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# Inequality, Poverty and Development

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(World Bank, Washington, DC 20433, U.S.A.; May 1976, Revised Version August 1976)

## 1. Introduction

The relationship between the distribution of income and the process of development is one of the oldest subjects of economic enquiry. Classical economic theory accorded it a central position in analysing the dynamics of economic systems, and while this pre-eminence was somewhat obscured in the heyday of neoclassical theory, in recent years it has again come to occupy the center stage of development economics. The purpose of this paper is to explore the nature of this relationship on the basis of cross country data on income inequality. The use of cross country data for the analysis of what are essentially dynamic processes raises a number of familiar problems. Ideally, such processes should be examined in an explicitly historical context for particular countries. Unfortunately, time series data on the distribution of income, over any substantial period, are simply not available for most developing countries. For the present, therefore, empirical investigation in this field must perforce draw heavily on cross country experience.

The results presented in this paper are based on a sample of 60 countries including 40 developing countries, 14 developed countries and 6 socialist countries.<sup>1</sup> In the established tradition of cross country analysis, the approach adopted is essentially exploratory. We have used multivariate regression analysis to estimate cross country relationships between the income shares of different percentile groups and selected variables reflecting aspects of the development process which are likely to influence income inequality.<sup>2</sup> The estimated equations are then used as a basis for broad generalisations about the relationship between income distribution and development. The difficulties inherent in this methodology are well known, although all too often ignored. It is self-evident that the relationships thus identified are primarily associational. They do not necessarily establish the nature of the underlying causal mechanism at work for the simple reason that quite different causal mechanisms might generate the same observed relationship between selected variables. Such alternative mechanisms (or hypotheses) are observationally equivalent in the sense that our estimated equations do not always permit us to choose between them.

The cross country relationships presented in this paper must be viewed in this perspective. We should treat them as 'stylised facts' which can be observed, but which still need to be explained, by an appropriate theory. The documentation of such 'stylised facts' is obviously not the same thing as the development of a tried and tested theory, but it may contribute to the development of such a theory in two ways. Firstly, the observed relationships may suggest hypotheses about the nature of the underlying causal mechanisms at work, which then need to be further tested and fashioned into a broader theory. Secondly, they provide

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\* The author is on the staff of the Development Research Center of the World Bank. The views presented are those of the author and not of the World Bank. Acknowledgements are due to Bela Balassa, John Duloy, Ben King, Michael Lipton, Graham Pyatt, Suresh Tendulkar and a referee for helpful comments. I am indebted to Mariene Lehwing for computational assistance.

<sup>1</sup> See Appendix for data sources and a brief discussion of data problems.

<sup>2</sup> We have used income shares as the dependent variables instead of summary indices of inequality such as the Gini coefficient because this permits us to focus on the impact of the development process over different ranges of the income distribution. The Gini coefficient is also a relatively insensitive measure and its limited variation across countries makes it difficult to identify statistically significant relationships. See, for example, Papanek (1976).

yardsticks for verifying theories of distribution and development by defining the observed 'behaviour' that such theories must explain.

What, then, do we know of the 'stylised facts' about income distribution and development. A logical point of departure for our investigation is the hypothesis, originally advanced by Kuznets (1955, 1963), that the secular behaviour of inequality follows an inverted 'U-shaped' pattern with inequality first increasing and then decreasing with development. Following Kuznets, the proposition that the distribution of income worsens with development, at least in the early stages, has received considerable attention.<sup>3</sup> More recently it has been advanced in a much stronger formulation, which states that the process of development may lead not just to increasing relative inequality, but also to the absolute impoverishment of the lower income groups.<sup>4</sup>

These issues, together with several others, are examined in this paper. Section 2 presents the cross section evidence on the relationship between inequality and the level of development, showing a distinct U-shaped pattern as hypothesised by Kuznets. Section 3 extends our search for stylised facts by including a number of other correlates of inequality in an expanded regression equation. Section 4 reviews the implications of the expanded regression equations for the U-shaped curve and the hypothesis of absolute impoverishment. Section 5 examines the relationship between inequality and the rate of growth as a short-term relationship and attempts to draw some implications for policy.

## **2. Kuznets' hypothesis: The 'U-shaped curve'**

We begin by documenting the evidence for Kuznets' hypothesis that inequality tends to widen in the early stages of development, with a reversal of this tendency in the later stages. Following convention, we have tested this hypothesis by taking the per capita GNP of each country (in US\$ at 1965-1971 prices) as a summary measure of its level of development and including it as an explanatory variable in regression equations in which the income share of different percentile groups is taken as the dependent variable.

The cross country regressions provide a substantial measure of support for the hypothesis that there is a U-shaped pattern in the secular behaviour of inequality. Table 1 reports the estimated equations describing the relationship between income shares of five different percentile groups (the top 20 percent, the next or 'middle' 40 percent, the lowest 60 percent, the lowest 40 percent and the lowest 20 percent) and the logarithm of per capita GNP.<sup>5</sup> Two equations are reported for each income share, one estimated from the full sample of 60 countries and the other estimated from the restricted sample of 40 developing countries only. For the full sample, we have included a dummy variable for the socialist countries in order to take account of the much higher degree of equality observed in these countries.<sup>6</sup> The results obtained can be summarised as follows:

(i) Taking the results from the full sample to begin with, there is clear evidence of a nonmonotonic relationship between inequality and the level of development. The estimated equations test for a quadratic relationship with the logarithm of per capita GNP. We find that

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<sup>3</sup> See, for example, Kravis (1960), Oshima (1962), Adelman and Morris (1973) and Chenery and Syrquin (1975). For a recent review of this literature see Paukert (1973) and Cline (1975).

<sup>4</sup> This is argued in Adelman and Morris (1973. pp. 179-183).

<sup>5</sup> 'The logarithmic transformation gives equal weight to equal proportional differences in GNP in measuring 'levels of development.' This has an intuitive appeal since growth occurs at a compound rate over time.

<sup>6</sup> Our results on this score are discussed in detail in section 3.

in all cases, both terms of the quadratic are significant<sup>7</sup> and the coefficients have the appropriate opposite signs to generate the U-shaped pattern hypothesised by Kuznets. Income shares of all percentile groups except the top 20 percent first decline and then increase as per capita GNP rises. Income shares of the top 20 percent display a corresponding opposite pattern.

(ii) The turning point for income shares implied by the estimated equations are also reported in table I. It is interesting to note that this turning point occurs at different levels of per capita GNP for different income groups. In the case of the full sample, the turning point for the income share of the top 20 percent occurs at per capita GNP levels of US\$ 364 (for the economy as a whole) after which the income share of this group begins to decline. However, the income shares of the middle 40 percent appear to improve after a per capita GNP level of US\$ 291 is reached. As shown in table I, the turning point of income shares shifts systematically further out as we go down the percentile groups, with the lowest 20 percent having to wait until per capita GNP levels of about 5600 are reached. Taking these estimates at face value (i.e. ignoring the question whether these estimated differences are significant), the cross section evidence suggests that the reversal of the 'deteriorating phase' of relative inequality begins fairly early, first for the middle income group and much later for the lower income groups. It appears that if there is a 'trickle down' process, then it takes substantially longer to reach the bottom!

(iii) The basic pattern described in (i) and (ii) above can also be discerned in the equations estimated from the restricted sample of 40 developing countries, with slight differences. Except for the equation explaining income shares of the middle 40 percent, the coefficients on both terms in the quadratic are again significant and have the same sign patterns as in the full sample, indicating a U-shaped pattern in the income shares of the lower income groups offset by an opposite pattern in the income shares of the top 20 percent. The absolute magnitudes of the estimated coefficients in these equations are, however, somewhat different, implying that there are differences in the shape of the Kuznets' curve obtained in the two cases. The exclusion of the developed countries and socialist countries from the sample has the effect of (a) shifting the turning point of the Kuznets' curve slightly inwards and (b) increasing the steepness of the observed U-shape in both phases. The extent of the shift can be seen in fig. 1, which compares the curve of estimated income shares for the lowest 40 percent at different levels of per capita GNP from eq. (A.4), with the curve of estimated shares from eq. (B.4), which includes developing countries only. We note that the improvement in relative income shares in the later phases of development appears markedly more modest if we look at the full sample than at the reduced sample of developing countries only. This is because the quadratic formulation forces a symmetry of shape with respect to the logarithm of per capita GNP and this allows the equations for the restricted sample to fit a steeper U curve in conformity with the steepness observed over the \$75-500 range, which is where most of the developing countries are concentrated (see Appendix, table 8). By contrast, the equation for the full sample is forced to fit a somewhat less steep curve to reflect the relatively modest improvement in equality observed between the middle income countries at the bottom of the U and the developed countries of today.

(iv) A major problem in interpreting the U shape revealed in cross country data is the possibility that it may be generated solely by the fact that the middle income range is dominated by countries with particular characteristics which generate high inequality. If so, the U shape has little relevance to the long-term prospect facing the low income countries of today, unless these countries share the same characteristics. Thus it is sometimes argued that the U shape simply reflects the concentration in the middle income range of Latin American countries, which display greater inequality because of particular historical and structural characteristics not applicable to others. We have tested for this 'Latin America

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<sup>7</sup> Throughout this paper the term significant will be used to indicate that the estimated coefficients are significantly different from zero with the sign indicated at least at the 10 percent level for a two-tailed test. The critical value of  $t$  for this level of significance is 1.68 for our sample size.

effect' by including a dummy variable for the Latin American countries in each of the equations (A.IMA.4). We find that the coefficient on this dummy variable is insignificant in all cases and its inclusion leaves both the sign pattern and the significance of the coefficients on the income quadratic largely unaffected.

**Table 1 : The Kuznets curve.**

Dependent variable	Estimated coefficients on explanatory variables <sup>a</sup>							
Income shares of:	Constant	Log per capita GNP	[Log per capita GNP] <sup>2</sup>	Socialist Dummy	R <sup>2</sup>	F	D.W. <sup>b</sup>	Turning point per capita GNP (1965-71)
<b>(A) Full sample</b>								
(1) Top 20 percent	-57.58	89.95	-17.56	-20.15	0.58	27.9	2.05	364
	(2.11)	(4.48)	(4.88)	(6.83)				
(2) Middle 40 percent	87.03	-45.59	9.25	8.21	0.47	18.6	2.08	291
	(4.81)	(3.43)	(3.88)	(4.20)				
(3) Lowest 60 percent	119.4	-73.52	14.06	17.52	0.61	31.4	1.97	412
	(5.85)	(4.90)	(5.23)	(7.95)				
(4) Lowest 40 percent	70.57	-44.38	8.31	11.95	0.59	29.8	2.04	468
	(5.38)	(4.61)	(4.82)	(8.45)				
(5) Lowest 20 percent	27.31	-16.97	3.06	5.54	0.54	24.3	1.93	593
	(4.93)	(3.71)	(3.74)	(8.28)				
<b>(B) Developing countries only</b>								
(1) Top 20 percent	-99.74	123.80	-24.18		0.12	3.6	2.24	363
	(1.56)	(2.35)	(0.26)					
(2) Middle 40 percent	92.93	-49.13	9.65		0.01	1.4	2.19	351
	(2.12)	(1.36)	(1.32)					
(3) Lowest 60 percent	171.50	-	22.72		0.22	6.5	2.20	364
	(3.79)	(3.12)	(2.99)					
(4) Lowest 40 percent	106.80	-74.69	14.53		0.24	7.2	2.20	371
	(3.83)	(3.25)	(3.10)					
(5) Lowest 20%	44.15	-31.33	6.07		0.22	6.3	1.98	381
	(3.43)	(2.%)	(2.81)					

Similarly, Papanek (1976) has argued that the observed U shape disappears when the 'strongly dualistic' countries are excluded from the sample. We note that our sample excludes South Africa, Rhodesia, Libya, Niger and Trinidad, four of the seven dualistic cases identified by Papanek, but this does not affect the significance of the U shape.

<sup>a</sup> statistics in parentheses

<sup>b</sup> In estimating these equations the observations were entered in ascending order of per capita GNP. The Durbin-Watson statistic therefore gives some idea of the pattern of residuals with this ordering. The lack of serial correlation of residuals in the above equations provides some reassurance that the quadratic formulation captures the underlying nonlinearity reasonably well.

These results are broadly in line with the findings of Adelman and Morris (1973) and Chenery and Syrquin (1975). They point to a marked decline in the relative income shares of the lower income groups in the early stages of development and they also suggest that the decline is most prolonged for the poorest groups. We will examine the welfare implications of this pattern in section 4.

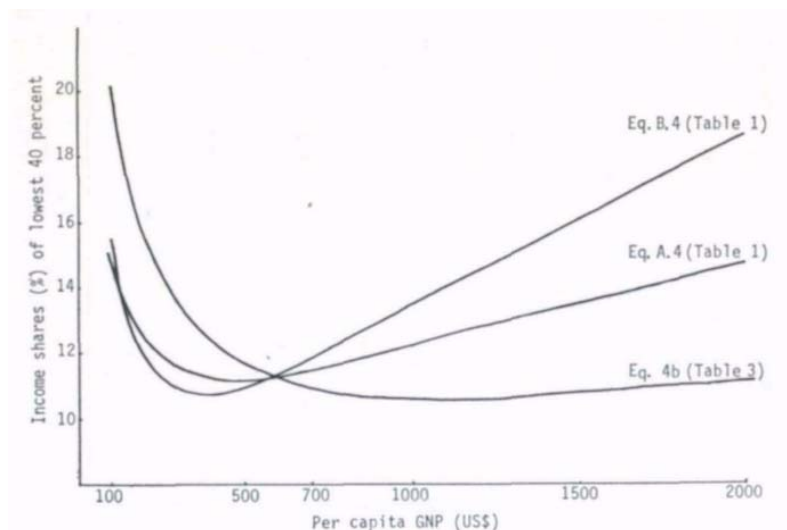


Fig. 1

For the moment, we continue our examination of the U-shaped curve in order to determine how far it tells the whole story. Judging this by goodness of fit, there is little doubt that the equations in table 1 leave much to be desired. In the sample of developing countries, the estimated equations explain just over a quarter of the observed variation in income shares of the lower income groups and much less than this for the top 20 percent. The  $\bar{R}^2$ 's  $\bar{R}$  for the equations estimated from the full sample are much higher, but this is to some extent due to the fact that the inclusion of socialist countries in this sample adds substantially to the intercountry variance in income shares and the dummy variable for these countries also 'explains' most of this added variance.

The relatively limited explanatory power of these estimated equations is hardly surprising. The true relationship between inequality and development must be fairly complex, reflecting the impact of a number of processes of structural change occurring with development. Such a complex relationship obviously cannot be 'reduced' into a relationship with a single explanatory variable. Per capita GNP is a useful summary measure of the level of development<sup>8</sup> in the sense that it is correlated with most of the processes occurring with development, and as such, it may capture the net effect of these processes as observed in cross country experience. The resulting estimated relationship is undoubtedly of some interest as a possible indicator of the secular behaviour of inequality, but it tells us nothing about the specific mechanisms through which development affects the degree of inequality. Since it is precisely these mechanisms that are of interest, from the analytical as well as the policy point of view, we need to extend our search for stylised facts to take account of them to the extent possible. The next section is devoted to an exploration of the cross country data along these lines.

### 3. Income distribution and economic structure

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<sup>8</sup> There are, however, major problems of comparability across countries in using per capita GNP as a measure of the level of development. The use of official exchange rates to convert GNP measured in domestic currency to GNP measured in US\$ introduces obvious errors since exchange rates typically do not reflect purchasing power parity. Kravis et al. (1975) investigating this problem found that the use of official exchange rates understates GNP in developing countries compared to developed countries. Furthermore, within the developing countries studied, the degree of understatement varies across countries sufficiently to create a switch in per capita GNP rankings. These results indicate that there must be substantial measurement error in our explanatory variables.

Our search for the specific mechanisms through which development affects the degree of inequality is necessarily limited by the availability of cross country data on explanatory variables. The explanatory variables we were able to use are reported in table 2, where they are grouped according to various aspects of the development process which are measured (albeit somewhat crudely) by these variables. The relationship between income inequality and these different aspects of development was explored by experimenting with alternative combinations of these explanatory variables in explaining cross country variation in the income shares of the different percentile groups.

**Table 2 Explanatory variables used in cross country regressions.**

	<b>Variables</b>	<b>Correlation coefficient with log of per capita GNP</b>
1	<i>Level and pace of development</i> Logarithm of per capita GNP (constant 1971 US\$) Dummy variable for all developed countries Rate of growth of GNP over the past 5-10 years (percentage)	1.00 0.73 0.03
2	<i>Education and human resources</i> Literacy rate (percentage) Primary school enrollment rate (percentage) Secondary school enrollment rate (percentage)	0.81 0.62 0.85
3	<i>Structure of production</i> Share of agriculture in GDP (percentage) Share of urban population (percentage)	-0.88 0.83
4	<i>Demographic characteristics</i> Total Population Rate of growth of population (percentage)	-0.03 -0.55
5	<i>Government activity</i> Share of government revenue in GDP (percentage) <sup>a</sup>	-0.24
6	<i>Other common variables reflecting structural commonality</i> Dummy variable for Latin American countries Dummy variable for Socialist countries Gini coefficient for land distribution*	0.01 0.12 -0.02

<sup>a</sup> This variable is not available for all countries in the full sample. The correlation coefficient relates to the sub sample for which observations are available.

In general, we find that three aspects of the development process appear to be systematically related to the degree of inequality. These are:

- (1) Intersectoral shifts involving a relative decline of the traditional agricultural sector and a parallel shift of population to the urban sector.
- (2) Expansion in the educational and skill characteristics of the population.
- (3) The 'demographic transition' involving a reduction in the rate of growth of population.

Inclusion of explanatory variables reflecting these processes in our regression equations substantially improves the goodness of fit obtained and the estimated relationships also conform to *a priori* expectations about the impact of these recesses upon income inequality.

Table 3 provides an overview of the results obtained by the expanded regression equations which include additional explanatory variables reflecting the impact of these aspects of development. Equation (a) is a general form applied to all income shares and includes variables with coefficients that are not always significant. Equation (b) for each income share contains only those variables that are found to be significant in equation (a). Clearly, the expanded equations have greater explanatory power than the equations reported in table 1, in which development was measured solely in terms of per capita GNP. They explain

between two-thirds and three-fourths of the observed variation in income shares compared to just over half in the case of the simpler formulation.<sup>9</sup>

A general problem in exploring these relationships is that the explanatory variables used to reflect different aspects of development are all highly correlated with per capita GNP (see table 2) and this makes it difficult to attribute observed associations in a particular equation to the impact of one or the other variable. This is an example of the problem of 'observational equivalence' of hypotheses mentioned in the introduction (section 1) and there is no satisfactory solution to this problem. The approach we have adopted is to examine the relationship with each variable under alternative specifications of the regression equation in order to determine which relationships appear more stable in the face of inclusion and exclusion of other explanatory variables.<sup>10</sup>

### 3.1. Intersectoral shifts

Intersectoral shifts occurring with development have long been recognised as a possible mechanism through which the process of development affects inequality. This was first pointed out by Kuznets (1963), who argued that development typically involves accelerated growth in the high income nonagricultural sectors, which slowly absorb population from the low income, relatively stagnant, agricultural sector. Kuznets showed that such a process would lead to an increase in relative inequality in the early stages of development and, under certain conditions, would generate precisely the U-shaped behaviour discussed above.

This effect of intersectoral shifts on overall inequality can be easily illustrated by a simplified two-sector example.<sup>11</sup> Taking the variance of the logarithms of income as a measure of inequality, the variance  $V$  for the population as a whole can be decomposed into component terms as follows,

$$V = s_u V_u + (1 - s_u) V_r + s_u (\bar{Y}_u - \bar{Y})^2 + (1 - s_u) (\bar{Y}_r - \bar{Y})^2, \quad (1)$$

where  $s_u$  is the population share of the urban (or nonagricultural) sector,  $K_u$  and  $K_r$  are the variances of logarithms of income within the urban and rural sectors respectively, and  $\bar{Y}_u$ ,  $\bar{Y}_r$ ,  $\bar{Y}$  are mean logarithms of income for the two sectors and the whole economy respectively. Using  $\bar{Y} = \bar{Y}_u s_u + \bar{Y}_r (1 - s_u)$ , eq. (1) can be rewritten,

$$V = V_r + s_u [(V_u - V_r) + (\bar{Y}_u - \bar{Y}_r)^2] - s_u^2 (\bar{Y}_u - \bar{Y}_r)^2. \quad (2)$$

<sup>9</sup> The increase in the variation explained is statistically significant at the 5 percent level in all cases.

<sup>10</sup> It should be emphasised that this approach does not provide a rigorous basis for choosing between alternative hypotheses. It is essentially a heuristic exploration of alternative patterns.

<sup>11</sup> For a fuller discussion see Robinson (1976).

**Table 3 Inequality and Development**

Dependent variable		Estimated coefficients on explanatory variables <sup>a</sup>												
Income shares of:		Constant	Log per capita GNP	[Log per capita GNP] <sup>2</sup>	Share of Agriculture in GDP	Share of Urban population in total	Literacy rate	Secondary school enrollment	Population growth rate	Socialist dummy	R <sup>2</sup>	F	D.W. <sup>b</sup>	Turning point US\$
(1)	Top 20 percent													
	(a)	-8.711	49.620	-7.975	-0.258	-0.090	-0.094	-0.146	3.611	-9.443	0.75	23.4	1.90	1291
		(0.26)	(2.24)	(2.10)	(2.15)	(1.58)	(2.29)	(2.63)	(4.28)	(3.27)				
	(b)	-1.592	43.580	-7.157	-0.225		-0.107	-0.160	3.48	-9.287	0.75	25.7	1.95	1108
		(0.05)	(1.97)	(1.87)	(1.87)		(2.60)	(2.86)	(4.09)	(3.17)				
(2)	Middle 40 percent													
	(a)	34.27	-5.819	0.977	0.226	0.035	0.045	0.115	-2.448	0.751	0.70	18.0	1.82	
		(1.57)	(0.40)	(0.39)	(2.86)	(0.93)	(1.68)	(3.14)	(4.43)	(0.40)				
	(b)	30.46			0.172			0.154	-2.51		0.70	45.8	1.88	
		(14.63)			(4.08)			(6.49)	(5.48)					
(3)	Lowest 60 percent													
	(a)	105.3	- 57.70	9.212	0.115	0.078	0.080	0.084	-2.50	10.43	0.74	22.47	1.96	1355
		(4.02)	(3.30)	(3.08)	(1.22)	(1.72)	(2.45)	(1.91)	(3.77)	(4.59)				
	(b)	126.3	-68.470	10.68		0.068	0.076	0.089	-2.425	11.05	0.74	25.2	1.92	1605
		(6.38)	(4.53)	(3.88)		(1.53)	(2.35)	(2.03)	(3.65)	(4.96)				
(4)	Lowest 40 percent													
	(a)	74.500	-43.850	7.009	0.032	0.055	0.049	0.031	-1.161	8.702	0.68	16.48	2.06	1343
		(4.01)	(3.54)	(3.30)	(0.48)	(1.73)	(2.13)	(1.0)	(2.47)	(5.40)				
	(b)	85.660	-51.440	8.41		0.057	0.056		-1.155	9.184	0.68	22.0	2.04	1144
		(6.59)	(5.29)	(4.%)		(1.85)	(2.61)		(2.48)	(5.98)				
(5)	Lowest 20 percent													
	(a)	35.110	-21.24	3.337	-0.004	0.027	0.021	0.001	-0.333	4.697	0.58	11.37	1.83	1522
		(3.73)	(3.38)	(3.10)	(0.12)	(1.67)	(1.82)	(0.08)	(1.40)	(5.75)				
	(b)	34.520	-21.00	3.315		0.027	0.022		-0.336	4.685	0.60	15.7	1.83	1454
		(5.31)	(4.32)	(3.91)		(1.77)	(2.01)		(1.44)	(6.10)				

<sup>a</sup> t-statistics in parentheses.

<sup>b</sup> In estimating these equations the observations were entered in ascending order of per capita GNP. The Durbin-Watson statistic therefore gives some idea of the pattern of residuals with this ordering. The lack of serial correlation of residuals in the above equations provides some reassurance that the quadratic formulation captures the underlying nonlinearity reasonably well.

It is easily shown that on certain restrictive assumptions, the intersectoral shifts described above generate a U-shaped pattern in inequality. Suppose, for example, that inequality within sectors remains constant and incomes in the two sectors grow at the same rate so that  $(F_u, F_r)$  remains constant. In this case, if there are no population shifts, our inequality measure  $V$  remains constant. However, if development involves a progressive shift of population into the high income sector then eq. (2) becomes a quadratic in  $s_u$  (the terms in square brackets being constants). This function reaches a maximum for  $V$  at an urban population share given by

$$s_u = \frac{1}{2} + \frac{V_u - V_r}{2[Y_u - Y_r]^2} \quad (3)$$

Clearly, development generates the familiar U shape in inequality provided the maximum occurs within the relevant range  $0 < s_u < 1$ . A sufficient condition for this is that  $|V_u - V_r| < [Y_u - Y_r]^2$ , i.e. the squared difference between sectoral means is greater than the differences between the within sector variances.<sup>12</sup>

The assumptions of constant inequality within sectors and equal growth rates in sectoral incomes are obviously unrealistic. In fact we would expect both the degree of inequality within sectors and mean income differences between sectors to change systematically with development. Interestingly, there are plausible reasons for supposing that these changes might reinforce the U-shaped pattern in overall inequality. For one thing, inequality in the urban sector may itself follow a U-shaped pattern. It may increase initially, as accelerated economic growth creates a strong demand for skilled labour, in the face of acute scarcities, with the result that skill differentials expand. In the later stages, we can expect urban income to become more equal as labour skills improve and become more widely dispersed in the population leading to both an increase in wage share, as well as greater equality in the distribution of wage income (see subsection 3.2 below).

The ratio of mean incomes between sectors may also follow a U-shaped pattern with intersectoral differences widening in the early stages, as scarce capital and other resources are pre-empted by the modern (and typically privileged) urban sector, to the detriment of productivity and income levels in the traditional sector. These differentials can be expected to narrow in the later stages of development for two reasons. Firstly, as capital becomes less scarce, more resources are likely to be made available to improve productivity in the low income sectors. Secondly, as the size of the modern sector increases in the later stages of development, its continued expansion has a proportionately larger impact on reducing the pressure of population in the low income sector. Both factors lead to an accelerated increase in productivity in the traditional sector in the later stages of development and can be expected to reduce income differentials between sectors.

A systematic exploration of the impact of intersectoral shifts on inequality obviously calls for data on inequality within each sector, sectoral mean incomes and sectoral population shares. In the absence of such data we have used two explanatory variables which capture some aspects of the process. These are *the share of agriculture in GDP*, which declines with development as the non-agricultural sector grows at an accelerated rate, and *the share of the urban population*,

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<sup>12</sup> As pointed out by Robinson (1976), it is not essential for urban inequality to be greater than rural inequality for the U shape to exist, provided the intersectoral mean differences are large enough. As eq. (3) makes clear,  $V_u > V_r$ , only ensures that the turning point occurs when more than half the population is in urban areas.

which can be expected to rise as population shifts away from the traditional agricultural sector. These two variables are obviously closely related but they do reflect somewhat different aspects of the same process. The share agriculture in GDP reflects the extent to which the income generating capacity the economy has shifted into nonagricultural activity while the share of the urban population reflects the extent to which this shift has been accompanied by increased absorption of population into the nonagricultural sectors.

Our first step was to consider if either of the structural shift variables are associated with the U shape in inequality. Table 4 summarises the results on this count. We note that either of the intersectoral shift variables generate a shaped behaviour in inequality when entered in quadratic form in the regression equations. It is obviously difficult to determine if the estimated relationships reflect the effect of these variables or the effect of per capita GNP with which both variables are highly correlated (see table 2). However it is worth noting that these results are slightly worse than those reported in table 1, in which the quadratic is defined in terms of the logarithm of per capita GNP. We also find that the U shape defined in terms of per capita GNP is more stable. When the quadratic formulation in either of the intersectoral shift variables is included, together with the quadratic in the logarithm of per capita GNP, the coefficients on the structural shift variables are no longer significant while the quadratic formulation in the per capita GNP remains significant. Table 4 reports one equation in which the quadratic formulations in all three variables included in the same regression equation. Again we find that the quadratic per capita GNP remains significant.

**Table 4 Inter sectoral shifts and inequality.**

Dependent variable		Estimated coefficients on explanatory variables*								R*	F
Income shares of:		Constant	Log capita GNP	per [Log per capita GNP] <sup>2</sup>	Share of agriculture in GDP	[Share of agriculture in GDP] <sup>3</sup>	Share of urban population	[Share of urban population] <sup>1</sup>	Socialist dummy		
(1) Top 20 percent	(a)	39.54 (13.73)			1.155 (5.01)	-0.018 (4.63)			-20.110 (6.33)	0.49	19.8
	(b)	52.08 (15.25)					0.28 (1.62)	-0.005 (2.53)	-18.140 (5.39)	0.43	15.8
	(c)	36.06 (0.73)	80.42 (279)	-15.64 (2.64)	-0.279 (1.17)	0.002 (0.66)	0.068 (0.70)	-0.005 (0.92)	-19.66 (6.59)	0.59	13.3
(2) Middle 40 percent	(a)	41.89 (21.55)			-0.671 (4.31)	0.010 (3.77)			8.453 (3.94)	0.34	10.9
	(b)	31.860 (14.00)					-0.050 (0.43)	0.002 (1.36)	7.066 (3.15)	0.28	8.5
	(c)	70.140 (2.16)	-41.88 (1.81)	8.870 (2.27)	0.093 (0.40)	0.002 (0.55)	0.249 (1.59)	-0.002 (1.25)		0.50	9.4
(3) Lowest 60 percent	(a)	36.58 (17.38)			-0.867 (5.15)	0.014 (4.91)			17.24 (7.42)	0.55	24.5
	(b)	29.49 (11.99)					-0.310 (2.46)	0.004 (3.78)	15.99 (6.54)	0.50	20.4
	(c)	109.0 (2.95)	-65.67 (2.49)	12.12 (2.73)	-0.171 (0.65)	0.004 (1.08)	0.123 (0.69)	-0.000	17.50 (7.84)	0.62	14.8
(4) Lowest 40 percent	(a)	18.56 (14.25)			-0.484 (4.64)	0.008 (4.61)			11.660 (8.11)	0.56	26.3
	(b)	16.060 (10.71)					-0.232 (3.04)	0.003 (3.69)	11.070 (7.50)	0.54	24.1
	(c)	66.010 (2.80)	-38.60 (2.30)	6.780 (2.39)	-0.162 (1.0)	0.003 (1.17)	0.031 (0.27)	0.000	12.090 (8.49)	0.61	14.4
(5) Lowest 20 percent	(a)	6.02 (10.11)			-0.159 (3.35)	0.003 (3.6«)			5.370 (8.18)	0.54	24.2
	(b)	6.10 (9.00)					0.107 (3.12)	0.001 (3.39)	5.221 (7.82)	0.53	23.0
	(c)	27.570 (2.48)	-15.02 (1.90)	2.39 (1.79)	-0.112 (1.41)	0.002 (1.40)	0.011 (0.21)	0.000	5.712 (8.51)	0.57	12.1

<sup>a</sup> t-statistics in parentheses.

These results suggest that the U-shaped relationship is better explained by per capita GNP than the structural shift variables. We have, therefore, retained the quadratic formulation in per capita GNP and entered the two structural shift variables as additional explanatory variables, but not in quadratic form. When this is done we find that these variables are significantly related to income inequality. The estimated relationships obtained are broadly comparable to those reported in our expanded 'best' equations in table 3 (which include some additional explanatory variables). Our general results on the impact of structural shifts on inequality can, therefore, be summarised with reference to the results reported in table 3.

(i) We find that the share of agriculture in GDP and the urban share of total population are both significantly related to the pattern of income inequality, but their effects on income shares of different groups are not identical. The share of agriculture in GDP is not significantly related to the income shares of the lowest groups, but it is positively related to the income shares of the middle groups and negatively related to the income share of the top 20 percent (equations (2b) and (1b) in table 3). By contrast, the share of the urban population in the total has no significant effect on the income share of the middle group, but is significantly positively associated with the income shares of the lowest groups and negatively associated with the income shares of the top 20 percent (equations (3b), (4b), (5b) and (1b) in table 3).

(ii) These results point to an interesting asymmetry in the distributional impact of the intersectoral shifts that occur with development. As the share of agriculture in GDP declines with development, there appears to be a relative shift of income away from the middle group and towards the upper groups. Alongside this 'disequalising' process, however, development also generates a shift of population to the modern or urban sectors. According to the cross section results, this latter process appears to favour the lowest income groups at the expense of the rich.

The proposition that increasing urbanisation may raise the income shares of the lowest income groups is consistent with *a priori* expectation. Given the dualistic nature of the development process, a higher rate of urbanisation, other things being the same, reflects a wider access to productive employment opportunities in the expanding nontraditional sector and a correspondingly lower pressure of population in the rural areas. Both forces can be expected to operate in favour of the lower income groups.<sup>13</sup>

The observed 'disequalising' impact of the decline in the share of agriculture in GDP in terms of a shift from the middle income groups to the top is less easily explained. One possibility is that as the relative size of agricultural activity diminishes, compared to nonagricultural activity, there is a shift towards greater concentration of income and wealth because the nonagricultural sector typically promotes larger size production units for both institutional and technological reasons. A shift from small to large scale production can be expected to generate an increased concentration of income in the upper income groups at the expense of the middle. We can also speculate that the observed adverse effect on the middle groups is due to the fact that the decline in the relative importance of agriculture probably has its strongest impact on small and middle sized land holding cultivators who dominate the middle income groups. The slower growth rate in agriculture implies a slower growth in income for these groups, which is in turn reflected in a declining income share of the middle income group in the economy. The difficulty

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<sup>13</sup> Note that this is not to deny that in many circumstances the extent of migration may be excessive compared to available employment possibilities. The urban population share variable measures the total absorption of population in the urban areas which largely reflects expansion in employment opportunities. These data provide no basis for measuring the degree of excess migration.

with this argument is that it implies that the poorest rural groups (e.g. landless labourers, artisans, etc.) may also be adversely affected by the slower growth of agriculture and this should be reflected in a positive relationship between the share of agriculture in GDP and income shares of the lowest 40 percent or lowest 20 percent. Our results provide no evidence of such a relationship. The equations in table 3 suggest that the income share of the poorest groups are affected by the level of development as measured by per capita GNP, but not by the relative importance of agriculture at a given level of development. One possible explanation is that the poorer, landless groups are relatively more mobile than landowning cultivators and are more willing to shift from agriculture into unskilled employment in urban areas so that their income share is not affected by the relative size of agricultural production. Note that since our equations indicate that income shares of the lower groups fall as per capita GNP rises in the early stages of development, the above result suggests only that the extent of the fall is independent of the relative size of the agricultural sector.

### **3.2. Education and labour skills**

Improvements in the educational characteristics and skill endowments of the labour force provide another mechanism through which development affects inequality. The usual argument is that this mechanism operates to promote income equality in the long run. The reasons underlying this optimism are worth reviewing before considering our empirical results.

The central assumption underlying this view is that there is substantial scope for substituting skilled for unskilled labour in the production process (particularly in a dynamic context) without a decline in the marginal productivity in the former. This view of production and technological change combined with the conventional marginal productivity theory of factor rewards, implies that a more skilled labour force will produce a shift from low paid, unskilled employment to high paid, skilled employment. This shift, it is argued, produces higher labour incomes, a reduction in skill differentials, and an increase in the share of wages in total output.<sup>14</sup> This mechanism, combined with economic policies that do not discriminate against labour-using and skill-intensive production sectors, is often described as the key to the success of countries such as Taiwan and Korea in achieving a rapid rate of development together with high growth rates of employment and relatively equal income distribution.

In addition to the technological assumptions about factor productivity, there is also the argument that skill intensive development patterns are less prone to income concentration than capital intensive patterns. This is because of the peculiar characteristic of human capital—unlike physical capital—that expansion in the stock of human capital in the economy necessarily involves dispersion across a wider population. There is a limit beyond which human capital cannot be accumulated in a single person, and at any rate it cannot be bequeathed across generations in the same manner as physical capital. Both factors, it is argued, combine to generate strong pressures towards equality in income distribution as the human resource endowment expands with development.

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<sup>14</sup> Note that the assumption that a greater supply of skilled labour will not produce a sharp decline in its marginal product is obviously crucial. Otherwise, skill upgrading will not have much effect upon total output, and while it may reduce relative wage differentials it may also reduce the share of labour in total income thus contributing to an increase in overall inequality. Indeed in these circumstances it is even likely that skill differentials will not narrow because of the resistance of organised labour, and the result will be either open unemployment of skilled labour or displacement of unskilled labour by skilled labour in the unorganised sector of the market. The existence of 'over-educated' manpower in many developing countries may reflect just such a phenomenon. Proponents of the importance of education are usually undismayed by this phenomenon and explain it away as an expansion in the 'wrong kind of education.'

The available data permit us to examine the education-inequality relationship in terms of three explanatory variables which provide crude approximations to the level of human resource development—the *literacy rate*, the *primary school enrollment ratio* and the *secondary school enrollment ratio*. Because of the high correlation among these variables, it is necessary to be somewhat selective in our choice of explanatory variables. We have chosen the literacy rate as a measure of the basic education level of the stock of the population and the secondary school enrollment rate as a measure of the degree of educational achievement beyond this basic level.<sup>15</sup> Two points about the exclusion of the primary school enrollment rate are worth noting. First, the literacy rate provides us with a better measure of the basic educational level, being a measure of the stock and not future additions to the stock. Secondly, we observe in our sample that there is relatively little variation in the primary school enrollment rate across countries beyond the middle level of development by when fairly high enrollment ratios are achieved in most countries. The lack of variation obviously makes it less attractive as an explanatory variable. The results obtained can be summarised as follows:

(i) There is clear evidence that education is significantly positively correlated with equality. When the two education variables chosen —the literacy rate and the secondary school enrollment rate—are entered in the regression equations without per capita GNP (equations (1a), (2a), (3a), (4a) and (5a) in table 5), we find that the secondary schooling variable is associated with shifts in income from the top 20 percent to all other groups except the lowest 20 percent. The literacy rate is not significant in any of the equations. When these variables are included together with the quadratic in per capita GNP the pattern changes in important respects. As shown in table 5, the secondary schooling variable retains its positive impact on the middle groups but the literacy rate variable now has a positive impact on the income shares of the three lowest groups. It is tempting to conclude that the relationship thus revealed reflects the true impact of literacy on inequality, which was previously swamped by the bias introduced by the exclusion of per capita GNP.<sup>16</sup> This basic pattern remains unchanged when the equations are expanded to include other explanatory variables (see table 3).

(ii) The positive impact of education on relative equality appears to be quantitatively fairly substantial. For example, an increase in the literacy rate from 10 percent to 60 percent is associated with a 2.8 percentage point increase in the share of the lowest 40 percent. This should be compared to an average share for this group of about 16 percent at low levels of development. Similarly, an increase in secondary school enrollment from 10 percent to 40 percent is associated with an increase of 4.6 percentage points in the income share of the middle 40 percent compared to an average share of 34 percent for this group at low levels of development.

(iii) The fact that the secondary schooling variable benefits the middle groups while the literacy

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<sup>15</sup> Measuring the educational and skill levels of the labour force is no simple task. Ideally we would need to develop appropriate definitions of skill levels and to measure the skill structure of the labour force in each country. Data of this sort relating to the stock of labour are not available for most of the countries in our sample. The use of the school enrollment rate has obvious limitations since it is a flow variable and not a stock variable.

<sup>16</sup> Recalling that the decline in income shares with respect to per capita GNP was most prolonged in the case of the lowest income groups (see section 2), it is reasonable to assume that the literacy rate, which is correlated with the per capita GNP variable, is picking up the negative impact due to per capita GNP through most of the early stages of development.

rate benefits the lower group calls for some explanation. The most plausible explanation is in terms of the likely beneficiaries of expansion in secondary schooling and expansion in literacy in our sample. In general, the observed variation in secondary school enrollment (between 5 and 40 percent for most developing countries) is not such that the benefits of expansion in secondary school enrollment are likely to have reached the poorer groups. Since access to secondary schooling almost certainly expands from the top downwards, the observed range of variation for most of the countries in our sample suggests that the lower income groups are excluded from secondary schooling. By contrast, the variation in literacy rates observed in our sample (between 10 to 80 percent for most developing countries) is such that the observed expansion in literacy across different countries clearly does reach the lowest groups.

**Table 5 Education and inequality.**

Dependent variable			Estimated coefficients on explanatory variables*						
Income of:	shares of:		Constant	Log capita GNP	per [Log capita GNP] <sup>1</sup>	per Literacy rate	Secondar y school enrollmen t rate	Socialist dummy	R <sup>2</sup> F
(1) Top percent	20	(a)	58.76			0.022	-0.219	-14.85	0.56 25.9
			(28.60)			(0.49)	(4.32)	(4.92)	
		(b)	-57.340	85.150	- 14.420	-0.085	-0.172	-16.46	0.67 24.4
			(2.11)	(4.16)	(3.84)	(1.81)	(2.70)	(5.92)	
(2) Middle percent	40	(a)	29.54			-0.014	0.152	5.16	0.52 22.3
			(23.27)			(0.51)	(4.86)	(2.77)	
		(b)	81.080	-37.860	6.430	-0.033	0.130	5.900	0.57 16.7
			(4.45)	(2.76)	(2.55)	(1.05)	(3.04)	(3.16)	
(3) Lowest percent	60	(a)	23.09			-0.015	0.143	13.50	0.54 24.5
			(14.25)			(0.40)	(3.58)	(5.67)	
		(b)	124.40	-74.330	12.60	0.078	0.102	14.91	0.68 26.1
			(6.54)	(5.25)	(4.44)	(2.20)	(2.10)	(7.09)	
(4) Lowest percent	40	(a)	11.70			-0.008	0.066	9.69	0.51 21.0
			(10.99)			(0.11)	(2.53)	(6.05)	
		(b)	76.32	-47.35	8.00	0.052	0.042	10.57	0.65 22.5
			(5.58)	(4.60)	(4.24)	(2.21)	(1.29)	(7.55)	
(5) Lowest percent	20	(a)	4.259			0.002	0.012	6.49	0.44 17.2
			(8.47)			(0.18)	(0.97)	(6.46)	
		(b)	31.32	-19.67	3.27	0.024	0.005	5.10	0.57 16.8
			(4.67)	(3.90)	(3.53)	(2.12)	(0.33)	(7.44)	

<sup>a</sup> t-statistics in parentheses.

(iv) It is interesting to note that in the case of each of the education variables, the income share of the relevant beneficiary group expands at the expense of the income share of the top 20

percent. This can be said to be an unambiguous improvement from the welfare point of view.

These results are broadly in line with earlier cross section studies-notably Adelman and Morris (1973) and Chenery and Syrquin (1975 —in that they testify to the close relationship between the process of educational and skill improvement, which occurs with development, and the increase in relative equality. As we have seen, there are persuasive reasons for arguing that the correlation reflects an important causal process, although even so the argument does depend upon some fairly crucial assumptions (see footnote 14) which may not hold in a number of circumstances. Sceptics will also want to point out that the observed correlation may even reflect the reverse direction of causation, i.e. educational levels may be determined by the degree of inequality. We can only record that the cross section data are also consistent with this hypothesis.<sup>17</sup>

### 3.3. Population growth and inequality

The reasons for expecting a particular relationship between income inequality and the rate of growth of population are much less clear than the reasons for expecting the relationships discussed above. For one thing, our understanding of the role of population growth in the development process is fairly limited. In any case, most of the debate in this area has been focussed on the relationship between population growth and the pace of development, while its impact on the degree of inequality has received relatively less attention.<sup>18</sup>

In these circumstances, it is appropriate to begin with observed cross country experience - the stylised facts-and then consider how far we have a theory to explain them. Our estimated results unambiguously show high growth rates of population to be systematically associated with greater income inequality. As shown in table 3, the rate of growth of population has a significant positive impact on the income share of the top 20 percent, and a significantly negative impact on the income shares of all other groups (except the lowest 20 percent for which group the negative coefficient on the population variable is not significant). This general pattern remains valid when the regressions are run with different combinations of other explanatory variables and also with the reduced sample of developing countries only.

In interpreting this result, it is important to note that the relationship identified above holds after controlling for other explanatory variables such as per capita GNP. In other words, we need to ask ourselves why an economy with faster population growth would show greater inequality *when it reaches a given level of per capita GNP* than another with a slower growth of population observed *at the same level of development*. The literature suggests two possibilities, neither of which has been fully explored.

(i) Perhaps the most important link between population growth and income inequality is provided by the fact that different income groups grow at different rates, with the lower income groups typically experiencing a faster natural rate of increase in population. Although we have not allowed explicitly for intergroup differences in population growth (data on this subject are simply

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<sup>17</sup> A regression of the literacy rate and the secondary school enrollment rate on per capita GNP and the income shares of the middle and lower groups yields significant positive coefficients on the latter.

<sup>18</sup> The conventional wisdom in this area (which has been extensively aired in recent years) states that there is a mutually reinforcing relationship between the pace of economic development and reductions in the rate of growth of population. For an unconventional - and on the whole implausible-view that population growth may actually provide the impetus to economic expansion in otherwise stagnant societies, see Boserup (1965).

not available) it is arguable that high growth rates in total population reflect greater differentials in population growth across groups, which in turn generate greater inequality. The argument can be summarised as follows. It is well known that the process of development produces a 'demographic transition.' Suppose that this transition takes the form of a reduction in the natural rate of population growth of each group as per capita income in the group rises, and there is a flattening out of this response at high income levels. In that case, declines in the rate of growth of total population will occur with development as the various groups slide down this curve, and the flattening of the curve implies that this process will produce a narrowing of intergroup differentials in population growth. The argument can be carried even further if we allow for the fact that high population growth rates in some low income countries reflect an initial acceleration in population growth as a result of lower mortality, after which they can be expected to go through a 'demographic transition' as birth rates decline. It is reasonable to assume that this type of acceleration in population growth occurs mainly in the low income groups where the mortality rate is highest. These factors suggest that countries with high growth rates of population probably suffer from larger intergroup differentials in population growth compared to countries with low growth rates of population. It follows that in countries with high growth rates of population, per capita income of the poorer groups will grow more slowly compared to per capita income of the rich, leading to higher inequality at given levels of per capita GNP.

(ii) A second link between population growth and inequality is suggested by the fact that higher growth rates of population imply greater pressure of labour supply on other productive factors with a consequent deterioration in the share of labour in total output. This is especially so in the presence of fixed factors such as land, which are likely to be particularly important in developing countries. A higher population density generated by faster population growth is likely to produce a higher rental share, which in turn generates greater inequality given the typically concentrated pattern of land ownership. A similar argument can be advanced in the case of capital as a productive factor. It is been argued that high growth rates of population lead to higher dependency burdens which reduce the flow of private savings and also places a larger claim on scarce public resources for 'nonproductive' public investment.<sup>19</sup> Both factors tend to lower the ratio of productive capital to labour. If we accept the conjecture that economics with a faster rate of growth of population have lower 'equilibrium' capital-labour ratios at any level of development, it is very likely that they will also have lower labour shares.<sup>20</sup>

### **3.4. Socialist countries**

A consistent finding in all the equations estimated is that the six socialist countries in the sample display substantially greater equality than is predicted by the cross country regression line. The coefficient on the dummy variable for these countries is significantly negative in all the equations explaining income shares of the top 20 percent and it is significantly positive for all other groups. This is precisely what one would expect, given the absence of the disequalising effect of income from property (i.e. land and capital), which is typically highly concentrated.

It is also of interest to consider how the absolute size of the coefficient on the dummy variable changes as we allow explicitly for the impact of particular aspects of development. Taking the various equations explaining the income share of the lowest 40 percent, for example, we find

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<sup>19</sup> See, for example. Left" (1969).

<sup>20</sup> This relationship between labour shares and capital-labour ratios follows from standard neoclassical assumptions, providing the elasticity of substitution is less than unity.

that the coefficient on the dummy variable for socialist countries is about 12.0 in the case of the basic equation reported in table 1. It drops to 9.7 when the educational variables are included in table 5 and is further reduced to 8.7 by the inclusion of all the other explanatory variables in the expanded equations reported in table 3. Thus a part of the much greater equality of the socialist countries observed in the sample may be due to the fact that in these countries, the progress made in expanding education levels and reducing the rate of growth of population is much greater than for other countries at their income levels. However, it is clear that even after allowing for these specific factors, the socialist countries display markedly greater equality.

In concluding this section, it is appropriate to remind the reader of some caveats. The results discussed above serve to identify some of the correlates of inequality which provide a basis for speculating about causal mechanisms. But it is important to note that our equations do not take account of some of the crucial factors determining cross country differences in income inequality. Two of these deserve special mention.

The most important omission from this point of view is our inability to examine the role of differences in the concentration in ownership of productive assets, including land. This aspect of economic structure is rightly regarded as a crucial determinant of income inequality and indeed the greater equality observed in socialist countries testifies to this fact. Countries differ widely in the degree of concentration in productive assets both in terms of the initial conditions in this respect and the institutional and policy framework which determines the evolution of concentration patterns over time. Unfortunately, for most countries, lack of data on patterns of concentration of wealth make it impossible to quantify this relationship directly.<sup>21</sup> We note that we have experimented with the Gini coefficient of the distribution of agricultural land (which is available for about thirty countries) as an explanatory variable, but no significant relationship was identified between this variable and income inequality. This is not really surprising, given that the direct impact on overall inequality will depend upon the size of the rural sector (in terms of both population share and income share), which varies substantially across countries.

A second limitation of our exercise is the lack of explicit recognition of the role of the institutional framework in which development takes place. The distribution of income generated by an economic system is ultimately the result of a complex interaction between economic and socio-political forces. Indeed, it can be argued that the very distinction between these forces results from arbitrary classifications, which are adopted for 'analytical convenience,' at some risk of over-simplification. For example, the distributional impact of an initial concentration of land depends not merely upon the resulting concentration of 'equilibrium' factor incomes, but also on its impact on the equilibrium itself, through the dominant position accorded to landowners in a whole range of transactions. Similarly, improvement in labour incomes and labour shares in total income, occurring with development, depends not only on the upgrading of skills and technological 'factor productivities' as discussed above, but also on the growth of labour power through social and political institutions. These socio-political factors are not easily quantified on an ordinal scale, let alone the cardinal scale needed for regression analysis.<sup>22</sup> Apart from the introduction of a dummy variable for socialist countries, we have made no allowances for subtler differences in socio-political structure. We note in passing that we have attempted to test for the

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<sup>21</sup> For a review of the importance of this aspect of economic structure in determining income inequality in the economy and its overwhelming importance in the agricultural sector, see Chenery et al. (1974).

<sup>22</sup> For an attempt at examining these relationships using analysis of variance techniques suitable for ordinally measurable variables, see Adelman and Morris (1973). Measurement of this type inevitably involves a high degree of subjective evaluation.

effect of the scale of government activity, as measured by the ratio of tax revenues to GNP, but no significant relationship was discernible.

#### 4. Relative inequality, absolute poverty and development

In the previous section, we showed that income inequality across countries is related not merely to per capita GNP, but also to other variables measuring particular aspects of development. An important feature of these results is that the inclusion of these additional explanatory variables does not swamp the observed relationship between inequality and per capita GNP. The expanded equations reported in table 3 show a clear U-shaped pattern with respect to per capita GNP, with the coefficients on the two terms of the quadratic being significant and of opposite signs in the case of the top 20 percent, as well as the three lower income groups—the lowest 60 percent, the lowest 40 percent, and the lowest 20 percent. In this section, we turn to the implications of these results for the long-term path of inequality and the welfare implications of this path.

##### 4.1. The U-shaped curve revisited

The first point to note about the expanded equations reported in table 3 is that although they confirm the U-shaped pattern, the absolute magnitudes of the coefficients on the quadratic terms are substantially altered, implying a change in the curvature of the estimated U shape.

The nature of this change can be seen in fig. 1, which compares the estimated U shape in the income share of the lowest 40 percent as derived from the equations in table 1 with the U shape as derived from the expanded equation in table 3.<sup>23</sup> The U-shaped curve in the expanded equation is substantially flattened out in the later phase when inequality declines. By comparison, the earlier phase of sharply increasing inequality remains relatively unchanged. This basic pattern of a flattening in the inequality reductions in the later phases of development is repeated in the case of the income shares of the lowest 60 percent and the lowest 20 percent, and there is a corresponding flattening of the inverted U shape for the top 20 percent also. In all cases, the turning point is shifted substantially further out (compare results in table 3 and table 1).

The change in the estimated U shape suggests an interesting hypothesis for further study. It can be argued that the two phases of inequality conventionally characterised by the U-shaped curve arise from the operation of quite distinct forces. The reduction in inequality observed in the later phases of development appears to be associated with a number of particular processes occurring with development, such as the increasing absorption of labour in the relatively high income modern sector, the expansion in education and the improvement in human resources, and the reduction in population growth rates. Once we allow explicitly for the operation of these processes (as we have done in the expanded equations) the ascending phase of the U-shaped curve is almost completely damped.<sup>24</sup> By contrast, we have not been able to isolate particular

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<sup>23</sup> In each case, the curve corresponds to the estimated share predicted by the regression equation for different levels of per capita GNP, holding all other explanatory variables at their mean value for the sample and holding the dummy variable for socialist countries at zero.

<sup>24</sup> Note that the quadratic formulation is necessarily symmetric in logarithms of per capita GNP. Our statement on the flattening of the curve in the ascending phase relates to the shape of the segment of the quadratic *over the relevant range*. Attempts to estimate the exponent on the logarithm of income together with the other parameters by using nonlinear estimation proved fruitless because of the flatness of the maximum likelihood function. In fact, a wide range of values of  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  in the general form  $\alpha + \beta \log Y + \gamma (\log Y)^\delta$  can generate much the same U-shaped curve over a given range of  $Y$ .

processes occurring with development which underlie the initial phase in which relative inequality deteriorates.

Can we explain this observed deterioration? Of the various relationships discussed in section 3, only the process of a declining share of agriculture in GDP is associated with a deterioration in inequality, and that too involves a shift from the middle group to the top, leaving the lower income groups unaffected. If we focus on the income shares of the lowest 40 percent and the lowest 20 percent, none of the additional explanatory variables with which we have experimented help to explain this particular 'stylised fact' of cross country experience. We must clearly look to country-specific studies for the answer.

#### **4.2. The absolute impoverishment hypothesis**

The prolonged decline in income shares of lower income groups in the early stages of development has important welfare implications. There is clearly a very strong presumption that the poor benefit from development much less than the rich. More seriously, it has been argued by Adelman and Morris (1973) that developing countries face the prospect not just of increasing relative inequality, but also of prolonged absolute impoverishment for the lower income groups. This view needs to be examined in some detail.

The proposition that development may lead to absolute impoverishment of the poorer groups obviously cannot be ruled out *a priori*. Such an outcome may result from the erosion of traditional economic structures as a consequence of the expansion of the modern sector. An aggressively expanding technologically advanced, modern sector, competing against the traditional sector for markets and resources (and benefiting in this competition from an entrenched position in the institutional and political context) may well generate both a relative and absolute decline in incomes of the poor. Needless to say, history provides numerous instances of the operation of such processes.<sup>25</sup>

Against this bleak view of the development process, there is another explanation of the observed increase in relative inequality which is somewhat less pessimistic. On this view, increasing relative inequality is not due to absolute impoverishment but to unequal benefits from growth. Thus if economic expansion occurs in sectors and segments in which the initial benefits accrue to the upper income groups, and if these groups have relatively weak income linkages with the poorer income groups, we would expect income shares of the poorer groups to decline without any decline in their absolute incomes. Interestingly, this disequalising impact is not restricted to the case in which opportunities for economic expansion are limited to upper income groups. It can be shown that if opportunities for economic expansion take a form in which individuals in all income groups have prospects for an  $x$  percent increase in income (with  $x$  constant across groups), but in all groups only a given percentage of the population (also constant across groups) can actually achieve this, it may still be the case that income shares of the poorer groups will decline.<sup>26</sup>

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<sup>25</sup> The European enclosure movements are often cited as an example in which the disruption of a technologically inferior pre-existing system led to substantial absolute impoverishment. The decline of the Indian cotton industry in the face of competition from Lancashire is another example in which an 'efficient' system declined in competition with modern technology aided by a commercial policy designed to favour the metropolitan power.

<sup>26</sup> I am grateful to Ben King for this point which can be illustrated by a simple example. Consider an initial distribution in which the poorest 10 people each have an income of 10 units, the next ten each have an income of 11 units and the richest 10 have incomes of 12 units each. The poorest 10 people have an

The differences between these two views of what lies behind the observed increase in relative inequality are crucial. In the one case we assume that the disruption of low income traditional economic activities is in some sense a necessary consequence (on some views it is even an essential pre-condition!) for the growth of the modern sector. In the other case, the problem is seen not as arising from a necessary contradiction.

Choosing between these views or, as is more likely, between an appropriate mix of these views is ultimately an empirical issue to be resolved for each particular country experience. Cross section analysis should not be used to derive general pronouncements to be applied to all cases, but in keeping with our objective, it can help to document the 'stylised facts' of cross country experience. The data permit two different tests of the absolute impoverishment hypothesis. The first consists of using the estimated income shares of the lower income groups from the regression equations described above to calculate the per capita absolute income of these groups at different levels of per capita GNP.<sup>27</sup> The second test consists of calculating the average absolute income of the poorer groups for each country from the actual income shares, and then estimating a cross country' relationship between this measure of average absolute income of the poor and the level of development.

We find that both tests reject the hypothesis that the process of development produces impoverishment in absolute terms.

(i) Table 6 presents estimates of average incomes of the lowest 60 percent, the lowest 40 percent and the lowest 20 percent at different levels of development based on income shares for these groups predicted by eqs. (3b), (4b) and (5b), for the full sample of countries (table 3) and from the same equations, estimated for the reduced sample of developing countries only. It should be noted that the predicted income shares for this exercise are obtained by holding all other explanatory variables constant at the mean value for the sample. This procedure can be questioned on the grounds that these variables reflect different aspects of development and as such it is not legitimate to hold them constant. An alternative would be to use income shares predicted from the simpler formulations of table 1 in which per capita GNP is the sole variable reflecting all aspects of development. We note for the record that the results obtained are broadly in accord with table 6. In all cases, the estimated average absolute income of these groups increases with per capita GNP.

(ii) These results are further supported by the attempt to estimate regression equations using the logarithm of average absolute incomes of the three lower income groups as the dependent variable. Table 7 reports the results of this exercise for the full sample of 60 countries as well as for the reduced sample of developing countries only. The explanatory variables are the same as

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income share of 30.3 percent. If half of each income group experience an increase in income of 20 percent, the resulting distribution will be one in which the income share of the poorest 10 will be 28.9 percent. It is easily seen that the decline in income shares arises because 'gainers' in a lower income group overtake 'non-gainers' in a higher income group, and in the re-ordered distribution the lower percentiles will always have a larger percentage of 'non-gainers.'

<sup>27</sup> The per capita absolute income of the  $i$ th percentile is calculated as  $(s_i/n_i) Y$  where  $s_i$  and  $n_i$  are the income share and population share of the  $i$ th percentile group and  $Y$  is the per capita GNP. Ideally we should use average personal income instead of per capita GNP but data on personal income are not available for most of the countries in the sample. Since the ratio of personal income to GNP probably falls as per capita GNP rises, our measure understates the income of the poor in the low income countries relative to the poor in the high income countries. This exaggerates the extent to which absolute income of the poor rises with development.

those used to explain income shares in the expanded equation in table 3 and include a quadratic in the logarithm of per capita GNP in order to test for the existence of a phase of absolute impoverishment. We find that although the coefficient on the first term in the quadratic is negative in the equations for the lowest 40 percent, and the lowest 20 percent, it is not significant in either case. In any case, the coefficients imply no decline in absolute income over the relevant range.

**Table 6 Estimated average absolute income levels of low income groups. <sup>a</sup>**

Per capita GNP in US\$	Lowest Full sample	60 percent Developing countries	Lowest Hill sample	40 percent Developing countries	Lowest Full sample	20 percent Developing countries
75	51.6	45.5	42.0	37.8	32.6	27.7
100	63.2	55.4	50.2	42.0	38.3	31.7
200	103.8	89.0	77.3	63.7	56.3	44.9
300	140.3	118.2	101.2	84.6	70.8	57.5
400	175.2	145.5	124.0	106.4	84.1	71.1
500	209.4	171.8	146.7	129.6	96.8	86.3
600	243.4	197.6	169.6	154.4	109.4	103.1
700	277.4	223.1	193.0	180.7	122.1	121.6
800	311.6	248.5	217.0	209.1	135.0	141.6
900	346.0	273.9	241.6	238.9	148.2	163.3
1000	380.7	299.4	266.9	270.2	161.8	186.5
1500	560.0		403.6		235.7	
3000	1158.9		909.1		519.1	

<sup>a</sup> The figures in the first column for each income group are based on income shares predicted by eqs. (3b), (4b) and (4c) from table 3, and the figures in the second column are based on income shares predicted by the same equation estimated from the reduced sample of developing countries only. In the latter case, absolute incomes for per capita GNP levels above US\$ 1000 are not shown because the predicting equation for income shares was estimated from a sample which did not extend beyond this level.

The behaviour of absolute income of the poor over the relevant range is perhaps best seen in terms of its elasticity with respect to per capita GNP. This can be directly obtained from the estimated equations in table 7. Differentiating partially with respect to the logarithms of per capita GNP gives  $5 + 2\epsilon$  [log per capita GNP] as the elasticity at that level of per capita GNP (where  $\epsilon$  and  $\delta$  are the coefficients on the two terms of the quadratic). As shown below, the elasticity for all three groups obtained from eqs. (1a), (2a) and (3a) from table 7 is positive, albeit less than unity (reflecting the increase in relative inequality).<sup>28</sup> Furthermore, it rises as per capita GNP rises.

	Elasticity of absolute income with respect to per capita GNP at:		
	Per capita GNP US\$ 100(1965-71)	Per capita GNP US\$ 500(1965-71)	Per capita GNP US\$750 (1965-71)
Lowest 60 percent	0.64	0.73	0.89
Lowest 40 percent	0.45	0.77	0.85

<sup>28</sup> When the equations reported in table 7 are estimated without the squared term, the coefficient on the logarithm of per capita GNP yields a constant elasticity for the absolute income of each group. In this case, the elasticities for the three groups are 0.89, 0.85, and 0.76 respectively, with t-ratios of 13.9, 9.0 and 5.1 respectively.

Lowest 20 percent

0.18

0.65

0.77

**Table 7 Cross country regressions using absolute average income.**

Dependent variable		Estimated coefficients on explanatory variables <sup>a</sup>									R <sup>2</sup>	F	D.W. <sup>b</sup>
Logarithms of average absolute income of:		Constant	Log per capita GNP	(Log per capita GNP) <sup>2</sup>	Share of agriculture in GDP	Share of urban pop. in total	Literacy rate	Secondary school enrollment	Population growth rate	Socialist dummy			
0)	Lowest 60 percent												
	(a) Full sample	0.959 (2.10)	0.070 (0.23)	0.143 (2.75)	0.002 (1.05)	0.001 (1.55)	0.001 (2.60)	0.001 (1.81)	-0.052 (4.47)	0.106 (2.68)	0.98	444.8	2.03
	(b) Developing countries	0.720 (0.79)	0.252 (0.35)	0.111 (0.79)	0.002 (1.16)	0.001 (0.86)	0.002 (2.32)	0.001 (1.21)	-0.061 (3.80)		0.94	87.8	2.02
(2)	Lowest 40%												
	(a) Full sample	1.620 (2.47)	-0.475 (1.09)	0.231 (3.08)	0.001 (0.28)	0.001 (1.32)	0.002 (2.36)	0.001 (1.01)	-0.047 (2.80)	0.189 (3.31)	0.97	214.7	2.02
	(b) Developing countries	1.828 (1.41)	-0.697 (0.69)	0.289 (1.44)	0.001 (0.50)	0.001 (0.56)	0.002 (2.16)	0.001 (0.49)	-0.055 (2.42)		0.88	41.2	2.04
(3)	Lowest 20 percent												
	(a) Full sample	2.479 (2.31)	-1.183 (1.65)	0.340 (2.77)	-0.001 (0.27)	0.002 (1.11)	0.002 (1.83)	0.001 (0.39)	-0.269 (1.00)	0.32 (3.46)	0.91	75.8	1.72
	(b) Developing countries	3.216 (1.55)	-1.967 (1.21)	0.534 (1.66)	0.001 (0.20)	0.001 (0.32)	0.003 (1.85)	0.000	-0.036 (0.99)		0.72	15.3	1.83

<sup>a</sup> t-statistics in parentheses. <sup>b</sup> In estimating these equations the observations were entered in ascending order of per capita GNP.

It is worth noting, however, that the elasticity for the lowest 20 percent, although positive, is much lower than for the other groups and takes much longer to rise to unity.

We conclude that while the cross country evidence points to unequal benefits from growth, it does not support the hypothesis of a prolonged decline in absolute incomes for the poor as development proceeds. There are, of course, a number of reasons why we should be careful in interpreting this result. The percentile groups we have defined are very large, and increases in 'average incomes' for such broadly defined groups may hide significant declines in absolute incomes for particular socio-economic groups which are offset by growth in income for other groups. Such offsetting changes may be an important aspect of the dynamics of income

distribution in developing countries but they cannot be captured by the traditional approach to distributional problems which focusses on income shares of ordered percentile groups.<sup>29</sup>

A systematic treatment of the absolute impoverishment hypothesis obviously calls for an examination of the trends in per capita income in particular socio- economic groups in particular countries. It will be some time before reliable time series data suitable for such studies become available, but until then it is worth noting that while cross section data strongly support the hypothesis of worsening relative inequality in the early stages, they do not support the proposition that absolute income levels of large sections of the population also decline.

## **5. Growth and inequality: The short-term relationship**

Thus far, our analysis has focussed on what are essentially long-term relationships between inequality and development. The worsening in relative inequality observed in our cross-country data occurs over the phase of development presented by the transition from per capita GNP levels of US\$ 75 to per capita GNP levels of around US\$ 750. For an economy experiencing growth in per capita GNP at the rate of about 2.5 percent per year, this transition would take about a hundred years.<sup>30</sup> While long-term relationships are of considerable interest, it is important to note that some of the debate in this area has focussed on much more short-term impacts.

The importance of making a distinction between the secular relationship between inequality and levels of development on the one hand and the short-term relationship between inequality and growth on the other, is not always clearly recognised. For example, it has been suggested that high growth rates in some of the developing countries observed over comparatively short periods - e.g. Brazil between 1960 and 1970-have led to a marked increase in income inequality. To some extent, the long-term relationship discussed above would produce precisely such an outcome-a higher rate of growth observed over a given period raises the level of development above what it would otherwise be, and this in turn affects inequality. However, the debate on this issue has a somewhat different flavour. There is a definite suspicion that there are short-run mechanisms which are quite distinct from any structural or long-term factors, and which generate greater inequality as a direct consequence of faster growth. This raises the question of whether the degree of inequality may be affected not only by the level of development but also by the speed at which this level is achieved.

A plausible reason for the existence of such a relationship may be found in a number of short-term pressures associated with high growth rates. For example, the existence of lags in factor mobility across regions or sectors will ensure that as opportunities for accelerated growth arise in particular regions or sectors, economic expansion creates factor market disequilibria which may generate significant income differentials. Such disequilibria are likely to be more severe in

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<sup>29</sup> In a recent study, Adelman and Robinson (1976) have drawn attention to such offsetting changes in the position of socio-economic groups as an important feature of the response of income distribution to policy intervention.

<sup>30</sup> This time frame is broadly consistent with that suggested by Kuznets (1955) on the basis of historical evidence from some of the now developed countries. Kuznets observed that the time series evidence for these countries indicated a steady reduction in inequality over the first half of this century, but he contrasted this trend with the more probable trend of widening inequality in the early stages of their industrialisation.

a high growth situation than in a more stable low growth situation.<sup>31</sup> Income differentials generated through this mechanism obviously need to be distinguished from those which reflect long-term structural factors such as the endowment of labour skills of the economy as a whole. They are perhaps better seen as being superimposed upon the structurally determined income differentials, serving (at least in market economies) as necessary lubricants to overcome any frictional resistance to a higher rate of expansion.

The cross country data permit only a crude test for the existence of a short- term relationship of this type. We can include the rate of growth of GDP for each country over the ten years preceding the point at which the distribution is measured as an additional explanatory variable in our regression equations and consider if (other things being the same) faster growing countries display greater inequality. The results obtained from this exercise reject the hypothesis that a faster rate of growth leads to greater inequality. The coefficient on the growth rate variable remained insignificant in a number of experiments with alternative combinations of explanatory variables, including some in which the per capita GNP variable was not included.

The absence of any significant relationship between inequality and the rate of growth is a potentially important aspect of observable cross country experience. One interpretation is that while there may be a secular time path for inequality which developing countries must traverse, and which contains a phase of increasing inequality, there is at least no evidence that countries which traverse this path at a fast pace are worse off *at the same level of development* than countries which traverse it at a slower pace. Such a proposition, if accepted, has dramatic policy implications. It suggests that policymakers are perhaps best advised to think of the rate of growth as determining essentially the speed of transition through the different phases of development and inequality: higher growth rates accelerate this transition without necessarily generating greater inequality than can be expected given the structural characteristics of the economy at each level of development.

It would be naive to pretend that so important a conclusion can be firmly established on the flimsy basis of the lack of an observable relationship between inequality and the rate of growth. Precisely because of its importance, however, it is worth examining the results more carefully to extract a legitimate interpretation. A major limitation of our methodology is that it does not permit us to go beyond the simple measurement of rates of growth to examine differences in the type of growth achieved in different situations. Since it is precisely these differences which will determine the distributional impact of growth, we cannot hope to provide any insight into this question by focussing solely on the levels of growth achieved. But if we cannot deny that certain types of high growth processes lead to greater inequality than can be structurally expected, we can at least assert that the cross section evidence does not suggest that *all fast growers* systematically display this pattern. If there are countries in which this is true, there are others which display the opposite pattern, so that no systematic pattern emerges across countries. Such time series evidence as is available tends to support this point of view.<sup>32</sup> The experience of Brazil, where the high growth was accompanied by worsening relative inequality, can be contrasted with the experience of Taiwan, where substantial growth has taken place with an actual reduction in income inequality.

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<sup>31</sup> A thorough examination of this issue would require us to distinguish between an increase in the growth rate observed in transit to a high growth dynamic equilibrium and a high growth rate observed in an established dynamic equilibrium. Clearly such distinctions go well beyond the capacity of our methodology.

<sup>32</sup> See, for example, Ahluwalia (1974).

Recognising this diversity of country experience is perhaps the most important lesson to be learned from the data. At the very least, it shifts attention from an unquestioning suspicion of high growth rates as such towards an examination of the particular nature of growth in different countries and the implications of different types of growth for inequality. A systematic investigation along these lines can only be conducted in the context of in-depth analysis of the historical experience of particular countries.

## 6. Conclusions

It was stated at the outset that the objective of this paper is primarily exploratory. It could not be otherwise, given the limitations of cross country analysis.

The results presented above therefore should not be viewed as definitive either in defining the prospects facing particular developing countries or in providing unambiguous policy guidelines. They are best viewed as a useful documentation of empirical regularities-the so-called 'stylised facts' of cross country experience. More ambitiously, they can also be viewed as providing some clues to the mechanisms through which the development process affects the degree of inequality. They can be no more than clues precisely because the essential complexity of a dynamic process, and its great variety across countries, cannot be adequately captured in a single equation.

Subject to these limitations, our cross country results can be summarised as follows.

(i) There is strong support for the proposition that relative inequality increases substantially in the early stages of development, with a reversal of this tendency in the later stages. This proposition holds whether we restrict the sample to developing countries or expand it to include developed and socialist countries. Furthermore, it appears that the process is most prolonged for the poorest group.

(ii) There are a number of processes occurring *pan passu* with development which are correlated with income inequality and which can plausibly be interpreted as causal. These are intersectoral shifts in the structure of production, expansion in educational attainment and skill level of the labour force, and reduction in the rate of growth of population. The operation of these processes appears to explain some of the improvement in income distribution observed in the later stages of development, but they do not serve to explain the marked deterioration observed in the earlier stages.

(iii) The cross section results do not support the stronger hypothesis that the deterioration in relative inequality reflects a prolonged absolute impoverishment of large sections of the population in the course of development. The cross country pattern shows average absolute incomes of the lower percentile groups rising as per capita GNP rises, although slower than for upper income groups.

(iv) Finally, the cross section results do not support the view that a faster rate of growth is systematically associated with higher inequality than can be expected given the stage of development achieved.

## Appendix: Data sources and problems

The income distribution data used in this paper are summarised in table 8. The sample of 60 countries was selected from a recent compilation of available cross country data undertaken in the World Bank's Development Research Center and reported in Jain (1975). The source for

each observation is given by the number in parentheses which corresponds to the source number reported in Jain (1975).

The quintile shares given in table 8 differ slightly from those implied by the decile shares reported in Jain (1975). This is because the latter are obtained from a Lorenz curve fitted to the original data. Our figures are read off a Lorenz curve plotted through individual points recorded in the original source. The main reason for preferring this method is that the fitted curve does not necessarily pass through the observed points and since these points correspond to deciles or quintiles in many cases, it is arguably more appropriate to use the exact figures. All equations reported in the paper have also been estimated using the data reported in Jain (1975) and the results are substantially unaffected.

The choice of 60 countries from a potential total of 71 countries was dictated by particular judgments about the reliability of data in some cases. Although multiple observations were available for some countries, we have restricted our data set to one observation per country on the grounds that adding more than one observation for some countries would give too much weight to particular country experience. Wherever available, household distributions have been used, but in many cases we have had to use the distribution of individuals.

It is important to emphasise that our selection process does not necessarily ensure that the sixty observations selected come up to some objective standard of quality. Income distribution data are notoriously deficient and the many sources of error affecting them are well known. These sources of error may be broadly grouped into three categories.

(i) There are a number of conceptual and definitional problems in measuring income inequality and available surveys do not display any uniform practice in handling these problems. For one thing, the concept of income that is relevant for the study of inequality is not easy to define uniquely. It should obviously include subsistence income (valued appropriately) and the case can even be made that it should refer in some sense to 'permanent' income, smoothing out both life cycle variations as well as purely stochastic variations around the life cycle profile. There are also obvious problems associated with inequality measures using money incomes for groups facing very different price levels.

(ii) There are well-known sampling problems which limit the reliability of measures of income inequality based on survey data. These problems are aggravated by the fact that many of the available surveys on which inequality measures are based were not originally designed to provide reliable measures of income inequality.

**Table 8 Income distribution at different levels of development.**

			Income shares of quintiles				
	Country	Per capita GNP in US\$ (1970 prices)	Bottom 20%	Second quintile	Third quintile	Fourth quintile	Top 20%
Developing countries							
1.	Chad 58(1)	79.3	7.3	10.3	17.0	22.0	43.0
2.	Malawi 69(1)	80.0	3.8	9.1	13.3	18.6	33.2
3.	Dahomey 59(1)	91.3	3.0	10.3	14.3	20.0	30.0

			Income shares of quintiles				
	Country	Per capita GNP in US\$ (1970 prices)	Bottom 20%	Second quintile	Third quintile	Fourth quintile	Top 20%
Developing countries							
4.	Pakistan 63-64 <sup>a</sup>	93.7	6.5	11.0	15.5	21.5	43.3
5.	Tanzania 67 (1)	103.8	5.0	9.0	12.0	17.0	57.0
6.	Sri Lanka 69-70 (3)	108.6	6.0	11.0	16.5	20.5	46.0
7.	India 63-64 (4)	110.3	5.0	11.0	13.0	19.0	52.0
8.	Malagasy 60(1)	138.7	5.5	8.0	9.5	16.0	61.0
9.	Thailand 62 (1)	142.8	5.7	7.2	11.9	17.5	57.7
10.	Uganda 70(1)	144.3	6.2	10.9	13.9	21.9	47.1
11.	Kenya 69(1)	153.2	3.8	6.2	8.5	13.5	68.0
12.	Botswana 71-72(1)	216.6	1.0	5.9	14.5	19.7	58.9
13.	Philippines 65 (1)	224.4	3.9	7.9	12.5	20.3	55.4
14.	Egypt 64-65 (1)	232.8	4.2	9.8	15.5	23.5	47.0
15.	Iraq 56(1)	235.5	2.0	4.8	9.2	16.0	68.0
16.	El Salvador 61 (1)	267.4	5.5	6.5	8.8	17.8	61.4
17.	Korea 70 (5)	269.2	7.0	11.0	15.0	22.0	45.0
18.	Senegal 60(1)	281.8	3.0	7.0	10.0	16.0	64.0
19.	Honduras 67-68 (1)	301.0	2.0	4.4	9.1	19.5	65.0
20.	Tunisia 70 (2)	306.1	4.1	7.3	12.0	21.6	55.0
21.	Zambia 59(1)	308.2	5.6	9.0	11.9	16.5	57.0
22.	Ecuador 70(1)	313.6	2.5	3.9	5.6	14.5	73.5
23.	Turkey 68(1)	322.2	3.0	6.5	11.1	18.8	60.6
24.	Ivory Coast 70 (2)	328.7	3.9	6.2	11.8	20.9	57.2
25.	Guyana 55-56 (1)	350.8	4.0	10.0	16.8	23.5	45.7
26.	Taiwan 68*	366.1	7.8	12.2	16.3	22.3	41.4
27.	Colombia 70 (7)	388.2	3.5	5.9	12.1	19.1	59.4
28.	Malaysia 70 (3)	401.4	3.4	8.0	12.6	20.1	55.9
29.	Brazil 70 (4)	456.5	3.1	6.9	10.8	17.0	62.2
30.	Jamaica 58(1)	515.6	2.2	6.0	10.8	19.5	61.5
31.	Peru 70 (4)	546.1	1.5	5.0	12.0	21.5	60.0
32.	Lebanon 55-60(1)	588.3	5.0	8.0	10.0	16.0	61.0
33.	Gabon 68 (2)	608.1	3.3	5.5	7.9	15.8	67.5
34.	Costa Rica 71 (2)	617.1	5.4	9.3	13.7	21.0	50.6
35.	Mexico 69 (5)	696.9	4.0	6.5	9.5	16.0	64.0
36.	Uruguay 67 (1)	720.8	4.3	10.0	15.1	23.2	47.4
37.	Panama 69 (2)	773.4	2.9	6.5	12.5	18.8	59.3
38.	Spain 64-65 (1)	852.1	6.0	11.0	15.7	22.1	45.2
39.	Chile 68 (1)	903.5	4.5	8.5	12.7	17.5	56.8
40.	Argentina 61 (1)	1004.6	7.0	10.3	13.1	17.6	52.0
41.	Puerto Rico 63 (1)	1217.4	4.5	9.2	14.2	21.5	50.6
42.	Japan 68 (2)	1712.8	4.6	11.3	16.8	23.4	43.8
43.	Finland 62 (1)	1839.8	2.4	8.7	15.4	24.2	49.3
44.	Netherlands 67 (2)	2297.0	3.1	10.5	16.4	21.5	48.5
45.	France 62(1)	2303.1	1.9	7.6	14.0	22.8	53.7
46.	Norway 63(1)	2361.9	4.5	12.1	18.5	24.4	40.5
47.	United Kingdom 68 (2)	2414.3	6.0	12.8	18.2	23.8	39.2
48.	New Zealand 70-71 (3)	2501.5	4.4	12.5	18.6	23.5	41.0
49.	Denmark 63(1)	2563.9	5.0	10.8	16.8	24.2	43.2
50.	Australia 67-68(1)	2632.4	6.6	13.5	17.8	23.4	38.7

			Income shares of quintiles				
	Country	Per capita GNP in US\$ (1970 prices)	Bottom 20%	Second quintile	Third quintile	Fourth quintile	Top 20%
Developing countries							
51.	Germany, W. 70 (2)	3208.6	5.9	10.4	15.6	22.5	45.6
52.	Canada 65 (1)	3509.6	6.4	13.6	16.5	23.3	40.2
53.	Sweden 70 (2)	4452.2	5.4	9.9	17.6	24.6	42.5
54.	United States 70 (3)	5244.1	6.7	13.0	17.4	24.1	38.8
Socialist countries							
55.	Bulgaria (1)	406.9	9.8	15.2	18.0	22.0	35.0
56.	Yugoslavia 68 (2)	602.3	6.5	12.0	17.0	23.0	41.5
57.	Poland 64(1)	660.8	9.8	13.6	18.1	22.5	36.0
58.	Hungary 67 (1)	872.7	8.5	15.5	19.0	23.5	33.5
59.	Czechoslovakia 64 (1)	887.7	12.0	15.6	19.0	22.4	31.0
60.	Germany, E. 70 (1)	2046.3	10.4	15.8	19.8	23.3	30.7

<sup>a</sup> The income distribution for Pakistan is for East and West Pakistan taken together as reported in source 1 for Pakistan from Jain (1975).

<sup>b</sup> The income distribution for Taiwan is from W. Kuo, 'Income distribution by size in Taiwan area-Changes and causes,' in: Income Distribution Employment and Economic Development in South East and East Asia, papers and proceedings of (he seminar sponsored by the Japan Economic Research Center and the Council for Asian Manpower Studies, vol. 1.

(iii) Finally, quite apart from sampling errors, there are non-sampling errors that are particularly serious in measuring income distribution. It is well known that response bias may lead to intentional understatement of incomes at the upper end of the income range and there may also be some overstatement at the lower end. More generally, it is widely recognised that surveys which include only a few questions on income are likely to elicit highly inaccurate statements about actual incomes from most people.

The data we have used are undoubtedly subject to all these limitations and the result is that our estimates of income distribution are subject to substantial measurement error. In defense of the use of such data for cross section analysis we have only the familiar excuse: the presence of random error in the data serves only to hide cross country patterns rather than to generate spurious patterns. Such patterns as can be discerned despite these errors therefore deserve serious, if critical, consideration.

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