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WHAT IS THE EVIDENCE ON INCOME INEQUALITY AND DEVELOPMENT?

by

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I. INTRODUCTION

The long-term relationship between income distribution and development has been one of the most closely investigated issues in development economics. In his pathbreaking article "Economic Growth and Income Inequality" Kuznets (1955) formulated the hypothesis that early economic growth increases inequality while later economic development narrows it. He based this hypothesis on an analytic model, on data for developed countries since the 1930s which showed a narrowing of inequality, and on cross-country comparisons between inequality in developed countries and inequality in two developing countries which showed considerably greater inequality in the latter. This paper formulated the U-hypothesis and posed the research agenda for subsequent studies of the relationship between income distribution and development.

Nevertheless, the first twenty years of economic development immediately following World War II proceeded on the basis of an optimistic view of the relationship between economic development and inequality. In the design of development policy and of foreign assistance it was assumed that the growth of the modern sector, if sustained, would eventually spread the benefits of economic growth to all, including the poorest. Economic

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growth and industrialization were proceeding at an unprecedentedly rapid rate. The benefits to newly prosperous urban groups, the workers in the modern sector and an expanding middle class of merchants, professionals and civil servants, were easily apparent while data on unemployment, poverty and income distribution was not available to cast doubt on the rosy picture of the effects of development. The U-hypothesis was ignored by all but a few radical critics such as Baran (1957)and Myrdal (1968).

The first identification of development failures by mainstream Western economists came when, in the late 1960s, as a result of the work of the International Labor Organization, it was realized that despite rapid industrialization and GNP growth unemployment was increasing to alarming proportions of the urban labor force. The combination of slow labor absorption in the modern sector, rapid population growth, education explosion, and exploitation of agriculture had transformed disguised rural unemployment into a combination of low-income, low-productivity disguised urban unemployment in the informal urban sector and had given rise to an escalation of educated open unemployment of recent secondary and university graduates. The realization of these trends revived interest in the Kuznets U-hypothesis. Distributional and poverty issues came to the center of the development agenda.

The early 1970s led to the initiation of research into the distribution of benefits of growth in developing countries. Data on income distribution in developing countries, however, was (and remains) scant. The first major study of the relationship between income distribution and economic development was by Adelman and Morris (1973). Completed in 1971 as a report to the Agency for International Development, and based on unpublished income distribution studies in 44 developing countries, their

study confirmed the increase in inequality inherent in the Kuznets U while indicating that the subsequent decrease in inequality with development was dependent on specific policy choices made in the course of the development process. With policies stressing the reduction of economic dualism and increases in primary and secondary education the later stages of development would reduce inequality; with a continuation of dualistic growth involving neglect of the agricultural sector and a narrow educational pyramid inequality would not decrease, even at the latest stages of development. The Adelman-Morris study did not use regression analysis to establish the relationship between income distribution and development. They argued (Appendix C) that the heterogeneity of the data and the state of ignorance about the appropriate functional form made the use of regression analysis a dangerous research tool. Instead they relied on the use of analysis of variance (the analysis of hierarchic interactions) which was robust to data quality and did not require the prior specification of functional forms.

Following their analysis, a large number of investigators used cross section regressions to study the relationship of inequality to development (Paukert 1973; Chenery et al 1974; Ahluwalia 1976 a and b; Cronwell 1977; Papanek 1978; Ahluwalia, Carter and Chenery 1979; Bacha 1979; Papanek and Kyn 1976 and 1977). These studies generally used a functional form that is quadratic in the log of per capita GNP. They also added some conditioning or policy variables to the regressions such as education, population, or a socialism dummy. The samples of countries varied, sometimes including and sometimes excluding developed and communist countries. The regressions all confirmed the existence of the Kuznets curve. Anand and Kanbur (1986), however, argue that the location of the

minimum point of the U is sensitive to sample composition and to the specific functional form. Such sensitivity is to be expected if, as claimed by Adelman and Morris (1973), the underlying relationship is either U shaped or J shaped, depending on policy choices made at higher levels of development for developing countries. Papanek and Kyn (1986) contradict the Anand and Kanbur contention, and find the relationship to be stable and insensitive to the inclusion or exclusion of specific countries. The conditioning variables they include, however, capture the very policy choices that affect whether the relationship is U or J shaped. They also find the Kuznets curve to be quite flat (1987).

In the present paper we investigate the issue of whether there is a trade-off between inequality and economic growth, using changes over time in the shares of income accruing to the poor and rich deciles as dependent variables and the rate of growth of per capita GNP together with conditioning variables as independent variables. Our procedure provides a more direct test than previous studies of the policy issues raised by the Kuznets curve.

II. THE STATISTICAL ANALYSIS

The estimation of trends in the size distribution of income within countries requires consistent time series on income distribution within countries. Unfortunately, there are very few countries with more than a single estimate of the size distribution of income. Of those for which estimates of the size distribution of income is available for more than one point of time, differences in coverage and differences in the definition of the basic income recipient units, make for lack of comparability of income shares over time. In addition, cross-country comparisons of income-share

changes require comparability across countries as well. To mitigate these difficulties, we adopt a three-step estimation procedure.

In the first step, we use cross-country regressions to estimate how the within-country distribution of income varies in response to changes in a set of independent variables. In the second step, we use these regressions together with data on the independent variables to estimate decile income shares for all non-communist developing countries with populations of more than 2 million in 1960. In the third step, we regress the changes in the estimated shares from 1960 to 1970 and from 1970 to 1980 on the rates of growth of per capita GDP and other conditioning variables to see whether the Kuznets-U hypothesis holds over time. Conceptually, this three -step approach is the equivalent of two-stage least squares. The primary statistical differences between the present approach and classical two-stage least squares are that: (1) the sample coverage for the two stages of the estimation procedure are different; and (2) the regressions in both stages are non-linear.

The advantages of this approach are that it provides for consistent estimates of income distribution over time and across countries, and enables the use of a large sample. Generally, the data sources for the estimation of income distribution are consumer household budget surveys, blown up to mimic national coverage. In these surveys, the definitions of response units, the income concepts and the procedures used to blow up the sample surveys to national census results vary across countries. Because our approach to estimating income distributions involves using regressions, the basic response unit, income concept and blow-up procedures in our study are "standardized averages" of constant and

consistent, but undefined, nature. The procedure used enabled us to extend the sample of countries from about 30 to about 70.

II.1 Estimating income distributions within countries

To estimate the decile distributions of income we must first assume a one-or-two-parameter distribution function for incomes. We experimented with two alternatives, the log normal distribution and the Pareto distribution, and found that the latter gave closer overall fits. We decomposed the economy into two sectors, rural and urban, and assumed that each sector has its own Pareto distribution. The Pareto distribution used in this study is a one parameter function of the form

$$Y=X^{-a}$$

where Y is the relative frequency of people having income greater or equal to X and "a" is a parameter indicating the degree of inequality of the distribution of income. (Other forms of the Pareto distribution exist). The dependent variables in our cross country regressions are the exponents "a" for income-inequality in each country's rural and urban sectors. To estimate "a", we fitted the Pareto distribution to the decile distributions for the rural and urban sectors of those countries for which we had data.

The next step involved estimating polynomial regression functions relating "a" to set of independent variables which were deemed on a priori grounds to be potentially relevant to intersector inequality. Since the ultimate purpose of the regressions is projection, we limited ourselves to candidate variables for which time series are available from international statistical compendia, such as the World Bank's World Tables. The variables were in logs and entered in polynomial form. Whether sectoral inequality increases or decreases with an increase in the level of a

particular variable therefore varies with the level of the variable. The regressions are summarized in Table 1. The column labeled "Power" in the table indicates the degree of the polynomial.

For the rural sector, the statistically significant variables were: the share of agricultural exports in agricultural gross domestic product, the agricultural terms of trade, and the school enrollment ratio . The R square for the regression was .59. The estimated relationship indicates that a larger share of agricultural exports increases rural inequality, presumably because agricultural exports are produced mostly in large commercial farms and plantations. It suggests that higher agricultural terms of trade reduce rural inequality, probably because they increase the employment of landless labor and raise the marketed surplus and off-farm employment of small, semi-commercial farmers. The estimated regression suggests that the impact on inequality of increases in the national school enrollment ratio varies with the school enrollment ratio, but is mostly negative; it is usually only at quite high levels of national schooling that mass education spreads to rural areas.

For the urban sector, the statistically significant explanatory variables were: per capita GDP, nonprimary exports as a ratio to non-primary GDP, and the ratio of the productivity in agriculture to productivity in the primary sector. The R square for the regression was .56. Both school-enrollment and per capita GDP have a U-shaped effect on urban inequality, increasing it at low levels of education and GDP and then reducing it. Increases in the share Kuznets of nonagricultural exports in nonagricultural output unambiguously reduce urban inequality, presumably because LDC manufacturing exports tend to be labor-intensive. Similarly, when the ratio of productivity in non-agricultural activities to

TABLE 1
Pareto Coefficent
Regression Equations

Rural Pareto coefficient R^2= .578; degrees of freedom = 28	Power	Coefficient	Standard error
Intercept		1.943	
Independent variables (log):			
Share of agricultural exports in agricultural output			
	1	1.054	.355
	2	1.656	.644
	3	1.151	.480
	4	.365	.155
	5	.425	.018
Agricultural terms of trade	1	- .297	.126
School enrollment ratio			
	2	- .246	.113
	3	.040	.019

Urban Pareto coefficient R^2= .561 degrees of freedom = 30	Power	Coefficient	Standard error
Intercept		- 318.512	
Independent variables (log):			
School enrollment ratio	1	277.886	143.520
	2	- 111.254	56.234
	3	19.681	9.754
	4	- 1.298	.632
GDP per capita			
	1	42.634	17.645
	2	- 11.245	4.644
	3	1.304	.539
	4	- .056	.023
Share of nonagricultural exports in nonagricultural output			
	1	- .226	.123
	2	- .071	.041
	3	- .006	.004
Ratio of productivity in non-agricultural activity to productivity in agriculture			
	1	- .029	.019

productivity in agriculture increases this reduces urban (but not, as we shall see below, national) inequality.

These estimated regression functions were used in conjunction with time series for the independent variables in the regressions to derive sectoral size distributions of income for each noncommunist developing country in each of three years: 1960, 1970 and 1980. For each year the sectoral distributions were then aggregated numerically in each country to derive within-country decile distributions of income. These deciles formed the basis for our subsequent exploration of the Kuznets hypothesis.

The results of these computations were used to estimate the changes in the average decile distributions within developing countries. Table 2 indicates that, for an average noncommunist developing country, there was a steady increase in within-country inequality over two decades. The share of income of the poorest 20% fell from 7.3% in 1960 to 6.8% in 1970, and to 6.7% in 1980, while the share of the richest 5% rose from 37.5% in 1960 to 39.4% in 1970 and to 40.1% in 1980. The most substantial increases in inequality occurred between 1960 and 1970, as might be expected from the Kuznets hypothesis.

The decline in income share of the poorest over the first quarter century of development is consistent also with the historical experience of currently developed countries. Typically, the historical increase in inequality in currently developed countries during the early stages of their industrialization lasted about half a century or more. Lindert and Williamson (1985) display evidence for income inequality rising steadily during the Industrial Revolution in Great Britain and leveling in the last quarter of the 19th century. Morris and Adelman (1985 and 1988) find that Belgium, France, Germany, Great Britain and Switzerland all underwent

Table 2. Mean Income Shares for 1960, 1970 and 1980, Non-Communist LDCs.

GROUP	1960	1970	1980
Poorest 20%	7.3	6.8	6.7
Poorest 40%	15.8	14.9	14.7
Poorest 60%	26.4	25.1	24.7
Middle 40%*	25.6	24.4	24.4
Top 20%	58.6	60.3	60.9
Top 10%	46.8	48.7	49.4
Top 5%	37.5	39.4	40.1
Top 1%	22.8	24.4	25.0

*The Middle 40% group is the 5th through 8th deciles, inclusive.
Source: Estimated, see text.

an industrialization process which followed the Kuznets curve: the numbers in extreme poverty increased early in the 19th century in all but Great Britain, where the increase occurred earlier; in the latter half of the 19th century widely based economic growth and industrialization resulted in reductions in poverty, labor absorption, and steadily rising average wages. Denmark, Norway and Sweden also displayed a Kuznets curve, but the dynamics of the curve were somewhat different: increases in extreme poverty occurred during the first half of the 19th century, especially among the landless, as a result of surges in population growth and negligible industrialization; the subsequent reductions in poverty occurred in the second half of the century, as a result of major emigration of surplus agricultural population and the expansion of specialized agriculture and small-scale industrialization.

We now turn to an examination of the systematic connections between growth and inequality. This is a particularly important issue because it is relevant to development policy. In particular, the dynamic version of the Kuznets curve elucidates whether there is a policy trade-off between the speed of economic growth and the extent of inequality.

III. Does Faster Growth Increase Inequality Within Countries?

Most tests of the Kuznets hypothesis have been based on cross section data. As indicated earlier, all these cross section studies trace out a Kuznets Curve, showing that income inequality first increases with development and then declines. But how is income inequality related to the process of transition from one development level to another? There is no time dimension to cross sections. And special assumptions, amounting to acts of faith, are required to enable one to take the cross section curve,

which traces out average relationships among economic states, as indicative of processes of change between neighboring economic states. For this, time series of change in individual countries are required.

There are two recent combined cross-section time-series analyses, both of which support the Kuznets hypothesis. Papanek and Kyn (1987) used the income share of various income deciles as dependent variables, and the log of per capita income, its square, time, socio-political dummy variables, education and the structure of exports as independent variables. They confirmed the Kuznets-U hypothesis in their regressions, but found the Kuznets curve to be quite flat. They also investigated the hypothesis that faster growth is associated with a greater deterioration in the share of income accruing to the poorest deciles. They confirmed the hypothesis but again found that the deterioration in income share with more rapid growth is small.

In the present paper, we test the hypothesis that faster growth is negatively correlated with the share of income accruing to the poor more directly than done in previous studies. We take as our dependent variable not the income shares of the poor (and rich) deciles, but rather the changes in these shares over time. And we do not use per capita income as an explanatory variable, but rather the rate of growth of per capita income. Thus, our cross section analysis is based on dynamic variables that are directly related to the policy issue of whether there exists a trade-off between economic growth and the equality of the distribution of income.

The results of our analysis are summarized in Tables 3 and 4, for 1960 to 1970, and in Tables 5 and 6, for 1970 to 1980. In fitting the regressions we started with a set of uniform independent variables and then omitted from the regression set for each period those variables that

were not statistically significant, either based on a t-test for individual significance or on an F-test for the specific subgroup, for any of the regressions for the particular period. As a result, the list of independent variables is larger for the 1970 to 1980 period than for 1960 to 1970. The values of R-square for the regressions range from between about .4 and .5 for the 1960 to 1970 period and between about .71 and .73 for 1970 to 1980. These values of R-square are very high, when one considers that both our dependent variables and most of our independent variables are expressed in rates of change rather than in levels. The F tests for the entire regression and for particular subgroups of variables are all high.

In selecting the list of candidate variables, we did not include variables that are directly related to the derivation of the national income shares from the sectoral distributions. For example, we did not include changes in the share of population in non-agricultural employment; rather, we included changes in the share of population in industry. We were also limited to variables for which time series exist for a large number of developing countries. Some candidate variables were not significant in any of our regressions, and therefore do not appear in the summary of results. Thus, we tested for the significance of regional dummies on all regions, for all classes of independent variables, and found that only a Latin American dummy for rates of growth of per capita GNP and an Asia dummy for the debt service ratio survived the significance test. The rate of population growth was never statistically significant, confirming recent studies of other authors on the ambiguity of the effects of rapid population growth on poverty and income distribution (Birdsall and Griffin, 1988; Chu 1987). Also, none of the purely political variables survived the significance test. A variable characterizing the extent of political participation

(Adelman and Morris 1973) and a variable characterizing the extent of a country's foreign dependence (Adelman, Lohmoller and Morris, 1988) were found to be statistically insignificant for both time periods. Since we excluded communist countries from the analysis, we could not use a socialism dummy, as in other studies.

III.1 Variations with the rate of growth of per capita GNP

For the 1960 to 1970 period, our regressions indicate that faster GNP growth was associated with a steadily increasing deterioration in the shares of income of the poorest 20%, the poorest 40%, the poorest 60%, and the middle 40 to 80 per cent of the population. In our regressions, on the average for all developing countries, both the rate of growth of per capita GNP and the square of the rate of growth are negatively associated with the shares of income accruing to the poorest deciles during this period. The regressions in Table 3 thus suggest that, on the average over all countries, the shares of the poor could increase but only with negative growth rates. By contrast, on the average for all developing countries, the shares of the richest 20, 10, 5 and 1 per cent of the population all rose steadily with faster growth in per capita GNP for this period (Table 4). For the rich, the signs of the coefficients of the rate of growth of per capita GNP and its square were both positive in the regressions for this period . Thus, our results for the 1960 to 1970 period indicate that during this period, in an average LDC, the benefits of faster growth were distributed in a very skewed manner. The rich not only captured their proportional share of benefits from growth but also benefitted from a trickle-up from the poorest 80% of the population.

Our regressions suggest that in Latin American countries in the sixties, the trade-offs were not quite as stark as for the average LDC. The

Table 3. Change in Income Shares of the Poorest Groups, 1960-1970, Regression Results.

VARIABLE	Poorest 20%*		Poorest 40%*		Poorest 60%*		Middle** 40%*	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
1. Base Income Share	-3.94	-4.17	-1.84	-4.24	-1.1	-4.21	-1.09	-3.94
2. GDP per capita Growth Rate (G)	-0.857	-0.60	-0.849	-0.62	-0.765	-0.60	-.490	-0.47
3. Square of G	-14.5	-1.08	-13.9	-1.07	-13.7	-1.13	-13.1	-1.33
*F(2,57)****		*5.21*		*5.31*		*5.47*		*6.02*
4. Lat. Am. Dummy X G	-25.1	-4.16	-23.8	-4.10	-22.3	-4.09	-17.7	-3.98
5. Lat. Am. Dummy X Sq. of G	1050	4.75	992	4.69	931	4.67	737	4.54
*F(2,57)****		*12.1*		*11.8*		*11.8*		*11.1*
6. Change in Share Labor in Ind.	-0.136	-2.02	-0.133	-2.03	-0.124	-2.02	-0.0964	-1.92
7. Constant	0.327	3.92	0.332	4.02	0.328	4.03	0.309	3.87
R-squared	0.495		0.495		0.496		0.484	
R-squared Adjusted for Degrees of Freedom	0.442		0.442		0.443		0.429	
F on Full Regression (6,57)***	9.32		9.32		9.34		8.90	

Note: See Table 7 for a description of variables and sources.

* The dependent variable is the ratio of the change in income share to the base income share.

** The Middle 40% group is the 5th through 8th deciles, inclusive.

*** Joint F-statistic for variables in box. Values in parentheses are degrees of freedom in the numerator and denominator.

Table 4. Change in Income Shares of the Richest Groups, 1960-1970, Regression Results.

VARIABLE	Top 20%*		Top 10%*		Top 5%*		Top 1%*	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
1. Base Income Share	-0.564	-4.44	-0.715	-4.26	-0.903	-4.06	-1.52	-3.55
2. GDP per capita Growth Rate (G)	0.628	0.72	0.896	0.68	1.17	0.64	1.69	0.51
3. Square of G	4.74	0.57	7.11	0.57	9.68	0.56	16.8	0.54
F(2,57)°°		*3.05*		*2.83*		*2.61*		*2.00*
4. Lat. Am. Dummy X G	12.2	3.27	17.8	3.16	23.9	3.05	40.2	2.83
5. Lat. Am. Dummy X Sq. of G	-497.0	-3.66	-726	-3.53	-967	-3.39	-1610	-3.12
F(2,57)°°		*6.98*		*6.48*		*5.95*		*5.00*
6. Change in Share Labor in Ind.	0.0581	1.38	0.0775	1.22	0.0955	1.08	0.123	0.77
7. Constant	0.325	4.43	0.331	4.17	0.339	3.85	0.366	3.11
R-squared	0.419		0.398		0.375		0.321	
R-squared Adjusted for Degrees of Freedom	0.358		0.335		0.309		0.249	
F on Full Regression (6,57)**	6.85		6.29		5.70		4.48	

Note: See Table 7 for a description of variables and sources.

° The dependent variable is the ratio of the change in income share to the base income share.

°° Joint F-statistic for variables in box. Values in parentheses are degrees of freedom in the numerator and denominator.

coefficients in our regression for the product of the Latin America dummy variables with the rate of economic growth indicate that, in Latin American countries in the sixties, the changes in the income shares of both poor and rich traced a U-shaped relationship with growth rates, as they do for all LDCs during the seventies. In Latin America, with faster growth the income shares of the poor first decline and then rise, and first rise and then decline for the rich. Our estimates suggest that the rate of growth of per capita income up to which the shares of the poor decline in Latin America is about the same as the rate up to which the shares of the rich rise -- 2.5%. However, this rate was exceeded by only three Latin American countries in this period.

For the 1970 to 1980 period, our results are less stark. As in Latin America of the sixties, we now find a U-shaped relationship for changes in the income share of each decile with the rate of growth of per capita GNP for all developing countries, on the average. For the poor, on the average, the signs of the regression coefficients of the income shares are negative on the growth rate and positive on its square (Table 5). This suggests that, up to a point, the shares of the poor decline with increases in the growth rates and after that they rise with higher growth rates. Our regression estimates indicate that, on the average for all developing countries, the positive GNP growth rate at which no change in the income share of the poorest occurred in the seventies was 4.2% per capita. At positive growth rates lower than 4.2% per capita the shares of the poor declined with more rapid growth; after those rates they rose. Since the average rate of population growth in LDCs was about 2.2%, the constant-income share growth rate of total GNP was about 6.5%. A similar U-shaped relationship held for the income shares of the rich (Table 6). The positive constant-income-share growth

Table 5. Change in Income Shares of the Poorest Groups, 1970-1980, Regression Results.

VARIABLE	Poorest 20%*		Poorest 40%*		Poorest 60%*		Middle** 40%*	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
1. Base Income Share	-6.15	-5.77	-2.79	-5.70	-1.64	-5.65	-1.64	-5.70
2. GDP per capita Growth Rt (G)	-2.00	-2.27	-1.87	-2.21	-1.74	-2.18	-1.31	-2.08
3. Square of G	53.8	2.76	50.4	2.68	47.5	2.69	36.9	2.65
F(2,44)°°°		*3.89*		*3.69*		*3.68*		*3.55*
4. Lat. Am. Dummy X G	2.46	0.87	2.27	0.83	2.18	0.85	1.92	0.94
5. Lat. Am. Dummy X Sq. of G	147	1.67	140	1.65	130	1.63	92	1.45
F(2,44)°°°		*9.44*		*9.05*		*9.02*		*8.42*
6. Debt Service/Export Ratio (D)	5.32	2.98	5.2	3.02	4.88	3.02	3.93	3.07
7. Square of D	-41.1	-2.81	-40.0	-2.84	-37.5	-2.83	-30.0	-2.86
8. Cube of D	89.2	02.7	86.6	02.7	80.8	02.7	64.3	02.7
F(3,44)°°°		*3.70*		*3.27*		*3.27*		*3.38*
9. Asia Dummy X D	3.37	0.67	2.98	0.61	2.80	0.61	2.17	0.60
10. Asia Dummy X Sq. of D	-17.3	-0.22	-13.5	-0.18	-12.8	-0.18	-10.3	-0.19
11. Asia Dummy X Cu. of D	32.4	0.12	21.4	0.08	20.7	0.08	18.7	0.09
F(3,44)°°°		*3.98*		*3.83*		*3.79*		*3.79*
12. Change in Nonag/Ag Inc. Ratio	-0.248	-4.14	-.233	-4.03	-0.22	-4.05	-0.18	-4.19
13. Change in Literacy Rate	0.0173	1.65	0.0161	1.59	0.0152	1.60	0.012	1.61
14. Constant	0.174	1.78	0.178	1.85	0.185	1.98	0.221	2.64
R-squared	0.717		0.711		0.711		0.716	
R-squared Adjusted for Degrees of Freedom	0.634		0.625		0.626		0.632	
F on Full Regression (13,44)***		8.58		8.30		8.32		8.53

Note: See Table 7 for a description of variables and sources.

° The dependent variable is the ratio of the change in income share to the base income share.

°° The Middle 40% group is the 5th through 8th deciles, inclusive.

°°° Joint F-statistic for variables in box. Values in parentheses are degrees of freedom in the numerator and denominator.

Table 6. Change in Income Shares of the Richest Groups, 1970-1980, Regression Results.

VARIABLE	Top 20%*		Top 10%*		Top 5%*		Top 1%*	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
1. Base Income Share	-0.554	-4.70	-0.686	-4.67	-0.850	-4.63	-1.39	-4.48
2. GDP per capita Growth Rt (G)	1.44	2.75	2.02	2.66	2.56	2.55	3.8	2.31
3. Square of G	-28.7	-2.68	-40.3	-2.60	-51.5	-2.50	-76.1	-2.27
*F(2,41)***		*4.16*		*3.91*		*3.61*		*2.96*
4. Lat. Am. Dummy X G	0.122	0.08	0.230	0.11	0.360	0.13	0.857	0.19
5. Lat. Am. Dummy X Sq. of G	-69.4	-1.56	-96.5	-1.50	-122	-1.43	-176	-1.27
*F(2,41)***		*3.65*		*3.26*		*2.86*		*2.05*
6. Debt Service/Export Ratio (D)	-3.17	-3.50	-4.68	-3.56	-6.31	-3.61	-10.5	-3.67
7. Square of D	25.1	3.41	37.0	3.46	49.6	3.49	82.2	3.53
8. Cube of D	-54.8	-03.3	-81.0	-03.3	-108.0	-03.3	-178.0	-03.4
*F(3,41)***		*4.27*		*4.41*		*4.51*		*4.65*
9. Asia Dummy X D	9.10	2.13	14.2	2.29	19.7	2.40	34.8	2.61
10. Asia Dummy X Sq. of D	-184	-2.39	-283	-2.55	-392	-2.66	-683	-2.85
11. Asia Dummy X Cu. of D	790	2.50	1220	2.66	1680	2.76	2930	2.96
*F(3,41)***		*2.58*		*2.81*		*2.94*		*3.26*
12. Change in Nonag/Ag Inc. Ratio	0.0939	3.06	0.133	2.98	0.172	2.90	0.265	2.73
13. Change in Sec. Educ. Rate	0.0311	2.93	0.0462	3.00	0.0620	3.02	0.105	3.13
14. Constant	0.428	5.30	0.473	5.26	0.523	5.14	0.653	4.74
R-squared	0.732		0.732		0.729		0.721	
R-squared Adjusted for Degrees of Freedom	0.648		0.647		0.643		0.633	
F on Full Regression (13,41)**		8.63		8.62		8.49		8.16

Note: See Table 7 for a description of variables and sources.

* The dependent variable is the ratio of the change in income share to the base income share.

** Joint F-statistic for variables in box. Values in parentheses are degrees of freedom in the numerator and denominator.

Table 7. Description of Variables

DEPENDENT VARIABLE

1. Change in Income Share of Poorest and Richest Groups - For group x and period t1-t2 this is:

$$\frac{\text{income share of group x in t2 - income share of group x in t1}}{\text{income share of group x in t1}}$$

EXPLANATORY VARIABLES

2. Base Income Share - Income share in 1960 for 1960-1970 results and 1970 for 1970-1980 results.

3. GDP per capita Growth Rt (G) - Growth rate of per capita GDP from t1 to t2 in Kravis dollars for each period.

4. Debt Service/Export Ratio (D)- Ratio of external public debt service to exports of goods and services, average of 1970 and 1980 values.

5. Change in Nonag/Ag Inc. Ratio - For period t1-t2 this variable is:

$$\frac{NAR2-NAR1}{NAR1}$$

where NAR# is the ratio of nonagricultural income per capita to agricultural income per capita in period #.

6. Change in Literacy Rate - For period t1-t2 this variable is:

$$\frac{LIT2-LIT1}{LIT1}$$

where LIT# is the number of literate adults as a percentage of the population 15 years or older in period #

7. Change in Sec. Educ. Rate - For period t1-t2 this variable is:

$$\frac{SER2-SER1}{SER1}$$

where SER# is the number enrolled in secondary school as a percentage of 12-17 years olds.

8. Change in Share of Labor in Ind. - For the period t1-t2 this variable is:

$$\frac{IND2-IND1}{IND1}$$

where IND# is the share of labor in industry as a percentage of the total labor force in period #.

Sources: 1,2 Estimated, see text.
3,5-8 World Bank, *World Tables*, Third Edition, 1983.
Kravis conversions from Kravis, Irving B., *World Product and Income: International Comparison of Real Gross Domestic Product*, Johns Hopkins University Press, Baltimore, Maryland, 1975.
4 World Bank, *World Development Report*, various years.

rate for the rich was about 6%. At slower growth rates, on the average for all LDCs, the income shares of the rich rose with faster growth; at more rapid growth rates, the income shares declined.

Taken together, the results of our regressions for both periods indicate that growth, up to a point, tends not to benefit the poor, in relative terms, except with a substantial delay, and then only if growth is quite rapid. These results support the notion of a trade-off between growth and distribution up to quite high growth rates posited in the Adelman-Morris 1973 study.

Relating these results to the Kuznets hypothesis requires that there be a significant association between development levels and growth rates, since Kuznets' hypothesis relates to systematic variations in income shares of the poor with levels of development. Our data indicate that there was a statistically significant correlation between development levels and growth rates, in both periods. Fourteen out of 16 countries with growth rates of per capita GNP in Kravis dollars less than 1% were at the lowest level of development, by the Adelman-Morris index of level of socio-economic development (Adelman and Morris, 1967) in the 1960-70 period. The analogous number for 1970-1980 was 12 out of 17. At the other extreme, of the non-oil exporting countries that had growth rates exceeding 3% per capita in Kravis dollars, 8 out of 11 in 1960-70 and 9 out of 10 in 1970-80 were at high or intermediate levels of development. Our results, which associate declines in the shares of income of the poor with increasing growth rates up to quite high rates of economic growth followed by a turnaround, may therefore be taken as confirming a dynamic version of the Kuznets hypothesis. The U-shaped relationship posited by Kuznets between the share of income of the poor and development levels, extends also to the

speed of transition between levels of per capita GNP. Not only development levels, but also the speed of transition among levels of per capita GNP exhibit a U-shaped relationship with rates of economic growth.

There are many a priori reasons why one might expect more rapid growth to be associated with decreases in the share of income accruing to the poor. More rapid growth requires higher rates of savings and investment. Therefore, if more rapid growth is to materialize, income must be shifted from low savers (the poor) to high savers (the rich). This hypothesis was first advanced by Kalecki (1943) and taken up by Kaldor (1955) and the Latin American structuralist school. But this hypothesis offers a closed-economy argument that does not incorporate the possibility for foreign aid and foreign borrowing as sources of investment funds and assumes that the government is neutral in the mobilization of savings. It also imparts the major role in the mobilization of savings to transfers among classes of savers rather than, as in the Lewis model, to transfers of savings between sectors, especially between agriculture and industry. The latter is probably a more significant mechanism for mobilizing savings than the former (Cline 1972; Adelman and Robinson 1988).

Intersectoral transfers of resources affect the relation between the distribution of income and the rate of economic growth indirectly,through the structure of growth, rather than directly, through savings requirements. Many Kuznets-U generating models of the relations between income distribution and development rely on intersectoral transfers of population and income to provide the income-inequality generating mechanisms. The course of income inequality with development is then explained by: the technological and income-distribution characteristics within sectors; and by how the development strategy and the strategy for

mobilizing savings affect the income and productivity gaps between sectors and their relative rates of growth. This was the mechanism on which Kuznets himself relied to generate the U-hypothesis. More mathematical exposition was given by Fields 1980.

Lewis' 1957 model of development through industrialization is also in this spirit. It also implies the generation of a U shaped income distribution through intersectoral transfers. The acceleration of growth in the early stages of industrialization implies increasing the income (and productivity) gap between industry and agriculture by transferring savings (and hence investment) and labor between the low-productivity, even distribution, traditional sector and the high-productivity, unequal-distribution modern sector. Up to a point, this process will generate an increase in inequality. The per capita income and productivity gaps between sectors will start closing in the Lewis model only when a rising wage rate is required to attract increased labor into the modern sector. Numerical simulations and individual-country studies suggest that, in a given country, the association of decreased inequality with further growth will start after more than half the labor force is employed in the modern sector (Robinson 1976; Fei and Ranis 1964; Ranis 1978).

A more dynamic explanation of the relationship of inequality and the speed of growth points to the contrast in initial conditions faced by the poor and the rich when responding to the new economic opportunities inherent in economic growth. (Adelman and Morris 1973 and Morris and Adelman 1983). Fundamentally, all processes of economic change give rise to both increased absorption of some individuals and displacement and marginalization of others. Those who own (or have access) to factors used disproportionately in the expanding sectors or in the new technologies, or to

complementary factors are enriched by the change. Those who own factors used in producing substitute commodities or less productive technologies lose relatively from the change. How more rapid growth affects different deciles depends on the net balance between the two forces for each decile. Those with assets-- including not only financial capital and land but also human capital, information, and networks facilitating migration and access to high-productivity jobs-- are better positioned to take immediate advantage of the opening up of any set of new economic opportunities. The poor are slower to respond to increased opportunities because they have less assets, in the more general sense. Furthermore, since the poor use traditional technologies and combine them with small amounts of low-productivity complementary factors, they are more likely to be marginalized by new technologies, to which they require more time to adapt. Slower growth also allows more opportunity for social adaptation by the poor (through demographic change, migration, and schooling) and hence is likely to affect them less unfavorably. The contrast in the extent to which economic growth marginalized the poor in the 19th century in France, a slow growing country, and Germany and Great Britain, fast growing countries, illustrates this point. During the early stages of the Industrial Revolution, poverty increased faster with growth in Great Britain and Germany than in France.

These considerations suggest not only reasons for the dynamic version of the Kuznets curve but also for the contrast between our results for the sixties and seventies. The average picture sketched by the regression results for the sixties associated continued declines in the income shares of the poor with more rapid growth at even the highest growth rates. It is only during the seventies that we found that, at growth rates exceeding 6.5% in

total GDP, higher growth rates led to improvements in the shares of income of the poorest. Both the Lewis model (1972) and the"initial-conditions-of-poverty" explanation of the previous paragraph are consistent with these findings. The initial conditions explanation suggests why, in the face of structural change, delays as long as a decade may occur before a high rate of economic growth would benefit the poor. Historically, during the Industrial Revolution, periods as long as two generations passed before economic growth benefitted the poor (Morris and Adelman, 1983; Lindert and Williamson, 1985).

The Lewis (1954) turning point is consistent both with the delayed reaction to high growth rates and with the specific 6.5 per cent growth rate of aggregate GDP for a turnaround to be attained. At a minimum, the turnaround requires that the growth rate of employment in the modern sector exceed the growth rate of supply of labor to the modern sector. The growth rate of supply is the sum of the rate of population growth in urban areas from urban fertility and from rural-urban migration. In the seventies, this sum, which equals the rate of urbanization, averaged 5% per year. This is the rate of growth of industrial employment that would just match the rate of increase in labor supply. However, the rate of growth of industrial employment must also be sufficient to absorb existing urban unemployment, before industrialization will generate upward pressures on modern-sector wages. Estimates of urban unemployment in the early seventies by the World Employment Missions of the ILO put the unemployment rate at about 20% in many middle-income developing countries. A rate of growth of 1.5%, maintained over a decade, would be required to mop up initial urban unemployment of 20% of the urban labor force. The sum of the two rates just equals 6.5% -- our estimate of the

minimum rate of growth of GDP before growth increases the income shares of the poorest. These rates were attained by only 11 countries in our sample. Fei and Ranis (1964) estimated that Japan, Korea, and Taiwan had reached the Lewis turning point by the seventies.

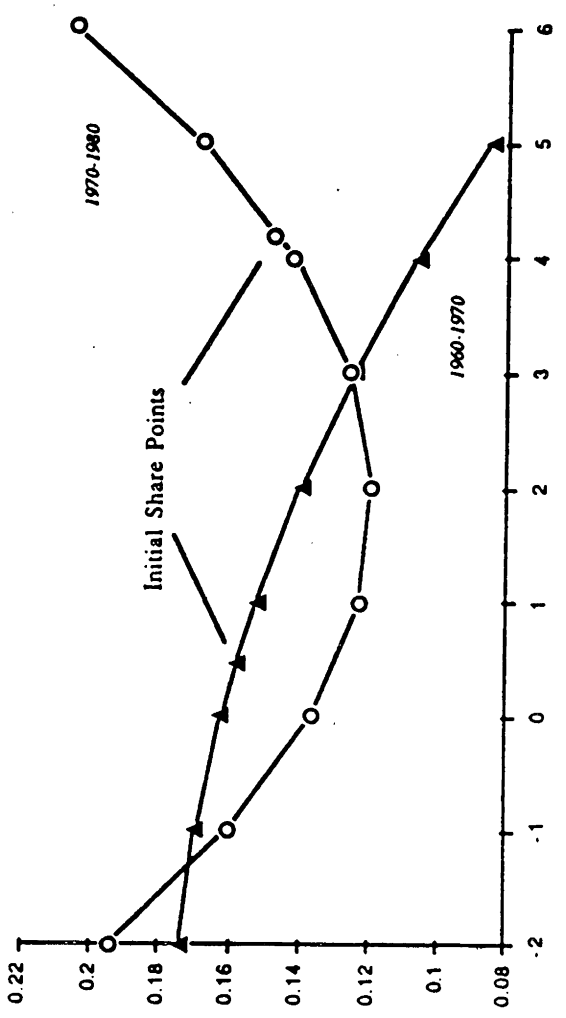
Papanek and Kyn's (1987) study indicated that the Kuznets curve was quite flat and so was the relationship of income shares to growth rates. Our results do not support this finding. Figure 1 portrays the relation between the income share of the poorest 40% and the growth rate of per capita GNP in Kravis dollars estimated by our regression. We find that, for the 1970-80 period, the share decreased from .19 at a growth rate of -2% to about .12 at 2%, and that a 1 percentage point change in growth rate around the minimum income share produces an 9.5% change in the income share of the poorest 40%.

III.2 Variation with the debt service ratio

The debt service ratio became a serious constraint on economic growth only during the seventies. After the first oil shock in 1973, developing countries shifted from trade-and-aid-led growth to debt-led growth. The average debt-service ratio to exports rose from 8.9% in 1970 to 13.7% in 1980. After the second oil shock in 1980, the debt-service problem became a debt-crisis, affecting growth and income distribution in all developing countries. Our time period, however, covers only the debt accumulation phase.

There is a large literature on the incidence of adjustment to the debt crisis, pointing to the fact that the poor have born the brunt of the cost of adjustment. (for a summary see Pinstrup-Anderson 1986 and Taylor 1988). We find, in our regressions of Table 5, that the impact of debt accumulation

Figure 1
Income Shares Versus Growth Rate for 1960-70 and 1970-80.



Source: Regressions, Tables 3-6

on the share of national income accruing to the poor was non-linear. For the poorest groups, there is a positive coefficient on the debt share to exports, a negative coefficient on the square of the debt share, and a small positive coefficient on the cube of the debt. For the rich (Table 6), the pattern of signs is the mirror image of that for the poor. The Asia dummy intensifies the quantitative impact of the basic pattern, for both poor and rich deciles.

The effects of debt accumulation on the poor and rich obviously depend on the projects and policies the new debt finances. If there is a correlation between the uses to which indebtedness is put and the relative size of the debt, changes in the share of debt to exports would have nonlinear effects on the income shares of both poor and rich.

Higher debt ratios may benefit the poor when the debt is used to finance social programs and to subsidize consumption of food and public services by the poor, especially the urban poor. A large number of countries used foreign debt to maintain a dual price policy in agriculture, paying higher prices to rural producers than they charged to consumers. The dual price policy benefits the rural poor, especially agricultural workers and semi-commercial farmers, the value of whose marginal product it raises. Also, after the food-crisis of 1973, many developing countries borrowed for agricultural development projects. These investments decrease the productivity gap between sectors, thereby reducing overall inequality. Depending on the design of the agricultural projects (e.g. what types of irrigation were expanded; and how the productivity-increasing measures were distributed between large commercial farms and small owner-operated farms) the investments could either increase or decrease income inequality within the agricultural sector (see Adelman 1984 and

Yeldan 1988 for a discussion of the income distribution effects of agricultural strategies).

Alternatively, increased debt may reduce the income share of the poor. Countries that incurred foreign debt frequently used the proceeds to finance import substitute industrialization, large scale capital-intensive projects, industrial infrastructure, and armaments purchases. All of these investment patterns tend to have unequalizing effects on the distribution of income. Import substitution turns the terms of trade against agriculture, where the poor are concentrated. Capital-intensive industrialization is skill rather than labor intensive, and therefore does little to raise the employment of the poor while generating excess demand for the services of high-level manpower. It therefore makes the distribution of wages less equal, while reducing the share of wages in GNP. Armaments purchases have small domestic multipliers and indirect benefits that are concentrated among the rich.

Thus, debt accumulation may have quite disparate effects on income shares, depending on the different investment programs and policies that are financed by the debt. If social and agricultural programs predominate at both small and large levels of indebtedness while investments in import substitution, armaments, and heavy-industry predominate at middling levels one would expect to find the particular nonlinear association between the income shares of the poor and debt accumulation that is present in our regression results.

III.3 Variations with other economic variables- or what explains the Kuznets Curve?

Structural Change

The rise and fall in sectoral imbalances in total-factor-productivity change may be expected to be a prime mover of income inequality. According to Kuznets (1966) and the Chenery-Syrquin studies (1975), early development is characterized by increasing the imbalance in productivity among sectors, followed by a levelling in productivity differentials and finally by a movement towards more balanced productivity growth, quite late in the development process. Even without population movement from the low-productivity to the high-productivity sector, the U-shaped movement in the productivity gap would by itself suffice to generate a Kuznets Curve.

We experimented with several measures of economic dualism and intersectoral emphasis of development: (1) changes in per capita income gaps between agriculture and nonagriculture; these represent also measures of productivity differentials between sectors; (2) total income gaps between the agricultural and nonagricultural sectors; and (3) changes in the relative shares of agriculture and nonagriculture in GDP; both measures (2) and (3) are indicative of structural change in the composition of production. Of the three, the first measure was the most significant statistically. It also comes closest to the factor-productivity-differentials explanation of the Kuznets curve.

Our results indicate that the share of income of the poor decreases with greater relative neglect of agricultural productivity. Since the poor are concentrated in the agricultural sector, emphasis on industrial development at the expense of agricultural development decreases the share of the poorest 80% of the population. But the magnitude of the

decrease becomes steadily smaller the higher the income of the poorest deciles, starting at an elasticity of -.25 for the income share of the poorest 20% and decreasing to an elasticity of -.18% for the share of the 4th to 8th decile. By the same token, since the top 20% of the population derive their incomes from the nonagricultural sector, either as workers in modern industry or as owners of industrial enterprises, a decrease in the relative share of agriculture in total output benefits the upper income groups. For the rich, a sectoral bias in development against agriculture is increasingly more beneficial the higher their income level, rising from an elasticity of .09 for the top two deciles to an elasticity of .27 for the richest 1% of the population.

The 1970s witnessed a renewed emphasis on agricultural development in many developing countries. Fuelled by the food crisis of 1973 and by the need to substitute for increasing imports of basic grains to feed the urban population, many semi-industrial LDCs and several low-income LDCs turned to agricultural development. Agricultural development has beneficial effects on the income share of the poorest (Adelman and Robinson 1987; Adelman 1984; and Yeldan 1988) and on their food security (Adelman and Berck 1988) provided it is coupled with agricultural terms of trade policies that do not take away all the benefits of agricultural output increases from the farmers. Gaiha (1987) finds a negative correlation between agricultural productivity and rural poverty in cross country analysis. Simulations by Adelman (1985) of the income distribution consequences of adopting an agricultural development strategy that combines increases in agricultural productivity with increases in exports and in agricultural terms of trade in all developing countries (Adelman 1985) indicated that this strategy is likely to result in a

substantial improvement in the distribution of income within LDCs, among all groups of LDCs except East Asia, among all nonsocialist LDCs and in the world as a whole. These agricultural development strategies also reduced worldwide absolute poverty by 30% relative to the base case.

Labor Absorption into the Modern Sector

Factor movements among markets with different pay structures are another potential major source of inequality. Even without changes in the relative magnitude of the productivity and income gaps among sectors in the course of development, transfer of labor from the low-paying sector with a low-income variance to the high-paying sector with a high-income variance would suffice to generate the Kuznets-U (Robinson 1976).

We could not use changes in the share of labor outside agriculture in our regressions, despite high correlations of income shares with this variable, because it comes too close to one of the variables we had used to derive national income shares from sectoral shares. Instead, we used the more restricted concept of changes in the share of the labor force employed in industry. This measure is indicative of labor absorption into the modern sector. We found that, during the 1960-70 period, increases in the share of labor force in industry reduced the share of the poor and raised the shares of the rich. This finding is consistent with the early stages of Lewis (1972) model, when labor is transferred from the low-inequality to the high-inequality sector and the income gap between the sectors increases. In the 1970 to 1980 period this variable was not statistically significant, and therefore does not appear in the regressions despite its theoretical appeal.

The Distribution of Wealth

One would expect both land distribution and the distribution of physical capital to affect the distribution of income. Indeed, many revolutions (1848, in France, and 1917, in Russia, in particular) have been based on this theory. Unfortunately, there are no time series we could construct to test this hypothesis. Also, as Lindert and Williamson (1985) point out, major wealth redistributions such as land reform, slave emancipation, war and losses from economic crises, are too sporadic to offer a systematic explanation of the course of the Kuznets curve. They are likely to lead to important shifts in the Kuznets curve, however. Elsewhere, (Adelman 1978) I have argued that land reform needs to be an important precursor to productivity improvement in agriculture, if technology change, such as the Green Revolution, is not to deteriorate the distribution of income rather than provide for egalitarian growth.

What about the distribution of non-physical capital? One policy prescription on which both conservative and progressive economists agree is that improving the educational attainments of the masses will make the distribution of income more equal. The "human capital" school (Schultz 1971 and Becker 1967) sees education as improving the earnings capacity of individuals. The "redistribution with growth" (Chenery et al 1974) and the "redistribution before growth" (Adelman 1978) schools see the broadening of the educational pyramid as a redistribution of wealth (human capital). Chenery et al argue for increasing the education of the poor as part of redirecting a larger share of investment towards increasing the assets of the poor. Adelman argues for increasing the education of the poor as part of equalizing the distribution of wealth of the major productive asset before its productivity is improved, as a means of setting the stage for more

egalitarian subsequent growth. Previous regression studies all support the equalizing role of increases in primary education (see, for example, Adelman and Morris 1973; Ahluwalia 1976 a and b; Papanek and Kyn 1987).

We used two different educational variables to represent the educational continuum relevant for the particular income group-- literacy increases for the poor and secondary schooling for the rich. We find (Tables 5 and 6) that the elasticity of the income shares of the poor with respect to literacy is of the order of .02 and that of the income shares of the rich with respect to the secondary schooling rate increases from .03 for the richest 20% to .10 for the top 1%. Our results thus indicate that which education is improved matters for distribution. Increases in secondary (and presumably University) education will favor the rich, and increase inequality, while increases in literacy (and presumably primary) education will decrease inequality.

IV. SUMMARY AND CONCLUSION

Even in the absence of the debt crisis, the prospects for the poor in developing countries can hardly be considered satisfactory. For the 1960 to 1970 period, our results indicate that the trade-off between the speed of economic growth and the share of income of the poor was unmitigated and that the deterioration in the share of income of the poor with growth was quite substantial. For the 1970-80 period, our results suggest the existence of an even stronger trade-off between the speed of growth and the equality of the distribution of income at rates of growth less than 1% per capita, a leveling between 1 and 2 percent, followed by possibilities for a turnaround. However, our results also suggest that, in the typical LDC of the seventies, the decline in the share of the poor with growth at low growth

rates was sufficiently large so that the poor would not recover their 1970 income share unless the LDC could attain quite high rates of growth for the period and reach at least moderate levels of development. These results hardly give much hope for attaining the goal of poverty eradication in LDCs in the foreseeable future through economic growth.

Our results do suggest policies that might mitigate the growth-equality trade-off somewhat. Foremost among those are rural development policies designed to close the agricultural-nonagricultural productivity and income gaps and massive primary education. I have advocated both approaches to the design of development strategies in earlier writings (Adelman 1984 and Adelman 1978) and found theoretical and empirical arguments to bolster these recommendations.

In short, our findings support the view that the primary hope of the poor in the current low-growth world lies not in accelerating their country's growth rate, but rather in changing the structure of growth and the assets of the poor.

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