
THE PATTERN OF INCOME DISTRIBUTION IN THE WORLD : A STATISTICAL STUDY

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In the face of a growing disparity between "have" and "have not" nations, we have tried to measure the degree of inequality of income distribution among different countries in the world as well as within each continent and between continents. We have also tried to study the pattern of income distribution among countries with developed market, centrally planned and developing economies. The empirical findings have conformed to a great extent to the common belief¹ namely, that poverty – tends to be concentrated geographically, (i.e. the degree of inequality of income distribution is usually greater between continents than it is within each continent). Income was also found to be more evenly distributed among countries with advanced market economies than it is among countries with centrally planned and developing economies. Finally, comparison of growth rates of per capita GNP confirmed the belief that the gap between rich and poor nations will increase, *ceteris paribus*.

I- DATA LIMITATIONS

The study relies on figures of population, GNP and per capita GNP for 1971 published in the World Bank Atlas of 1973. As the report of the IBRD indicates, these data should be used cautiously, keeping in mind their limitations.

Many of these figures – particularly population and GNP estimates in less developed countries – are derived from incomplete or unreliable basic data and the conversion of GNP figures into a common currency, namely U.S. dollars, provides an additional source of error.

GNP per capita has been used as an indicator of level of development and welfare, although it is an inadequate measure for this purpose because GNP per capita can increase¹ – without any corresponding increase in well-being, (to use Meade's hypothetical example, low income receivers can simply be slaugh-

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tered). But this argument applies to all per capita indices as compared to overall indicators, and if this possibility is excluded, per capita figures remain a better measure of the state of welfare than total figures, although they reveal nothing about income distribution within each country.

However, the question remains whether per capita GNP is a good index of welfare. Assuming, other things to be equal, (by other things here we mean all non-economic and non-quantifiable factors affecting "total" welfare – using Pigou's terminology²) – per capita GNP would provide a rough approximation of economic welfare if it includes all goods and services actually available for consumption. Unfortunately this condition is not realized due to well-known theoretical and practical problems met in calculating GNP³.

In theory, GNP is defined as all final product, and we are faced with the problem of drawing a line between final and intermediate product. In practice, we are faced with a valuation problem especially for goods and services which are not exchanged in the market.

Intercountry comparisons are made more difficult by the following:

1. It is well known that national accounts for centrally planned (socialist) economies are compiled originally on the basis of the System of Material Product Balances (MPS) rather than the Standard U.N. System of National Accounts (SNA). The data published in the Atlas have been adjusted to bring the MPS accounts more into line with the SNA concepts. However, it should be kept in mind that even after such adjustments, in the absence of market conditions in the centrally planned economies, the internal cost and price relationships differ substantially from those of other countries with similar per capita GNP.
2. GNP per capita figures tend to overstate the differences in real income between developed and underdeveloped economies. In less developed countries, where a large subsistence sector still prevails, a wide range of goods and services available for consumption are left out of GNP estimates or, if included in these estimates, are undervalued. However, the bias is not all in favour of less developed countries. In developed countries, GNP tends

to be understated because of the treatment of durable consumer's goods as consumption rather than investment.

3. For purposes of international comparison, GNP estimates should be expressed in terms of some common numeraire and this conversion is the source of additional problems:

- a) Where full currency convertibility does not exist, it is extremely difficult to determine the appropriate exchange rate to be used.
- b) Where equilibrium exchange rates prevail, the conversion of GNP figures between currencies is biased because goods and services traded internationally and determining these exchange rates are not representative of the relationship between total goods and services produced within each country⁴.
- c) Another difficulty is due to an index number problem, namely, that the result is not the same whether, say, the Nigerian national product is valued in U.S. prices and compared with the U.S. product or whether the U.S. product is valued at Nigerian prices and compared with Nigerian estimates.

The GNP estimates included in the Atlas⁵ and used in this study are computed by expressing GNP in domestic currency in weighted average prices of the base period 1965-71 and then, converting these figures to U.S. dollars at a weighted average exchange rate for the base period in an attempt to reduce the affect of temporary fluctuations in exchange rates. The figures were adjusted for U.S. inflation between the base period and the current year and then divided by the mid-year population to derive per capita GNP. Note that the degree of accuracy and reliability of population figures varies in different countries and provides an additional source of error in comparing standards of living through comparison of per capita GNP.

Finally, in the absence of a more satisfactory basis for the study of the pattern of income distribution and the degree of inequality of standards of living in different countries, we have had to rely on GNP per capita estimates, bearing in mind the limitations of this index as an indicator of the level of economic welfare achieved by each country and the additional difficulties encountered in using these figures in international comparisons.

II- MEASUREMENT OF INEQUALITY OF INCOME DISTRIBUTION

The information contained in the Atlas was used to measure the degree of income inequality in the world as a whole, then within each continent and between continents; finally the pattern of income distribution was studied within three different groups of countries; namely advanced, centrally planned and developing economies.

A- Inequality of Income Distribution between Countries with a Population of One Million or More:

In all cases studied, the countries were arranged in ascending order of their per capita GNP. They were divided into groups with per capita income of the same order of magnitude and then the percentage of total population and of total GNP in each group was calculated. Finally, through linear interpolation we computed the percentages of income received by one-tenth of the world population living in the poorest countries. Similarly, using linear interpolation the percentages of income received by the other one-tenths were obtained. Table 1 gives the results of our computations for all countries with a population of one million or more. The total number of these countries was 124 in 1971.

Table 1

Distribution of World GNP between countries in 1971

Population decile	Percentage of GNP Received	Cumulative Frequency		
		Population %	GNP %	
Lowest	0.89	Lowest	10	0.89
2nd	1.19	"	20	2.08
3rd	1.40	"	30	3.48
4th	1.77	"	40	5.25
5th	1.82	"	50	7.07
6th	2.69	"	60	9.76
7th	4.88	"	70	14.64
8th	14.37	"	80	29.01
9th	25.22	"	90	54.23
Highest	45.77		100	100.00

According to this table, the one-tenth of the world population living in the richest countries received 45.77% of total world GNP, while the other nine-tenth received 54.23%. Only 0.89% of this income went to the one-tenth of world population in countries with the lowest per capita GNP.

The concentration ratio is frequently used as a measure of income inequality.⁶ Unlike the presentation in Table 1, this coefficient has the advantage of expressing the degree of inequality in one figure. Theoretically the concentration ratio can take any value between zero and one. The two extreme values zero and one, are very unlikely to occur, because zero is obtained when everybody's income is equal and one is obtained in the impossible case that all income accrues to one person only. The larger this ratio, the greater is the degree of inequality of income distribution. The concentration ratio computed for the preceding figures was found to be as large as 0.647.

Finally, the information contained in the last two columns of Table 1 can be diagrammatically presented by what is referred to as the Lorenz curve, which is obtained by plotting the cumulative percentage of GNP against the cumulative percentage of population (see Figure 1). The configuration of the curve reflects data of the last two columns in Table 1, while the area between the curve and the line of equal distribution (the diagonal in the figure) is proportionate to the corresponding concentration ratio. It is known that greater equality in income distribution is indicated by a closer proximity of the Lorenz curve to the diagonal.

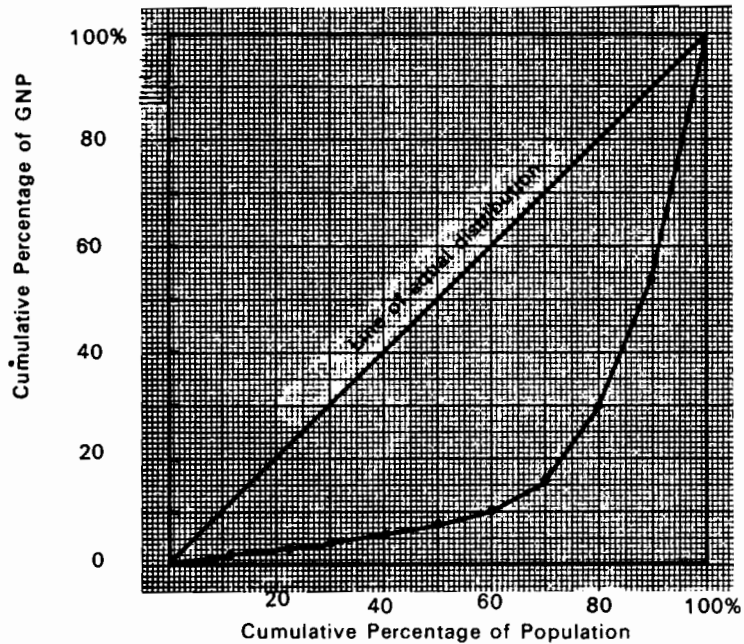


Figure 1 : Lorenz Curve for all countries with population of 1 million or more

B- Pattern of Income Distribution within each Continent and Between Continents:

1- Income Distribution within each Continent

The same kind of computations, applied to countries within each continent,⁷ gave the relative shares of GNP received by the population in groups of countries with different per capita income levels shown in Table 2. The relative share of GNP received by each 10% of ranked population was obtained – as mentioned previously – through linear interpolation. The shares obtained by several consecutive **deciles** of population in some continents were found to be equal for the following reasons:

- a) In each continent there are highly populated countries (e.g. The People's Republic of China and India in Asia, USSR in Europe, USA in North America, Mexico in Central America, Brazil in South America, Indonesia in Oceania) each of which includes more than 20% of the total population of the continent.
- b) The whole population within each individual country was treated as if it had the same per capita income.

Table 2
Percentage Share of GNP received by each Ten Per Cent
of Ranked Population in each Continent in 1971

Population Decile	Percentage Share of GNP received in						
	Africa	Asia	Europe	North America	Central America	South America	Oceania & Indonesia
Lowest	3.4	3.0	3.0	8.3	3.5	5.0	2.0
2nd	3.8	4.2	5.5	10.1	6.0	6.5	2.0
3rd	4.8	4.2	6.5	10.2	7.7	7.9	2.0
4th	5.8	4.3	7.7	10.2	9.4	7.9	2.0
5th	6.3	5.8	7.7	10.2	10.9	7.9	2.0
6th	7.2	6.0	9.2	10.2	10.9	7.9	2.0
7th	9.8	6.0	10.8	10.2	10.9	8.1	2.0
8th	11.7	6.0	13.3	10.2	10.9	10.2	2.0
9th	15.0	8.6	17.3	10.2	10.9	17.7	12.3
Highest	32.2	51.9	19.0	10.2	18.9	20.9	71.7

The concentration ratios computed on the basis of the figures shown in the previous table were found to be as follows:

Table 3
Concentration Ratios and Weighted Average Per Capita
GNP for each Continent and for all Continents in 1971

Continent	Concentration Ratio	Weighted Average p.c. G.N.P. (US\$)
Africa	0.385	223
Asia	0.488	274
Europe	0.271	1827
North America	0.017	5063
Central America	0.193	641
South America	0.234	584
Oceania & Indonesia	0.699	396
All Countries	0.544	911

These estimates point to the fact that the degree of disparity of income levels is generally smaller within each continent than it is between continents and in the world as a whole where the concentration ratios reach 0.544 and 0.647 respectively. The

only exception to this is the case of Oceania and Indonesia which include densely populated Indonesia with its population of over 119 million and its per capita GNP of as little as \$ 80 a year side by side with sparsely populated Australia and New Zealand with a total population of less than 16 million and per capita income reaching \$ 2870 and \$ 2470 respectively. These coefficients also show that income distribution within the continents with lowest per capita income (Africa, Asia, Oceania and Indonesia) is less equitable than in richer continents.

The degree of dispersion of per capita income of different countries around the mean income in each continent and in all continents, and the frequency distribution of countries classified by per capita GNP within each continent were also studied. The range, average, median, mode and standard deviation of per capita GNP within each continent between continents and for all countries were calculated for this purpose.

The median and modal values have been computed because the mean value of per capita GNP, being sensitive to extremely large or extremely small values of GNP per head, may not represent a typical level of income and may therefore be misleading. The median per capita GNP is the value of per capita GNP equaled or exceeded by half the countries considered. In the case of a central pair of countries, the average of their per capita GNP was taken to represent the median. The mode represents the level of GNP per head around which the countries tend to concentrate. It is therefore the most typical value. To compute it, the countries were subdivided into groups with per capita GNP falling within a certain range; then the modal group (which included the biggest number of countries) was determined and then, through linear interpolation, the modal value of GNP per head was calculated. The results of the computations were as follows:

Table 4
Range, weighted average, mean, median, mode and standard deviation of per capita GNP of different countries and Pearson's measure of skewness within each continent, between continents and for all countries in U.S. \$

Continents	No. of observations	Lowest p.c. GNP	Highest p.c. GNP	Range	Weighted Average	Mean	Median	Mode	Standard Deviation	Pearson's measure of Skewness ⁸
Africa	53	60	1450	1390	223	256	180	126	249.5	0.521
Asia	41	70	3860	3790	274	612	260	86	874.9	0.601
Europe	35	340	4240	3900	1827	1943	1870	1188)	1000.9	—
North America	2	4140	5160	1020	5063	4650	4650	—	—	—
Central America	28	120	3800	3680	641	964	615	485	957.4	0.500
South America	13	190	1230	1040	584	625	480	480	328.1	0.442
Oceania & Indonesia	16	80	3090	3010	396	1059	465	151)	1090.3	—
All Continents	7	256	4650	4394	911	1444	964	750	1398.0	0.496
All Countries	188	60	5160	5100	911	894	390	123	1055.4	0.731

Comparing unweighted mean income within each continent to the corresponding weighted average per capita GNP (the weights used being the size of population in each country), it appears that the latter is much smaller than the former in Asia, Central America and particularly Oceania (which here includes Indonesia) pointing to the fact that these continents include heavily populated countries with low per capita income side by side with countries with a very high per capita income and a relatively small population. North America, unlike all other continents, had a weighted per capita GNP larger than the unweighted mean. This was due to the fact that the U.S.A., with a per capita GNP higher than that of Canada, also has a much larger population.

Table 4 also shows that the mean per capita GNP (as well as the weighted average per capita income) is higher than the median which is, in its turn, greater than the modal value of per capita GNP in Africa, Asia, Central and South America as well as for all countries. The reason for this is that the arithmetic mean is influenced by the value of per capita GNP in each country, and the presence of a few countries with a high level of income per head increases the value of the mean income in each continent. These countries, however, have no more effect on the median income per head than have the same number of countries with any income per head greater than the median (—as the median is sensitive to the position of the values but not to their size). Finally, the mode is not at all affected by the extreme values. These results indicate that the frequency distribution of countries classified by per capita GNP within each of these continents and in the world as a whole tends to be positively skewed — i.e. that the greater number of these countries have per capita incomes which cluster around values less than the mean value of GNP per capita head in the previously mentioned continents and in the world as a whole.

The frequency distribution of countries classified by GNP per head in Europe seems to have two humps as these countries tend to concentrate within two ranges of per head, namely \$ 1001 — 1500 and \$ 2001 — 2500. The calculations of North America have been omitted as the continent includes only two countries and they are among the countries with the highest per capita GNP in the world. Finally, Oceania (with Indonesia)

includes very poor countries side by side with relatively rich ones (as reflected by the high range and standard deviation highest per capita GNP in the world. Finally, Oceania (with Indonesia) includes very poor countries side by side with relatively rich ones (as reflected by the high range and standard deviation of per capita income) with little tendency for per capita GNP to be concentrated around the mean per capita income for the whole continent or any other typical value (see Appendix 1)

The standard deviations, in Table 4, indicate that the dispersion of per capita GNP around its mean value is highest in Oceania and Indonesia, in Europe and for all continents and all countries and is lowest in Africa and South America.

The results in the previous table also show – as expected – that poverty is concentrated mainly in Africa and Asia. In Asia however, a few rich countries (Japan, some Arab oil-producing countries, Israel, with per capita GNP exceeding \$ 2000 a year) present a strong contrast with very poor neighbours (Bangladesh, Burma, Afghanistan, Yemen, Sri Lanka, India with per capita GNP around \$ 100 and less) and show a considerable maldistribution of income among countries within the continent. This differs with Africa which includes the poorest countries of the world and where GNP per head in each country – with the exception of Libya – is less than \$ 1000 a year. Comparison of the per capita GNP range and standard deviation for both Africa and Asia shows greater dispersion of income in the latter. This disparity of levels of income per head was also reflected by the concentration ratio which was found to be as large as 0.488 in Asia while it was only 0.385 for Africa.

Finally, the last column of Table 4 gives Pearson's measure of skewness. For Africa this measure is 0.521. This suggests that the mean per capita GNP is larger than the mode by an amount equal to 52.1% of the standard deviation. For Asia, the difference between the mean and the modal value of per capita GNP reaches 60.1% of the standard deviation which confirms the results already mentioned, namely, that most of the countries in Africa are poor, unlike in Asia where rich countries contrast with very poor neighbours with a smaller tendency for per capita income in individual countries to be concentrated around the mean level of income per head of the continent. The case of South America

resembles that of Africa, i.e. the disparity between the standard of living of different countries is not as large as it is in Asia and the most typical level of per capita income is close to the mean GNP per head for the continent (44.2% of the standard deviation). In Central America, the exceptionally high income per head of a few countries (e.g. Virgin Islands, Bermuda, ...) increases the range and standard deviation of per capita GNP within this continent and affects the mean income per head which explains its relatively high deviation from the modal value of GNP per capita.

2- Income Distribution between Continents

The concentration ratio between continents shown in Table 3 was computed after ranking continents in ascending order according to the level of per capita GNP given in the third column of the same table and calculating the percentage of income accruing to each decile of population through linear interpolation. The following table shows the percentages thus obtained and the cumulative frequencies of population and GNP.

Table 5
Distribution of World GNP between Continents in 1970

Population decile	Percentage of GNP received	Cumulative Population %	Frequency GNP %
Lowest	2.5	Lowest 10	2.5
2nd	3.0	" 20	5.5
3rd	3.0	" 30	8.5
4th	3.0	" 40	11.5
5th	3.0	" 50	14.5
6th	3.0	" 60	17.5
7th	5.0	" 70	22.5
8th	15.3	" 80	37.8
9th	20.1	" 90	57.9
Highest	42.1	100	100.0

As already mentioned, the concentration ratio computed from figures in Table 5 was found equal to 0.544. This coefficient is higher than the corresponding coefficient for each continent taken separately, with one exception, namely that of Oceania and Indonesia – as shown previously. This indicates that the disparity of income distribution between continents is larger than

it is within each continent. However, this coefficient is smaller than the one obtained for all countries ranked according to their per capita GNP without grouping them in different continents and which was found to be as high as 0.647. This difference between the two coefficients is explained by the fact that each continent (even the poorest among them: Africa and Asia) includes, side by side, rich and poor countries. This decreases the disparity between per capita GNP in the richest continent (North America with per capita GNP of \$ 5063) and in the poorest continent (Africa with GNP per head of \$ 223), compared to the disparity between richest and poorest countries of the world (e.g. U.S.A. with per capita income of \$ 5160 and Rwanda with income per head as little as \$ 60).

The configuration of the Lorenz curves drawn for different continents and for all countries in Figure 2 illustrates that the maldistribution of income between continents is smaller than it is between different countries.

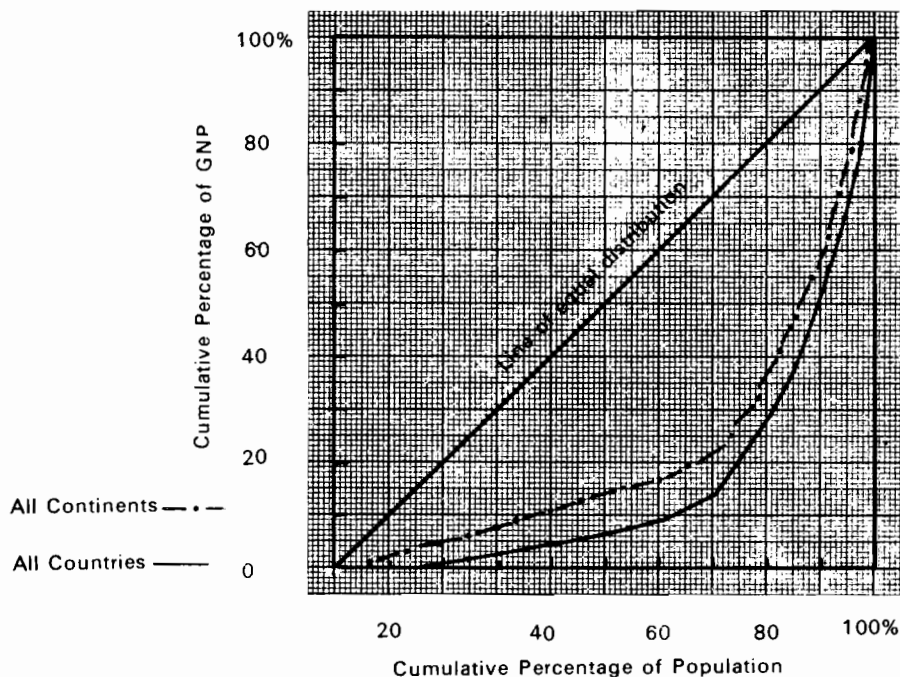


Figure 2: Lorenz curves for all countries and for all continents.

C- Pattern of Income Distribution between Developed Market Economies, Centrally Planned and Developing Economies.

Calculating the cumulative frequency distribution of both population and GNP in developed market economies, centrally planned and developing economies¹⁰, and applying the same procedure as before, we obtained the results shown in Table 6.

Table 6
Cumulative Frequency Distribution of Population and GNP in Developed Market, Centrally Planned and Developing Economies

Population decile	Percentage of GNP received in			Population %	Cumulative Frequencies		
	Developed Market Economies	Centrally Planned Economies	Developing Economies		Developed Economies	Centrally Planned Economies	Developing Economies
Lowest	1.9	2.8	3.4	10	1.9	2.8	3.4
2nd	4.8	3.1	3.5	20	6.7	5.9	6.9
3rd	6.6	3.1	4.9	30	13.3	9.0	11.8
4th	7.3	3.1	4.9	40	20.6	12.1	16.7
5th	8.3	3.1	4.9	50	28.9	15.2	21.6
6th	10.4	3.1	5.2	60	39.3	18.3	26.8
7th	11.3	4.7	8.3	70	50.6	23.0	35.1
8th	15.9	21.3	12.1	80	66.5	44.3	47.2
9th	16.7	26.1	18.6	90	83.2	70.4	65.8
Highest	16.8	29.6	34.2	100	100.0	100.0	100.0

This table shows that the 10% of people living in the poorest countries with developed market economies get a lower percentage share of GNP than the corresponding decile living in centrally planned and developing economies. However, the percentage share of GNP received by population deciles living in the middle income countries of the first group is higher than the share of corresponding percentages of population living in the other two groups of economies. Finally, the share of deciles of population living in the richest countries of the more developed group is relatively smaller than in the other groups. This indicates that income distribution between countries with advanced market economies is generally less uneven than between countries with centrally planned and developing economies. The configuration of the Lorenz curves for the three groups of countries of countries depicts these results.

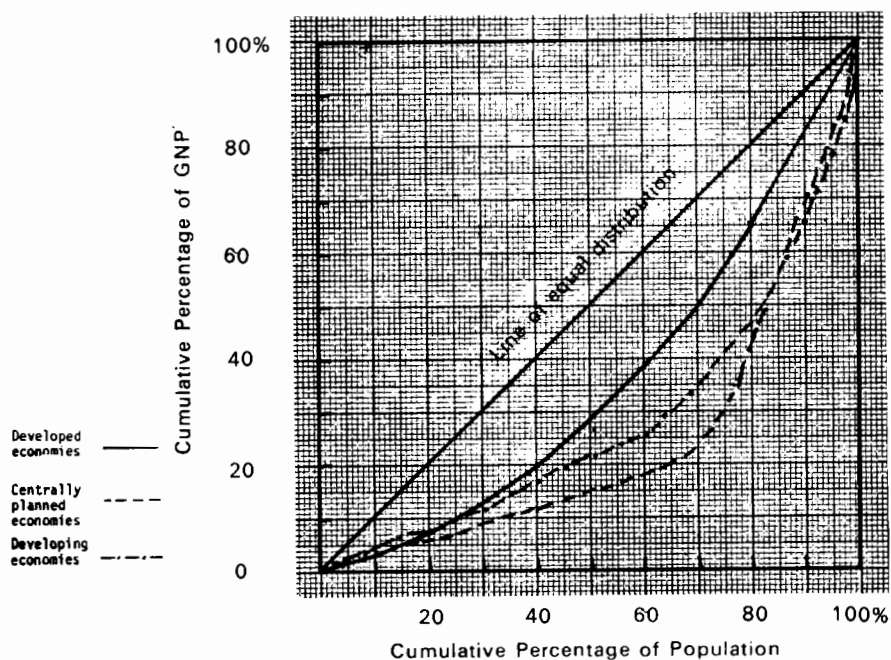


Figure 3: Lorenz curves for developed, centrally planned and developing countries

Using the cumulative frequencies in the previous table, the concentration ratios were computed and were found to be as follows:

Table 7

Concentration ratios in the three groups of countries

Groups of Countries	Concentration Ratios
Developed market economies	0.288
Centrally Planned economies	0.498
Developing economies	0.429

The values of these concentration ratios indicate that income is more evenly distributed between countries with advanced market economies than it is between countries with centrally planned and developing economies and that the degree of disparity of income distribution in the latter group is somewhat smaller than in the group of centrally planned economies.

The comparison of weighted and unweighted average per capita GNP – see Table 8 – shows that in developed market economies, the population living in countries with income per capita above the median income per head in the group is greater than the number of people living in countries with income per head less than the median income – and this explains why the weighted average income per head is larger than the unweighted average. The reverse occurs in the centrally planned and developing economies where the population in relatively low income countries is larger than the population living in high income countries of the same group. This is reflected in the fact that the weighted average per capita income is smaller than the unweighted average.

Table 8

Range, weighted average, mean, median, mode and standard deviation of per capita GNP of different countries and Pearson's measure of skewness within each continent, between continents and for all countries (in US.\$)

Group of Countries ¹¹	No. of observations	Lowest p.c. GNP	Highest p.c. GNP	Range	Weighted Average	Mean	Median	Mode	Standard Deviation	Pearson's measure of Skewness ⁸
Developed Market Economies	23	340	5160	4820	3088	2528	2550	2572	1193.2	-0.037
Centrally Planned Economies	14	100	2190	2090	535	893	735	500	700.9	0.561
Developing Economies	87	60	2190	2130	233	363	250	88	383.4	0.717

Table 8 also shows that the dispersion of per capita GNP of countries with advanced market economies is greater than in the other two groups of countries. Finally, Pearson's measure of skewness for the first group of countries is negative and equal to -0.37 ; this means that the frequency distribution of countries classified by per capita GNP within the group of developed market economies is slightly skewed to the left, i.e. per capita GNP for these countries tends to concentrate around a value higher than the mean income per head for the group by an amount equal to 3.7% of the standard deviation. In contrast, the frequency distributions of countries ranked according to GNP per head within centrally planned and developing economies are positively skewed and the most typical value of GNP per head within each of these groups (the mode) exceeds the mean income per head for the group by an amount respectively equal to 56.1% and 71.7% of the standard deviation.

The percentage of world population in each group of countries and the percentage of world GNP accruing to each group were, in 1971, as follows:

Table 9

Percentage of world population and GNP in developed, centrally planned and developing economies in 1971.

Group of countries	Percentage of population	Percentage of of GNP
Developed	20.3	76.6
Centrally Planned	32.8	21.5
Developing	46.9	1.9
Total	100.0	100.0

This table shows the extent of maldistribution of income between the three groups. While 20.3% of the world population lives in developed market economies enjoying 76.6% of the world GNP only 1.9% of this GNP went to 46.9% of world the population living in developing economies, and centrally planned economies have 32.8% of the world population and get 21.5% of the world income.

D- Future Growth Trends of Per Capita GNP in Developed Market Economies, Centrally Planned and Developing Economies.

Comparing per capita GNP in the three groups of economies, it appears that, in 1971, the weighted average per capita GNP in the developed market economies group was more than thirteen times larger than the weighted average per capita GNP in developing economies and this, in turn, did not reach half the average per capita GNP in centrally planned economies. In addition, the income distribution within the two latter groups is more uneven than in the former group. These results give a rough indication of the degree of poverty of the poor, especially in developing economies, as compared to the average standard of living in developed market economies, and these disparities are expected to go on growing, if we assume that the growth rates of per capita GNP prevailing in the three groups of countries, over the period 1960-71, were to continue.

Average growth rates of per capita GNP and of population in the three groups of countries for the periods 1960-71 and 1965-71, were found to be as follows:

Table 10
Average annual growth rates of GNP and Population during the periods 1960-71 and 1965-71

Group of countries	GNP per capita Rates %		Population Growth Rates %	
	1960-71	1965-71	1960-71	1965-71
Developed Market economies	4.12	4.10	1.15	1.07
Centrally Planned economies	4.18	4.40	1.51	1.44
Developing economies	2.51	2.48	2.61	2.57
All Countries	3.00	3.00	2.22	2.16

The analysis of variance, applied to the annual growth rates of GNP per capita in individual countries within these three groups and between these groups, showed that the observed differences in growth rates of per capita GNP of countries with

developed and centrally planned economies were not statistically significant at the 99% level of confidence, but that these rates were significantly higher than annual growth rates of per capita GNP in developing countries for both periods considered. Applying the analysis of variance to the population growth rates in countries within and between the three groups, it was found that the observed differences in population growth rates of countries with developed market economies and centrally planned economies were not statistically significant at the 99% level of confidence, but that these growth rates were significantly lower than population growth rates in developing countries over the two periods, 1960-71 and 1965-71.

These findings confirm the common belief that, *ceteris paribus* the gap between material well-being in developed and centrally planned economies on the one hand and the developing economies on the other will continue to increase. In addition, the present rate of growth of GNP per head is more difficult for developing economies to sustain than it is for the other two groups of countries because GNP has to grow faster than it does in developed and centrally planned economies in order to counter-balance a faster population growth.

III- CONCLUDING REMARKS

Summing up our empirical results, it was found that the disparity of income distribution within each continent is generally smaller than between continents and that the disparity of income distribution between countries in the world as a whole is even larger than it is between continents. These findings point to the fact that poverty tends to be concentrated geographically; mainly in Africa, Asia, Oceania and Indonesia, where the weighted average GNP per capita was, in 1971, less than \$ 400.

We also found – in conformity with the general pattern of income distribution, which is believed to be less equitable in developing countries than in developed countries, – that the maldistribution of income is greatest in continents with low per capita GNP (see Table 3 which shows that the concentration ratios in Africa, Asia and Oceania and Indonesia are higher than in the other continents where per capita GNP is higher on the average).

Comparing the patterns of income distribution between developed market economies and between countries with centrally planned and developing economies, it was found that this pattern is less equitable for countries falling within the latter two groups than it is for countries within the former group. It appeared that the gap between standards of living in developing countries and in both centrally planned and developed countries is likely to increase if the growth rates prevailing over the periods 1960-71 and 1965-71 were to continue.

Even if we assume that the growth of per capita GNP were to stop in countries with centrally planned and developed market economies, it will take the developing economies around one-hundred and three years of growth at the present average rate to achieve the average 1971 standard of living in the developed market economies and around thirty-three years to reach the average standard of living in the centrally planned economies. We may also say that per capita GNP in developing countries will have to grow at an average annual rate of 8.9% and 2.9% in order to reach the average standard of living achieved in 1971 in developed market economies and in centrally planned economies, respectively, by the year 2000.

It is too optimistic and even unrealistic to think that if economic growth is accelerated in some parts of the world, economic well-being will sooner or later be spread around to all nations. On the contrary, one would expect income distribution between nations to become more uneven and unequitable. Instead of trying to increase economic welfare or any of its modern indicators in developing countries, we may approach the problem differently by trying to decrease, as much as possible, human hardships; the reason being that while it is difficult to define welfare, the causes for human suffering are very concrete and might be ascribed to hunger, disease, unemployment, poverty, illiteracy,...

It has been suggested¹² that this way of looking at the problem of decreasing the disparities between the standard of living in rich and poor nations may be the basis for setting up a new international economic order aimed at decreasing to the minimum human sufferings and guiding rich nations towards a new way of life. It has also been suggested that this philosophy may lead to some fundamental economic principles of practical interest,

namely:

- 1- Abolishing absolute poverty by determining a minimal income for all people in the world.
- 2- Establishing an upper bound to income for the richest people in the world so that they will not be allowed to increase their wealth as long as everybody does not get the essentials of life.
- 3- Finding appropriate channels to transform savings of the richer nations into income for the poorer. Two methods are being applied now: (a) Regulation of the world market and increasing the relative prices of goods and services exported by the poor countries. The most successful example of such regulation is the policy followed by the OPEC during the past few years which led to huge capital transfers from rich to poor countries reaching at least double the modest and yet unachieved goal suggested by the U.N. of allocating 1% of the national income of advanced countries to economic aid. (b) Free transfer of purchasing power or of goods through more economic aid.

Such action will benefit both "have" and "have not" nations, as it is in the interest of richer nations to avoid unrest and instability in the world due to maldistribution of income.

Appendix 1

Frequency Distributions of Countries Classified by GNP Per Capita within each Continent and for the World as whole

Table A-1

Per capita GNP in African Countries

Per capita GNP (in US\$)	Number of countries		
1- 100	14	801- 900	1
101- 200	16	901-1000	1
201- 300	10	1001-1100	0
301- 400	7	1101-1200	0
401- 500	1	1201-1300	0
501-600	0	1301-1400	0
601- 700	2	1401-1500	1
701- 800	0		
		Total	53

Table A-2
Per capita GNP in
Asian Countries

Per capita GNP (in US\$)	Number of countries
1- 50	0
51- 100	10
101- 150	6
151- 200	1
201- 250	3
251- 300	3
301- 350	1
351- 400	3
401- 450	3
451- 500	0
501 - 550	1
551- 600	0
601- 650	1
651- 700	1
851- 900	1
1151-1200	1
1351-1400	1
2101-2150	1
2151-2200	1
2351-2400	1
3101-3150	1
3851-3900	1
Total	41

Table A-3
Per capita GNP in
European Countries

Per capita GNP (in US\$)	Number of Countries
1-500	2.
501-1000	5
1001-1500	8
1501-2000	3
2001-2500	7
2501-3000	3
3001-3500	5
3501-4000	1
4001-4500	1
Total	35

Table A-4
Per capita GNP in
Per capita GNP in Central
American Countries

Per capita GNP (in US\$)	Number of Countries
1- 300	3
301- 600	11
601- 900	6
901-1200	2
1201-1500	1
1501-1800	0
1801-2100	1
2101-2400	1
2401-2700	0
2701-3000	1
Over 3000	2
Total	28

Table A-5
**Per capita GNP in South
 American Countries**

Per capita GNP (in US\$)	Number of Countries
1– 300	2
301– 600	5
601– 900	3
901–1200	2
1201–1500	1
Total	13

Table A-6
**Per capita GNP in
 countries in Oceania and
 Indonesia**

Per capita GNP (in US\$)	Number of Countries
1– 100	1
101– 200	3
201– 300	1
301– 400	2
401– 500	3
801– 900	1
2001–2100	1
2401–2500	1
2601–2700	1
2801–2900	1
3001–3100	1
Total	16

Table A-7
**Per capita GNP in all
 countries of the world**

Per capita GNP (in US\$)	Number of Countries		
1- 100	25	2301-2400	2
101- 200	27	2401-2500	3
201- 300	20	2501-2600	1
301- 400	24	2601-2700	2
401- 500	13	2701-2800	1
501- 600	3	2801-2900	1
601- 700	7	2901-3000	1
701- 800	7	3001-3100	1
801- 900	7	3101-3200	3
901-1000	3	3201-3300	1
1001-1100	4	3301-3400	2
1101-1200	3	3401-3500	1
1201-1300	2	3601-3700	1
1301-1400	3	3701-3800	1
1401-1500	3	3801-3900	1
1501-1600	1		
		4101-4200	1
1801-1900	3	4201-4300	1
2001-2100	1	5101-5200	1
2101-2200	6		
2201-2300	1		
		Total	188

Appendix 2

Gross National Product and Population in 1971, average annual growth rates of per capita GNP and Population (1960-71 and 1965-71) in Developed Market Economies, Centrally Planned Economies and Developing Economies.

Table A-8

Per capita GNP, Gross National Product, Population and average annual growth rates in Developed Market Economies with a population of 1 million or more.

No.	Country	GNP Per Capita (in US\$)	GNP (in US\$ million)	Population (000)	Growth Rates %			
					GNP per capita		Population	
					1960-71	1965-71	1960-71	1965-71
1.	Turkey	340	12,160	36,160	3.7	4.0	2.5	2.5
2.	Portugal	730	7,050	9,716	5.3	5.3	0.9	0.9
3.	South Africa	810	18,360	22,740	2.8	2.2	3.0	3.1
4.	Spain	1,100	37,430	34,003	5.6	4.9	1.1	1.1
5.	Greece	1,250	11,230	8,975	6.7	6.4	0.7	0.8
6.	Ireland	1,510	4,490	2,970	3.6	4.1	0.5	0.6
7.	Italy	1,860	100,440	54,078	4.4	4.6	0.8	0.8
8.	Japan	2,130	222,520	104,660	9.6	10.4	1.1	1.1
9.	Austria	2,200	16,390	7,460	4.1	4.7	0.5	0.4
10.	U.K.	2,430	135,940	55,910	2.2	1.8	0.6	0.5
11.	New Zealand	2,470	7,050	2,850	2.1	1.6	1.7	1.3
12.	Finland	2,550	11,920	4,680	4.0	4.6	0.6	0.3
13.	Netherlands	2,620	34,600	13,190	3.9	4.2	1.3	1.2
14.	Australia	2,870	136,540	12,730	3.2	3.3	1.9	1.9
15.	Belgium	2,960	28,710	9,710	4.2	4.5	0.6	0.4
16.	Norway	3,130	12,220	3,900	4.1	3.7	0.8	0.8
17.	Fed. Rep. of Germany	3,210	196,980	61,290	3.7	4.2	0.9	0.7
18.	France	3,360	172,370	51,250	4.6	4.9	1.0	0.8
19.	Denmark	3,430	17,020	4,960	3.9	3.9	0.7	0.7
20.	Switzerland	3,640	22,990	6,320	2.7	2.8	1.4	1.1
21.	Canada	4,140	89,320	21,600	3.8	3.4	1.8	1.6
22.	Sweden	4,240	34,380	8,110	3.6	3.0	0.8	0.8
23.	U.S.A.	5,160	1068,380	207,050	3.0	1.9	1.2	1.1
	Total		2,298,390	744,312				

Table A-9
Per capita GNP, Gross National Product, Population and average growth rates in Centrally Planned Economies with population of 1 million or more.

No.	Country	GNP per Capita (in US\$)	GNP (in US\$ million)	Population (000)	Growth Rates %			
					GNP per capita		Population	
					1960-71	1965-71	1960-71	1965-71
1.	Vietnam, Dem. Rep. of	100	2,600	21,600	3.0	2.7	2.7	2.1
2.	China, Peoples Rep. of	160	128,900	787,180	2.6	2.6	1.8	1.8
3.	Korea, Dem. Rep. of	320	4,500	14,280	5.1	4.5	2.7	2.8
4.	Mongolia	380	480	1,280	-0.8	1.4	3.0	2.9
5.	Albania	480	1,070	2,230	5.8	4.8	2.9	3.1
5.	Cuba	510	4,390	8,575	-1.2	-1.6	2.1	1.9
7.	Yugoslavia	730	15,180	20,721	4.5	5.0	1.1	1.0
8.	Romania	740	15,220	20,470	7.5	6.0	1.0	1.4
9.	Bulgaria	820	7,020	8,540	7.4	7.5	0.7	0.7
10.	Hungary	1,200	12,360	10,350	5.1	5.9	0.3	0.3
11.	Poland	1,350	44,220	32,750	5.2	5.3	1.0	0.8
12.	U.S.S.R.	1,400	343,420	245,090	5.9	6.2	1.2	1.0
13.	Czechoslovakia	2,120	30,790	14,500	3.8	6.1	0.6	0.4
14.	German Dem. Rep.	2,190	34,890	17,050	4.6	5.2	0.0	0.0
Total				1204,616	644,600			

Table A-10

Per capita GNP, Gross National Product, Population and Average Annual Growth rates in Developing Economies with a population of 1 million or more.

No	Country	GNP Per Capita (in US\$)	GNP (in US\$ million)	Population (000)	Growth Rates %			
					GNP per capita		Population	
					1960-71	1965-71	1960-71	1965-71
1	Rwanda	60	230	3,786	-0.8	2.2	3.5	3.3
2	Burundi	60	220	3,615	1.1	0.5	2.0	2.0
3	Mali	70	370	5,123	1.4	1.0	2.1	2.1
4	Upper Volta	70	390	5,497	-0.9	1.7	2.1	2.1
5	Bangladesh	70	5,130	72,400	0.7	-0.1	2.7	2.6
6	Somalia	70	210	2,895	0.9	0.8	2.4	2.4
7	Afghanistan	80	-1,140	14,586	0.6	1.6	2.0	2.0
8	Ethiopia	80	1,990	25,250	2.7	1.2	2.1	2.4
9	Indonesia	80	9,460	119,182	1.3	3.4	2.0	2.0
10	Burma	80	2,430	29,578	0.3	0.1	2.6	2.8
11	Chad	80	310	3,716	0.6	2.2	1.8	1.8
12	Yemen Arab Rep of	90	480	5,900	2.0	2.4	2.2	2.2
13	Nepal	90	990	11,280	0.3	0.6	1.8	1.8
14	Malawi	90	410	4,550	2.5	2.3	2.6	2.5
15	Zaire	90	1,750	19,326	2.9	3.6	2.8	2.8
16	Guinea	90	380	4,080	0.1	0.3	2.6	2.5
17	Niger	100	400	4,132	-2.5	-4.4	2.9	2.7
18	Sri Lanka	100	1,260	12,849	1.8	1.8	2.4	2.3
19	Dahomey	100	280	2,783	0.8	1.8	2.8	2.8
20	Tanzania	110	1,470	13,249	3.1	3.3	3.0	2.8
21	India	110	62,720	551,123	1.3	2.4	2.3	2.2
22	Haiti	120	500	4,315	-0.8	-0.8	1.6	1.6
23	Sudan	120	1,900	16,135	Unavail- able	-0.9	2.8	2.8
24	Yemen, Peoples Dem Rep	120	170	1,470	-4.5	-7.2	3.2	2.9
25	Laos	120	370	3,030	2.0	3.5	2.4	2.4
26	Khmer Rep.	130	990	7,692	-0.6	-2.2	3.1	2.8
27	Uganda	130	1,340	10,148	2.1	1.6	2.7	2.9
28	Pakistan	130	8,290	62,700	3.7	3.0	2.9	2.9
29	Nigeria	140	7,840	56,510	2.1	2.7	2.5	2.5
30	Malagasy, Rep.	140	1,020	7,220	0.6	2.5	2.5	2.5
31	Togo	150	300	2,009	4.6	2.5	3.0	3.4
32	Central African Rep	150	240	1,586	0.4	1.6	2.5	2.3
33	Kenya	160	1,850	11,670	3.5	4.3	3.1	3.3
34	Mauritania	170	200	1,190	5.7	2.1	1.9	2.1
35	Bolivia	190	950	5,063	2.5	2.2	2.6	2.2
36	Cameroun	200	1,160	5,786	4.0	3.7	2.1	2.1
37	Liberia	210	330	1,570	2.5	3.8	3.1	3.1
38	Sierra Leone	210	540	2,668	3.9	4.7	2.2	2.2
39	Thailand	210	7,820	37,340	4.8	4.7	3.1	3.1
40	Egypt Arab Rep of	220	7,540	34,080	1.6	0.2	2.5	2.5
41	Viet-Nam, Rep of	230	4,350	18,809	-1.0	0.7	2.6	2.6
42	Philippines	240	9,160	37,919	2.5	2.7	3.0	3.1
43	Senegal	250	1,020	4,019	-0.4	-1.2	2.4	2.4
44	Ghana	250	2,250	8,856	0.0	-2.1	2.6	2.6
45	Jordan	260	620	2,380	2.0	-3.5	3.3	3.4
46	Morocco	270	4,040	15,379	1.1	2.5	2.7	2.7

No	Country	GNP Per Capita (in US\$)	GNP (in US\$ million)	Population (000)	Growth Rates %			
					GNP per capita		Population	
					1960-71	1965-71	1960-71	1965-71
47	Congo, Peoples Rep. of	270	300	1,123	0.9	1.4	2.1	2.1
48	Paraguay	280	680	2,458	1.2	1.3	3.1	3.2
49	Mozambique	280	2,200	7,830	4.0	5.6	1.9	2.1
50	Korea, Rep. of	290	9,140	31,849	7.4	10.0	2.4	1.9
51	Syrian Arab Rep.	290	1,900	6,509	3.1	3.1	3.3	3.3
52	Honduras	300	780	2,610	1.7	1.4	3.2	3.0
53	Equador	310	1,960	6,300	1.7	2.6	3.4	3.4
54	Rhodesia	320	1,730	5,500	1.1	2.6	3.3	3.5
55	Tunisia	320	1,670	5,245	2.8	3.6	2.1	2.1
56	Papua New Guinea	320	810	2,520	4.7	5.7	2.5	2.8
57	El Salvador	320	1,190	3,679	1.6	0.5	3.7	3.9
58	Ivory Coast	330	1,730	5,227	4.6	4.4	3.1	3.3
59	Algeria	360	5,260	14,438	3.5	4.8	3.2	3.2
60	Iraq	370	3,560	9,750	2.4	1.4	3.2	3.2
61	Columbia	370	8,180	22,324	1.7	2.3	3.2	3.2
62	Angola	370	2,040	5,572	3.9	5.4	1.3	1.3
63	Zambia	380	1,620	4,250	3.2	1.0	2.5	2.5
64	Guatemala	390	2,120	5,438	1.7	2.1	3.3	3.4
65	Malaysia	400	4,500	11,160	3.1	3.3	3.0	2.8
66	Dominican Rep.	430	1,750	4,119	2.1	4.7	2.8	2.7
67	China, Rep. of	430	6,440	14,880	7.1	7.3	2.6	2.3
68	Iran	450	13,420	29,780	6.5	7.7	3.0	3.0
69	Nicaragua	450	950	2,085	3.5	1.3	3.0	3.0
70	Brazil	460	44,260	95,435	2.7	5.1	2.9	2.9
71	Peru	480	6,650	14,010	2.0	0.5	3.1	3.1
72	Saudi Arabia	540	4,010	7,487	8.1	7.4	1.7	1.7
73	Costa Rica	590	1,040	1,775	3.1	4.5	3.2	2.9
74	Lebanon	660	1,840	2,804	0.7	0.8	2.6	2.6
75	Mexico	700	36,740	52,422	3.5	2.9	3.5	3.5
76	Jamaica	720	1,370	1,901	3.3	3.5	1.5	1.3
77	Uruguay	750	2,200	2,924	0.2	0.7	1.3	1.2
78	Chile	760	7,550	9,995	2.4	2.4	2.4	2.3
79	Panama	820	1,210	1,478	4.4	4.5	3.1	3.1
80	Hong Kong	900	3,650	4,045	5.8	5.6	2.4	2.0
81	Trinidad & Tobago	940	970	1,030	2.1	2.5	1.9	0.9
82	Venezuela	1,060	11,300	10,617	2.3	1.4	3.4	3.4
83	Singapore	1,200	2,530	2,110	6.8	10.6	2.3	1.8
84	Argentina	1,230	28,920	23,569	2.6	2.6	1.5	1.6
85	Libya	1,450	2,930	2,010	17.6	8.1	3.7	3.7
86	Puerto Rico	1,830	5,050	2,760	6.0	5.9	1.5	1.2
87	Israel	2,190	6,600	3,010	4.7	5.2	3.2	2.7
Total			399,560	1718,472				

Table A-11
**Per capita GNP in
 countries with Developed
 Market Economies**

Per capita GNP (in US\$)	Number of Countries
1-1000	3
1001-2000	4
2001-3000	8
3001-4000	5
4001-5000	2
5001-6000	1
Total	23

Table A-12
**Per capita GNP in
 countries with Centrally
 Planned Economies**

Per capita GNP (in US\$)	Number of Countries
1- 300	2
301- 600	4
601- 900	3
901-1200	1
1201-1500	2
1501-1800	0
1801-2100	0
2101-2400	2
Total	14

Table A-13
**Per capita GNP in
 countries with Develop-
 ing Economies**

Per capita GNP (in US\$)	Number of Countries
1- 50	0
51- 100	19
101- 150	13
151- 200	4
201- 250	8
251- 300	8
301- 350	6
351- 400	7
401- 450	4
451- 500	2
501- 550	1
551- 600	1
601- 650	0
651- 700	2
701- 750	1
751- 800	1
801- 850	1
851- 900	1
901- 950	1
1051-1850	5
2151-2200	1
Total	87

FOOTENOTES

- (1) J.E. Meade, **Trade and Welfare**, Oxford, Fair Lawn, N.Y. 1955, Ch. VI.
- (2) A.C. Pigou, **The Economics of Welfare**, London, MacMillan & Co. Ltd 4th ed., 1962 reprint, Ch.1.
- (3) C.P. Kindberger, **Economic Development**, McGraw Hill Book Co., Inc., 2nd ed., 1965, Ch.1.
- (4) Gilbert and Kravis: **An International Comparison of National Products and the Purchasing Power of Currencies**, OEEC, Paris, 1954; also, Gilbert and Associates: **Comparative National Products and Price Levels: A Study of Western Europe and the U.S.**, OEEC, Paris, 1958.
- (5) GNP is expressed at market prices and is thus more closely related to the value of goods and services exchanged in the market. As pointed out in the World Bank Atlas, GNP at market price is consistently about 11% higher than GNP at factor cost in groups of countries with different income levels although there are deviations around this average relationship.
- (6) The formula used to calculate this coefficient is:

$$G = 10^{-4} \sum_{t=2}^{10} (P_{t-1} Y_t - P_t Y_{t-1})$$

Where G refers to the coefficient to be estimated, P_t is the cumulative frequency of population, Y_t is the cumulative frequency of GNP, t refers to the percentile. See Ynetema, Dwight B., "Measures of Inequality in the Personal Distribution of Wealth and Income", **Journal of the American Statistical Association**, Vol.28 (December 1933) pp.423-433.

- (7) These computations include countries with a population of less than one million as well.
- (8) Pearson's measure of skewness = $\frac{\text{mean} - \text{mode}}{\text{standard deviation}}$. This measure usually falls within the range -1 , it is positive for the distributions skewed to the right and negative for distributions skewed to the left. See, e.g., Croxton and Cowden **Practical Business Statistics**, Prentice Hall, Englewood Cliffs, 3rd ed, 1960.
- (9) The figures appearing in this row of the table have been calculated using mean p.c. GNP for each continent, if the weighted average p.c. GNP had been used the result would have been; range = S4840, median = S584, mode = S475, standard deviation = 1621.9, Pearson's measure of skewness = 0.269.
- (10) Appendix 2 gives the list of countries entering each one of these groups.
- (11) The countries considered here are the countries with population of 1 million or more.
- (12) Gunnar Adler-Karlsson. "Utilitarisme Inversé ou un Nouveau Mode de vie dans les Pays Développés", Document prepared for the **Symposium on the New International Economic Order** organised by the Dutch Minister for the Cooperation to Development, M.J. Pronk, at the Congresgebouw, the Hague, and held on May 23 and 24, 1975.

ملخص

دراسة احصائية لنمط توزيع الدخل بين دول العالم

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يهدف هذا البحث الى دراسة نمط توزيع الدخل بين بلدان العالم المختلفة باستخدام البيانات التي نشرها البنك الدولي للانشاء والتعمير في أطلس سنة ١٩٧٣. فقامت الكاتبة بقياس درجة التفاوت في توزيع الدخل بين دول العالم التي يزيد عدد سكانها عن مليون نسمة عن طريق حساب معامل التركيز ورسم منحى لورنز. كما قامت بدراسة نمط توزيع الدخل بين الدول داخل كل قارة من القارات المختلفة وبين هذه القارات وبعضها البعض محاولة تحديد خصائص هذا التوزيع وخاصة درجة تشتته والتوائه، وحسبت أيضا معامل التركيز ومنحى لورنز بالنسبة للدول في كل قارة وبالنسبة للقارات وبعضها. ثم انتقلت الى دراسة نمط توزيع الدخل بين دول العالم مقسمة الى ثلاث مجموعات: الدول ذات اقتصاديات السوق المتقدمة والدول التي تتبع التخطيط المركزي والدول المتخلفة. وأخيرا حاولت تحديد المعالم المستقبلية لاتجاهات النمو في هذه المجموعات الثلاثة.

وتتلخص النتائج التطبيقية التي توصلت اليها الكاتبة في أن التفاوت في توزيع الدخل بين الدول داخل كل قارة من القارات أقل مما هو بين القارات المختلفة وأن التفاوت في توزيع الدخل بين دول العالم في مجموعها أكبر مما هو بين القارات المختلفة، مما يشير الى أن الفقر يتجه الى التركيز جغرافيا في بعض القارات وخاصة في افريقيا وآسيا وأوسيانيا (التي تشمل على اندونيسيا في هذه الدراسة) حيث يقل متوسط نصيب الفرد من الناتج القومي الاجمالي عن ٤٠٠ دولار سنويا وذلك في سنة ١٩٧١.

وقد أوضحت الدراسة أنه وفقا للنمط السائد لتوزيع الدخل داخل كل دولة والذي غالبا ما يكون أقل عدالة في الدول الفقيرة عنه في الدول الغنية أن التفاوت في توزيع الدخل بين دول القارات المختلفة كبيرا في القارات التي ينخفض فيها نصيب الفرد من الناتج القومي الاجمالي. فمعامل التركيز في كل من افريقيا وآسيا