

Chapter 1

Introduction

In many applications, in social policy and development policy as well as poverty and inequality analysis, households of different demographic composition have to be compared with respect to their well-being. In assessing inequality, poverty lines or appropriate levels of social benefits, the needs and the welfare of a household depend on the number of household members, of adults and children and on their personal characteristics, their age, their employment status and so on.

For a household of two, an income of, say 1500€ a month, implies a very different purchasing power per head than for a household of five. Without further adjustments, the relation of their incomes is no measure for a comparison of these two households with respect to welfare. With the help of a so called *equivalence scale* the incomes of different household types can be transformed into equivalent reference incomes which are a direct money metric measure of welfare and therefore comparable. This transformation enables researchers and policy makers to address income distributions for a population of different household types, while taking into account the different value that a certain income has for households of different sizes and characteristics. Equivalence scales are also an important tool for comparing the effects of policy measures like tax reform or a change in social benefits on different household types. Other applications are the evaluation of the cost of children and the assessment of child welfare. Recently, equivalence scales found a new application in the evaluation of compensations for wrongful death (Lewbel, 2003).¹

In order to be compared, households have to be brought on a common basis either in terms of purchasing power per head or in terms of welfare. When a household of type s and a given income μ^s , is as well off as a reference

¹Lewbel considers a compensation which consists of two parts that have to be assessed separately: a compensation for suffering and a compensation that allows for the maintaining of the former living standard. The latter has to take into account that the household has lost one member due to wrongful death, hence the application of equivalence scales.

household of type r with an income μ^r , then the relationship between both incomes is called the *equivalence scale* of s with respect to r . Formally, if the level of well-being of both households can be represented by indirect utility functions $u^s = V^s(\mu^s, \mathbf{p})$ and $u^r = V^r(\mu^r, \mathbf{p})$ for a vector of prices \mathbf{p} , then the equivalence scale of s with respect to r can be written as:

$$m_r^s = \frac{\mu^s}{\mu^r} \Big|_{V^s(\mu^s, \mathbf{p}) = V^r(\mu^r, \mathbf{p})} .$$

The income μ^s at which household s is as well off as household r with income μ^r ($V^s(\mu^s, \mathbf{p}) = V^r(\mu^r, \mathbf{p})$) is called the *equivalent reference income*. It is calculated by dividing the income of a household by its equivalence scale. Usually the reference household is a single adult or a childless couple. With a single adult reference household, the equivalence scale is called an *adult equivalence scale*. Analogously, the *equivalent per capita income* is the reference equivalent income with a single adult as reference. E.g. if the adult equivalence scale for a couple with two children and a monthly income of 2000€ is 2.0, then its equivalent per capita income is 1000€. An adult who is living alone needs an income of 1000€ to be as well off as the compared couple with children, or, speaking of individuals, as well off as any member of the compared household (assuming that all members of a household enjoy the same level of welfare).

The size of an equivalence scale can be affected by household characteristics. These can be fairly general and merely include the number of persons, or they can be very specific and include age, employment status, gender and other characteristics which might influence the household's needs. So with reference to an unemployed single adult, a couple with two children, aged eight and ten, might have a different equivalence scale when both parents are working than when only one is working or when both are unemployed. Similarly, the equivalence scale might be different when the children are not aged eight and ten, but four and six.

The “head count” is the most primitive equivalence scale. In this model the adult equivalent income is the total household income divided by the number of persons in the household. The head count does not account for differences in needs of household members: in particular, the needs of children might be different from the needs of adults. Neither does the head count take into account savings from living together, like shared housing, shared appliances, shared fixed cost of a telephone and economies of scale in household production such as food preparation.

Equivalence scales are a sophisticated way of head counting. They take into account differences in needs among household members and economies of scale within the household. Each member is weighted according to its needs and the scale economies that correspond to its index in the number of household members. So if a household consists of two adults with equal

needs, the weight of the first adult is one, and the weight of the second is less than one if there are any economies of scale in consumption from living together. If a third adult is added, his or her weight might differ again from the weight of the second person. There might be additional scale economies: in this case the weight of the third person is still lower than that of the second. Or all savings from scale economies have been exploited with the second person and there is congestion in the use of household public goods: then the weight of the third person would be higher than that of the second. On the other hand, if children are added instead of adults, weights will be different again, because – although savings from economies of scale might be the same – children may have different needs than adults, and therefore have a different weight. The weight can also be influenced by other parameters, such as the age of a child, its gender, and even the number and characteristics of other household members. The value of the total equivalence scale is the sum of the individual weights.

Household Welfare and Individual Welfare

Equivalence scales contain a comparison between households and some notion of household welfare. There is not one definite answer to the correct value of the scale, because the value depends on the definition and measurement of welfare. A social welfare function is necessary to derive a household utility function from the individual utility functions of household members (Samuelson, 1956), because households do not have utility, only individuals do. However, there is an infinite number of social welfare functions that map the personal utilities of the individuals on the same household utility function, and there is no way to distinguish the “true” social welfare function.² To solve this problem, economic methods that estimate equivalence scales for families with children usually focus on the welfare of the parents. It is assumed that children’s welfare is a function increasing in parents’ welfare (Rothbarth, 1943) or – in a stronger version – that children have the same welfare as parents (Blackorby and Donaldson, 1993). Most studies that compare single adults with couples (childless or not) equally assume that both partners have the same level of welfare.

Indeed, some studies shed doubt on the assumption of equal welfare for children, because they can show that resources diverted to children depend on the children’s gender³ and on the distribution of income between mother and father.⁴ This indicates that, even though children’s welfare might still be

²See Lind (2003) for an extended discussion.

³Liu and Hsu (2004) estimate equivalence scales for Taiwan. Treating girls and boys separately, they find substantially lower cost for girls than for boys. This is interpreted as discrimination against girls – but maybe boys do have different needs than girls.

⁴See for example Thomas (1990) for a study on the effect of parents’ influence over income on their girls’ and boys’ health

increasing in their parents', it is not independent of other factors.

The same applies to the welfare of partners. A wealth of studies shows that distribution between husband and wife depends on their respective incomes.⁵ Thus, when compared with men and women living alone, the equivalent income of husband and wife might not be the same. Only recently efforts have been made to address the effect of unequal intra-household distribution on equivalence scales. Browning et al. (2004) estimate collective equivalence scales that treat individuals separately and model intra-household distribution via a distribution function. The household welfare problem is solved by disaggregation: the scale is split in two, one for each partner.

This work follows a two-track approach. The comparison of couples with singles is separated from the estimation of equivalence scales for families with children. Whenever families with children are compared with childless couples, the focus lies on parents' welfare, where the utility functions of both partners are aggregated to a household or parents utility function. When couples are compared with singles the focus is on individual welfare.

Conditional and Unconditional Equivalence Scales

Today and throughout history, having children often has been a deliberate choice. People choose to become parents because they want to have children either because of the love they can give to them, because of the love their children will give them back, because their children can care for them when they are old or just because they see their children as a necessary adjunct to their life style. Whatever the reason, parents have children because they expect to be better off with children than without. In a wider sense, children can be seen as a "consumption choice" to these parents.⁶ This poses a problem to the definition of equivalence scales. If, given a certain income, parents decide to have children, then their revealed preferences indicate that they expect to be better off having them, and there is no need for compensation. These parents were even willing to pay a tax to be allowed to have children. This view has forcefully been argued for by Pollak and Wales (1979) and again by Pollak (1989). Equivalence scales that take into account the rational decision for having children are called *unconditional equivalence scales*.

⁵There is an extensive literature on this topic starting from the bargaining models of Manser and Brown (1980) and McElroy and Horney (1981) over collective models of the household (see for example Bourguignon et al. (1993), Browning et al. (1994) and Browning and Chiappori (1998)) to models that include household production (Apps and Rees, 1997).

⁶When provision for old age is the main rationale behind having children, then having children should be interpreted rather in terms of an intertemporal consumption choice. Such an interpretation might give some deeper insights in a developing country, while this motive for having children will be of little importance in a society with a developed pension system. As Germany is the focus of empirical applications in this work, the motive of old-age provision will not be considered here.

In a perfect world, unconditional scales would have a value of at most one. Parents decide to have children because they are better off with them, while childless persons decide not to have children, because they have different preferences and are better off without them. In the presence of child benefits, the unconditional equivalence scale would have to be adjusted, because the marginal household would take the benefits into account in its decision and rather not have an extra child if benefits were lower.

Studies on equivalence scales usually circumvent this problem by assuming children to be exogenous. Scales that are calculated under the condition that children are already there and parents have no choice over having them are called *conditional equivalence scales*. Here, the comparison of households is applied exclusively to material welfare, calculating the money cost of children. Time use for child care as well as improved well-being from having children or having a partner is typically excluded from the measure of welfare.⁷ Deaton and Muellbauer (1986) argue that this is the appropriate approach for calculating the short run money cost of children. In many contexts this approach leads to relevant results, and throughout this work the same assumption will be taken. Nevertheless, it is important to be clear about the fact that only a specific part of a household's and its members' welfare determines the presented equivalence scales.⁸

But are fertility decisions always rational? With respect to this issue Coulter et al. (1992) remark: "... we do not live in a perfect contraceptive society, and many children (and multiple births) are unplanned, decisions to have children may have been taken given a set of expectations about unemployment rates and income growth, and such decisions are irreversible. If expectations are not in fact realized, living standards may be reduced, not enhanced, by children"

Indeed, a study on income satisfaction by Charlier (2002) finds scales higher than one and of a similar size to other results for conditional equivalence scales. The same study shows that equivalence scales are very "flat" (i.e. not increasing with household size) when people are asked for their satisfaction with life. A family with a child needs the same income as a childless couple to report the same life satisfaction, while it needs a higher income to report the same income satisfaction. This implies that families with children do distinguish between the two notions of conditional and unconditional equivalence scales and both approaches are valid depending on the problem in question.

Deaton and Muellbauer (1986) write on the subject: "If we suppose that most parents are parents because they *want* to have children, then the compensation that would have to be paid to restore them to their utility level

⁷Apps and Rees (1997) are an exception. They include time use, but they do not calculate equivalence scales.

⁸For a recent discussion of the problem see Bradbury (2003).

prior to the birth of the child would be negative since they are now better off than they were before. But this is simply not relevant to the problem of measuring the costs of the upkeep of the child, the costs of being born, or the costs of food and education. *That parents choose to have children means that the benefits of having them are greater than the costs, but it does not mean that the costs are zero.*" (my emphasis) This work follows the cost approach. Only conditional equivalence scales will be estimated.

Identification and Measurement

In addition to the issue of definition, there are severe identification and measurement problems related to the estimation of equivalence scales. The level of a household's welfare (or its utility level) can be derived from observed behaviour, from statements about a household's perception of its own welfare or from other indicators like housing situation or the access to services like education. Identification problems can arise in some methods, when only an ordinal utility level can be determined. In these cases, the household utility function can be recovered from observed behaviour only up to a monotonous transformation. The equivalence scale is not identified when the monotonous transformation depends on household characteristics. This identification problem does not apply to methods that can determine some cardinal utility function. All methods are subject to measurement problems that can arise for example from framing effects when a household is surveyed about its perceived level of well-being.

Consequently, there is a wide variety of estimation methods, that try in different ways to overcome these difficulties. Methods can be classified into three large groups: (1) Expert scales, where the needs of households are determined by experts, according to a necessary bundle of goods or to an "objective" measure of well-being. (2) Economic methods, where equivalence scales are derived from expenditure patterns and utility theory and (3) survey methods, where households are questioned either about necessary incomes in different demographic situations or about their personal satisfaction with income or with life in general. Chapter 2 will give an overview of these methods and their respective problems.

In the subsequent chapters different methods will be applied to German data. Chapters 3 and 4 focus on equivalence scales for families with children compared to childless couples, and the distribution between parents and their children. In Chapter 5 the distribution between partners is examined and respective equivalence scales are calculated for childless couples compared to single households.