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A NOTE ON TWO SOURCES OF BIAS IN ESTIMATING
INCOME ELASTICITIES FROM CROSS-SECTION DATA
ON HOUSEHOLDS PRODUCING AT LEAST PARTLY FOR
SUBSISTENCE

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Subsistence

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A household's consumption pattern is influenced by relative
prices of goods and services consumed by the household. If inter-
household differences in relative prices are not taken into account,
estimated income elasticities of demand may be biased. In a cross-
section study of rural households in an LDC, where the households
produce for own consumption as well as (or instead of) for the
market, there are two sources of possible price bias.

Interregional Price Differential.

First, if the households come from a large heterogeneous
area, there may be regional price differences. This is parti-
cularly the case in an LDC where inadequate and expensive
transport and a relatively small market combine to restrict the
interregional flow of some commodities, thus permitting price
differentials to exist. The regulation of the marketing of
some commodities also contributes to the interregional price
spread. If one area has a surplus and another area a shortage
of some commodity, restrictions on the flow of the commodity
between the areas limit the extent of equalization in its price.

If the price of (say) maize is higher in area A than in
area B, one would expect more maize to be consumed in B, all
other factors equal. This would be true among households with
high income as well as those with low income. In general, all
other factors will not be equal, but there will nevertheless
be a tendency for more maize to be consumed in area B. If area
B has not only a lower maize price than area A, but also a
higher average income, the estimated income elasticity will be
biased upward. This can be seen in figure 1. Line AA' relates
maize consumption in area A to income; and BB' is the corresponding
schedule for area B. If one pools data from the two areas and
estimates a single income elasticity, the result will be a line
CC' which cuts across the other two lines. It can be seen that
CC' has a higher slope than AA' or BB'. Of course, the estimated
elasticity can be biased either upward or downward.

Typically, in estimating income elasticities, the dependent
variable is measured in value terms. This modifies the argument
above, which refers to quantity consumed (in physical terms) as
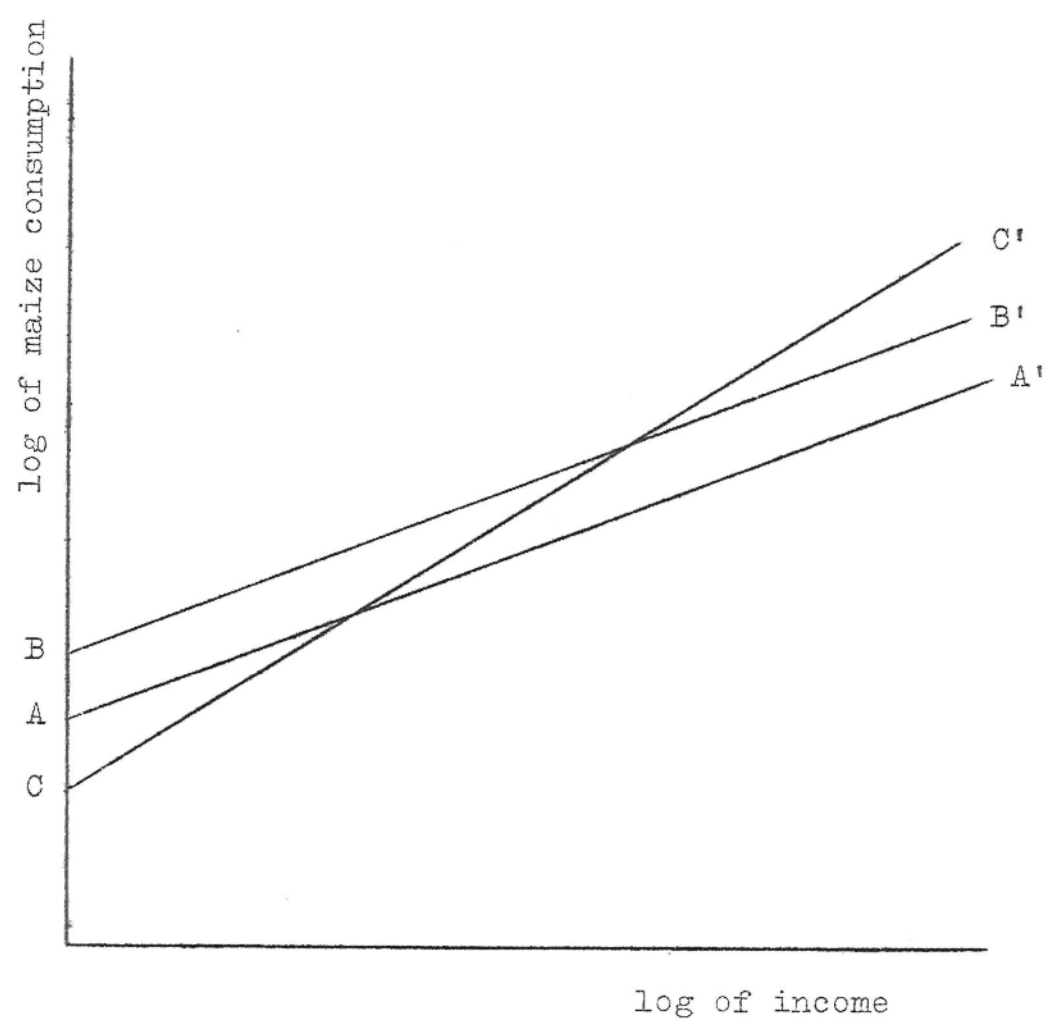
Figure 1

a function of price. If the price falls, the value consumed may rise, fall, or remain unchanged, depending on the price elasticity. A bias will still be present unless the price elasticity is unity, but the magnitude of the bias will be smaller when consumption is measured in value than in quantity terms.[1]

To eliminate bias from this source, one can use dummy variables, one for each area. Assuming that the interarea price differentials (where they exist) shift the curves like AA' and BB' without altering their slopes, the use of dummy variables will eliminate the bias. In the absence of further information, this assumption appears reasonable. For example, a double log income-consumption relationship will be unchanged in slope if the price elasticity is independent of income.

Buying-Selling Price Spread.

A second source of bias relates to the fact that in rural areas in an LDC, most households grow the major part of their food on the farm. A household's consumption of (say) maize is hypothesized to be related to the household's income and to the maize price. The price of maize grown on the farm is taken to be the opportunity cost, i.e., the price at which this maize could be sold. In a frictionless world characterized by perfect markets, the amount of maize grown on the farm would not influence maize consumption. But in a rural LDC, where markets are less than perfect and are characterized by considerable friction, this is not the case. The price a farm can get for its maize is likely to be less than what it would have to pay if it buys maize, because of transport and other frictional costs (including restrictions on marketing).

Consider Figure 2. DD' is the household's demand curve for maize, AA' is the selling price, and BB' the buying price. Regardless of how much is produced on the farm, at least OM and no more than ON will be consumed.[2] But between these two amounts, the consumption will depend on own production. Consider two households with the same tastes each growing only maize, and each planting the same number of acres. Due to a

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1 If part of consumption is recorded in quantity terms, and converted to value terms by using an average price for each commodity, then the price bias will be the same, whether viewed in value or quantity terms. This was in fact the procedure used by the UN team in evaluating subsistence output in Kenya's Central Province Survey.

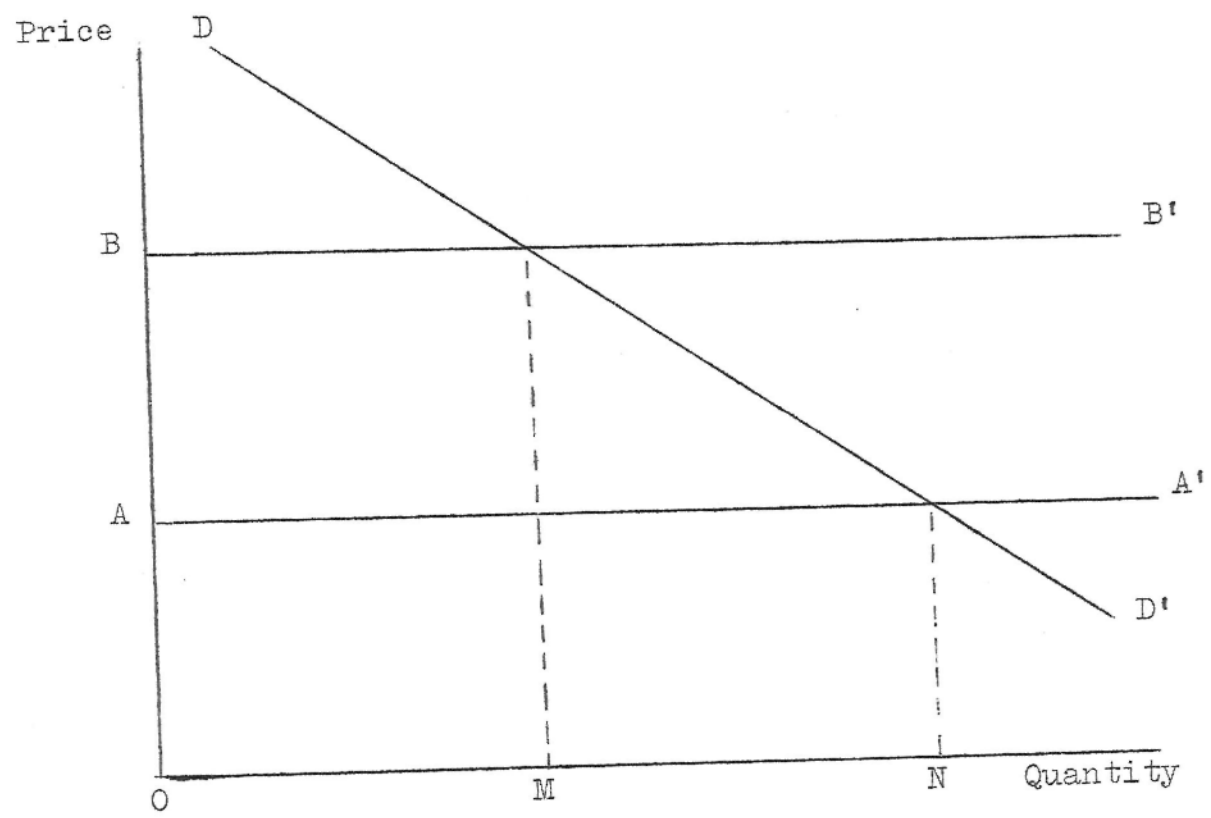2 But these limits change over time, or with changes in income.

Figure 2

combination of stochastic factors (weather, timing, luck, etc)
one farm obtains higher yields than the other and consequently
a larger maize output. It is likely that the farm growing more
will also consume more. Specifically, this will be the case
unless either both households produce more than ON or both
produce less than OM. And because maize production is assumed
to be the only source of income, the household with the larger
maize output also has the higher income. The higher consumption
of maize is due not only to the income difference, but also to
the price effect of the higher output. Although this is an
extreme case, it serves to illustrate a source of bias in
estimating income elasticities from a sample of households in
a rural LDC. This hidden price effect will tend to bias income
elasticities of home-grown foods upward -- and accordingly other
elasticities downward.

It does not matter whether one is talking about quantity
consumed or the value of consumption -- the effect is the same;
this is so because the same price will be used to value all
maize grown in the area.

This source of bias is more difficult to deal with than
the one discussed earlier. If differences in crop output
could be attributed to random forces, then it would be
possible to estimate price and income elasticities separately.
However the problem is complicated by the fact that production
decisions (how many acres to plant to beans rather than to
maize or wimbi) are influenced by tastes. Thus one requires
more information than is likely to be available to separate out
the effect of price from that of income.