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# A 'World' Distribution of Income and of Real Poverty and Affluence

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Since the early 1970s, when income distribution became an operative objective of economic development (Chenery *et al.* 1974), knowledge on the subject has certainly improved. A number of analytical treatises have focused on the issue Pen (1971), Atkinson (1970), Cline (1975) and, more important, data on income distribution are routinely reported for about a score of developing countries (LDCs) and as many developed countries (DCs) World Bank (1986), Jain (1975), Paukert (1973). These data deal with the within-country relative income distribution and report one or more of the common inequality measures. Moreover, for some countries measures of absolute poverty exist which report, e.g., the population that lives below a "poverty level", defined in terms of consumption (calories) or income (for example, Dandekar and Rath (1971), Bardhan (1970), (1973), Fishlow (1972). Such measures of absolute poverty, if aggregated over a number of countries, give a measure of relative world poverty and an idea of how it is distributed between countries. Cross-country comparisons have also been based on ranking various countries on the basis of their measures of relative income distribution.

Not only does this paper do that much in measuring the within-country relative and absolute poverty but it also goes one step farther. The *real* is the operative qualifier, both for within- and between-country comparisons. Having normalized various national income distributions for *real* (rather than nominal) income one can do two more things: (i) construct a world distribution of real income – and within that examine the between-country inequality; (ii) more importantly, define equivalent income groups in the within-country distributions, pluck them out and transfer

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them to the world income distribution – in other words, define global socio-economic classes and measure their density based on material levels of living that cut across national aggregates.

This is not an idle exercise; it has some obvious applications. The more interdependent our system becomes, the more importance the within-country class structure probably assumes. The elites belonging to countries in the developing world invidiously compare their levels of living to those of their counterparts in richer countries. Furthermore, a decision taken in the developed countries, say a stabilization programme, may affect differentially the welfare of various classes in the developing world – it may, e.g., hurt the poor more. As long as world institutions exist, the world distribution of real income is of great significance, despite the fact that there is no World Government.

Another use of the approach is as an analytical tool. Once we define comparable socio-economic classes across countries, the concept of class solidarity acquires an empirical counterpart. Could it be that it also has operational implications for economic development? Some thoughts on this issue are suggested in the concluding section.

Household Income and Expenditure Surveys (HIES) provide the raw data for constructing any income distribution. However, there are two main reasons why they have hardly ever been used for constructing a world income distribution and for measuring relative international inequality. One, the HIES are expressed in local currencies, thus rendering international comparability meaningless. Two, the HIES, owing to the fact that they refer to various subsamples of a national population and are taken at different times, constitute a non-homogeneous cross-country data base.

The two "methodological parents" of this paper which distinguish it from previous attempts to derive a world distribution of income are the conversion of local currencies into "international" dollars (PPP $) and the approach used to specify from national data the underlying income distribution. Neither methodological construct is new, but their combination and application is. Section I discusses the logic of the application, the specific methods used and the parallel attempts in the literature to derive a world distribution of income.

Section II refers to the data used. Since they come from only fourteen countries (nine LDCs and five DCs) the 'world' distribution of income is hardly representative. The data requirements of the statistical method and our intention to carry this research to a second stage, by combining the income distributions with demand behaviour, required that instead of using the national distributions compiled, we should look up the original data of recent HIES. We are attempting to increase the sample in the future.

Section III presents the national distributions and discusses them with reference to (i) two "global" distributions for LDCs and DCs, and (ii) to the 'world' distribution.

Section IV presents the summary and conclusions and outlines future extensions of this work.

## I. RATIONALE AND METHOD

### International Comparability: PPP Dollars

The problem of international comparability is not simply that of finding a common numeraire to apply to different countries. The exchange rate would have done for this purpose. It is well established by now that exchange rates which reflect the relative prices of internationally traded goods tend to understate the real income of LDCs by a factor which is systematically (and inversely) related to the country's GDP per capita. This factor has been measured as the "exchange rate deviation index" or "Kravis factor" Kravis, Heston and Summers (1978; 1982). There are two reasons for a value of the "exchange rate deviation index" which is different from 1.0: the relationship between prices of tradeables and non-tradeables in the process of development; and the share of tradeables and non-tradeables in the budget as incomes grow.

With respect to the first factor, the general observation is that although prices of non-tradeables (relative to tradeables) tend to be cheap in LDCs, they increase with the growth of income. The converse is true for the prices of tradeables. This systematic relationship of prices of tradeables and non-tradeables is based on Ricardo's Principle. Ricardo observed that the productivity-differential gap between rich and poor countries is smaller in the non-tradeable sector (e.g., haircuts) than in the tradeable sector (e.g., manufacturing). In the tradeable sector the "law of one price" holds which tends to equalize prices of tradeable goods among countries (allowing, perhaps, for a constant band representing transportation costs, tariffs and subsidies). Given equal prices of tradeables in DCs and LDCs, wages will be high in countries that have high productivity in tradeables, i.e. the DCs; they will be low in countries that have low productivity in tradeables, i.e. the LDCs. More precisely, and as a result of the operation of the "law of one price" the ratio of wages in the tradeable sector between DCs and LDCs tends to be proportional to the ratio of their respective average productivities.

Although the "law of one price" does not operate in the non-tradeable sector, relative wages there are still influenced by labour productivity in tradeables, for DCs and LDCs alike. The low tradeable wages in LDCs carry over to the non-tradeable sector, despite the fact that the LDC productivity there is not so low. (Note that this is a heretical statement that turns conventional wisdom on its head. It implies that the free trade link may be the cause of *low*, rather than high, wages in LDCs.) Correspondingly, the high wages in the tradeable sector in DCs carry over to the non-tradeable sector also, despite the low (close to LDC) productivity these countries

have in non-tradeables. Not only, then, is the ratio of DC to LDC wages in non-tradeables greater than one, but it also follows from Ricardo's Principle that the higher wages in the non-tradeable sector in the high-tradeable productivity countries (DCs) cannot be fully offset by greater tradeable-productivity advantage. They must, therefore, lead to higher prices of non-tradeables in DCs as compared to LDCs. Moreover, assuming a non-increasing differential in DCs and LDCs in non-tradeable productivities, the prices of non-tradeables and the associated wages in the non-tradeable sector will be increasing faster in the developed than in the developing countries.

With respect to the second factor, the share of tradeables and non-tradeables in the budget (and GDP) as incomes grow is determined by the Gerschenkron effect. It states that demand tends to adjust to a country's factor proportions: non-tradeables being relatively cheap in LDCs tend to assume high weight in the budget and the converse for the DCs where tradeables tend to be consumed in greater proportions.

The "Kravis factor" has been derived empirically by studying prices and purchasing power parity in a large number of countries. It purports to measure the bias that enters international comparisons as a result of the application of Ricardo's Principle and of the Gerschenkron effect. Its application results in a conversion to PPP dollars that favours the lower incomes more than it does the higher incomes.

## The Statistical Method: National Distribution Density Functions

All attempts to construct distributions of income from grouped HIES data face the statistical problem of deriving the Lorenz curve from a density function of an income distribution which is not known. The usual approach is to fit a well-known density function and derive the equation of the Lorenz curve from the fitted function. The trouble is that the usual density functions rarely give good fit to a wide range of observed income distributions. Kakwani and Podder (1976) addressed this problem by specifying a functional form of the Lorenz curve which has certain properties that can be effectively utilized to specify the underlying equation. Once the Lorenz equation is specified and estimated from actual data, standard inequality measures can be derived from the parameters of the equation, the standard errors of the inequality measures can be computed from the standard errors of the parameters of the equation, and the density function can also be derived from the equation Kakwani (1980, Chapter 7).

The first step in specifying a new functional form for the Lorenz curve is to define the coordinates of that curve. Let these coordinates be

$$s = \frac{1}{\sqrt{2}}\,(P + Q) \quad \text{and} \quad r = \frac{1}{\sqrt{2}}\,(P - Q)$$

where $P$ is cumulative function of population and $Q$ is cumulative function of income. The equation of the Lorenz curve to be estimated is assumed to be log-linear. Thus, the Lorenz curve, in terms of $s$ and $r$, can be written as

$$r = g(s) = a's^{\alpha}(\sqrt{2} - s)^{\beta}$$

or

$$\log r = a + \alpha \log s + \beta \log(\sqrt{2} - s) \quad \ldots \quad \ldots \quad (1)$$

where $a = \log a'$ and $a' > 0$, $1 > \alpha > 0$ and $1 > \beta > 0$.[1]

For grouped data, we have information on income ranges, and the estimation procedure can utilize this additional information. The authors showed that if $x_t$ is the upper limit of the income class $t$ and $m$ is the mean of income, given the Lorenz function (1), the following relation also holds:

$$\frac{(m - x_t)}{(m + x_t)} \cdot \frac{s_t(\sqrt{2} - s_t)}{r_t} = (\sqrt{2} - s_t)\alpha - s_t\beta \quad \ldots \quad (2)$$

Introducing the stochastic terms in Equations (1) and (2) and combining them together, we get,

$$\begin{vmatrix} \text{Log } r_t \\ D \end{vmatrix} = \begin{vmatrix} 1 & \log s_t & (\sqrt{2} - s_t) \\ 0 & (\sqrt{2} - s_t) & -s_t \end{vmatrix} \begin{vmatrix} a \\ \alpha \\ \beta \end{vmatrix} + \begin{vmatrix} w_{1t} \\ w_{\epsilon t} \end{vmatrix}$$

where $D$ is the dependent variable in Equation (2). The system can be estimated by using GLS. In the event that the restrictions on $\alpha$ and/or $\beta$ in Equation (1) were violated, the coefficients were estimated by constrained ML method with a large penalty term in the likelihood function for $\alpha > 1$ or $\beta > 1$. Table 1 gives the estimated coefficients of the Lorenz curves for the 14 countries of this study.

[1] The restriction $a' > 0$ implies that $g(s) \geqslant 0$ for all values of $s$ in the range 0 to $\sqrt{2}$, which means that the Lorenz curve lies below the equilibrium line. The restriction $\alpha, \beta > 0$ means that $g(s)$ assumes values zero when $s = 0$ or $s = \sqrt{2}$. The restriction $\alpha, \beta < 1$ satisfies the condition that the second derivative is negative which rules out the possibility of inflection in the Lorenz curve (Kakwani 1980, p. 133).

Table 1

*Estimated Coefficients of Lorenz Curves*[a]

| Countries | $a$ | $\alpha$ | $\beta$ | $\bar{R}^2$ | $F$ |
|---|---|---|---|---|---|
| **LDCs** | | | | | |
| Bangladesh | −1.636 | 0.868 | 0.781 | 0.99 | 2014 |
| | (−20.97) | (35.81) | (19.59) | | |
| India | −1.080 | 0.870 | 0.787 | 0.99 | 1588 |
| | (−48.50) | (65.17) | (50.04) | | |
| Sri Lanka | −0.714 | 0.940 | 0.309 | 1.00 | 963 |
| | (−66.62) | (293.99) | (13.13) | | |
| Pakistan | −1.102 | 0.906 | 0.808 | 0.98 | 1066 |
| | (−42.33) | (46.29) | (52.53) | | |
| Indonesia | −1.124 | 0.901 | 0.823 | 0.99 | 1152 |
| | (−42.81) | (54.54) | (45.13) | | |
| Philippines | −1.033 | 0.883 | 0.781 | 0.99 | 711 |
| | (31.75) | (44.64) | (32.67) | | |
| Brazil | −1.078 | 0.968 | 0.866 | 0.98 | 227 |
| | (−17.99) | (24.06) | (20.44) | | |
| Mexico | −0.741 | 0.970 | 0.991 | 1.00 | 1230 |
| | (−42.49) | (102.60) | (67.29) | | |
| S. Korea | −1.085 | 0.879 | 0.746 | 0.98 | 437 |
| | (−26.76) | (28.54) | (33.93) | | |
| **DCs** | | | | | |
| Ireland | −1.747 | 0.753 | 0.629 | 0.99 | 458 |
| | (−30.21) | (23.14) | (7.40) | | |
| United Kingdom | −1.893 | 0.998 | 0.912 | 0.98 | 621 |
| | (−28.63) | (31.65) | (14.27) | | |
| France | −1.174 | 0.905 | 1.00 | 0.99 | 1232 |
| | (−27.11) | (31.26) | (24.73) | | |
| Japan | −1.044 | 0.793 | 0.792 | 0.99 | 1450 |
| | (−51.27) | (57.47) | (57.78) | | |
| United States | −0.96 | 0.86 | 0.999 | 0.99 | 8298 |
| | (41.51) | (55.27) | (53.18) | | |

*Note:* All regressions estimated with GLS numbers in parentheses are estimated $t$-ratios.

[a]In interpreting the estimated coefficients, it is noted that the Lorenz curve is symmetric if $\alpha = \beta$, skewed toward (1, 1) if $\beta > \alpha$ and skewed toward (0, 0) if $\alpha > \beta$.

Given the estimate of the Lorenz curve, the density function can be estimated. Next, from the density function one can calculate the percent of income or population at any level of income. The relationship between income level ($I_t$) and $s$ is given by

$$\frac{m - I_t}{m + I_t} = a'\alpha s^{\alpha-1} (\sqrt{2} - s)^{\beta} - a'\beta s^{\alpha} (\sqrt{2} - s)^{\beta-1} \quad \ldots \quad (3)$$

Since mean income $m$ is known and $I_t$ is assumed, the above equation can be solved for $s$ using numerical methods. From the knowledge of $s$ and the estimated coefficients, $r$ can be obtained.

## II. DATA AND LIMITATIONS

The data, derived from HIES, were scrutinized to make sure they represent, as closely as possible, a sample of the country's national population as opposed to urban or rural alone. The description of the surveys appears in Table 2. After expressing all data on a 12-month basis, the respective national income distributions were fitted (Table 1).

Table 2

*Description of Household Income and Expenditure Surveys*

| Countries | Year of Survey | Number of Classes | Income/ Expenditure | Unit | Time |
|---|---|---|---|---|---|
| **LDCs** | | | | | |
| Bangladesh | 1973-74 | 13 | I | Household | Month |
| India | 1973-74 | 14 | E | Individual | Month |
| Sri Lanka | 1981-82 | 11 | I | Household | Month |
| Pakistan | 1979 | 34 | I | Individual | Month |
| Indonesia | 1981 | 11 | E | Household | Month |
| Philippines | 1985 | 9 | I | Family | Year |
| Brazil | 1974 | 9 | E | Household | Year |
| Mexico | 1977 | 13 | I | Household | Week |
| S. Korea | 1983 | 15 | E | Household | Month |
| **DCs** | | | | | |
| Ireland | 1980 | 13 | I | Household | Year |
| United Kingdom | 1983 | 16 | I | Household | Year |
| France | 1978-79 | 7 | I | Consumption Unit | Year |
| Japan | 1981 | 18 | I | Household | Month |
| United States | 1972-73 | 12 | I | Household | Year |

In bringing the national information to the common 1980-base year we start from the 1980 per capita income, convert it into PPP dollars and apply to it the coefficients of the Lorenz curve estimated from the HIES. We make the assumption that the Lorenz curve fitted on each HIES remains invariant to the base year. The farther away a national survey is from the base year, the more tenuous this assumption becomes. Moreover, consecutive increases in per capita income in the intervening years would mean gradual decreases in the absolute poverty levels. Whether development operates in such a "neutral" fashion or is instead "biased" is an empirical question which has been commonly treated in an *a priorist* fashion.

Of the 14 countries included in the 'world' distribution of income, 9 are LDCs, with a total of 1.3 billion population and 5 DCs with 0.5 billion. This is obviously a "small world", and expansion of the sample with other populous countries is desirable. Table 3 gives the 1980 population for each country and its per capita income in dollars, PPP and US. The K-factor employed in going from the latter to the former is also given.

The limitations of the data used for constructing income distributions are well known (Ahluwalia 1974, pp. 4–6). The most suitable concept of income for economic analysis is permanent income which is the annualized concept of an appropriate stock of wealth over a specified period (a lifetime). Permanent income does not exactly correspond with the flow concept of annual income, let alone with the snapshot of income captured over a shorter period in most surveys, which is appropriately blown up to one year. Moreover, surveys cover only money income, failing to adjust for the incidence of tax and transfer payments. The question of whether income or expenditure is the better proxy for permanent income arises often. It is likely that the former is closer to permanent income for the higher-income groups, while expenditure is more satisfactory for the lower incomes. Where there was a choice, it was made after considering the probable magnitude of the two biases. To the extent that these problems exist, they are shared with all other income distribution studies.

The next problem is going from money income to real income, given the wide variation of prices facing different consumers. Although PPP adjustment is not formally carried out at the within-country level, this problem is less serious in our study. The Kravis factor for each country has been derived by using quality-adjusted prices. To the extent that lower-income classes consume lower-quality goods, the PPP adjustment may still underestimate their real basket.

Finally, the accuracy of estimating the distribution of income in the population from the observed distribution in sample surveys has always been a nagging concern of investigators. While it is widely acknowledged that the Kakwani and Podder method is the most appropriate for estimating the underlying distribution, it has been used in the literature only for illustrative purposes. Our results probably reflect the improved technique.

Table 3

*Country Population and Income Data, 1980*

| Countries | Population (Million) | Per Capita Income US % | Per Capita Income PPP | K-factor |
|---|---|---|---|---|
| **LDCs** | | | | |
| Bangladesh | 88.7 | 144 | 535.7 | 3.72 |
| India | 663.6 | 245 | 681.1 | 2.78 |
| Sri Lanka | 14.2 | 273 | 802.6 | 2.94 |
| Pakistan | 82.6 | 291 | 710.4 | 2.44 |
| Indonesia | 146.4 | 495 | 801.9 | 1.62 |
| Philippines | 48.1 | 732 | 1464.0 | 2.00 |
| Brazil | 121.3 | 2059 | 2985.6 | 1.45 |
| Mexico | 69.4 | 2685 | 4269.2 | 1.59 |
| S. Korea | 38.1 | 1634 | 2859.5 | 1.75 |
| **Global LDCs** | **1272.4** | | | |
| **DCs** | | | | |
| Ireland | 3.4 | 4880 | 4636.0 | 0.95 |
| United Kingdom | 55.9 | 7212 | 5769.6 | 0.80 |
| France | 53.9 | 12163 | 9487.1 | 0.78 |
| Japan | 116.8 | 9890 | 8505.4 | 0.86 |
| United States | 227.7 | 11556 | 11556.0 | 1.00 |
| **Global DCs** | **457.7** | | | |
| **Total** | **1730.1** | | | |

In conclusion, some of the limitations of data and method in this study are shared with extant studies of income distribution. Some improvements in method have been introduced. No specific additional cost of extending the study to between-country distributions seems to arise.

## III. RESULTS AND ANALYSIS

### Relative Within-Country Inequality

The conventional approach to income distribution focuses on relative *within-country* inequality. Table 4 presents the two standard inequality indices i.e., shares of population quintiles in income and Gini coefficients. At this level of analysis, our

Table 4

*Measures of Relative Within-Country Inequality 1980*

| Countries | Gini Coefficient | Percentage Share of Income by Population Quintiles | | | | |
|---|---|---|---|---|---|---|
| | | Lowest 20% | Second Quintile | Third Quintile | Fourth Quintile | Fifth Quintile |
| LDCs | | | | | | |
| Bangladesh | 0.216 | 12 | 15 | 18 | 22 | 33 |
| India | 0.357 | 9 | 12 | 15 | 20 | 44 |
| Sri Lanka | 0.213 | 6 | 7 | 9 | 12 | 66 |
| Pakistan | 0.347 | 9 | 12 | 15 | 21 | 43 |
| Indonesia | 0.342 | 7 | 13 | 16 | 20 | 44 |
| Philippines | 0.368 | 7 | 11 | 14 | 17 | 51 |
| Brazil | 0.361 | 6 | 8 | 11 | 20 | 55 |
| Mexico | 0.458 | 5 | 8 | 13 | 24 | 50 |
| S. Korea | 0.346 | 10 | 13 | 16 | 23 | 38 |
| **Global LDCs** | **0.501** | **5** | **10** | **17** | **27** | **41** |
| DCs | | | | | | |
| Ireland | 0.224 | 13 | 16 | 17 | 21 | 33 |
| United Kingdom | 0.149 | 14 | 16 | 20 | 22 | 28 |
| France | 0.306 | 8 | 13 | 18 | 23 | 38 |
| Japan | 0.411 | 6 | 10 | 17 | 24 | 43 |
| United States | 0.389 | 5 | 11 | 16 | 24 | 44 |
| **Global DCs** | **0.428** | **6** | **11** | **16** | **22** | **45** |

approach contributes only to the improved estimation techniques and the recent data. The conversion to PPP$ is immaterial, since no income-group specific Kravis factors are available.

The findings of the within-country inequality are dramatically different from the conclusions the literature has reached so far. In no country is the share of the lowest 40 percent of the population less than 12 percent of the income. Four of the countries in our sample, Philippines, Brazil, Mexico and France, had fallen in this category with the Ahluwalia data and were characterized as cases of "high inequality" Ahluwalia (1974). Brazil and Mexico have graduated to "moderate inequality" (share of lowest two quintiles of the population between 12 percent and 17 percent) and have been joined in this group by Sri Lanka, Japan and the

United States, all three previously classified in the next group.[2] The remaining countries have a share of the two lowest deciles of 17 percent of income or above and have "low inequality".

The Gini coefficients of within-country inequality in Table 4 describe the entire distribution, and as a result they present a more complete and often different picture from that conveyed by quintile shares in income. The example of Sri Lanka, which had the highest inequality among LDCs with the quintile measure and has the lowest Gini (along with Bangladesh, which had also the lowest quintile inequality) illustrates the case. The general observation is that in comparison to earlier studies Jain (1975), Paukert (1973) Gini coefficients are lower with the more recent data. The only countries in our sample that have higher (inequality) Ginis are South Korea, Japan and the United States.

The general picture that emerges from the within-country distributions is an overall improvement, with a few notable exceptions of deteriorating income distribution. The improvement is not much of a surprise and it is in keeping with the trend observed in the World Bank estimates which have been gradually increasing the share of the lowest classes in LDCs in their periodic revisions World Bank (1986) and previous years. The improvement, where it occurred, may have been the result of the vigorous rates of growth most LDCs experienced in the decade starting in the late 1960s, along with increased political awareness of the problem that came with the international politicization of poverty. However, how much of the improvement in distribution is real and which part may be a statistical artifact, is also a legitimate question. Increased awareness of distribution might have led to better collection techniques and fewer measurement errors.[3] Similarly, the increased efficiency of

[2]The case of Sri Lanka is an interesting example of inevitable biases that may intervene in the collection of HIES data. The 1969 data showed extremely low inequality and made Sri Lanka a celebrated success case in distribution – with the trade-off in growth Sen (1981, 1987). This has been vehemently contested recently Glewwe (1986), Bhalla and Glewwe (1986). One factor that must have affected both the 1969 and the 1981 data is the understatement of income through the failure of HIES studies to fully account for taxes and subsidies. The understatement might not have affected differentially the different economic groups in 1969 when subsidies and in-kind transfers were general. Since the economic liberalization and the structural adjustment policies introduced in 1977, subsidies have become means-tested in an attempt to target them to the poor. If successful, this policy must have increased the understatement of incomes in the lower groups only, thus increasing measured inequality. Moreover, since 1979 the eligibility for rationed rice, one of the most important subsidies, was restricted to households whose income fell below Rs 300 per month (equivalent to PPP$ 130 per capita per year). This might have led to wide under-reporting of all incomes by households attempting to protect their rice ration. The very narrow distribution of income in Sri Lanka – around a peak of about PPP$ 160 (Appendix) may well reflect such generalized under-reporting.

[3]The ten years difference between the Ahluwalia data (mostly from the 1960s) and the present study data may account for better data-collection techniques in the most recent surveys.

estimation of the method employed may account for some of the improvement in distribution.[4] The surprising finding, on the other hand, is the marked deterioration in the distribution in a few cases: Korea, Japan and the United States, along with Pakistan.[5] If this, indeed, is the case for DCs or upper-middle-income LDCs, the famous Kuznets U-curve of income distribution may have to be re-examined.

**Relative Two-World Inequality**

The drawback of the Gini, along with any other measure of inequality, is that its value is not independent of the level of aggregation. The novel aspect of our approach is that by converting incomes to homogeneous PPP$ units we can construct different levels of aggregation and measure inequality within that new framework. Figure 1 plots on the same income axis, but different population coordinates, the global distribution of income for the LDCs as well as for the DCs. The model values of the two distributions clearly suggest that we deal with two worlds which have relatively small regions of continuity between them. This is an insight which is not clearly conveyed by ranking the countries in terms of per capita incomes, an exercise that assumes a continuum between the two worlds.

Following that insight, we estimate the Gini coefficients for the two global populations separately, i.e. for LDCs and DCs. The resulting inequality index is higher than all the within-country inequality indices estimated for either country group. One may be inclined to dismiss this result as simply a fluke of aggregation. For those who assign political life in national aggregates the message may be different. If inequality, e.g. in the DCs, increases after enlargement with LDC partners, it may be that the perception of inequality has also increased, which could lead to increased political pressures. Is "fragmentation" then (whether in markets or in politics) a form of pressure-release valve?

**Inequality and Absolute Income Levels**

By expressing local currencies in comparable PPP units, any population group, at any level of aggregation, can be referred to with respect to an absolute level of income. A specific band of income that deserves further comment is that between PPP$ 1600 to 5300, or the fourth quintile of the world's population where the tails of the LDC and DC global distributions overlap (Figure 1). This region represents the "affluent" in the world distribution of income as opposed to the "rich". It is further highlighted in Table 5 and Figure 2.

A total of 354 million people of the world's population, 220 from LDCs, 130 from DCs, belong to the affluent group (defined arbitrarily as 20 percent of the

[4] The result of increasing efficiency in estimation through the method used is raising the mean for the lower quintiles and correspondingly lowering it for the higher, reflecting the underlying log-normal distribution.

[5] The three former comparisons are with Ahluwalia.

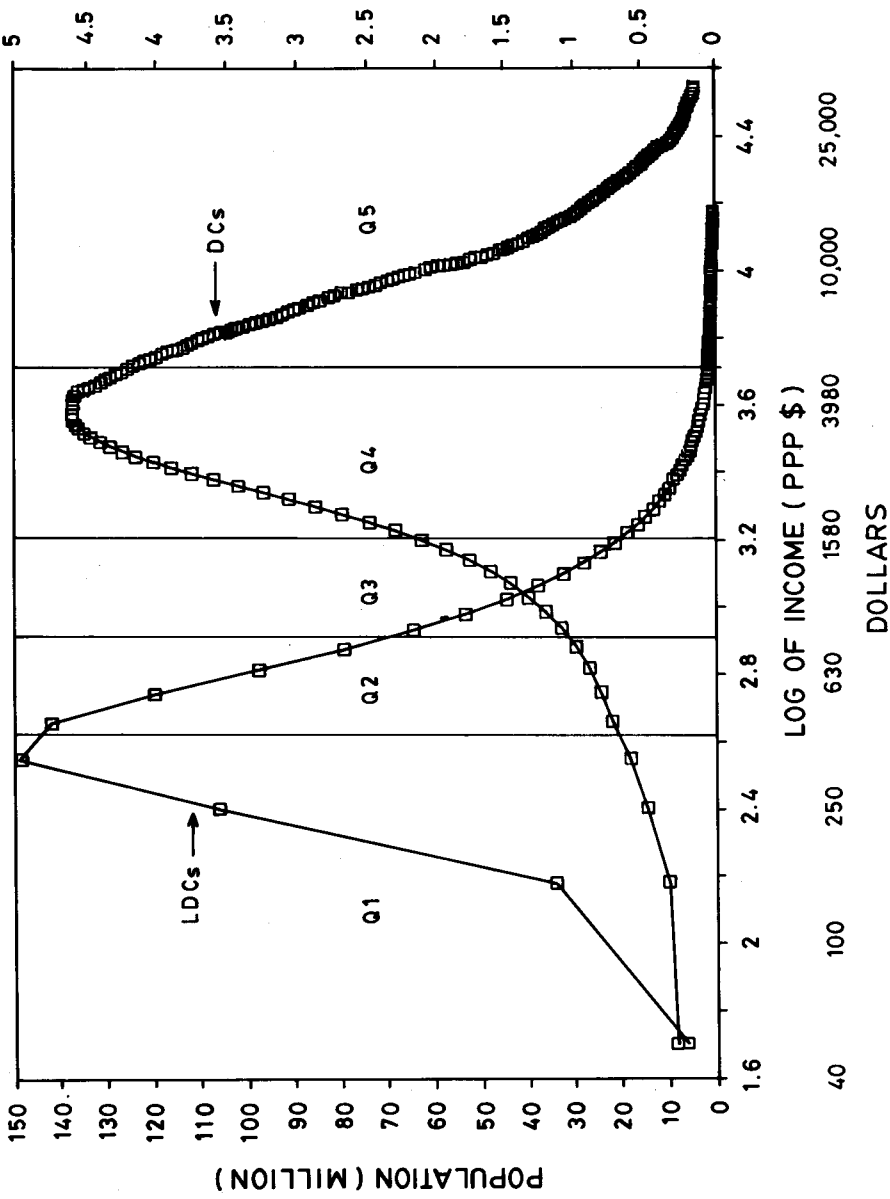



**Fig. 1. Global Income Distribution : DCs and LDCs**

*Note:* Squares indicate number of population (on either verticle axis) that have the corresponding income on the horizontal axis.

Table 5

*The National Composition of the "Affluent" in the World Distribution of Income (Population in Income Range $1600 to $5300) 1980*

| Countries | Population (Million) | Percent of Total "Affluent" | Percent of Country Population |
|---|---|---|---|
| **LDCs** | | | |
| Bangladesh | 0.45 | 0.13 | 0.51 |
| India | 37.87 | 10.69 | 5.71 |
| Sri Lanka | 0 | 0 | 0 |
| Pakistan | 5.24 | 1.48 | 6.34 |
| Indonesia | 32.42 | 9.15 | 22.14 |
| Philippines | 14.52 | 4.10 | 30.19 |
| Brazil | 72.54 | 20.47 | 59.80 |
| Mexico | 34.93 | 9.86 | 50.33 |
| S. Korea | 24.74 | 6.98 | 64.93 |
| **Global LDCs** | **222.71** | **62.86** | **17.50** |
| **DCs** | | | |
| Ireland | 2.53 | 0.71 | 74.41 |
| United Kingdom | 24.94 | 7.04 | 44.62 |
| France | 13.26 | 3.74 | 24.60 |
| Japan | 37.64 | 10.62 | 32.23 |
| United States | 53.21 | 15.02 | 23.37 |
| **Global DCs** | **131.58** | **37.14** | **28.75** |
| **Total** | **354.29** | **100.00** | **20.48** |

world population). The surprise in the data is the broad participation of some middle-income LDCs in this group: More than one-half of the populations of South Korea, Mexico and Brazil belong to the affluent class, followed by the Philippines and Indonesia who have one-fifth to one-third of their population represented. Such rates of participation in affluence are not much different from those of the DCs. This, in fact, is a startling conclusion. Despite the two-world distribution of income, in terms of means and variances, the elites in most LDCs enjoy comfortable DC middle-class standards of living.

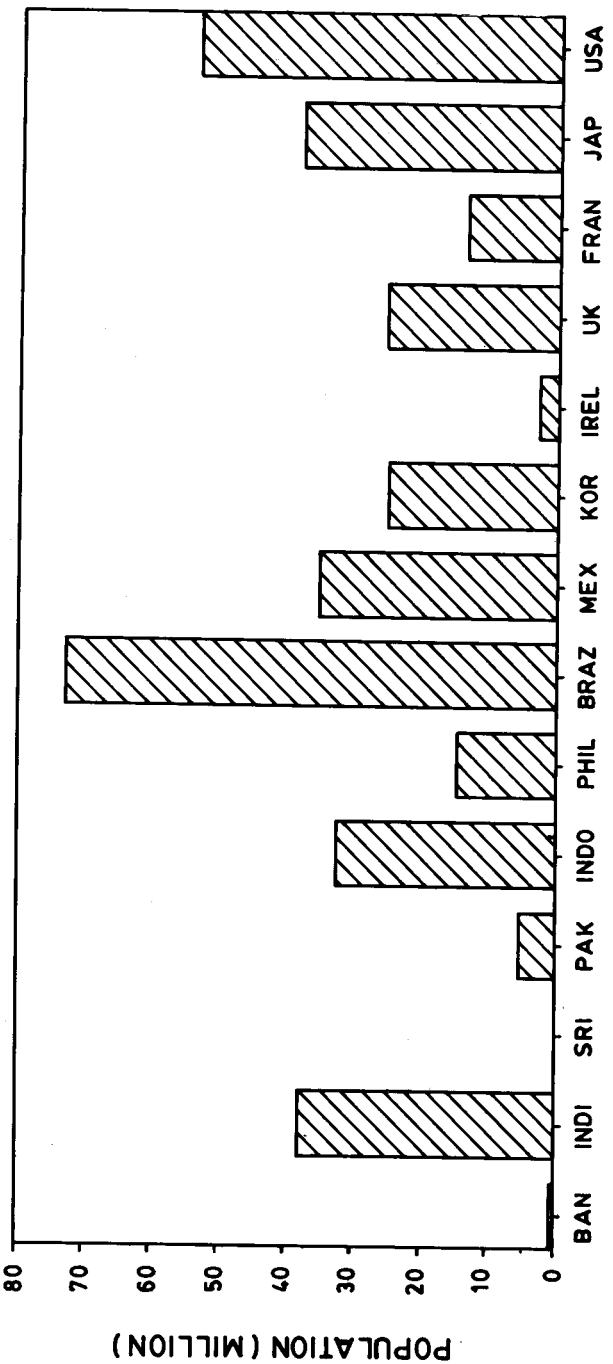



Fig. 2. Composition of the Affluent Class (4th Quintile)
( World' Distribution)

The measurement of absolute poverty across countries has always been an clusive goal. Having established homogeneous PPP incomes, we can proceed to measure the numbers of people who fall below a standard income that provides "non-poverty" subsistence; or above a standard income that provides "middle-class" (or well-off) subsistence. At this stage of analysis, we set these standards arbitrarily by definition. As we will note later, however, there is nothing that precludes drawing the cut-off points by observation.

For purposes of comparison, we adopted Ahluwalia's (1974) cut-off point of income below US $75 (1971 values) which, adjusted to 1980 values and for purchasing power, is equivalent to PPP$ 355. Table 6 puts the poor in LDCs at 236 million, or 18.5 percent of the total LDC population. In the previous study, the poor in the eight countries that overlap with our sample (excluding Indonesia) represented 39.3 percent of these countries' population. This is a dramatic difference. What is constant, however, is India's paramount position at the poverty levels. With the 1969 data India held 76 percent of the total world's poor, the same share it holds in Table 6. However, while in Ahluwalia's study 67 percent of the Indian population was classified as poor, in our data it is only 27 percent. It turns out that the use of unadjusted per capita incomes in the previous studies resulted in too much emphasis being laid on a poverty superstar while dimming the importance of broadly-spread poverty.

The middle-class (well-off) income threshold was arbitrarily defined at PPP$ 1000. Table 6 indicates that 33 percent of the total LDC population enjoy incomes

Table 6

*LDC Global Distribution: The Poor and the Well off, 1980*

| Countries | Poor below PPP$ 355 | | | Above PPP$ 1000 | | |
|---|---|---|---|---|---|---|
| | Number of Poor (Million) | Percent of Total Poor | Percent of Country Population | Number (Million) | Percent of Total in the Group | Percent of Country Population |
| Bangladesh | 19.43 | 8.25 | 21.91 | 3.16 | 0.75 | 3.56 |
| India | 181.35 | 76.97 | 27.33 | 107.12 | 25.48 | 16.14 |
| Sri Lanka | 7.56 | 3.21 | 53.24 | 0 | 0 | 0 |
| Pakistan | 19.40 | 8.23 | 23.49 | 14.66 | 3.49 | 17.75 |
| Indonesia | 5 58 | 2.37 | 3.81 | 65.82 | 15.66 | 44.96 |
| Philippines | 1.74 | 0.74 | 3.62 | 26.46 | 6.30 | 55.01 |
| Brazil | 0.36 | 0.15 | 0.30 | 106.55 | 25.35 | 87.84 |
| Mexico | 0.02 | 0.01 | 0.03 | 61.58 | 14.65 | 88.73 |
| S Korea | 0.15 | 0.06 | 0.39 | 34.98 | 8.32 | 91.81 |
| **Global LDC** | **235 60** | **100.00** | **18.52** | **420.33** | **100.00** | **33.03** |

*Notes:* The cut-off point for poverty was defined as US$75 in 1971 prices. Using the mean PPP conversion ratio for LDCs (0.4) and expressing 1971 dollars in 1980 terms, the PPP dollar income for the definition of the poor class was found to be $355 per capita per year.

above that threshold. Not surprisingly, the middle-income LDCs that participated heavily in the world-affluent category have even larger shares of those populations that have crossed a "well-off" threshold, which represents about 2.5 times the poverty level.

The main conclusion drawn from this section is that poverty decreased substantially in conjunction with the increase in the numbers of the affluent and the well-off, which explains why in some cases inequality might have increased. Still, how seriously can one take the headcount of the poor? Obviously, the absolute number depends on the definition of the poverty line. The US $75 (1970) cut-off point was chosen, not out of conviction that it is the right number but, because it makes comparison with the World Bank estimates of the late 1960s possible.

The plausibility of the absolute count of the poor can be defended by considering the anatomy of a few extreme examples. Sri Lanka seems to have an unexpectedly high poverty level with 51 percent of its population in that group. Odd as it appears, this is not independent of the high relative income equality in the country. Had the distribution been more skewed, the headcount of the poor would probably have been smaller (Appendix Figure A 2). Errors in measurement may also explain Sri Lanka's performance. The country relies heavily on health and welfare instruments for poverty alleviation. Such types of subsidies are usually not captured in HIES. Finally, it is likely that the number of the poor has increased since 1979 when the main instrument for poverty alleviation, the food ration guarantee, was eliminated. The 1983 data may well reflect that change.

Is it plausible that the number of poor in Bangladesh and in Pakistan is the same, 19.4 million? Bangladesh, in this case, may have been the beneficiary of a statistical artifact. The HIES data refer to 1973-74 (as opposed to 1979 for Pakistan). By the 1980 base year, Bangladesh had grown at an average of 5 percent per year. On the assumption that the distribution remained invariant to the change in the mean, the whole distribution shifted to the right with the survey-year number of the poor declining by 5 percent annually. It is, therefore, important to obtain reliable HIES data at close reference points, and it is also important to determine empirically the exact relationship between GNP growth and the change in the parameters of the distribution. Panel data on HIES are necessary for this purpose.

## IV. CONCLUSIONS AND EXTENSIONS

This paper trod some common ground with the conventional literature on income distribution by first estimating measures of within-country relative inequality by using HIES grouped data. The contribution at this level has been the use of improved statistical methods that utilize all the information available in grouped data to estimate the parameters of the underlying population distribution. Next,

the distributions estimated were fitted on the 1980 per capita incomes of 14 countries after they were converted first to PPP dollars. The resulting national PPP distributions were then aggregated to produce global income distributions for DCs and LDCs. These global distributions are used for the purpose of carrying out cross-country comparisons of inequality, as well as for measuring the density of the distribution and the number of people at any arbitrary cut-off point of income.

As compared to the estimates with data from the 1960s, our estimates have substantially reduced the numbers of those in poverty. Part of the improvement is due to the factors mentioned earlier – data, techniques or trickling-down. The biggest component, however, is probably due to the adjustment for purchasing power which favours the lower-income countries. Had purchasing power been adjusted for socio-economic-class-specific prices as well, the improvement would have been greater.

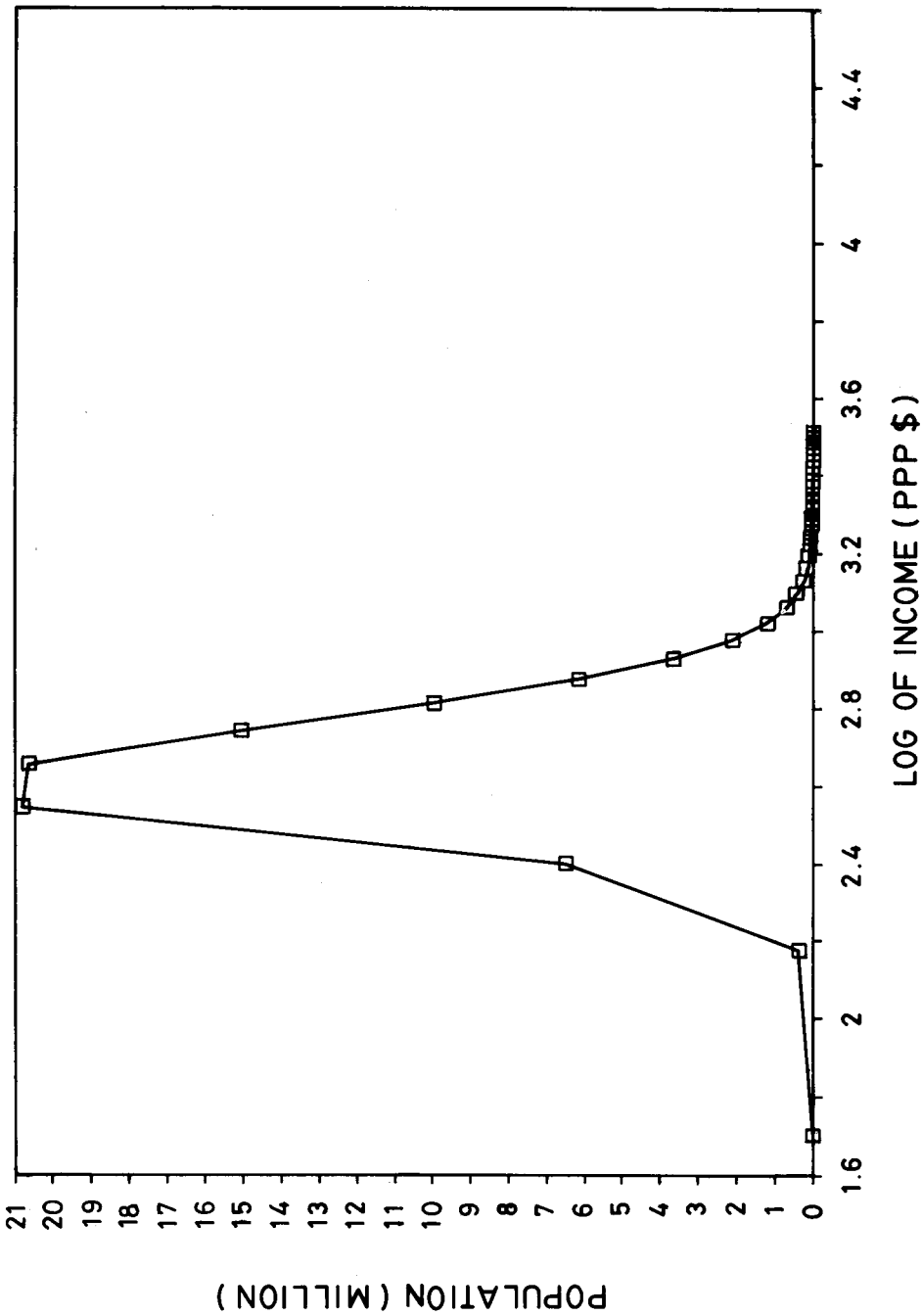
The estimates of the "affluent" population in the world distribution of income and of those who are above a cut-off point or for the "well-off" cannot be readily compared to earlier estimates. Still, they must come as a surprise. The LDCs in our sample has contributed 220 million population to the DCs 130 million population to constitute the "affluent" group in the world's income distribution (PPP$ 1600 to 5300). Moreover, 33 percent of the LDC population have crossed a "middle-class threshold" of PPP$ 1000, to be considered among the "well-off". One may debate whether economic development homogenizes the population of the three worlds. All the same, it certainly homogenizes the standard of living of the Third World elites to that of their peers in the First World.

One might be tempted to conclude that the decrease in poverty should be the end of the story and that it is immaterial whether income distribution in the process improves or deteriorates. In effect, the answer depends on the role that socio-economic classes play in the process of development. For example, is the fact that Brazil, Mexico and Korea have over 50 percent of their population in the "affluent" group uniformly good or bad for economic development? The "tricklers-down" would tend to believe the former. The structuralists, on the other hand, would be inclined to argue that affluence goes along with increased power to expropriate the rents of economic development for the benefit of a certain class, overall development is rendered more difficult. Is this, however, as likely to happen in Korea as it is in Brazil? The answer evolves around the way in which socio-economic classes interact with one another, in other words, whether a society is articulated or disarticulated. The relation between socio-economic classes and the degree of articulation of a development process can be formulated as testable hypotheses.

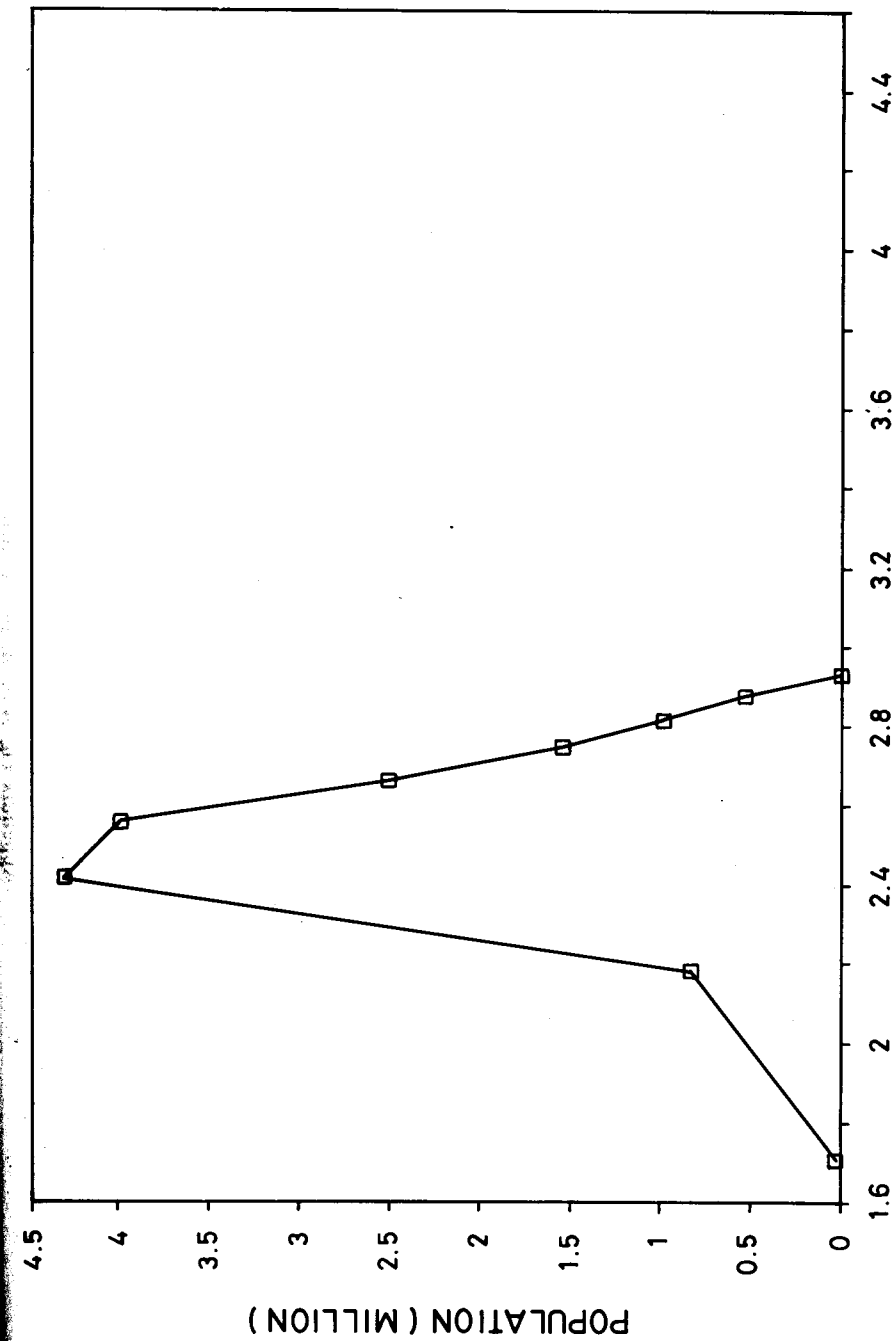
The class structure of a country is probably an important variable in determining the process of development. That it has not been rigorously defined is

probably related to the fact that its role has been largely ignored. Instead, distinctions between countries (colonialism, imperialism, etc.) have attracted major attention as the causes of underdevelopment. It is conceivable that if the role of the upper socio-economic classes is more closely examined, the answer to underdevelopment might be: "We have faced the enemy and it is us!"

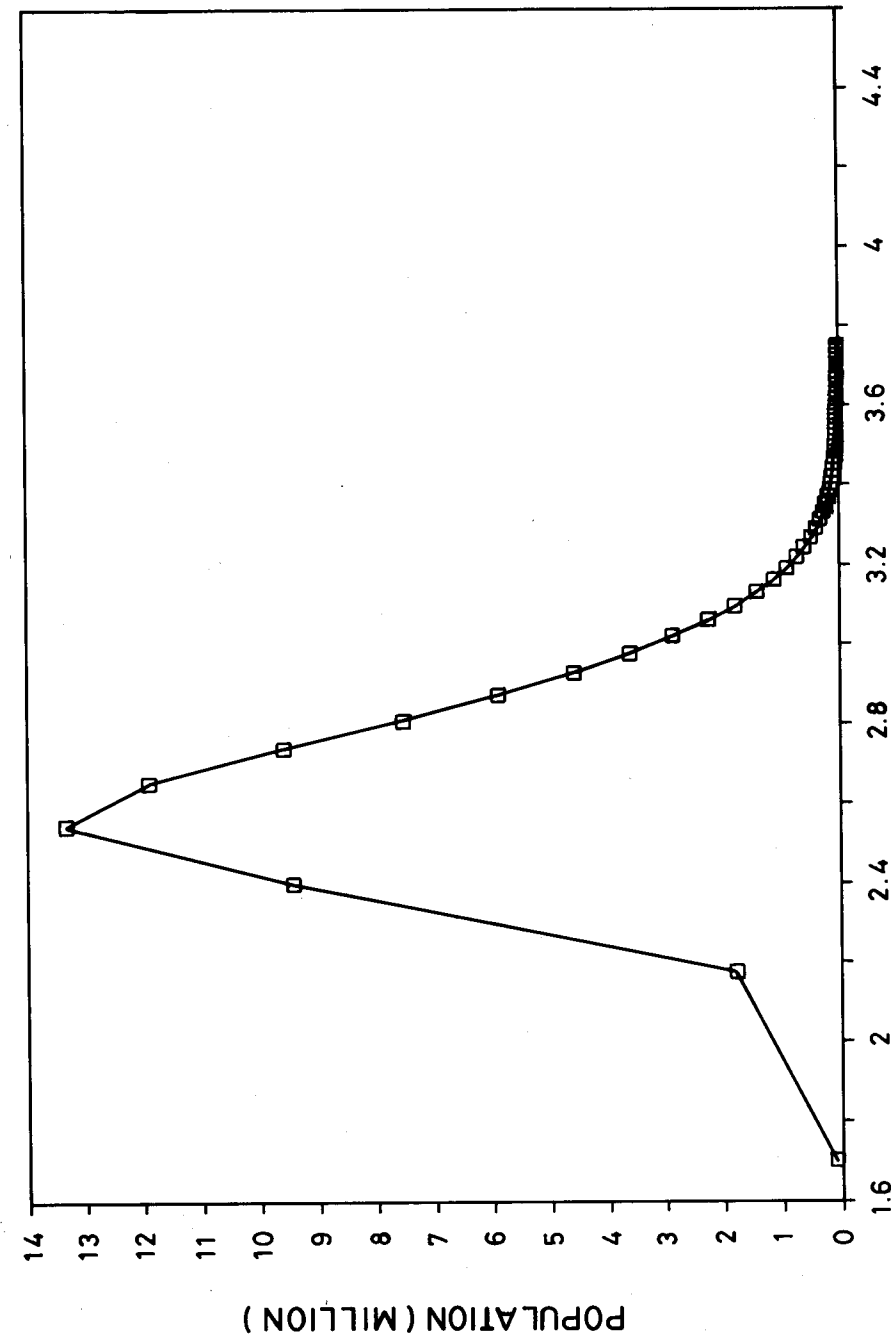
If class structure is really important, we cannot afford to measure it by arbitrary definition. If a class is a real construct, it should have some observable characteristics which make its role in economic development amenable to testing. The next stage of this research is to consider objective criteria that define the cut-off points (and the world socio-economic classes) which have universal applicability. The regularities observed in consumption behaviour, when mapped onto the distributions of income, would probably provide such objective reference points for measurement, Yotopoulos (1985).



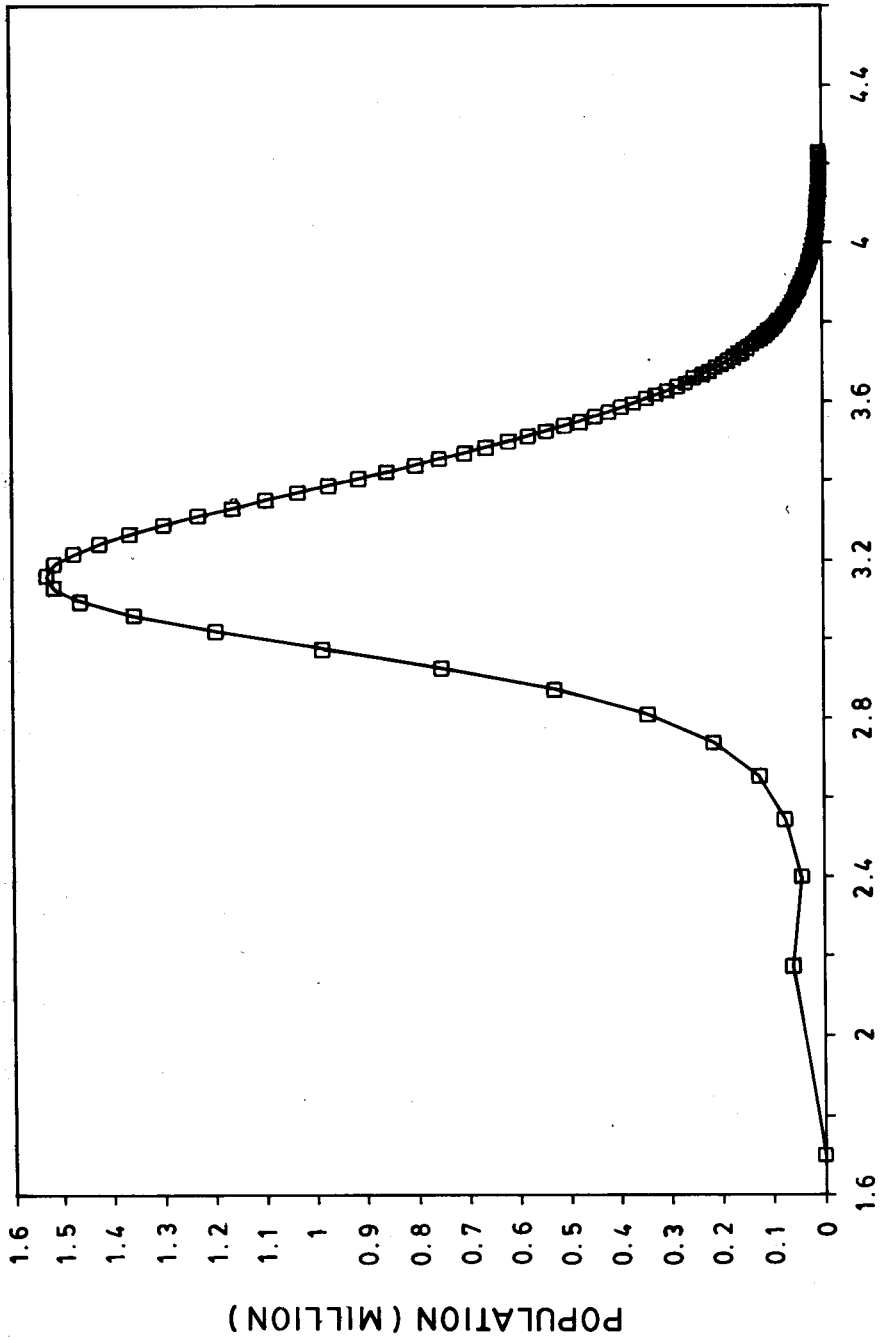

**Appendix Fig. A 1. Income Distribution : Bangladesh**




Appendix Fig. A 2. Income Distribution: Sri Lanka




**Appendix Fig. A 3. Income Distribution: Pakistan.**




**Appendix Fig. A 4. Income Distribution: Korea.**

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# Comments on "A 'World' Distribution of Income and of Real Poverty and Affluence"

One of the messages put before us with some force by Professor Yotopoulos's paper is that in studies of poverty the distinction between "rich" and "poor" countries can be very misleading. The level of the average income per capita in a country is only a crude yardstick; it hides a possibly wide disparity in incomes within the country. As the paper shows, groups of people in so-called rich countries may be poorer than groups in so-called poor countries. By itself this is not a new finding: any traveller can make this observation. But the paper indicates in quantitative terms to what extent the incomes of different countries overlap and lists the methodological problems that have to be overcome in the process. It is, in a way, ironical that one of the corrective measures that has been applied, viz. the "Kravis factor", is precisely related to countries' average income per capita.

The subject of the present Quaid-i-Azam lecture and the lively presentation by Professor Yotopoulos make my task of presenting comments a very light and pleasant one. In fact, there is the danger of being carried away and dwelling on ideas inspired by the lecture, which would be slightly beside the core-subject. The organizers of the conference have seen this danger and have wisely put a limit on the length of the comments that can be included in the proceedings. So I will restrict my remarks to matters relating directly to data, methodology and results.

First, I have a few questions which relate to both methodology and data used in the exercise. With respect to the definition of income there is the question whether the figures represent the distribution before or after taxes. The question is of particular importance in an international comparison including developed and developing countries, because these countries typically differ in terms of the composition of taxes. Generally speaking, in developing countries a relatively small proportion of collected taxes consists of direct taxes, whereas the inverse situation holds in developed countries. And, with strongly progressive direct tax rates in many countries in the latter group, the distribution after taxes is often considerably more equal than distribution before taxes. As the paper is concerned with the international distribution of real affluence and poverty, the preferred definition seems to be the one of income-after-taxes.

Another question in the same area is related to the conversion of domestic currency into nominal dollars. For this purpose the nominal exchange rate seems to be used. But this parameter is likely to lead to serious overvaluation of domestic currencies for countries characterized by a considerable measure of exchange control. Also, this matter is especially relevant in comparisons with developing and developed countries, as exchange control is, generally speaking, more severe in the latter group of countries than in the former.[1] As a result, the magnitude of the poverty problem in developing countries may be understated. We all know, of course, that equilibrium exchange rates are very hard, if not impossible, to estimate, but even the use of rates adapted into the right direction is probably to be preferred to the use of biased official rates.

As a side remark, it may be added that also for analytical purposes the U.S. dollar has lost its attraction as an international unit of account after it started to float, following the collapse of the Bretton Woods system in the early 1970s. Precisely in 1980, the year to which the exercise relates, the value of the dollar in currency markets *vis-a-vis* several European currencies and the yen had clearly lost contact with purchasing-power-parity indices. Application of the market exchange rate thus seems to have disadvantages, so that a correction may well be in order here also.

Now I come to some remarks on the results and conclusions of the paper. In passing, it can be mentioned that some of the findings are somewhat at odds with the impressions generated by other sources of information. For example, the proportion of the population below the poverty line in Bangladesh, according to the figures presented in Table 6, is lower than the corresponding percentage groups in India, Pakistan and Sri Lanka, where one would expect the outcome to be the other way round. Further, one wonders if the sample of countries in the exercise is sufficiently representative of the non-socialist world as a whole. For example, most of the developing countries covered are very large and African countries are not represented. Still, these and other comments of a similar nature only affect the major conclusion of the paper indirectly, if at all.

I want to use the remainder of the space allotted to me to dwell on this most important conclusion drawn from the exercise, which is that the poverty problem seems to be much less serious than earlier studies have suggested. Not only are there signs that relative within-country inequality has improved, also the number of people in absolute poverty comes out substantially lower than had been suggested earlier. Professor Yotopoulos gives several explanations for the much more optimistic picture of reality that is obtained in his analysis:

[1] The correction provided by the "Kravis factor" is, of course, of a different nature.

1980s exchange rates? The income surveys are for years quite different in terms of the relative exchange rates. It is not clear how the movements in exchange rates have controlled to isolate the real change in poverty lines in various countries.

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**Mahmood Hasan Khan**

# Comments on "A 'World' Distribution of Income and of Real Poverty and Affluence"

First of all I would like to say that it is an honour for me to be a discussant of the Quaid-i-Azam lecture so ably delivered by Professor Pan A. Yotopoulos. The topic of the lecture is of great interest, yet very little work has been done in this area in the past. Professor Yotopoulos has put in a tremendous amount of hard work to construct a world distribution of income. He provides us estimates of income inequality and poverty at country as well as at global levels. The estimation of world poverty using world income distribution, I think, is a pioneering work for which Professor Yotopoulos deserves to be congratulated.

I would like to offer some specific comments on the paper. My first comment deals with an interesting result of Table 4. We see in the table that the values of the Gini coefficients for global populations of the developing countries and the developed countries are much higher than the values for countries within these groups. This shows that income inequality at global level is much higher than at country level. This result is due to the fact that there are wide income disparities between countries and when these income disparities are added to internal income inequalities of the nations, the global income inequalities turn out to be in relatively large numbers. It would have been interesting if Professor Yotopoulos would have reported the income inequality for the world as a whole. I think that inequality in world income distribution would be higher than that reported for the groups of developing and developed countries.

My second comment is about the income recipient unit of the distributions of different countries. The income recipient unit is not the same for all countries. In most cases it is household but in some cases it is family or individual. It would have been very useful for the reader if the author would have explained how these income distributions, with different income recipient units, have been merged together to get a world income distribution with a common income recipient unit.

My third comment deals with the Kravis factor or coefficient which is used to obtain world income distribution in international dollars. What I have understood about this coefficient is that it takes cares of differences in prices of commodities in different countries. We know that prices of commodities are affected by indirect taxes in a country. We also know that in developing countries, indirect taxes

dominate in total tax revenue, while this is not the case in the developed countries. There, the major share of tax revenue comes from direct taxes. The Kravis coefficient will pick up the effects of indirect taxes in different countries but it will not capture the effects of direct taxes. Therefore, it is better to use disposable income, which takes into account direct taxes, rather than pre-tax income to construct world distribution of income.

Finally, I fully agree with the author when he says that there is a strong need to estimate a poverty line for each country separately. This is needed because each country has its own socio-economic structure. People of different countries can have different tastes and different consumption patterns. When Professor Yotopoulos accomplishes this task and includes more countries in his analysis, I am sure his results will become even more interesting and useful.

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