The Conceptual Basis of Measures of Household Welfare and their Implied Survey Data Requirements

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AND THEIR IMPLIED SURVEY DATA REQUIREMENTS

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THE CONCEPTUAL BASIS OF MEASURES OF HOUSEHOLD WELFARE AND THEIR IMPLIED SURVEY DATA REQUIREMENTS*

I. INTRODUCTION

The purpose of this paper is to outline a conceptual basis for the measurement and analysis of levels of welfare. The paper reflects the thinking that has been ongoing in the Living Standards Measurement Study (LSMS) which the World Bank launched in February 1980. 1/ More specifically, it crystallizes the discussions that took place during a workshop held at the University of Warwick, May 25-29, 1981. 2/ The topics discussed in this paper and the references quoted are selective, as this paper is not intended as an exhaustive survey of the literature on welfare and its measurement.

The LSMS is concerned with both the conceptual framework behind the measurement of welfare and the collection of the needed data. While a fair amount of the latter is ongoing at present, both statisticians and users recognize its imperfections and inadequacies; little dialogue takes place between data producers and consumers. LSMS has been established, in part, to promote such a dialogue and to guide the data collection process towards

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1/ The basic ideas behind LSMS and the need for it are explored in Pyatt (1979). The study's work program is described in Chander, Grootaert and Pyatt (1980).

2/ I should like to acknowledge the intellectual input of all the workshop participants into this paper: Ehtisham Ahmad, Sudhir Anand, Anthony Atkinson, Nancy Birdsall, François Bourguignon, Angus Deaton, Meghnad Desai, John Duloy, Mervyn King, Timothy King, Michael Kusnic, William McGreevey, John Muellbauer, Graham Pyatt, Jeffery Round, Amartya Sen and Nicholas Stern. I am also thankful to Susan Cochrane and Wouter van Ginneken who provided comments on an earlier draft. The views in the paper do not necessarily reflect a consensus of the participants at the workshop but are merely my interpretation of the background papers and the discussions, interwoven with personal reflections. Although all participants were invited to provide comments and corrections to an earlier draft, and several did so, final responsibility for the contents of this paper of course rests solely with me.

producing data which could attempt to answer questions that catch the attention and interest of policy makers.

Such questions center around fundamental concerns about which groups in society are getting better- or worse-off, and in which dimensions they especially do so. LSMS thus attempts to indicate which data need to be collected, which concepts are to be used in analysis, and what story the data tell about poverty and about the efforts of groups in society to improve their level of living.

An intermediate question is how to move from the concepts to the empirical stage, i.e.,to the drafting of questionnaires useable in household surveys which can elicit the required information. It should be emphasized that the views expressed in this paper regarding conceptual issues take that "mission" of LSMS into account, i.e.,the trade-off that exists between conceptual rigor and practical constraints on data collection and use is explicitly incorporated and will, in fact, be highlighted. Ultimately, the study is striving to come up with the simplest possible survey instrument, set of tabulations and analytical tools that will improve the data base in order to help answer questions regarding the changing levels of living between groups as a result of development policy.

This focus on the relative position of groups within a society and shifts in that position over time implies only a secondary emphasis on international comparability. Indeed, it is believed that the former is of primary concern to the national policy maker. Equally, the main concern of the World Bank's lending policy is the betterment of living conditions of target groups in society. It should not be overlooked though that efforts to better outline

and define basic concepts, methods of data collection and presentation will tend to improve international comparability.

The plan of this paper is as follows. Section II outlines three approaches to the measurement of welfare and attempts to compare these from the perspectives of concepts used, data requirements, and analytical demands. The third section proceeds to issues that pertain to the causal analysis of welfare levels and the changes therein. Section IV discusses some implications of viewing welfare as a multi-dimensional concept; the time dimension will receive special attention. Section V explores the nature of the survey instrument required to obtain the data base for studying welfare and offers a few suggestions regarding data presentation. Finally, the last section presents a few concluding remarks and a table that summarizes the implications of the viewpoints taken in this paper for data collection and analysis.

II. MEASURING WELFARE: CORE CONCEPT

LSMS is concerned with measuring welfare, not utility. Welfare and utility are related but not identical concepts: welfare derives from the consumption of goods, either directly or because of the characteristics of the goods (in the Lancaster sense, for example the transportation characteristics embodied in a bicycle). The translation of consumption into welfare units is a function of various physiological characteristics (age, sex) of the recipient and of environmental factors. However, throughout this paper it will be assumed that, ceteris paribus, a good bestows the same amount of welfare on an individual regardless of personal psychological factors which may result in

differences in the pleasure or utility that different individuals derive from the same good. 1/

We distinguish three main approaches to welfare measurement, each of which will be discussed in turn.

A. **Estimation of True Indexes of Welfare**

True indexes of welfare can be derived from the preference parameters estimated in an integrated model of household consumption and employment behavior. This approach is outlined by Muellbauer (1980). The basic premise is that welfare depends on goods, leisure, household composition and access to public services. These variables, with the exception of leisure, are seen as determinants of welfare at the household level; leisure is introduced in the welfare function at the individual level, i.e.,the leisure/work choice of each potentially active household member is recognized.

The household maximizes welfare subject to a budget constraint which takes into account the prices of outputs and of purchased inputs, the time endowment of each household member, net accumulation of wealth, and the wage rate that each member can obtain in the market. The accumulation variable would be endogenous in an intertemporal context. However, if one is willing to make the assumption that preferences are separable in time, then the inter-temporal optimization can be broken down into a series of static optimizations. This has the added advantage that it is not necessary to introduce assumptions regarding the degree of perfection of capital markets.

1/ A similar distinction exists between welfare and utility derived from leisure and access to public services.

With this model, the goods/leisure choice and the choice between market and domestic work for each household member can be studied within the household context by estimating functions for (individual) labor supply, demand for commodities, and inputs into the domestic enterprise. This is a system of simultaneous equations which can be estimated from cross-section data using instrumental variable techniques. Based on the estimated parameters, welfare levels can be calculated and compared since the variables in the welfare function are all observable. Translation into money-metric equivalents is possible by using a reference price and wage vector.

The most obvious advantage of such a model is its completeness. It estimates welfare directly from the consideration of household behavior both on the consumption side and on the employment side. Its major feature is that it disaggregates activities of household members and studies the leisure/work choice at the individual level. The model displays a flexibility on at least two important scores: First, it can easily be expanded to include schooling, which for household members in the relevant age bracket constitutes a fourth potential activity next to labor market participation, work in the domestic enterprise, and leisure. Second, the model is able to handle corner solutions, especially unemployment; however, here it is sensitive to the correct identification of the lack of labor market opportunity as opposed to voluntary non-participation. If the identification does not take place correctly, then biases can result in the estimated parameters.

One suggestion in this context has been to rely on self-reporting of unemployment, i.e.,to ask household members directly why they are not participating in the labor market - for voluntary reasons or because of lack of opportunities. An alternative solution is to introduce the concept of normal

wage. This could be derived from a cross-section regression of wages on per-
sonal characteristics for those individuals who are participating in the labor
market. The normal wage for non-participants would then be derived as the
wage predicted by that equation for an individual with similar characteris-
tics. Unemployment would be indicated by a situation where the normal wage is
above the wage actually offered to the individual; voluntary non-participation
would occur in the opposite case. It is clear that this econometric procedure
is potentially subject to selectivity bias and that adequate testing for this
would be required.

A model of the type described above is demanding in two respects.
First, the econometric techniques involved are complex, especially if the par-
ticipation decision is modeled as involving multinomial discrete choices.
Second, the data requirements are quite substantial: they include complete
information on hours and wages for market participants, the value of output
from the domestic enterprise together with hours and other inputs, and time
use data on other activities.

B.   Total Household Expenditures

In contrast to the multi-equation simultaneous model discussed in the
previous section, the approach to welfare measurement that relies on the esti-
mation of total household consumption is essentially a one-equation model in
which welfare is a function of goods consumed by the household. The key
assumption here is that the preference patterns as revealed by the purchases
of goods and services by the household implicitly take into consideration
other preferences which in the previous approach were introduced explicitly in
the welfare function: these include the leisure choice, the decision to have
children, etc. In the present approach, these decisions are considered

exogenous and it is assumed that the implications for welfare are fully re-
flected in the pattern of purchases by the household. 1/ Welfare measurement
is then a question of constructing an index of total expenditures deflated by
an appropriate price index and by an index of household size and composition,
i.e., an equivalence scale.

Ideally, the price index in question should be a true cost-of-living
index. It has been demonstrated (Deaton 1980) that both the Laspeyres Index
and the Paasche Index are first-order approximations to a true cost-of-living
index. Specifically, the Laspeyres Index is an upper bound for the base
referenced true cost-of-living index and the Paasche Index is a lower bound
for the current referenced true cost-of-living index. 2/ These approximations
unfortunately worsen when important price substitution effects appear, as is
often the case in cross-sectional data. This provides an argument for
constructing price indexes for different groups which are more or less homo-
geneous with respect to the prices they face. Distinctions that immediately
come to mind are urban vs. rural and various geographic locations within a
country. If prices also vary with income levels, then different price indexes
could be constructed for different income groups. The case for this is

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1/ Note that, in principle, welfare depends on consumption of goods. Since,
in practice, household expenditure surveys record purchases, it is
virtually impossible to obtain actual consumption from survey data. This
would, in fact, require data on stocks of all non-durables at the
beginning and at the end of the survey reference period. For durables,
imputation of the consumption flow would require data on purchases and on
the stock of durables (with information on age and expected lifetime).
Therefore, expenditures are used here as a proxy for consumption.

2/ When preferences are homothetic, there is a single true cost-of-living
index bounded by the Laspeyres and Paasche Indexes.

strengthened since often quantity weights will also vary with income level and/or geographically.

Abstracting for a moment from differences in household size and composition, total household expenditures deflated by a price index can now be seen as an instrument for measuring changes in welfare levels relative to a particular base year. They indicate the minimum cost for the household to reach a particular indifference curve at reference prices. Alternatively, different levels of the index label different indifference curves, thereby allowing a ranking of households.

We now turn to the issue of differences in household size and composition. An index number can be constructed which indicates at reference prices the cost differential for a household, due to different household size and composition, to reach the indifference curve of the reference household. Such an index number is known as an equivalence scale. If the reference household consists of a single adult then the equivalence scale can be thought of as representing a number of equivalent adults.

While several models of equivalence scales are available in the literature (for a general discussion, see for example Deaton and Muellbauer, 1980, chapters 7-9), a major problem is that they are all quite difficult to estimate and require large amounts of data, substantially beyond what one can expect to be available in most LDC (and even in DC) contexts. Fortunately, two simpler and less data-demanding approaches have been developed and applied recently to existing data sets.

The first one is based on Engel's law and assumes that the share of non-food items in total expenditures is a direct indicator of welfare (Deaton, 1981). In practice, the method requires estimation of an equation predicting

the share of (non-) food in total expenditures as a function of total household expenditures or expenditures per capita, and various dummy variables reflecting the age and sex composition of the household. This equation is then solved to find the expenditure level that would give a household of a particular type the same (non-) food share as the reference household. The ratio of that expenditure level to that of the reference household is the equivalence scale. If expenditures also enter the estimated equation in quadratic form, the scale will vary with expenditure level. This method is analytically simple and straightforward and has the advantage that it incorporates economies of scale in household consumption.

A second approach to estimating equivalence scales was used in a recent article by Deaton (1981) and draws from Rothbarth (1943). It is based on the assumptions that commodities can be separated into child and adult goods, and that the expenditures on adult goods (at constant prices) can be used as a measure of welfare. Households with the same expenditures on adult goods are identified and the ratio of the total expenditures of a household of a given type to those of the reference type gives the equivalence scale. This method only allows comparisons of households with the same number of adults and does not incorporate economies of scale in consumption over all household members. For practical estimation the Rothbarth method requires the arbitrary identification of at least one adult good; others can be sought endogenously. The estimated scales, however, are in general not independent of the identification of the initial good. Little, if any, experimentation has been done to date to explore the sensitivity of the scales with respect to that initial identification.

The basic problem with the Engel and Rothbarth methods is that they yield very different scales and the literature has not yet justified which method should be preferred, i.e.,whether the non-food share or expenditures on adult goods is, in principle, the preferred index of welfare.

Ideally, the construction of equivalence scales should address more fully the issue of costs and benefits of children and the decision about the number of children. For this, a more complete model would be required including such aspects as fertility, education and intergenerational transfers. The real question is whether or not children are endogenous, and the answer depends essentially on the time dimension adopted to study income and welfare. If one uses income or expenditure over a one-year period, it is reasonable to consider children as exogenous. Lifetime concepts of income, however, would require them to be treated endogenously.

Accurate construction of equivalence scales also requires the collection of information on the income and income potential of children. Indeed, making the assumption that children's contribution to household income is zero when in fact it is positive, would bias the scales since children would actually cost less than indicated by the scales. If a long-run time horizon is adopted, the insurance aspect of children should be incorporated. On the cost side, the uncertainty regarding many costs of children (for example health) should also be considered.

The data requirements for the approach to welfare measurement discussed in this section are good expenditure data, information on the household composition and price data. While the former two are standard outputs of any household expenditure survey and, in fact, constitute the major purpose of

taking the survey, the collection of price data is a less clearcut undertaking. The question can be raised whether price data should be collected at the household or at the community level. Prices are known to be subject to stochastic variations. Since over a longer time period or within the context of a group of households such as a socioeconomic group such stochastic variations probably largely cancel out, it may be better to try to obtain average or "normal" prices. These may conceivably be collected at the community level; this could be accomplished, for example, by taking a price survey of various stores or market vendors, or by using a panel of consumers.

C. Full Income Concept

Full income is the sum of monetary income, income in kind (including production of the household enterprise and government services), and the value imputed to services derived from endowments and assets such as durables, housing, time, etc.,owned by the household. The method attaches a monetary value to leisure based on behavioral decisions by the household and its members to equate the utility of time spent on various activities at the margin. The full income method can be seen as a reduced-form equation of the complete behavioral model described in section A. An interesting empirical application of the method is presented in Kusnic and Da Vanzo (1980).

The value to be used for imputation of time is directly linked to available opportunities, and the full income method crucially depends on correct estimation of the real opportunity set. For example, one can impute the value of h hours of, say, cooking at opportunity wage rate w, as h x w if, and only if, one can sell the h hours at w if one so chooses. Caution is required when assuming that the same full opportunity set exists for everyone and doing all imputations at existing market wage rates. In

practice, not all leisure consumption is bound to be voluntary and the failure to recognize this can result in seriously over-estimating (actually, over-imputing) welfare. In principle, when quantity restrictions apply, the shadow value of time must be derived from a modeling exercise at the household level, as described in the section dealing with true indexes. However, an investigation of work opportunities at the local level may be a more practical way to obtain an indication of the opportunity wage rates for the community to which a household belongs.

It would seem useful to do sensitivity analysis over varying opportunity·wage rates and varying real employment opportunity sets to see how robust the full income measure is in identifying the poor or poor groups in society. Related to this is the question of how much time should be alloted daily to an individual for allocation other than sleep. Again, the full income measure is sensitive to this and the identification of the poor may be affected.

Two potential difficulties can arise in the application of the full income method. First, careful imputation of the value of publicly provided goods is necessary, especially when the provision alters the distribution of time spent on various activities. For example, if a well is built in a village, hours spent on water transportation will decline, but the full income measure may remain the same if leisure is valued at the same rate as household work. Conceivably it would even decline if leisure is valued at a lower rate than time spent on productive activities, even though one would easily agree that the installation of the well is a welfare improvement. Second, in order to perform the imputation for non-market activities a sufficient amount of

information on market activities is required, and in virtually all instances
testing for the presence of selectivity bias will be required.

In terms of data requirements imputations of the sort needed to com-
pute full income require accurate accounting of hours spent in various acti-
vities. The crucial question from a practical viewpoint is how far one should
go in selecting items to be included in the imputation. To some extent this
is a matter of survey cost, since it depends on the amount of detail (distinc-
tion of various types of activities) with which one wants to collect time-use
data. 1/

Considering the generally high cost of collecting time budgets, one
may wish to experiment with an alternative approach which would consist of
simply asking household members whether or not they have done a particular
activity during the previous day or week (i.e.,a checklist with yes/no
answers, or, at most, simple qualifiers such as much/little time spent).
There is a fair amount of stochastic variation across individuals in the
amount of time spent to perform a certain task. One may not wish to capture
that variation and instead obtain an average for the community as a whole of
the time spent on various activities. This method would require a careful
definition of the activities and would be most suited for activities that can
be broken down into specific tasks. Examples are farm work, house building

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1/ Although not unique to applications of the full income method, it is
worthwhile to mention the interpretation difficulty of time use data if no
concommitant information is available on intensity of work or of perform-
ing any given activity. One study, for example, found that farmers
actually worked more hours in the agricultural slack season. The explana-
tion obviously lies in differing labor productivity per hour. However,
intensity of work is a notion that largely escapes current theoretical
modelling efforts.