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Poverty in India

Misspecified Policies and Estimates

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Abstract

Specification counts in the formulation of any economic problem, estimation of its magnitude and its assessment. This is particularly so for problems in the context of economic development. Solutions for poverty alleviation in developing countries like India are often formulated under misspecified premises. This results in wrong choice and design of strategies and policies. Faulty evaluation due to specification errors in estimates of poverty only compounds the error. This paper discusses such an in issue in the context of strategies for and estimates of poverty reduction in the developing countries. The results are general. They are illustrated with reference to India.

India has pursued a strategy for growth with redistribution with little appreciation of its limited potential. What have been the consequences? There is a consensus that incidence of poverty with reference to the calorie intake criterion has declined in India from about 55 percent in the mid 1970s to about 25 percent of the population today. The paper lists the implicit assumptions underlying the application of the conventional income/consumption based poverty estimates. It examines how institutional and structural changes during the development process could lead to specification errors in such estimates and hence, faulty evaluation of the consequences. The study concludes that the estimates of poverty with reference to a time-invariant calorie-intake-based norm do not show a real reduction in poverty but only a reduction in overestimation of poverty for the initial years followed by its underestimation for the later years. Even today about 75 percent of the population is calorie deficient. …/…

Keywords: growth, redistribution, poverty, specification error

JEL classification: C1, I32, O0

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However, outcome based indicators like measures of health status do not show any deterioration; on the contrary, they show an improvement. This calls into question the choice of input based measures like income-based poverty estimates and calls for use of outcome indicators like social indicators for assessing deprivation and changes therein in a developing country undergoing structural changes.

1.   Introduction

Much of the literature on growth, income inequality and poverty in developing countries like India is centered on defining and estimating these measures, specifying a quantitative relationship among them and its statistical verification, documenting and explaining the trends in them. These studies have received much acclaim for their seemingly relevant findings. Of course, the results are quite important for they bear on the choice of strategies for economic development, in general, and policies for poverty reduction, in particular. However, a shortcoming of some such exercises is specification errors in the choice of variables, database and estimators due to changing institutions and structural features of a developing country. Specification matters for identification. If the estimated relation were spurious, the results would be meaningless and irrelevant for public policy. This paper attempts to examine this question both theoretically and empirically. The empirical verification is with reference to the Indian experience, which has won universal applause for its success in poverty reduction and which is supposed to have scientifically collected time-series data sets on distribution of consumer expenditure relevant for purposes of a study on growth, inequality and poverty.

The paper is structured along the following lines. Section 2 deals with the premises underlying choice of development strategies and policies for poverty alleviation, specification of the relationship among the three variables and their implications. Section 3 deals with the question of specification for empirical evaluation. This section examines the implicit assumptions underlying the conventional method of poverty estimates. In other words, it examines the conditions necessary for obtaining unbiased estimates of poverty and how these conditions get violated in a developing economy undergoing structural changes in production, technology, consumer preferences and relative prices. Section 4 provides empirical details about the structural changes and their implications for economic deprivation in India. Section 5 concludes the paper.

2.   Policy specification

2.1   Premises

Sometimes policies for poverty alleviation through growth and redistribution in developing countries like India are formulated under the premises of '*separability*' and '*independence*'. *Separability*: this essentially states that the growth and redistributive strategies are separable and can be pursued independently. *Independence*: the potential effectiveness of growth/redistribution strategy is independent of the level of income or stage of development.

The Indian Planning Commission, for instance, formulated the Strategy for poverty reduction during the sixth five-year plan (1980-5) under the premises of separability and independence. The Plan sought to reduce poverty during the plan period partly by growth and partly by redistribution. It sought to bring down rural poverty from 50.70 percent to 40.47 percent and urban poverty from 40.31 percent to 33.71 percent by growth. The plan provided for a further reduction in both rural and urban poverty to the targeted level of 30 percent by redistribution (Government of India (GoI) 1981a). Statistically redistribution is

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represented as a reduction in inequality. The Sixth Plan exercise on poverty reduction called for a reduction in inequality by 27.42 percent in the rural and 8.93 percent in urban areas (Suryanarayana, 1983). It would be worthwhile to examine whether such a premise is theoretically valid or empirically verifiable, given the fact that a developing country has its own peculiar features far different from a mature market economy and undergo substantial structural changes.

2.2   How valid are the premises?

The relation between growth, redistribution, and poverty may be examined within a statistical framework using the two-parameter lognormal distribution. Bhattacharya (1978) and Iyengar (1960) have shown that this distribution graduates the Indian consumption distribution well. The Indian five-year plan exercises on poverty estimation and related issues are based on the two-parameter lognormal model (GoI 1973, 1981a). This is a restrictive assumption since it implies that Lorenz curves never cross.[1] Still we maintain this assumption to show how inadequate and incomplete the Indian policy formulation exercise was within its own framework. As per the lognormal assumption, the per capita consumer expenditure, say X, in India or in a given country follows a two-parameter lognormal model with parameters θ and λ. Mean value of X and the degree of inequality in the distribution of X as measured by the Lorenz ratio are monotonic functions of these two parameters respectively (Aitchison and Brown, 1957). Further, the measure of absolute poverty P^*, defined as the proportion of population having a consumption level below a normatively defined minimum, say x^*, called poverty line, is given by:

$$P^* = \Phi\left[\frac{\ln x^* - \theta}{\lambda}\right] \tag{1}$$

where Φ is the distribution function. Thus, poverty is a function of the poverty line (x^*), and parameters θ and λ.

How would poverty respond to changes in growth and redistribution? Partial first- and second-order derivatives of (1) respectively are given by:

$$\frac{\delta P^*}{\delta \theta} = -\left(\frac{1}{\lambda}\right)\left(\frac{1}{\sqrt{2\pi}}\right)\exp\left[-\frac{1}{2}\frac{(\ln x^* - \theta)^2}{\lambda^2}\right] < 0 \tag{2}$$

$$\frac{\delta^2 P^*}{\delta \theta^2} = -\left(\frac{1}{\lambda}\right)^3\left(\frac{1}{\sqrt{2\pi}}\right)(\ln x^* - \theta)\exp\left[-\frac{1}{2}\frac{(\ln x^* - \theta)^2}{\lambda^2}\right] \tag{3}$$

Thus, an increase in θ, ceteris paribus, will always cause a reduction in poverty (equation 2). However, the pace at which poverty decline would depend upon whether the

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[1] Kakwani (1993) has made far more general treatment of this topic where he presents the derivatives of a wide range of poverty measures with respect to mean and the Gini index.

second derivative (equation 3) is negative, positive or zero. This reduction in poverty will take place at an increasing rate if poverty is less than 50 percent, occur at a decreasing rate if poverty is greater than 50 percent, and will be maximum when poverty is equal to 50 percent. These results are depicted graphically in Figure 1.

Figure 1
Relation between θ and poverty
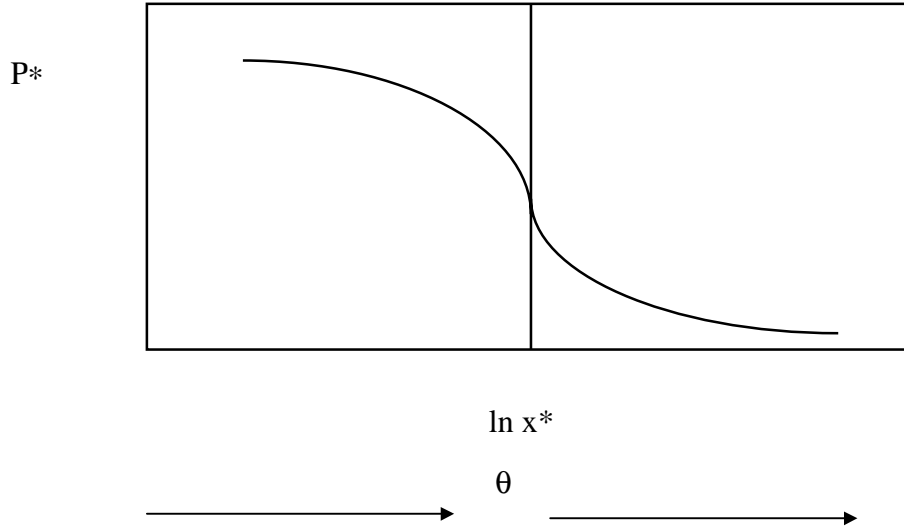
Let us now examine poverty behavior in response to changes in inequality, We have

$$\frac{\delta P^*}{\delta \lambda} = -\left(\frac{1}{\lambda}\right)^2 \left(\frac{1}{\sqrt{2\pi}}\right)(\ln x^* - \theta)\exp\left[-\frac{1}{2}\frac{(\ln x^* - \theta)^2}{\lambda^2}\right] \qquad (4)$$

That is, whether poverty would decline in response to a redistributive effort would depend upon the size of the cake itself. An increase in inequality will increase poverty when it is less than 50 percent, decrease it when it is greater than 50 percent; and be neutral when poverty is 50 percent. Further,

$$\frac{\delta^2 P^*}{\delta \lambda^2} = -\left(\frac{1}{\lambda}\right)^3 \left(\frac{1}{\sqrt{2\pi}}\right)(\ln x^* - \theta)\exp\left[-\frac{1}{2}\frac{(\ln x^* - \theta)^2}{\lambda^2}\right]\left[2 - \frac{(\ln x^* - \theta)^2}{\lambda^2}\right] \qquad (5)$$

Given the lognormal assumption, one can calculate the probability for the event

$$\frac{(\ln x^* - \theta)^2}{\lambda^2} < 2$$

for a random *X*. One can say that whenever the probability is above 8 percent and less than 92 percent, this inequality holds. Thus, this inequality holds for most of the developing countries. This would imply that a worsening of distribution will increase poverty at a

decreasing rate when poverty is less than 50 percent, decrease poverty at an increasing rate when it is greater than 50 percent; and distributional changes will be neutral when poverty is equal to 50 percent. The above findings are depicted graphically below in Figure 2.

Figure 2
Relation between inequality and poverty
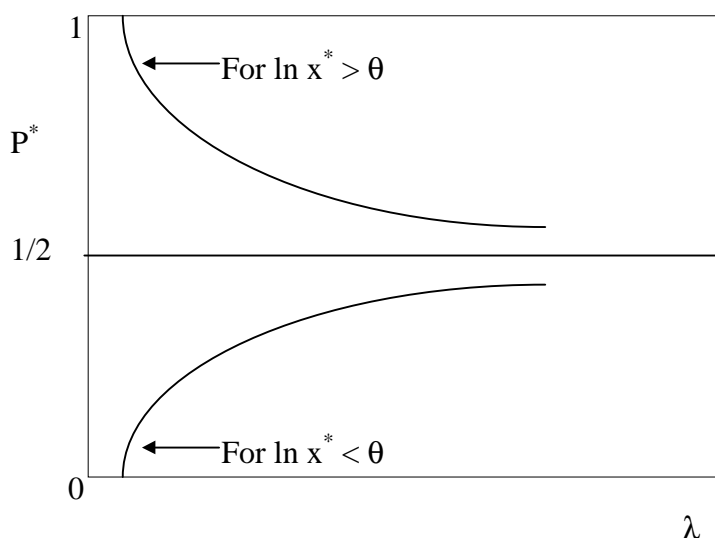
It follows that the precise impact of a growth or redistribution strategy on poverty reduction depends upon the mean level of income itself i.e. at what stage of development the country is currently placed. While a growth strategy is uniformly poverty reducing, though the pace of reduction varies at different stages, a redistribution strategy can reduce poverty only when the size of the cake is large enough so that the poverty level is not acute. This finding makes a clear case for strategies for growth in the interest of the poor. However, the Indian Plan exercise did not recognise the limited scope for a redistributive exercise; instead it laid considerable emphasis on it. The real need was for a refocus on growth. What could be the consequences of such misplaced strategies? How to carry out an empirical examination of the issues, causes and consequences? This is attempted in the following sections.

3.   Empirical evaluation

3.1   Poverty estimate and the database

Poverty is defined as the inability of an individual to secure a normative minimum level of living. This is the amount considered enough to get food to meet minimum energy requirements for an active and healthy life and also minimum clothing and shelter.[2] Given

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[2] The Planning Commission Task Force (of the Government of India) on Projection of Minimum Needs and Effective Consumption Demand defined the poor as 'those whose per capita consumption expenditure lies below the midpoint of the monthly per capita expenditure class having a daily calorie intake of 2,400 in rural areas and 2,100 in urban areas' (GoI, 1981a:81). The poverty lines corresponding to these norms were

the poverty line and the data on size distribution of population across monthly per capita expenditure classes, poverty estimates are made as follows. Poverty estimate given by the headcount measure, that is, the proportion of population living below the poverty line for the base year is simply read as the cumulative proportion of population with consumer expenditure less than the poverty line. Poverty ratios for subsequent years are estimated by price-adjusting the poverty line to account for changes in prices since the consumer expenditure data are at current prices. The price-adjustment is carried out by specifying and estimating price indices in term of market prices.

This method of obtaining timeseries estimates of poverty would yield unbiased estimates only if the underlying consumer expenditure distribution is not misspecified, and the institutional and behavioral parameters governing the choice of poverty line remain invariant during the development process. In other words, there are some assumptions, which are left unstated in the application of the conventional method of poverty estimation. They are as follows:

A.1   The items consumed by a household are recorded as its own consumption by the investigator.

A.2.   The items of consumption are reported correctly by all the households.

A.3.   The survey methodology remains the same over the years.

A.4.   Each item of consumption is valued uniformly at market retail prices across households so that a simple consumption weighted index of market retail prices would capture the impact of inflation for the household.

A.5.   The transaction costs of obtaining items of consumption are similar (a) across households at a point of time; and (b) for a given household over a period of time.

A.6.   Techniques of production and efficiency with respect to calorie utilization remain the same. In other words, the minimum calorie norm remains invariant with respect to the structural developments in the economy like improvements in methods of production and in medical and health facilities.

It would be interesting to examine how far time-series estimates of the data base and hence, poverty for different countries meet these requirements.

3.2   Indian experience

Majority of the studies on poverty in India conclude that poverty, rural poverty (which accounts for about 75 percent of the total) in particular, has finally declined since the seventies. (i) Rural poverty estimates declined from about 55 percent in the 1950s and 1960s to about 35 percent in the 1980s as a result of agricultural growth and public intervention; (ii) fluctuations, whatsoever, in rural poverty estimates are due to fluctuations in agricultural performance caused by droughts, inflation, unanticipated price increase, population growth, real wages, distributional changes and public intervention etc. (See Ahluwalia, 1978, 1985; Griffin and Ghose, 1979; Saith, 1981; Mathur, 1985; van de Walle, 1985; Mellor and Desai, 1985; Gaiha, 1989; Ghose, 1989; Bhattacharya, *et al.,* 1991; Bell and Rich, 1994; and World Bank studies by Gaurav Datt and Martin Ravallion.) However, few

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worked out with reference to the National Sample Survey (NSS) data for the year 1973-4. The poverty line turned out to be Rs49.09 per capita per month at 1973-4 prices for rural all-India.

studies seem to recognise that what matters for a timeseries study in the context of a developing country is specification of database and choice of estimators to obtain unbiased estimates of poverty. These issues are discussed below.

3.3   Are the estimates of poverty for India unbiased?

Bias due to misspecified distribution

The estimates of poverty for India are based on the National Sample Survey (NSS) data on consumer expenditure distribution. Its very definition and method of accounting does not satisfy assumption (A.1) mentioned above. Total consumption of the household is defined to consist of consumption of goods and services obtained through (i) market purchases (ii) receipts in exchange of goods and services (iii) home grown stock (iv) transfer receipts like borrowings, gifts, charities, etc. and free collection. It does not include any 'transfer payments like loans advanced, charities, gifts, perquisites and other offerings' (GoI, 1972:120). It includes consumption out of homegrown stock, gifts, loans, etc. but not perquisites like 'cooked meal' in the employer's house. Thus, the NSS is designed so as to obtain an unbiased estimate of the *mean* consumer expenditure and not the *distribution* parameters.

What are its implications for estimates of poverty? At a point of time, foodgrain consumption of the employee households who are generally poor labour households in the rural sector would be underestimated and that of rich employer households would be overestimated. Thus, inequality and poverty would be overestimated. To illustrate, in 1960-1, 37 percent of the rural poor households belonged to rural labour households (Minhas, 1974:261).[3] During the 1950s and 1960s wage payments in kind (primarily prepared food given by the employer) used to be substantial. The Second Agricultural Labour Enquiry of 1956-7 reports that agricultural labourers got paid in kind for about 50 percent of the mandays worked.[4] Accordingly, the NSS estimates show very low levels of cereal consumption for the bottom decile groups during the 1950s and 1960s. Corresponding estimates for the richest decile group are very high, in some years as high as 26kg per capita per month, that is almost a kilogram per capita per day.[5] Thus there must have been substantial underestimation of foodgrain consumption, virtually the consumption basket, of the poorer labour class and hence, significant overestimation of poverty for the 1950s and 1960s.

What could be its implications for poverty estimates over time? This would depend upon the nature and extent of changes in the commodity and labour markets, including the mode of wage-payment. Casualization of labour has increased since the mid 1970s

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[3] In 1983 agricultural labour households constituted 30.70 percent of the total rural households but accounted for nearly half (45.59 percent) of the total rural poor households. Other rural labour households accounted for 6.57 percent of the total rural labour households and 5.99 percent of the rural poor households. Incidence of poverty (corresponding to the poverty line of Rs76.65 per capita per month) was the highest (45.45 percent) among the agricultural labour households (Suryanarayana 1998a:46).

[4] Government of India's *Agricultural Labour in India*, Report on the Second Survey, Volume I, All India (p.107) cited in Jose (1978:A-16).

[5] This is not a realistic estimate since the maximum amount of cereals a person can consumer per day cannot exceed half a kilogram, that is, 15kg per month (Naidu, 1983:6).

(Vaidyanathan, 1986; ILO-ARTEP, 1993; GoI, 1996a). This has resulted on a progressive reduction in in-kind wage payment, and increasing monetization of the labour market.[6] In 1983 a rural household distributed only 1.6 number of meals per month to its employees (Minhas 1991:7). In 1993-4, the proportion of rural households which received some wages or salaries in kind was only 7.1 percent, in the form of food was 6.6 percent and in the form of cooked food was a mere 2.1 percent (GoI, 1998:42). Such a reduction in in-kind wage payment should lead to a corresponding decline in (a) the estimates of foodgrain consumption of the employer households; and (b) the under-recording of food consumption of the labour households. The estimates of cereal consumption by decile groups show a marked decline for the richest decile group from about 26kg in the 1960s to about 20kg in the early 1970s and finally to 15.5kg in 1993-4 (Suryanarayana, 2000). The decline in under-recording of food consumption of the labour households would be matched by the corresponding increase in the monetised part of their consumption. The data should show an increase in food consumption (cereals and complementary items like milk and milk products, fruits, vegetables, nuts and edible oils) at least to the extent such households replenish the loss due to reduced payment in-kind.

Bias due to differential valuation and misspecified price index

The estimates of consumer expenditure in value terms as published by the NSS are based on differential- broadly dual- valuation of consumption; that is, consumption from home-grown stock is valued at farm harvest prices (P^f) and that from market purchases is valued at retail prices (P^r), where, in general, $P^f = \delta P^r$, where $0 < \delta < 1$. Of course, this method of valuation has its own sound economic reasoning. It is that farm harvest prices measure the opportunity cost of consumption on the farm. However, it would violate assumption (A.4) and would affect estimates of both inequality and poverty.

Estimates of poverty would be biased if the poverty lines are price-adjusted by indices of base-year-consumption weighted retail prices but not a combination of farm and retail prices. The conventional procedure of using market-retail-price index would involve over-inflation and hence overestimation of poverty; the extent of over-inflation and overestimation depending upon the relative increases in farm-harvest and retail prices of food grains and the distribution of monetized-consumption across expenditure groups.

The implications of dual valuation for absolute poverty estimates may be examined using the lognormal framework as follows:

Let Q denote the distribution of real consumption across N individuals; that is,

$$Q = (q_1, q_2,...q_m,...,q_N)$$

where $q_1 \leq q_2 \leq ... \leq q_m \leq ... \leq q_N$

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[6] Intensified marginalization process, that is, increase in the proportion of holdings in the marginal category (size of operated holding less than 1.01 ha.) since the 1970s must have reinforced such a trend. The proportion of marginal owners increased from 39.1 percent in 1960-1 to 45.8 percent in 1970-1 and finally to 62.8 percent in 1991-2. During the same period, the size of the large farmers declined from 4.5 percent to 3.1 percent and to 1.3 percent respectively (GoI, 1997:20).

Let q_m be the quantity of consumption capable of providing the normative amount of calories; hence, q_m is the poverty line and 'm' is the number of poor. Since most of the studies based on the NSS data have adopted poverty lines estimated following a similar methodology, the base year estimates of absolute poverty are not affected by the NSS method of data valuation. Assume that *ln* q follows normal distribution with mean and variance parameters θ and λ^2. Absolute poverty (head-count ratio (H)) based on is given by :

$$H = \Phi \left[\frac{\ln q_m - \theta}{\lambda} \right] \tag{6}$$

where $\Phi(.)$ denotes the distribution function.

In order to examine the consequences of dual valuation for estimates of head-count ratio, consider and compare two alternative situations: (i) Uniform valuation; and (ii) Dual valuation. Let C denote the distribution of nominal consumption across the same set of individuals when real consumption is valued or updated uniformly at the same retail price 'p^r'; that is

$$C = (c_1, c_2,...,c_m,...,c_N)$$

where $c_i = p^r q_i$; and $c_{1 \le} c_2 \le ... \le c_m \le ... \le c_N$

Let the poverty line c_m be denoted by z. Then logarithm of nominal consumption '*ln* c' also follows normal distribution with mean and variance parameters $(\theta + ln \ p^r)$ and λ^2. The head-count ratio H^c is given by :

$$H^c = \Phi \left[\frac{\ln z - \theta - \ln p^r}{\lambda} \right]$$

$$= \Phi \left[\frac{\ln q_m - \theta}{\lambda} \right] \tag{7}$$

$$that \ is, H = H^c$$

Consider the NSS case where q_i's are dually valued. This gives rise to a distribution of nominal consumption denoted by the vector

$$C^* = (c^*_1, c^*_2,...c^*_m,...,c^*_N)$$

where $c^*_i = q_i \ p^r [\ \gamma_i + (1 - \gamma_i) \ \delta \ ]$

γ_i = proportion of consumption bought from the market; and $\gamma_i \in [0,1]$ and $0 < \delta < 1$.
The mean and variance parameters of *ln* c^* will be:

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$$E(ln(c^*)) = \theta + ln\ p^r + \kappa$$

where $\kappa = E\ [ln\ (\tau)] < 0$ since

$$\tau_i = [\{\gamma_i + (1 - \gamma_i)\ \delta\}\ ]\ \text{and}\ 0 < \tau_i < 1\ \ \forall\ i.$$

$$\text{Var}\ (\ ln\ c^*\ ) =\ \lambda^2 + \xi^2$$

where $\xi^2 = \text{Var}\ [\ ln(\tau)\ ]$

Since the poverty line is always updated by the retail price, absolute poverty H^* based on the NSS data will be given by:

$$H^* = \Phi\left[\frac{\ln Z - \theta - \ln p^r - \kappa}{\sqrt{\lambda^2 + \xi^2}}\right]$$

(8)

$$= \Phi\left[\frac{\ln q_l - \theta - \kappa}{\sqrt{\lambda^2 + \xi^2}}\right]$$

Since $\kappa < 0$, H^* will be unambiguously greater than H when the actual proportion of the poor is less than half; for the case when the poor proportion is more than half, the implication for H^* is not that unambiguous since the addition to the variance given by ξ^2 tends to deflate the expression and hence the precise impact will depend upon the magnitude of ξ. However, it may not be significant since ξ^2 is the variance of a variable whose range is given by (0,1).

The implications of dual valuation for poverty estimates will vary depending upon the distribution of share of monetized consumption across expenditure groups :

Case (i): Increasing monetization across expenditure groups : In this case, the absolute magnitude of κ will be relatively large since consumption is a positively skewed distribution and τ will be weighted towards lower values. Hence, the degree of overestimation will be larger compared to the other two possible alternatives scenarios.

Case (ii): Decreasing monetization. Conversely, in this scenario, the degree of overestimation will be smaller.

Case (iii): Constant monetization. Only in this case, there will not be any ambiguity regarding the impact of dual valuation on poverty estimates. $H^* > H$ always, be it a situation where poverty is less than half of the population or a situation where it is more than half since τ being a constant, ξ^2 will be zero.

The degree of overestimation over years will depend upon the pattern of relative changes in δ and γ. The degree of overestimation will decline irrespective of the changes in γ only if

δ tends towards unity; but δ becoming unity is highly unlikely. In the development context, with changes in the occupational structure and increasing monetization, γ will tend towards one for a very large section of the population and hence the degree of overestimation will decline over time.

In India, landlessness and casualization of labour market in the rural sector has increased over the decades. The share of labour households in all rural households increased from 25 percent in 1964-5 to 38 percent in 1993-4 (ILO-ARTEP, 1993:26; GoI, 1996a:11). The percentage share of casual male workers in total male workers went up from 22 in 1972/73 to 26.6 in 1977-8, 29.3 in 1983, 31.4 in 1987-8 and 33.8 percent in 1993-4 (GoI, 1996a:63). It is these groups of labour households, which account for bulk of the rural poor (Suryanarayana, 1998a). This increasing subset of the rural population being net buyers in the market there can only be increasing monetization of consumption. As a result, over-estimation of the poverty line and hence poverty due to consumption weighted market retail price indices must have reduced over the years. The exact magnitude and pattern of the decline in overestimation depend upon the changes in and relative importance of τ and δ parameters. This may explain *a part* of the observed decline in poverty estimates based on nominal consumption since the 1970s even though estimates of physical consumption of cereals show only stagnation if not decline for the rural population, particularly the bottom four decile groups (Suryanarayana, 2000). This is quite important since poverty lines are estimated using food energy method and cereals account for about 50 to 60 percent of total consumption expenditure and about 80 percent of total calorie intake for the bottom half of the rural population.

Bias due to 'moving reference period' and misspecified price index

The NSS is based on the notion of 'moving reference period' spread generally over an year in order to take care of seasonal variations in income and consumption expenditure. This results in (a) the imposition of seasonal variation on the actual variation in consumption; and (b) the generation of a nominal consumption distribution which will be very different from the real consumption distribution particularly when the prices have risen during the survey period. The former will give rise to inequality estimates, which are different from the true ones. The latter part holds because prices at the beginning of the survey period may be different from those at the end of the period, so that the same real consumption will get recorded as different nominal amounts at different time points. Accordingly different poverty and inequality estimates will be generated depending upon the pattern and pace of price movements. Glewwe (1990) has showed theoretically and empirically that inequality estimates will be overestimates. Glewwe's analysis may be extended further to examine how the estimates of poverty based on nominal consumption will be affected by the fact that the NSS is based on a moving reference period.

Assume that the survey is done during time $t = 0$ to $t = 1$ and the real consumption distribution (Q) does not change. There is no dual valuation. Let y denote the nominal consumption at current prices. In other words, $y(t) = y(0) p(t) = q(0) p(t)$, where $y(t)$ is the nominal consumption at time t, $q(t)$ is the real consumption and $p(t)$ is a price index such that $p(0) = 1$. As shown in Glewwe (1990:48), the variance of logarithm of nominal consumption would be an additive sum of the actual degree of inequality in real consumption when there is no inflation (that is, variance of logarithm of real consumption ($q(t)$) given by λ^2) and variance due to inflation (the variance of logarithm of the price index given by ω^2).

Assuming normal distribution for '$\ln q$' as in the previous section, we get

$$\theta = \log \mu - \frac{1}{2}\lambda^2 \tag{9}$$

where $\mu = E(q)$.

Assuming no inflation, the proportion of poor would be :

$$H = \Phi \left[\frac{\ln z - \ln \mu + \frac{1}{2}\lambda^2}{\lambda} \right] \tag{10}$$

Consider the case when there is inflation. In such a context, poverty lines are also currently updated by an average price index. If so, the estimate of poverty would be

$$H^{**} = \Phi \left[\frac{\ln z + \ln [E(p(t))] - \ln \mu - \ln[E(p(t))] + \frac{1}{2}(\lambda^2 + \omega^2)}{\lambda + \omega} \right] \tag{11}$$

$$= \Phi \left[\frac{\ln z - \ln \mu + \frac{1}{2}(\lambda^2 + \omega^2)}{\lambda + \omega} \right]$$

$H^{**} > H$ so long as poverty is less than half the population. Barring the years 1966/67 and 1967/68, rural poverty proportion has always been less than half. This implies that for majority of the years rural poverty in India has been overestimated. For cases where poverty is more than half the population, the implication will differ depending upon the magnitude of ω.

Bias due to changes in 'sampling method' and its implications

Generally, the NSS estimates of consumption and consumption distribution are obtained from direct surveys using consumption expenditure schedules. But during the 19th-25th rounds (1964-5 to 1970-1), an integrated household schedule was canvassed, when data on consumer expenditure was collected along with data on income from different sources. As households, universally, have a tendency to understate their income, it is quite conceivable that during the integrated surveys, households under-reported their consumption by the same proportion to provide consistent and convincing information. This is exactly what has happened. For these years, the NSS estimates of consumer expenditure are lower than the estimates in the *National Accounts Statistics* (NAS) for this period (Mukherjee and Saha, 1981:133). This is further confirmed by the available estimates of food and non-food

consumption shares for the past decades. These estimates show a sudden increase in food consumption shares and a proportionate decrease in non-food consumption shares during 1965-6 till 1970-1, which coincides with the period of the integrated household surveys. What is important to note is that the increase in food share is largely on account of upward shifts in 'food grains' share, and the downward shift in 'non-food' share is due to a dip in the share of 'miscellaneous goods and services' (Viswanathan, 1998). This could be because the consumption of the majority of the population being already at subsistence levels, the scope for under-reporting was limited to only 'miscellaneous good and services' consisting of items like durable goods and consumer services. This pattern could be observed only for the top half of the population (Viswanathan, 1998).

Under-reporting total consumption (by understating non-food consumption) would affect not only the estimates of average total consumption but also those of poverty and inequality. Hence, poverty and inequality could be overestimates. If the reasoning above is correct, then the consumption estimate should increase (and poverty estimate decrease) after the integrated household survey was abandoned. And this is what actually happened: Observed poverty reduction after 1970-1 is probably nothing but reduction in overestimation of poverty during 1965-71.

The preceding sections essentially seek to show how the findings of any study on poverty could get distorted just for its failure to obtain unbiased estimators of poverty, which, in turn is due to specification errors in choice of data base and estimators. Therefore, the following section examines the underlying structural changes and their implications in terms of the disaggregate data on consumption.

4.   Development and deprivation

Contrary to the statistical summary measures of poverty, estimates of real consumption do not show any significant reduction in deprivation. Real monthly per capita consumption of the bottom half of rural India declined by about 20 percent during the first half of the 1960s (Suryanarayana, 2000). It took over a decade to recover the loss, and not all population decile groups recovered their initial consumption levels. The bottom five decile groups experienced improvement in real consumption after 1977-8.

Does the increase in consumer expenditure suggest a real improvement in food consumption and calorie-intake status of the poor? Consumer expenditure on cereals increased only for the three poorest decile groups. But this was not sufficient to ensure adequate consumption of cereals for them. With a decline in wage payment in the form of cooked meals, the poor households had to spend on complementary items. Accordingly, their budget allocation on other items like edible oils, fruits, vegetables, nuts, miscellaneous goods and services increased *marginally* (Suryanarayana, 1995b). Cereal quantity consumption increased only for the poorest decile group. The estimates of cereal quantities consumed show a general decline for other decile groups. In keeping with this picture, estimates of calorie intake show an increase, though not sufficient to meet the normative minimum, for the bottom four decile groups only; remaining groups suffered a decline in calorie intake (Suryanarayana, 2000). Thus, the incidence of calorie deficiency in rural all-India increased from 65 percent 1972-3 to 74.50 percent in 1993-4. In sum, estimates of rural average calorie intake show a decline from 2,511 calories in 1961-2 to 2,328 in 1973-4, to 2,221 in 1983, and finally to 2,153 in 1993-4.

How does the widely believed decline in poverty reconcile with that in food (cereal) consumption? The cereal basket declined in size but not so with respect to all the individual cereal items. Its composition has changed with a decline in consumption of subsistence crops like coarse cereals, and an increase in those of superior cereals (Suryanarayana 1995b). The change is marked since the mid 1970s, that is, during the period of increases in foodgrain production and an *apparent* increase in real consumer expenditure of the poorer groups. The notable features are a follows: (i) The average monthly per capita consumption of rice has increased for the poorest three decile groups but remained nearly stable for the remaining population. Accordingly, the shares of rice in the cereal basket increased for these poorest decile groups (Suryanarayana 1995a:690). (ii) Much more striking are the decreases in the consumption of coarse cereals without any offsetting increase in the that of wheat. These changes were gradual until 1977-8, but dramatic thereafter.[7] Similar changes occurred for other decile groups too. In the rural sector as a whole, the share of wheat in the cereal basket increased and that of coarse cereals decreased.

What are such changes due to? Such changes in the composition of the consumption basket have taken place in response to, *inter alia*, changing tastes, changing relative prices and their substitution effects on consumer choices but largely due to changing production and supply conditions. The changes on the supply front are because the new agricultural growth strategy benefited largely wheat and rice. Crop composition of food grains has changed considerably in favour of these superior cereals for cost, relative profitability and rate of return considerations (see Bhatia, 1988; Nadkarni, 1986; Suryanarayana, 1997). The area under coarse cereals has declined after the green revolution. The area under coarse cereals, which increased at the rate of 0.87 percent per annum during 1949-50 to 1964-5, declined at the rate of 1.20 percent per annum during 1967-8 to 1993-4. [8] The area under the superior cereals has increased throughout resulting in a change in cereal cropping pattern. Between 1960-1 and 1993-4 per capita daily availability of rice increased from 201.10 grams to 207.40 grams (by 3.13 percent), that of wheat from 79.10 grams to 159.50 grams (by 101.64 percent) while that of other cereals decreased from 119.50 grams to 67.10 grams (by 43.85 percent) (GoI, 1996b:120). The poor subsistence farmers were left with no option but to shift their cereal consumption in favour of superior cereals. This has increased their market dependence for costlier rice and wheat. The increasing landlessness and casualization of rural labour (discussed above) have only reinforced such dependence. Other types of rural households had to change their preferences because of the decline in coarse cereal availability. Thus the reduction in coarse cereal availability must have affected that part of total consumption which is met through market purchases because of higher market retail prices of superior cereals. This must have led to a decline in total cereal consumption in spite of an apparent increase in real consumer expenditure of the

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[7] For the rural poorest decile group, monthly per capita wheat consumption increased gradually from 210 grams in 1954-5 to 1.57kg in 1977-8 but sharply to 2.84kg by 1983; the corresponding share in total cereal consumption of wheat increased from 2.00 to 16.10 percent and then to 27.41 percent in the same years. Its coarse cereals consumption declined gradually from 7.57kg per capita per month in 1954-5 to 4.44kg in 1977-8 and then to 4.28kg in 1983 and 2.82kg in 1986-7; the corresponding coarse cereal shares in total cereal consumption decreased from 73.00 percent in 1954-5 to 45.64 percent in 1977-8, 41.37 percent in 1983 and to 28.26 percent in 1986-7.

[8] Estimates obtained from log-linear trend functions based on data from GoI (1981b, 1995).

bottom three decile groups in the rural areas. As regards the remaining decile groups, the consumer expenditure on cereals has either stagnated or declined marginally but not to warrant a decline of the magnitude observed. Even for these groups increases in the average cost of the cereal basket seem to have contributed to the decline in cereal consumption. Thus, while estimates of poverty show a decline, actual food and calorie consumption show the opposite.

5.   Summing up

What do all these amount to? The preceding discussion essentially conveys the following message. Policies for poverty alleviation as well as evaluations of their consequences suffer from major problems of misspecification in the context of a developing country undergoing structural changes. Plan strategies are formulated based on the improbable assumptions of separability and independence of growth and redistribution programmes. For the evaluation of the development process, it is important to obtain unbiased estimates of poverty. Such issues are illustrated with reference to the Indian experience.

The Indian NSS data on consumer expenditure was not a reliable estimate of expenditure distribution because of under-accounting of consumption of the labour class. This was serious particularly during the 1950s and 1960s when wage payment in-kind used to be about half of the total payment. Thus, consumption of the poor was underestimated and hence levels of poverty in the 1950s and 1960s were overestimated. With structural changes in the economy, such underestimation of consumption has declined and what we observe in different studies on rural poverty is only a reduction in its overestimation. If poverty has declined by a large margin, then the data should have shown a substantial increase in the consumption and calorie status of the poor. But it does not. This is because: (i) With (a) a transition from wage payment in-kind (largely in the form of prepared food for final consumption) to wage payment in-cash, the labour households, who constitute the majority of the poor; and (b) increasing landlessness and hence decline food consumption from the homegrown stock,[9] the poor have ended up incurring transaction costs, costs on overheads and complementary food items; and (ii) At the same time, changes in cereal production pattern has involved an increase in the average cost of cereal purchases leading to a decline in the cereal consumption of the poor and hence their calorie intake. Updating the poverty line is such context is not simply a matter of price-adjusting the poverty line but a matter of redefining the poverty bundle and the overhead costs. With such an adjustment, it would appear that poverty has gone up. Estimates of incidence of calorie deficiency, which are insulated from all the methodological problems at least for the post-1970s, only confirm this conclusion. Even this estimate is valid only if the calorie norm has remained invariant. This is unlikely. With improvements in methods of production, there must have been a reduction in energy requirement. With improvement in education and medical facilities, human capital and hence labour efficiency must have improved.

Studies for 1990s show a reversal of the trend in consumption-based estimates of rural poverty. But, estimates of outcome indicators like infant mortality and child mortality

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[9] Even if the consumption pattern did not change, a shift in consumption source from homegrown stock to market alone would lead to an exaggerated estimate of shares of such items. This is because of the shift in valuation from ex-farm prices to market retail prices. The items, which are most likely to fall into this category, are fruits, vegetables nuts and milk and milk products.

provide evidence to the contrary. This is further corroborated by anthropometric evidence on the health status of children (Suryanarayana, 2001). This essentially calls into question any analysis of changes in deprivation based on input measures like consumer expenditure/income with reference to a time-invariant norm. To get meaningful insights, it would be worthwhile to examine disaggregated indices of various components of living standards during different phases of development.

References

Ahluwalia, M.S. (1978) 'Rural poverty and agricultural performance in India', *Journal of Development Studies* 14:298-323.

Ahluwalia, M.S. (1985) 'Rural poverty, agricultural production, and prices: a re-examination', in Mellor and Desai (eds) *op cit.*:59-75.

Aitchison, I., and J.A.C. Brown (1957) '*The lognormal distribution with special reference to its uses in economics*', Cambridge University Press: Cambridge.

Bardhan P.K. and T.N. Srinivasan (eds) (1974) *Poverty and Income Distribution in India*, Calcutta: Statistical Publishing Society.

Bell, C., and R. Rich (1994) 'Rural poverty and aggregate agricultural performance in post-independence India', *Oxford Bulletin of Economics and Statistics* 56:111-34.

Bhatia, B.M. (1988) *Indian Agriculture: A Policy Perspective*, Sage Publications India Ltd.: New Delhi.

Bhattacharya, N. (1978) 'Studies on level of living in India', in Iyengar, N.S. and Nikhilesh Bhattacharya (eds) *A Survey of Research in Economics*, Allied Publishers: New Delhi.

Bhattacharya, N., D. Coondoo, P. Maiti and R. Mukherjee (1991) *Poverty, Inequality and Prices in Rural India*, Sage Publications: New Delhi.

Datt, G., and M. Ravallion (1994) 'Growth and Poverty in Rural India' (mimeo) Policy Research Department, World Bank: Washington DC.

Gaiha, R. (1989) 'Poverty, agricultural production and prices in rural India: a reformulation', *Cambridge Journal of Economics* 13:333-52.

Ghose, A.K. (1989) 'Rural poverty and relative prices in India', *Cambridge Journal of Economics* 13:307-31.

Glewwe, P. (1990) 'The measurement of income inequality under inflation', *Journal of Development Economics* 32:43-67.

Government of India (1972) 'Appendix III: Extracts from Instructions to Field Workers: NSS Nineteenth Round: July 1964–June 1965', in *Tables with Notes on Consumer Expenditure, The National Sample Survey Nineteenth Round: July 1964-June 1965*, (Report No. 192:117-24), National Sample Survey Organization: New Delhi.

Government of India (1973) *A Technical Note on the Approach to the Fifth Plan of India: 1974-79*, Planning Commission: New Delhi.

Government of India (1981a) *A Technical Note on the Sixth Plan of India (1980-85)*, Planning Commission: New Delhi.

Government of India (1981b) *Area and Production of Principal Crops in India, 1979-80*, Directorate of Economics and Statistics, Ministry of Agriculture: New Delhi.

Government of India (1995) *Area and Production of Principal Crops in India, 1994-95*, Directorate of Economics and Statistics, New Delhi: Ministry of Agriculture.

Government of India (1996a) 'A note on employment and unemployment situation in India. Fifth quinquennial survey, NSS 50th Round (July 1993–June 1994)', *Sarvekshana* (Journal of the National Sample Survey Organization) XX:1-150.

Government of India (1996b) *Bulletin on Food Statistics: 1994 and 1995*, Ministry of Agriculture: New Delhi.

Government of India (1997) 'A Note on Operational Land Holdings in India, 1991-92. NSS 48th Round (January–December 1992)', *Sarvekshana* (Journal of the National Sample Survey Organization) XX:1-64.

Government of India (1998) 'A note on wages in kind, exchange of gifts and expenditure on ceremonies and insurance in India, NSS 50th Round (1993-94)', *Sarvekshana* (Journal of the National Sample Survey Organization) XXI:29-49.

Griffin, K.B., and A.K. Ghose (1979) 'Growth and impoverishment in the rural areas of Asia', *World Development* 7:361-83.

International Labour Organization and Asian Regional Team for Employment Promotion (ILO-ARTEP) (1993) *India: Employment, Poverty and Economic Policies*, ILO-ARTEP: New Delhi.

Iyengar, N.S. (1960) 'On a method of computing the engel elasticities from concentration curves', *Econometrica* 28:882-91.

Jose, A.V. (1978) 'Real wages, unemployment, and income of agricultural labourers', *Economic and Political Weekly* XIII:A16-20.

Kakwani, N.C. (1993) 'Poverty and Economic Growth with Application to Côte d'Ivoire', *Review of Income and Wealth* 39(2):121-39.

Mathur, S.C. (1985) 'Rural poverty and agricultural performance in India', *Journal of Development Studies* 21:422-28.

Mellor, J.W., and G.M. Desai (eds) (1985) *Agricultural Change and Rural Poverty*, The Johns Hopkins University Press: Baltimore.

Minhas, B.S. (1974) 'Rural poverty, land redistribution and development strategy: facts', in Srinivasan, T.N., and Bardhan P.K. (eds) *Indian Economic Review* 1974:252-63.

Minhas, B.S. (1991) 'On Estimating the inadequacy of energy intakes: revealed food consumption behaviour versus nutritional norms (nutritional status of Indian people in 1983)', *The Journal of Development Studies* 28:1-38.

Mukherjee, M. and S. Saha (1981) 'Reliability of national income and allied estimates', *The Journal of Income and Wealth* 5:131-6.

Nadkarni, M.V. (1986) 'Backward Crops in Indian Agriculture: Economy of Coarse Cereals and Pulses', *Economic and Political Weekly* XXI(38, 39):A113-18.

Naidu, V.C. (1983) 'National Sample Surveys Data on household consumer expenditure–a critique', *Working Paper* No. 43, Madras Institute of Development Studies: Chennai.

Ravallion, M., and G. Datt (1996) 'How important to India's poor is the urban-rural composition of growth?', *The World Bank Economic Review* 10:1-25.

Saith, A. (1981) 'Production, prices and poverty in rural India', *Journal of Development Studies* 17:196-213.

Suryanarayana, M.H. (1983) 'Treatment of poverty in the Sixth Plan', *Artha Vijanana,* 25(4):419-25.

Suryanarayana, M.H. (1995a) 'PDS Reform and Scope for Commodity based Targeting', *Economic and Political Weekly* XXX(13):687-95.

Suryanarayana, M.H. (1995b) 'Growth, Poverty and Levels of Living: Hypotheses, Methods and Policies', *Journal of Indian School of Political Economy* VII(2):203-55.

Suryanarayana, M.H. (1997) 'Food Security in India: Measures, Norms and Issues', *Development and Change* 28(4):771-89.

Suryanarayana, M.H. (1998a) 'Methods of Poverty Estimates: A Critical Survey', in Balakrishna, S and K. Hanumantha Rao (eds) *Data Base on Rural Poverty Indicators*, National Institute of Rural Development: Hyderabad.

Suryanarayana, M.H. (1998b) 'Nutrition Security in India: Issues and Policies', paper presented it the symposium on Reforming India's Social Sectors: Strategies and Prospects, Department of Economics, University of Mumbai jointly with Office of the UN Resident Coordinator in India, New Delhi and National Bank for Agriculture and Rural Development, April 16-17, Mumbai.

Suryanarayana, M.H. (2000) 'How real is the secular decline in rural poverty?', *Economic and Political Weekly* XXXV:2129-40.

Suryanarayana, M.H. (2001) 'Social Cost of Economic Reform: Some Hard Evidence?; paper presented at the workshop on Poverty and Human Development Monitoring System', Planning Department, Government of Karnataka and Institute for Social and Economic Change, 2-3 February 2001, Bangalore.

Vaidyanathan, A. (1986) 'Labour use in rural India: a study of spatial and temporal variations', *Economic and Political Weekly* XXI: A130–46.

van de Walle, D. (1985) 'Population growth and poverty: another look at the Indian time series data', *Journal of Development Studies* 21:429-39.

Viswanathan, B. (1996) *Some Econometric Issues in Consumer Behaviour Analysis*, mimeo, Indira Gandhi Institute of Development Research: Mumbai.