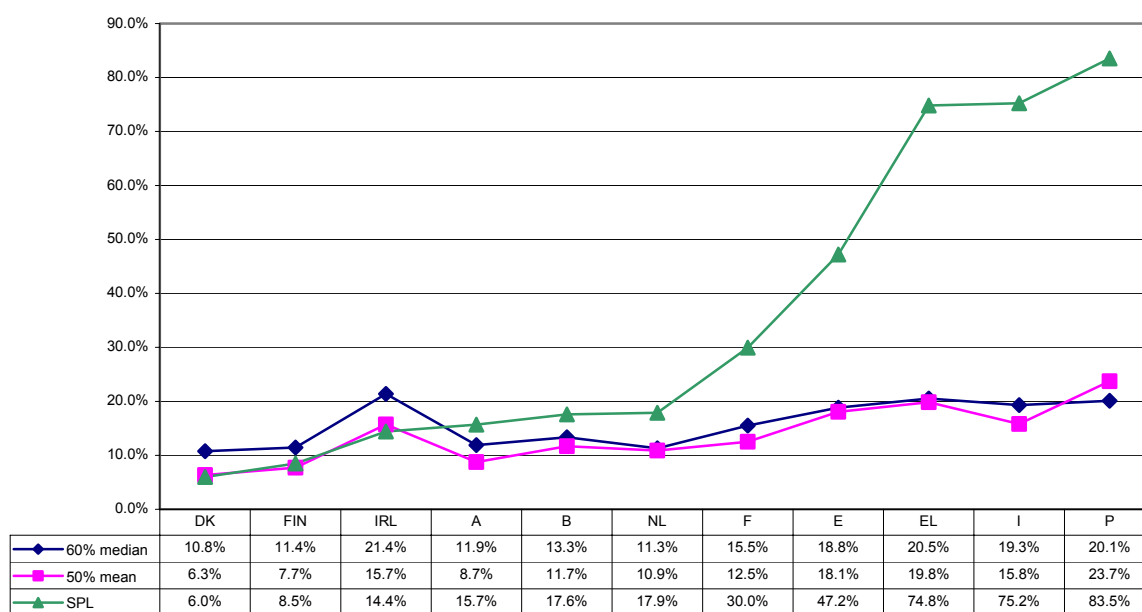


Figure A.5: Subjectiv Poverty Lines (SPL) in Euro



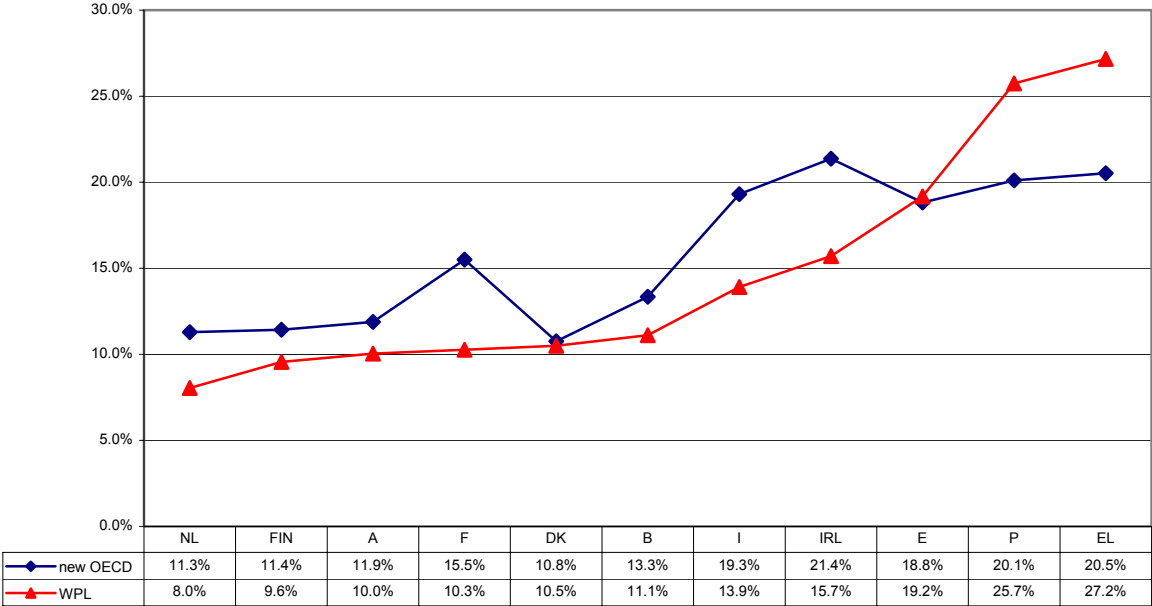
Source: European Community Household Panel, wave 8 (2001)

Figure A.6: Poverty rates based on the Subjectiv Poverty Lines (SPL)



Source: European Community Household Panel, wave 8 (2001), non-weighted OLS estimation

Figure A.7: Poverty rates based on the Welfare function based Poverty Lines (WPL) compared to 60%-median poverty rates



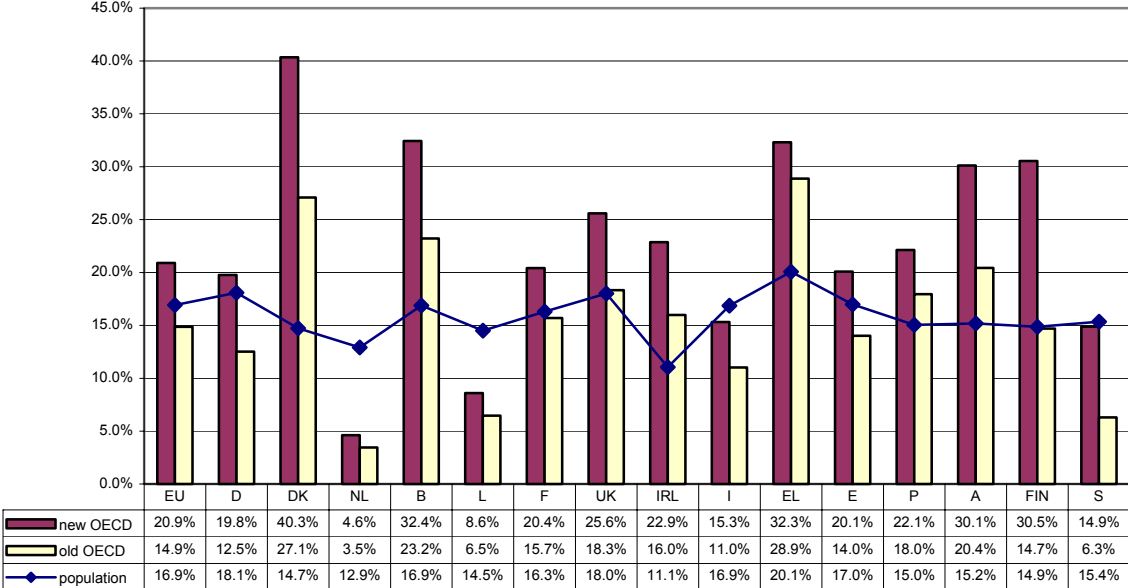
Source: European Community Household Panel, wave 8 (2001)

Figure A.8: Poverty rates based on the Welfare function based Poverty Lines (WPL) compared to 50%-mean poverty rates



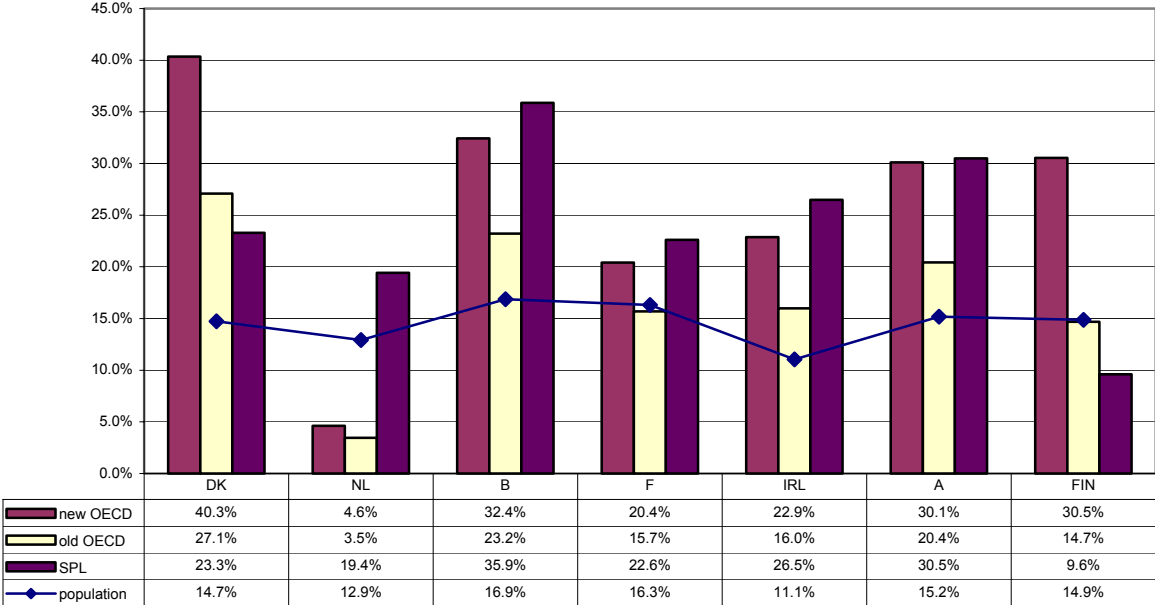
Source: European Community Household Panel, wave 8 (2001)

Figure A.9: Shares of the elderly (65+) among the poor using different equivalence scales



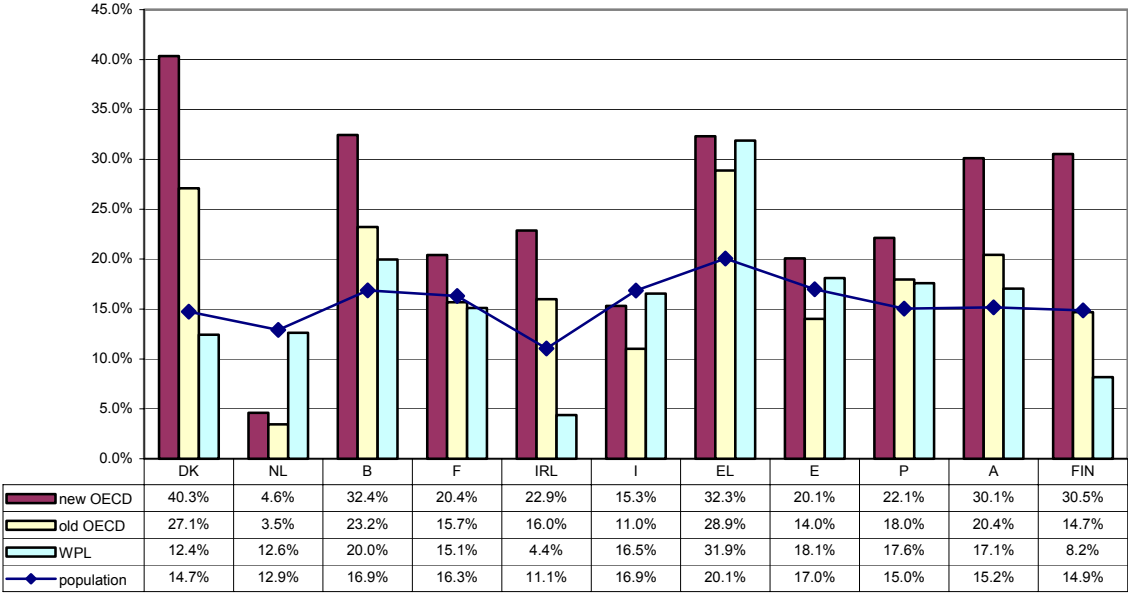
Source: European Community Household Panel, wave 8 (2001)

Figure A.10: Shares of the elderly (65+) among the poor: SPL compared to relative poverty lines (60% median)



Source: European Community Household Panel, wave 8 (2001)

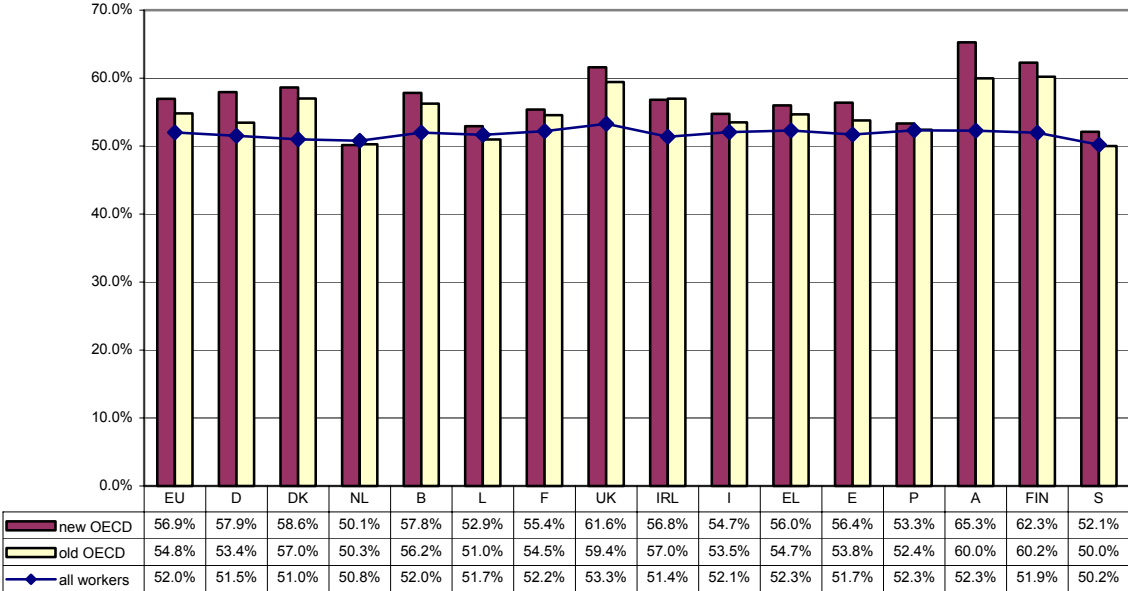
Figure A.11: Shares of the elderly (65+) among the poor: WPL compared to relative poverty lines (60% median)



S

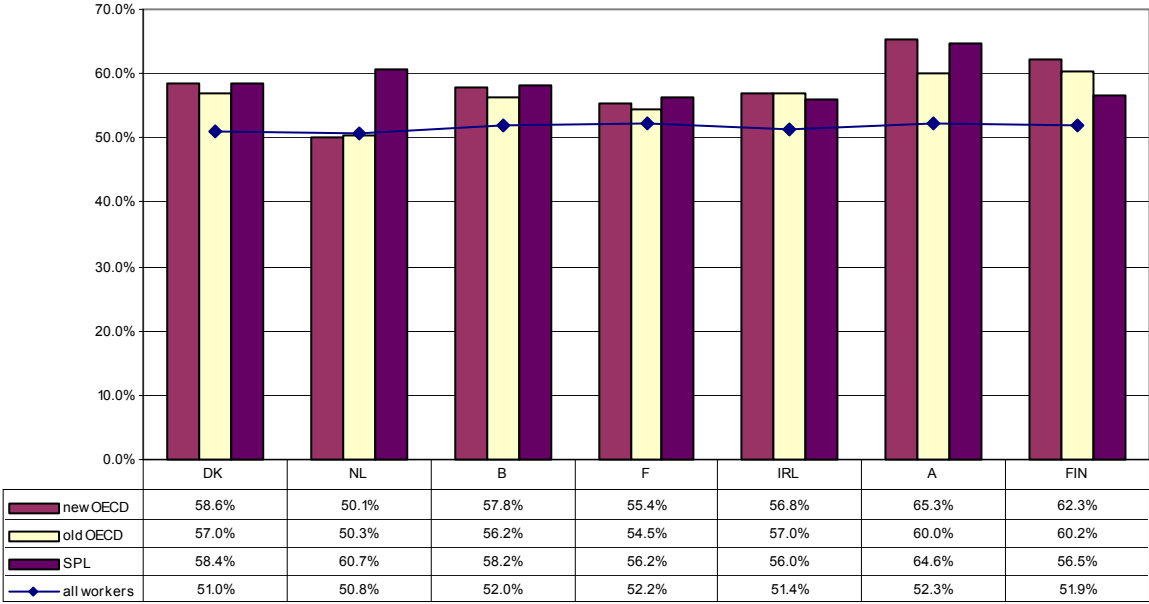
ource: European Community Household Panel, wave 8 (2001)

Figure A.12: Shares of women among the poor using different equivalence scales



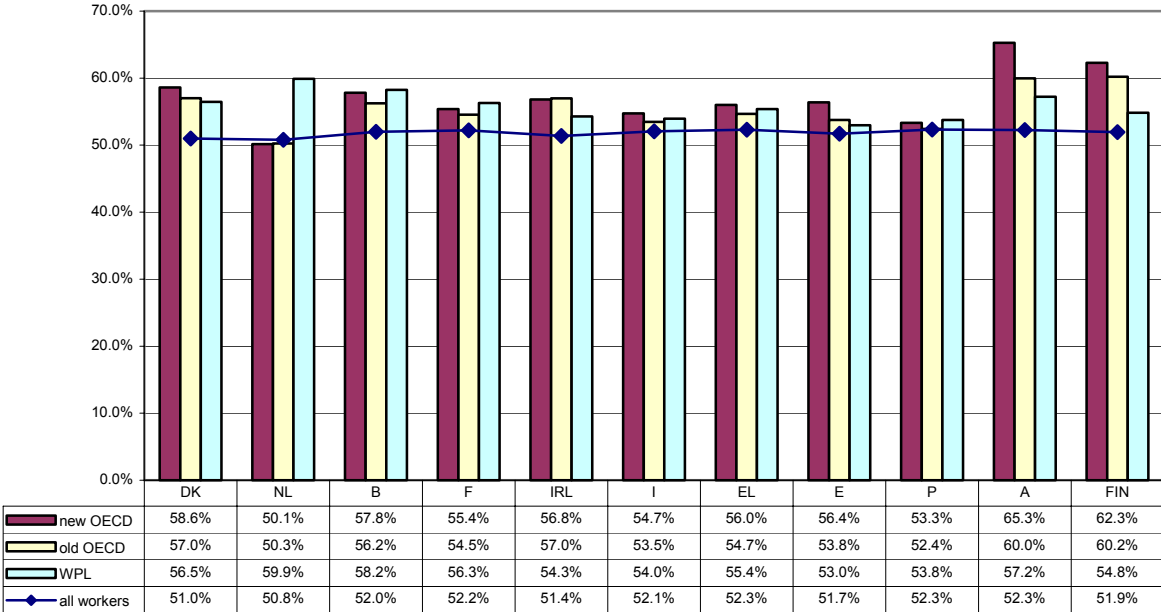
Source: European Community Household Panel, wave 8 (2001)

Figure A.13: Shares of women among the poor: SPL compared to relative poverty lines (60% median)



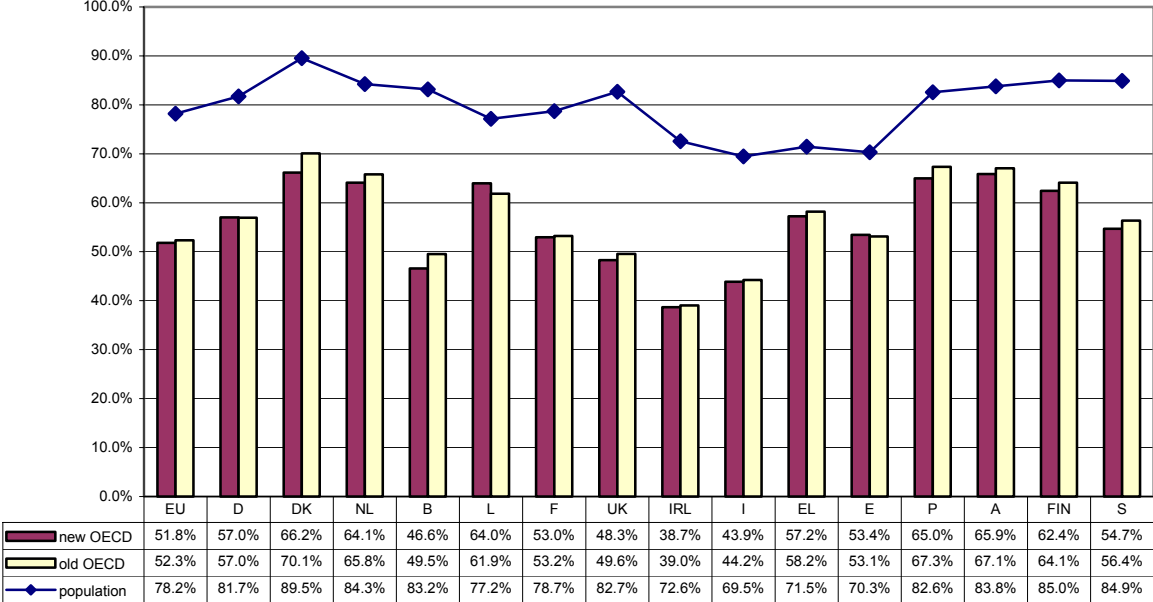
Source: European Community Household Panel, wave 8 (2001)

Figure A.14: Shares of women among the poor: WPL compared to relative poverty lines (60% median)



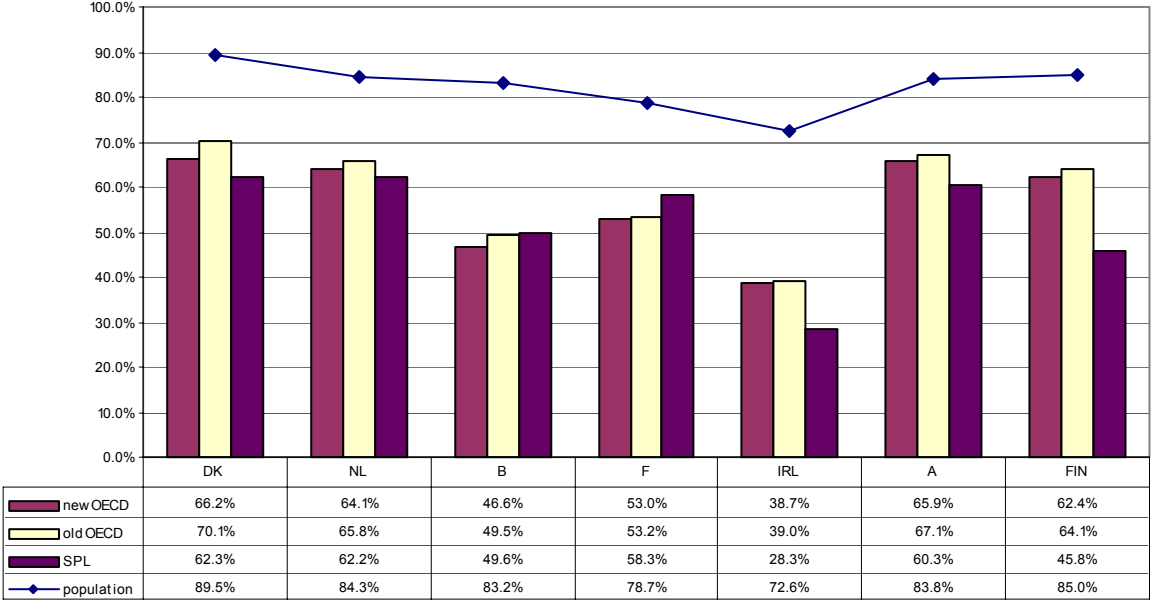
Source: European Community Household Panel, wave 8 (2001)

Figure A.15: Shares of workers among 25 to 55 year old poor using different equivalence scales



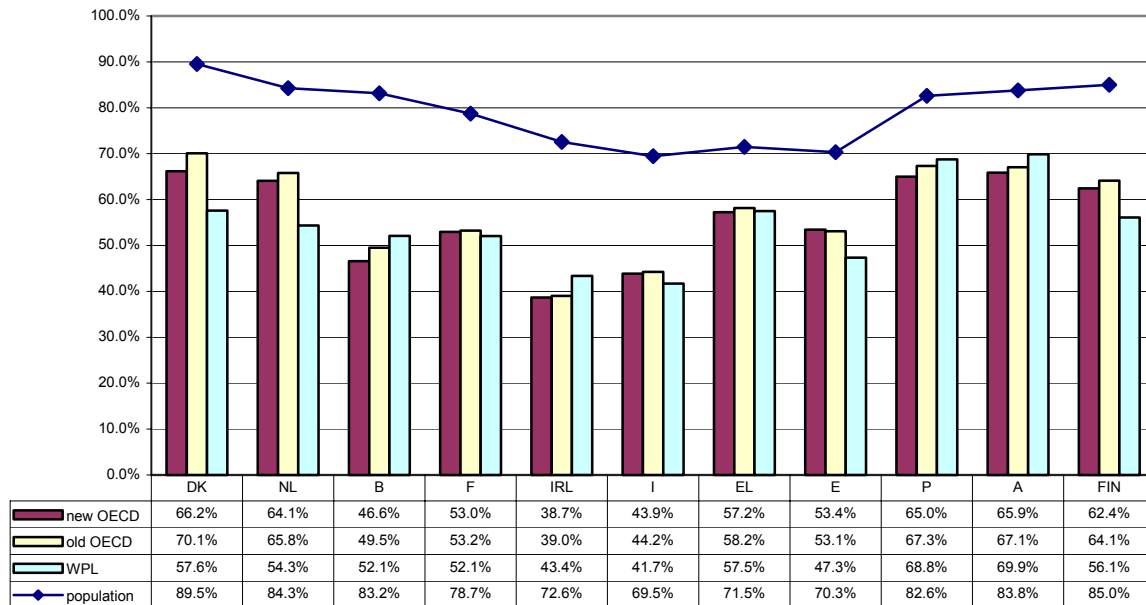
Source: European Community Household Panel, wave 8 (2001)

Figure A.16: Shares of workers among 25 to 55 year old poor: SPL compared to relative poverty lines (60% median)



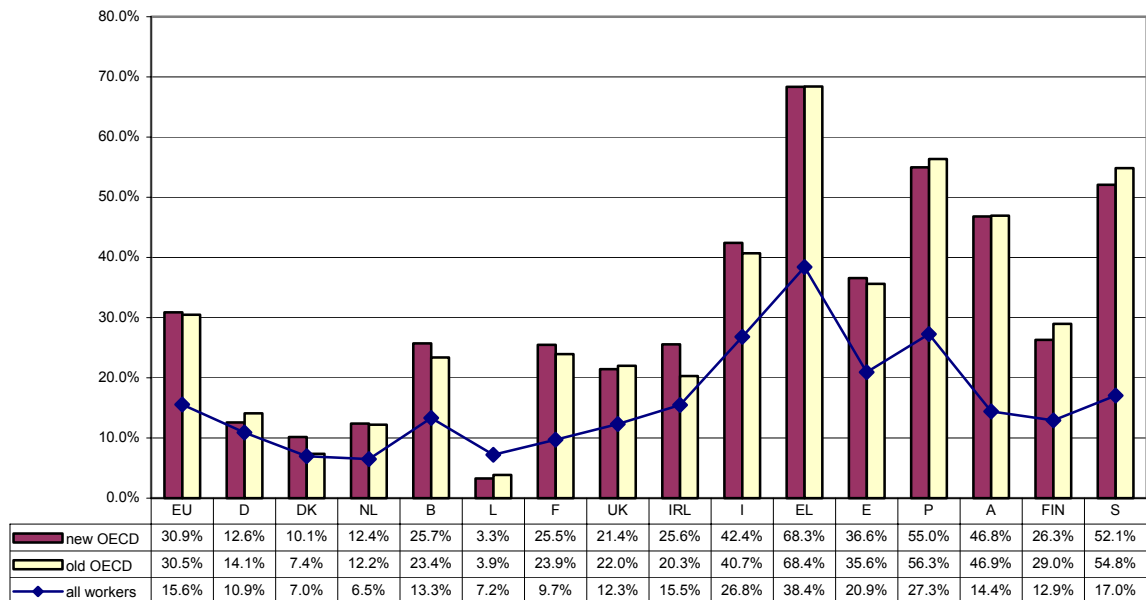
Source: European Community Household Panel, wave 8 (2001)

Figure A.17: Shares of workers among 25 to 55 year old poor: WPL compared to relative poverty lines (60% median)



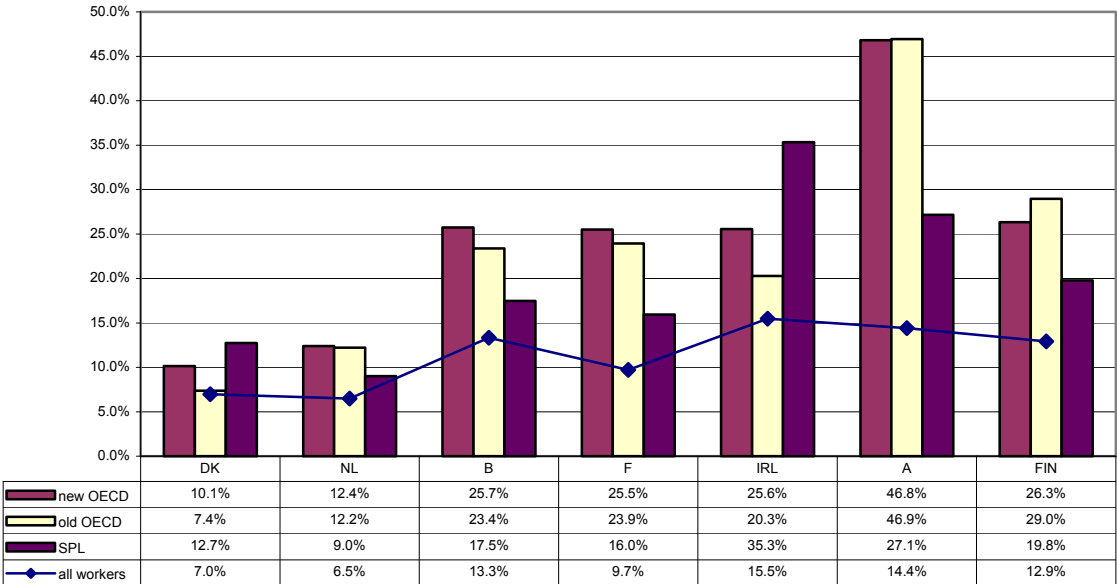
Source: European Community Household Panel, wave 8 (2001)

Figure A.18: Shares of self-employed among the working poor using different equivalence scales



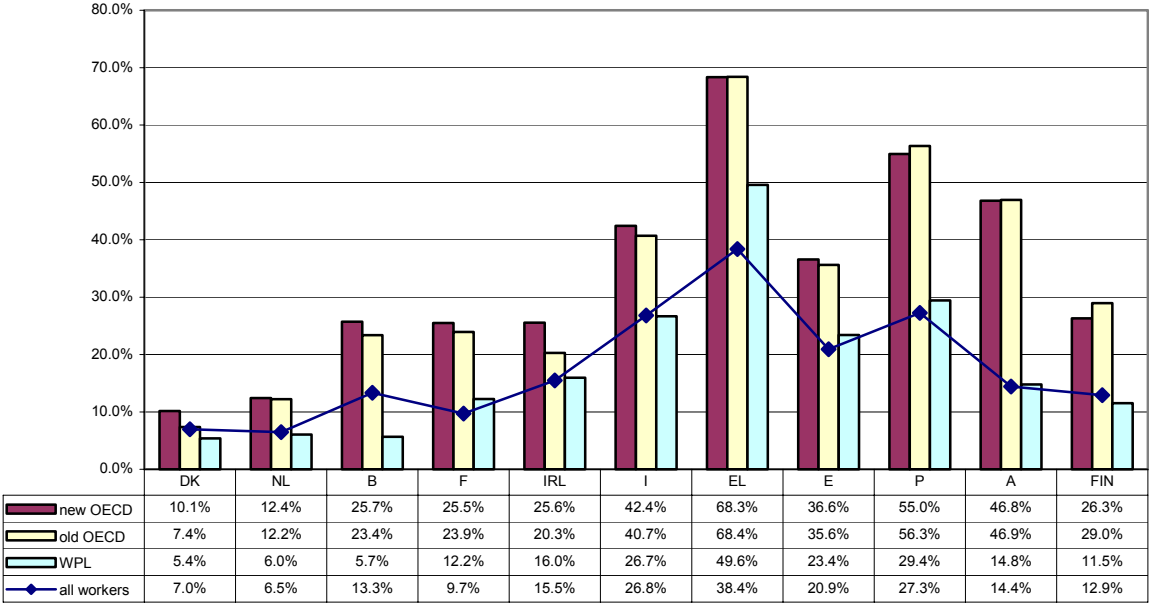
Source: European Community Household Panel, wave 8 (2001)

Figure A.19: Shares of self-employed among the working poor: SPL compared to relative poverty lines (60% median)



Source: European Community Household Panel, wave 8 (2001)

Figure A.20: Shares of self-employed among the working poor: WPL compared to relative poverty lines (60% median)



Source: European Community Household Panel, wave 8 (2001)