

"The World Distribution of Income:
Growth and Inequality"

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ABSTRACT

The character of the evolving distribution of world income over the years between 1960 and 1990 is described in this presentation.

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Questions about incomes that never seem to lose their interest are: "How much richer are the rich than the poor?" and "Do the rich get richer and the poor get poorer?" (Or "Do the rich get richer faster than the poor get richer?" Or "Do the rich get richer and the poor get children?") Using these intriguing questions about levels and growth as a springboard, I propose to say some things that I hope you will find enlightening about the world income distribution. I'll speak mostly about rich vs. poor countries rather than individuals or families, and I'll try to illuminate the diversity of income levels around the world as well as the changes that have been observed.

Incidentally, more fundamental than the questions just raised is "Why are the poor poorer than the rich?" I won't attempt to give an answer here. (The perfect title for such a discourse would be a 180-degree reversal of the name of Adam Smith's well-known book, but a colleague at the University of Minnesota has already written "The Poverty of Nations.")

I. The Simple Facts: 1960 to 1990

The world I will speak about consists of 134 countries on all six continents that include all but 3 per cent of the world's population. (See the Annex for listing. The World Bank's Atlas lists 209 countries and territories. Virtually all of the extra 74 political subdivisions, those not covered by the studies of the International Comparison Programme¹ from which the data I will talk about come, are very small.)

First, let's look at what has happened over the last 30 years. In Figure 1 we see the path of world output---that is, world Gross Domestic Product, called just GDP---between 1960 and 1990. GDP is measured in so-called "international dollars" of 1985. In that base year an average market-basket of goods cost the same amount in international dollars as it cost in United States dollars. (The international prices in which each country's goods are valued are the averages of relative prices in all countries.) The experience of the groupings of countries I'll focus on shortly are graphed here too, but let me pass over them for now. (A technical note: the heights of the points on the curves are proportional to the logs of the dollar values; this is so constant growth rate will show up as a straight line instead of an exponential curve. Figure 2 shows the 1960-to-1990 experience of the world and the country groupings in terms of GDP per capita. GDP per capita of the world was \$2,245 in 1960. The average rose 37 per cent by 1970, another 24 per cent in the next ten years, and by 1990 at \$4,326 it was a full 92 per cent beyond its level 30 years earlier. But while the average went up 92 per cent over 30 years, did everyone's income go up at the same rate? Surely not everyone's, but were there any systematic differences between the experience of the developed and developing countries? The answer

is YES. First, let's look at income levels and then we'll go on to growth.

A. Levels

The World Bank classifies 45 of my 134 as "low income," 65 as "middle income" (14 of which are oil exporters), and just 24 as industrialized. First, how much difference in income was there among the countries in the 1960-1990 era? Table 1 gives the shares of world output going to the countries in the various income tiers. To no one's surprise, with 56 per cent of the world's population (now), the low's "enjoyed" around 15 per cent of the world's income. To no one's surprise, the industrialized's had only 15 percent of the population but absorbed over half (53 per cent in 1990 and 60 per cent in 1960) of the world's income. It's noteworthy that the rich's drop of 7 per cent didn't all go to the low's. The middle's had 29 per cent of the population; at the beginning it had only a quarter of the world's income but at the end it was up to almost 31 per cent. Now let's see what all of this says about growth.

B. Growth

In Table 2 we see the pattern of growth rates of the income tiers. The table gives growth rates for overall GDP, GDP per capita, and GDP per equivalent adult. (The last term will be explained below.) The annual rate of growth of world output was 2.2 per cent and the rate for the low's was virtually the same. However, the non-oil middle's and the industrialized had growth rates of just under 3 per cent. How can it be that the low's were at the world average and the middles and industrialized were both above? Very simple: the oil's only grew at an annual rate of 1.4 per cent!

To summarize what happened over the thirty years: The low's didn't grow very rapidly; the middle non-oils and the industrialized grew a quarter again as fast; and the oil's, in the middle, grew very slowly indeed. The fact that more than half of the world's population was in the low's meant that the overall world performance was very similar to that of the low's. Therefore, it appears the world income distribution at the level of countries---ignoring intracountry inequality---was becoming more unequal. But there is a subtlety here. The conventional measure of inequality, the Gini coefficient, displayed through Lorenz curves in Figure 3, didn't change much from its 1960 level of about .54 because the falling behind of the low's was counterbalanced by the catching up of the non-oil middle's. The Lorenz curves cross so the critical area that the Gini coefficient is based on stayed about the same. But a person who is concerned about inequality is likely to worry primarily about the people at the bottom of the income distribution. He/she is unlikely to be satisfied if both the poor and the rich are worse off--relatively, of course--and the middles are better off.

We have answers now to the questions I started with, at least for the last third of the Twentieth Century. The poor are much poorer than the rich: the bottom half of the world's population (in fact, 56%) get a sixth of the world's output and the top sixth of the population get half-plus of the output. Neat but unpleasant stylized facts: Half get a sixth; a sixth get half.

The answer to the second question about growth is: NO! The rich got richer and the poor got richer. Both had positive growth rates. (The rich grew at the rate of 2.9 per cent while the poor grew at the rate of 2.2 per cent. But the rich got richer faster. Thirty years of growth at 2.9 per cent per year raised the rich's incomes by a factor of 2 and a third; over the same period the poor's growth at 2.2 per cent didn't quite double their income. It was better to be rich in 1960 for the rich 1960 standard of living; and it was even better 30 years later. And the neither poor nor rich (countries), the middle's shared the rich's experience but from a lower base.

C. Children

My last question above has a cynical tone, with somewhat deep implications. I'm not going back on my promise to stay away from the "why?" question---exactly---but maybe one should think a little about the role children play here. GDP is a numerator looking for a denominator. India has a much larger GDP than Luxembourg but that wouldn't fool anyone into thinking that India is better off than Luxembourg. The denominator used by economists concerned with material wellbeing is usually population size. That denominator helps to take account of the number of mouths that must be fed by the GDP. (Of course, it also helps to take account of the number of people in the country who make the GDP, but the number of mouths is not the same as the number of workers. Labor-force participation rates vary widely across countries; if productivity is one's concern, population is not the right denominator to use.) Using a per capita GDP criterion for material wellbeing may mask what is really going on. Could it be that the low's have a lower per capita GDP growth rate than middle's and the industrialized's not because the numerator is growing slower but because the denominator is growing faster? Sure enough. The low's GDP growth rate was 4.4 per cent per year; the industrialized's was 3.6 per cent! It follows that the population growth rates were 2.2 per cent and .9 per cent, respectively! One should be careful in drawing inferences from these numbers. Over thirty years, children grow up. Some of that higher growth rate in output may in fact be a consequence of a larger labor force arising from the greater population growth. Still, most of that growth comes from the womb and must be nurtured for a long time before it becomes productive. Even recognizing that children enter the world of work much earlier in low income countries than in high, it seems unlikely that this could fully account for the difference. But

notice, this speculation runs counter to my promise not to get too tangled up in "why?"

II. Slightly More Complicated Facts: 1960 to 1990

I'll expand on the preceding in two directions. First, more on children. Then I will present some evidence on just how robust these findings are to a certain important fact about the data base, namely the somewhat dubious character of our knowledge of China's income.

A. Taking Better Account of Children

In this section I follow up on counting mouths for getting a denominator to go with GDP. All mouths aren't the same size, and there are more small mouths, proportionately, in poor countries than in rich. (The stylized facts usually quoted are that 20 per cent of a developed country's population is under 15 but the corresponding number for developing countries is 40 per cent.) If small mouths need less to sustain them than large---perhaps the metaphor should be changed to "bellies"---then it's misleading to count children as the equivalent of adults. Suppose each child needs half the goods and services an adult would require to attain the same level of wellbeing. (I'm waiting to hear hisses from the part of the audience that has 14 year old sons. I'm waiting to hear shrieks of derision at the notion that the equivalent-adult scale value would be one-half for persons under 15. I'm waiting to hear "**Enough**" from people who know better than to think whatever the right equivalent-adult scale value might be here and now, it surely isn't the same everywhere, in both rich and poor countries, and it surely has been subject to secular trends.) Whatever your complaints, I know the value is not 1 everywhere, and any informed guess about it is a better estimate than 1. (Besides, if YOU have a better equivalent-adult scale value than one-half, and you think you know how the value varies from poor countries to rich, and you know how it changed moving from 1960 to 1990, then I can show you how to redo my calculations for your equivalent-adult values.)

Level Counting children as half-adults---that is, denominating GDP in equivalent-adult terms---has the effect of reducing the perceived gap in material wellbeing between poor countries and rich. (This is a **further** reduction beyond the one that arose when economists and policymakers concerned with cross-country comparisons of GDP switched from exchange-rate based GDP estimates to ones based on purchasing power parities (PPPs).) All population denominators become smaller when one shifts to the number of equivalent adults so all GDPs per equivalent adult become larger. But the increase is greater for the poor countries---remember 40 per cent under 15 years vs. 20 per cent ---so the difference between the standing of developing and developed countries by this more realistic measure is considerably smaller.

Growth rates for GDP per equivalent adult (see Table 2) are slightly less than for GDP per capita, but the difference is about the same across the various income levels. Taking better account of children and their needs is informative about differences in level of wellbeing across countries, but it conveys no new story about rates of improvement.

B. China

Unfortunately, China has never participated in one of the ICP's benchmark studies. The estimates of China's PPPs and its time-series of GDP denominated in its own currency are both needed in making these world income judgments. Since the Chinese GDP data provided by the Chinese are notoriously bad, with exaggerated growth rates, and the PPP estimates are based on very fragmentary information, the Chinese numbers that have gone into the present work must be regarded as tentative. This would not be a matter of great concern if China were not so great. With more than a fifth of the population of the world, China's effect on the comparisons is substantial. Small inaccuracies have a magnified effect. Therefore it is of some consequence to know if the level-and-growth conclusions reached above remain the same if China is omitted from the world being described.

Perhaps all that has been said isn't to be trusted because of the questionable China numbers. Table 1' is the same as Table 1 except that China has been omitted. Observe that when China is excluded, the population proportion of the poor goes way down, by more than the decline in the proportion of income they receive. (The population goes from 56 per cent to 44 per cent; the proportion of income received goes down from 17 per cent to under 11. That's a 12 percentage point reduction in mouths for a 6 percentage point reduction in the wherewithal for feeding them.) Because China is so poor, excluding it makes the split between rich and poor appear somewhat less serious.

D. Overall Inequality: Intra-country added to Intercountry Inequality

It is difficult to integrate the poor information we have about inequality within countries with the poor information about intercountry effort, but my colleagues and I have tried. You don't want to know all of the very complicated things that must be done to integrate the two different sets of data. I will only extract a couple of simple "facts" that I have some confidence in: (i) How does overall intercountry inequality, as measured by the Gini Coefficient, compare with intracountry inequality for individual countries? Which is more unequal: (i) Earth consisting of the present inhabitants, each with an income equal to his/her country's average income; or (ii) the United States inhabitants with their incomes; or (iii) the inhabitants of India with their incomes? Quick answer: the US distribution would display the least inequality, the intercountry inequality would be next, and India would be third.

III. A Few Additional Miscellaneous Facts

A. Geography

What is the correlation between country income and the absolute value of country latitude? A prominent Yale economist told me it was zero. I could barely believe it---after all, where are all the poorest countries and where are the richest?---but I didn't want to fight his computer. However, Henri Theil looked at this systematically and got the intuitively plausible result. He divides the world into six regions: North (above 30 degrees), South (below -30 degrees)---including Argentina, Chile, and Uruguay, but not Brazil), Tropical Africa, Tropical America, and three subregions of Asia. Without any question, the time series of GDP per capita for the regions are neatly in order, North on top, South next, and then South-West Asia tied with Tropical America, followed by Southeast Asia, Tropical Africa, and then South-Central Asia. I'm staying away from WHY this is.

B. Political stability and Political Freedoms

Robert Barro has tried to see if economic growth is affected by some political variables. I remain unconvinced, but in his regressions he finds Political Instability (as measured by revolutions and assassinations) make very little difference, and Political Rights and Civil Liberties are entirely insignificant. (Is this because these variables are not really exogenous?) An interesting inquiry if quite inconclusive.

C. Living on A Dollar (Peso) per Day

In some development circles, economists talk about world poverty in terms of how many people in the world live on less than \$1.00 per day. I have an old envelope that I carried with me from Philadelphia on Aerolineas Argentinas. On my way here I worked out on the back of that envelope my estimate of this. I figure that in 1990, about 600 million people---give or take a hundred million---lived (consumed, that is) on less than a dollar worth of goods and services per day.

I leave you with that mind-boggling statistic. Thank you for your attention.

ENDNOTE

1. The data underpinning the income distributions discussed here originated in the various International Comparison Programme benchmark studies. They have been reported in Kravis, Kenessey, Heston, and Summers [1975] and Kravis, Heston, and Summers [1978] for the year 1970; Kravis, Heston, and Summers [1982] for 1975; United Nations and Eurostat [1986] for 1980; United Nations and Commission of the European Community [1994] for 1985; and Organization for Economic Co-operation and Development (1993) for 1990.

Specifically, the income numbers entering into the aggregation calculations that are depicted in the graphs and reported in the tables came from the Penn World Table (Mark 5.5) [6/5/95]. (For a detailed description of PWT 5.6's predecessor, PWT 5, see Summers and Heston [1991]).

Annex #1:

Low Income (45):

BENIN
BURKINA FASO
BURUNDI
CAPE VERDE IS.
CENTRAL AFR.R.
CHAD
COMOROS
EGYPT
ETHIOPIA
GAMBIA
GHANA
GUINEA
GUINEA-BISS
KENYA
LESOTHO
LIBERIA
MADAGASCAR
MALAWI
MALI
MAURITANIA
MOZAMBIQUE
NIGER
RWANDA
SIERRA LEONE
SOMALIA
SUDAN
TANZANIA
TOGO
UGANDA
ZAIRE
ZAMBIA
ZIMBABWE
HAITI
HONDURAS
NICARAGUA
GUYANA
BANGLADESH
CHINA
INDIA
INDONESIA
MYANMAR
NEPAL
PAKISTAN
SRI LANKA
YEMEN

Oil Producing (14):

ALGERIA
ANGOLA
CONGO
GABON
NIGERIA
TRINIDAD&TOBAGO
ECUADOR
VENEZUELA
IRAN
IRAQ
KUWAIT
OMAN
SAUDI ARABIA UNITED
ARAB E.

Middle Income (51):

BOTSWANA
CAMEROON
IVORY COAST
MAURITIUS
MOROCCO
NAMIBIA
REUNION
SENEGAL
SEYCHELLES
SOUTH AFRICA
SWAZILAND
TUNISIA
BARBADOS
COSTA RICA
DOMINICAN REP.
EL SALVADOR
GUATEMALA
JAMAICA
MEXICO
PANAMA
PUERTO RICO
ARGENTINA
BOLIVIA
BRAZIL
CHILE
COLOMBIA
PARAGUAY
PERU
SURINAME
URUGUAY
JORDAN KOREA, REP.
MALAYSIA
PHILIPPINES
SYRIA

TAIWAN
THAILAND
BULGARIA
CYPRUS
CZECHOSLOVAKIA
GERMANY, EAST
HUNGARY
MALTA
POLAND
PORTUGAL
ROMANIA
TURKEY
U.S.S.R.
YUGOSLAVIA
FIJI
PAPUA N.GUINEA

Industrialized (24):

CANADA
U.S.A.
HONG KONG
ISRAEL
JAPAN
SINGAPORE
AUSTRIA
BELGIUM
DENMARK
FINLAND
FRANCE
GERMANY, WEST
ICELAND
IRELAND
ITALY
LUXEMBOURG
NETHERLANDS
NORWAY
SPAIN
SWEDEN
SWITZERLAND
U.K.
AUSTRALIA
NEW ZEALAND

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International Comparisons of Real Product and Purchasing Power, Baltimore: Johns Hopkins Press

_____ [1982] World Product and Income, Baltimore: Johns Hopkins Press

Kravis, Irving B., Zoltan Kenessey, Alan Heston, and Robert Summers [1975] A System of International Comparisons of Gross Product and Purchasing Power, Baltimore: Johns Hopkins Press

Organization for Economic Co-operation and Development (1993)
Purchasing Power Parities and Real Expenditures (GK Results: Volume 2), 1990, Paris: OECD

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