

Economic Growth and the Income of the Poor¹

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Abstract

The paper finds a strong relationship between overall income growth and real growth of the income of the poor. For the widest possible sample of countries there tends to be a one-to-one link between overall growth and growth of the real income of the poor. Furthermore the same variables that affect economic growth also affect growth of the real incomes of the poor, with roughly equal magnitudes. This implies that there are relatively few variables that affect income distribution independently of their affect on economic growth, and we tend to confirm this statement. The few variables that do not conform to this pattern appear to be political instability, lax government budget policies, and location in the tropics.

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1. Introduction

What is the empirical relationship between economic growth, income inequality and real incomes of the poor? Development specialists have debated for decades the relative importance of overall economic growth, economic policies, social policies, and aid programs for influencing the income of the poor. One widely held view has been that economic growth does not reach the poor as fully as it does other members of society. At least in part, this notion is based on a hypothesis originally sketched out by Simon Kuznets (1955) that income distribution tends to worsen at early stages of development, and only later improve as incomes rise. If there is indeed such a law of development, it suggests that the growth-oriented policies pursued by many developing countries during the last decade may leave the poor behind. Furthermore, many believe that it has been demonstrated that growth in developing countries has indeed left the poor behind.

To explain the logic of what we are attempting to do in this paper, consider figure 1 below.

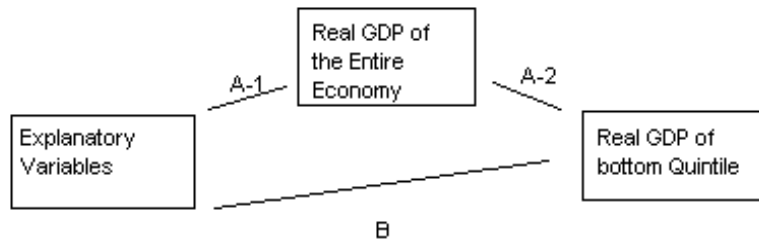


Figure 1. The explanatory variables can affect the real income of the bottom 20 percent in two ways: through their effect on GDP (channel A) or independently of their effect on GDP (channel B).

In principle, any given set of the explanatory variables can affect the real income of the poor through either of these channels individually or through both channels. There is a large pre-existing empirical literature on channel A1. This paper considers specifically channel A2 and B.

The crucial question regarding channel A2 is how close is the relationship to one-to-one. Some implicitly argue that it is exactly one-to-one; others argue that it is substantially below one-to-one.

The crucial question regarding channel B is to identify the set of variables that operate through channel B, and to estimate their magnitudes. Many have argued that poverty-reduction policies need to be more than just growth-promoting policies. Implicitly they are saying that the set of variables operating through B is large; and that growth-promoting policies are not sufficient to effectively address poverty.

In this paper, we investigate channel A2 with three data sets: one using levels of income, a second using growth of income over long horizons, and a third using growth of incomes over a shorter horizon. We also provide evidence on which variables operate through channel B.

Before continuing, it is important to note that the three empirical concepts we will be discussing in this paper, namely the average income of the poor, the income share of the poor, and overall per capita income are related mathematically as follows. Defining “poor” as the poorest 20 percent of the population, we have.

$$Y_p \equiv (S_p/0.2) * Y$$

In this equation, Y_p is the real income per capita of the bottom 20 percent, S_p is the income share of the bottom twenty percent, and Y is per capita income of the entire society. It follows also that growth rates will be additive:²

$$\text{Growth}(Y_p) \equiv \text{Growth}(S_p) + \text{Growth}(Y) \tag{1}$$

In other words, the growth rate of the income of the poor is equal to the growth rate of the share of the poor plus the growth rate of the average income of the poor. Since effectively $Y_p = Y * S_p$, there is an isomorphism between asking about what determines S_p and what determines Y_p after conditioning on Y . They are the same question. Channel B asks about whether explanatory variables affect the real income of the poor after controlling for the affects through total GDP. We can test for this either by running regressions directly on the share of the poor or by running regressions on real growth of the income of the poor *holding constant overall GDP growth*.

It is also worth discussing with an example some typical numbers for these concepts. Let’s take the African nation of Mauritius as an example. In 1980, the average income for someone in the bottom twenty percent of the income distribution in Mauritius was 1,410 U.S. dollars.³ By 1991, it was \$1,996 per year. During the same period average GDP per person for the entire population went from \$3,988 to \$5,959. So several statements are correct about Mauritius. First, Mauritius had substantial per capita economic growth: 3.7 percent per year. Second, the average real income of the poor increased by 3.2 percent per year. Third, income inequality increased, since the growth rate of the poor lagged behind overall per capita growth. Fourth, the income share of the bottom twenty-percent declined from 7.1 to 6.7 percent. Growth did not leave the poor behind in the sense of lowering their real income (their real incomes rose by 41 percent), but it did leave the poor behind in the sense that their income rose less rapidly than that of the rest of society.

The debate on the relationship between economic growth and the income of the poor generally has been based on individual case studies and the experiences of a few countries. More extensive statistical research has been hampered by the lack of reliable and comparable data on income shares and income distribution across a large number of countries. However, a new data

² To derive, take the natural logarithm of both sides of the equation for the income level of the poor and differentiate with respect to time.

³ This income figure and the others discussed throughout the paper are expressed as purchasing-power-parity Gross Domestic Product (GDP) per capita in constant 1990 U.S. dollars. We use “income” and “GDP per capita” interchangeably.

set compiled by Klaus Deininger and Lyn Squire (Deininger and Squire, 1996b) represents a major step forward in this direction, and allows more systematic research into these questions.⁴ Our results on channel A2 extends earlier research in this direction by Deininger and Squire (1996a) and Roemer and Gugerty (1997).⁵

Regarding the A2 channel, We establish that the average relationship for A2 is one-to-one, and this does not depend on the sample of countries or the time period, or the time horizon. In other words, the Mauritius example cited above, where the real income of the poor grew at 3.2 percent and that of the entire population grew at 3.7 percent is not typical. On average across countries, an economic growth rate of 2.8 percent is associated with a 2.8 percent growth rate of the income of the poor.⁶

The analysis proceeds as follows. Section 2 briefly describes our data. Section 3 explores the evidence on channel A2. Section 4 looks at the evidence on channel B. Section 5 offers some concluding comments.

⁴ For analysis of the relationship of poverty and growth using the limited data available on absolute poverty, see Squire (1993) and Ravallion and Chen (1996).

⁵ There is a large empirical literature examining the relationships of poverty, inequality, and economic growth, but the income distribution data available before Deininger and Squire's compilation included so few countries and so few time periods that the results often depended on what countries were included in the sample. Ahluwalia's influential 1974 paper, for example, anticipates some of our results on growth and poverty, but with a sample of only 13 developing countries. Fields (1983) surveys the early literature.

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2. Poverty Data Sources and Coverage

The Deininger and Squire (1996b) income distribution data set allows us to address the relationship between poverty and economic growth in a large number of developing countries for the first time. This data set includes income shares by quintile for multiple periods for sixty-four countries. We have updated the Deininger and Squire data set with more recent observations (from World Bank, 1998, Annex Table 2.8) to provide multiple periods for sixty-nine countries. We combine these share data with data on overall GDP per capita, adjusted for purchasing power parity (PPP), drawn from the Penn World Tables (Summers and Heston 1995, 1991), and updated with PPP estimates of GDP per capita growth from the World Bank (1998). This allows us to calculate the average income level of the poorest quintile (the poorest 20 percent of the population) in each country over time, and the corresponding income growth rate, for these 69 countries.

Deininger and Squire compiled data from every study they could find with national coverage of income distribution that had been conducted during the last forty years. They evaluated these studies and extracted from this universe the subset of what they considered to be “high quality” observations on income distribution. They required these observations to be based on household surveys, comprehensive coverage of the population, and comprehensive coverage of income or expenditure sources. The result is the first comparable data on income distribution for a large number of countries over time.

Although these data are the best available, they are not perfect. The underlying data were compiled using somewhat different methodologies across countries and over time. Observations vary in measuring income or expenditure, and by individuals or households as the unit of observation. Even in the “high quality” data, there are likely to be large measurement errors and some clearly questionable observations. The number of observations varies widely by country, so the sample is unbalanced. In addition, it is worthwhile pointing out that when we examine the average income of the poorest quintile over time, we are not looking at the same individuals at all points in time. Some individuals achieve rapid income growth and move out of the bottom quintile, and others who start in a higher income bracket may experience slower income growth and shift into the bottom income quintile. The data do not allow us to track individuals over time; rather, the data allow us to calculate the average income for those who happen to be in the low-income quintile at any point in time. Finally, although the Penn World Tables are undoubtedly the best cross-country income data available, they too contain errors. In summary, these data provide useful insights, but the conclusions should be viewed with some caution. In particular, we focus on the broad patterns across countries over time, rather than the trends in any one country. With 69 countries in the sample, many countries are missing. Some geographical regions, especially Africa and the Middle East, are substantially under-represented because of lack of reliable data on income shares of the poor. Despite these caveats, we believe the data is of sufficiently high quality to provide useful insights. These data represent most of what is known about general trends in poverty around the world.

3. The Relationship Between Growth of the Economy and Growth of the Real Income of the Poor (Channel A2)

In this section we investigate the empirical relationship between growth in the economy and growth in the real income of the poor. This corresponds to channel A1 in figure 1. At issue is whether this relationship is one-to-one or less than one-to-one as many have implied.

Income Levels

The fitted trend between average income levels and the income of the poor in Figure 1 (which is displayed with logarithmic scales) shows that countries with one percent higher average incomes on average have exactly one percent higher incomes of the poor.⁷

Income Growth Rates

We organize the data on growth rates in two different ways. First we look at rates over as long a period as possible, yielding one observation for each country, which we call the long panel. Second, we examine growth rates between every pair of observations available for a country, yielding several shorter growth episodes for most countries, which we call the short panel.

The time span of the long panel depends on the availability of income distribution data. Since these data are recorded for different years in different countries, the time period under observation differs across countries, though in most cases the period runs from the late 1960s to around 1990. We exclude countries with data for less than a ten-year period, which leaves us with 60 countries having an average growth span of 19 years.⁸ A list of the countries included, and the dates of the first and last observation, is shown in Table 1. As noted above, many key countries are missing, especially in Africa and the Middle East. Income distribution data over time are simply not available for most countries in these regions. Since many of these countries are among the poorest and slowest growing in the world, we must take care in generalizing our conclusions.

The short panel includes 488 growth episodes for 69 countries (including the countries whose data does not span ten years). The average growth span is 2.7 years. The geographical coverage is improved, including eleven countries in Africa, but the data are for short-run variations. Countries with more frequently measured income distribution are more heavily represented in

⁷ In a recent paper, Peter Timmer (Timmer, 1997) found less than a one-to-one relationship between the relative level of income of the poorest 20% and average income. The coefficient for the log of average income when it was regressed on log income of the poor was 0.79, significantly less than one. We have checked a wide variety of additional regressions, and have found that the estimated coefficients cluster around one, with the 0.79 coefficient being one of the lowest.

⁸ To minimize the effect of idiosyncrasies in the endpoint observations, we use the trend growth rate over time for all countries with more than two observations (53 of the 60). The trend is estimated by regressing the log of income on time, with the estimated slope yielding the average growth rate. This method uses all of the observations available for a country rather than just the endpoints. For consistency, we also use predicted rather than measured initial income levels (overall and for the poor) when initial levels are used in the analysis. Use of the trend rather than the endpoint growth rates causes the trend values for Mauritius in Table 1 to differ slightly from the endpoint values discussed in the introduction.

the short panel, so for example India with annual data for most of the years from 1951 to 1994 has 31 observations, but Zambia with data only for 1976 and 1991 has one growth period observation. Since our interest is primarily in the long-term relationship of poverty and growth, rather than short-term fluctuations, we will focus the analysis on the long panel.

On average across all countries, the income of the poor grew almost as fast as overall income.

Across all regions general income growth was only 0.1% faster than the income growth of the poor. There does not seem to be any tendency for the poor's income growth to lag behind average growth more in faster growing regions. If anything, the poor's income lagged behind the average most in the slowest growing regions.

Country data on income growth rates of the poor and the average from the long panel are plotted in Figure 2. The diagonal line that goes through the origin is the line on which average income growth is equal to income growth of the poor. The plotted data are quite close to this one-to-one relationship. The first column of Table 3 presents a regression estimate of the relationship between overall growth and income growth of the poor.⁹ The estimated coefficient is slightly *greater* than one (1.17), meaning that when growth in per capita income increases by one percentage point, the growth rate of the income of the poor increases by slightly *more* than one percentage point. The straight line in Figure 2 that is slightly steeper than the diagonal through the origin is the fitted line from the regression in Table 2. Taking into account the negative intercept in the regression (though statistically indistinguishable from zero), the poor's income is estimated to grow slower than overall growth for overall growth rates below 2.8% and faster than overall growth above 2.8%. This estimated one-to-one relationship is consistent with the findings of Roemer and Gugerty (1997) using an updated sample. It is also consistent with Deininger and Squire's (1996a) finding that income distribution changes little over time in most countries, since a worsening income distribution (with respect to the poor) would require that the poor's income grows slower than overall incomes.

Several countries that are outliers in the data are identified by country codes in Figure 2. However, omitting these countries would not have a substantial impact on the estimated relationship. When these data points are excluded, the estimated correlation between the growth rates is 1.03 with a constant term of -0.11 (regression not shown). The majority of individual countries have similar growth rates for income overall and of the poor. The exceptions to this trend, where the poor's income has grown at least 2% slower than the average, are Guatemala,

⁹ It may seem nonsensical to *estimate* the relationship between income growth of the poor and average income growth when equation (1) above shows that the income growth of the poor is identically equal to average income growth plus the growth in the income share of the poor. However, implicit in the notion that overall economic growth may not reach the poor is that the share of income to the poor changes as a result of overall growth. In other words, $s = \text{Growth}(Sp)$ is a function of $y = \text{Growth}(Y)$. Suppose that $s = \theta y + s^e$ where θ is a constant and s^e is the exogenous change in the income share of the poor not related to average income growth. If i denotes data from country i , and $p = \text{Growth}(Yp)$, then $p_i \equiv y_i + s_i = (1 + \theta)y_i + s_i^e = \alpha + \beta y_i + \varepsilon_i$, where $\alpha = \bar{s}^e$, $\beta = 1 + \theta$, $\varepsilon_i = s_i^e - \bar{s}^e$, and \bar{s}^e denotes the cross-country average of s_i^e . α and β are parameters to be estimated, and are, respectively, the average exogenous change in the income share of the poor (which might be related to factors like the growth of health and education of the poor), and the total effect of average income growth on the income growth of the poor.

Sierra Leone, and China. These countries are balanced by six countries where the poor's income has grown at least 2% faster than the average: Trinidad and Tobago, Honduras, Turkey, Zambia, Jamaica, and Puerto Rico (an economy, not an independent country).

In thinking about these exceptions to the overall trend, it is difficult to find common characteristics among these countries. They are diverse in terms of economic policy, income levels, geographical location, and resource endowments.

4. Are there variables that affect real incomes of the poor independently of their effect on economic growth?

The previous section has shown evidence that the simple relation between growth of the economy and growth of the real income of the poor tends to be one-to-one. In this section we look at two additional questions. First, can we find any variables that destroy this one-to-one relation? Second, can we find any variables that affect income distribution apart from their effect through overall income growth (so called channel B in the introduction)?

We estimate the following regressions. First, to connect with the previous empirical growth literature, we start with a regression that has overall economic growth as the dependent variable (in terms of our notation in the introduction, we look at growth in Y). Then we estimate *exactly the same regression* with growth in Y_p instead of growth in Y as the dependent variable. Comparison of the estimated coefficients from these two regressions will tell us something about whether any of the variables has a *differential* effect on Y_p as opposed to Y .

If they do, it must be the case, from equation (1), that such variables have an effect on growth of income distribution (growth in S_p). Hence we then estimate this regression to test for this. Together these regressions address what channel B is about: are there variables that affect distribution independently, or does all the action come through the effects on overall growth?

Another way to address these issues, which is almost equivalent, is to estimate a regression of real income growth of the poor, control for overall income growth, and then add additional regressors? The question then becomes whether any of the additional regressors are significant. From equation (1) one can see why this is almost equivalent. It would be exactly equivalent if the estimated coefficient on economic growth was exactly unity. In our results below we show that in fact the estimated coefficient is indeed quite close to one, so in fact the two approaches should yield consistent results.

We turn now to the previous literature on determinants of economic growth. This research explores the relationships between a variety of structural, geographical, policy, and demographic variables and growth in income per capita. Most studies have found strong relationships between economic growth and initial levels of income per capita (negatively associated with growth), savings rates (positively associated), openness to trade (positive), institutional quality (positive), health (positive), and levels of education (positive, although insignificant in many studies). Some studies include other variables, such as government

spending patterns, natural resource abundance, geographical endowments (e.g., landlocked or located in the tropics), and demographic structure.¹⁰

Does trade openness, for example, exert a stronger, weaker, or similar influence on economic growth and growth of the income of the poor? To the extent that the impact might be stronger (or weaker) for the poor, openness would then influence income distribution by being associated with an increase (or decrease) of the poor's share of total income. We therefore can estimate the statistical relationship between a set of independent variables (e.g., policy and geography) and three related outcomes: economic growth, growth of the income of the poor, and changes in the poor's share of total income.

We estimate the following.

$$y_i = \alpha_0 + \alpha_1 Y_i + \alpha_2 Z_{1i} + \alpha_3 Z_{2i} + \dots + \alpha_{n+1} Z_{ni} + v_i \quad (2)$$

In this equation, y_i is the instantaneous growth rate of per capita income in country i , Y_i is the initial level of income per person, and $Z_{1i}, Z_{2i}, \dots, Z_{ni}$ are a series of variables that collectively determine the long-run potential level of income. The set of Z variables, described in more detail below, includes government policies, levels of schooling, and geographical attributes. We explicitly include, as one of the Z 's, the initial share of income of the poorest quintile in order to further explore the relationship between income distribution and growth. The estimated constant term is α_0 and v_i is the error term.

We estimate two additional equations with similar form in which the dependent variables are the growth rate of the incomes of the poor, and the growth rate of the share of income of the poorest quintile, as follows:

$$p_i = \beta_0 + \beta_1 Y_i + \beta_2 Z_{1i} + \beta_3 Z_{2i} + \dots + \beta_{n+1} Z_{ni} + \omega_i \quad (3)$$

$$s_i = \gamma_0 + \gamma_1 Y_i + \gamma_2 Z_{1i} + \gamma_3 Z_{2i} + \dots + \gamma_{n+1} Z_{ni} + \sigma_i \quad (4)$$

In these equations, p_i and s_i are the instantaneous growth rates of the average income of the poorest quintile, and of the share of income of the poorest quintile in country i , respectively. Note that the independent variables on the right hand side of each of equations 2-4 are identical. When these three equations are estimated in this way, there is a direct relationship between the estimated coefficients for each of the independent variable across the equations. Recall from equation 1 that the dependent variables of these three equations are linked by an identity that says the growth of the incomes of the poor will be exactly equal to the sum of the growth rate of the poor's share of total income and the overall rate of economic growth. By substituting the right-hand sides of equations 2-4 into equation 1 and simplifying the resulting expression, it can be shown the estimated coefficients for initial income and each Z variable for the three equations are related in the following way:

¹⁰Some of the papers in this body of research are Barro (1991); Barro and Lee (1994); Mankiw, Romer and Weil (1992); Sachs and Warner (1995a and 1995b); Radelet, Sachs, and Lee (1997); Barro and Sala-i-Martin (1995); Hall and Jones (1997); and Baumol and Wolff (1994).

$$\beta_j = \alpha_j + \gamma_j \quad (5)$$

That is, for each of the independent variables, the sum of the estimated coefficients in equation 2 and 4 should be exactly equal to the estimated coefficient in equation 3.¹¹ In this way, we are able to systematically estimate how each of the Z 's may affect overall economic growth, the growth of the income of the poor, and the share of income of the poorest quintile.

Estimation Results

With our focus on long-run growth in per capita incomes and the incomes of the poor, we use the long panel of data described earlier in the paper. Thus, the data set includes one observation per country, corresponding to the long term trend growth rates of income. Of the 60 countries listed in Table 1, all of the right-hand side variables needed to estimate equations 2-4 were available for 54 of these countries (the six excluded countries are marked with an asterisk in the last column of table 1).

The results of estimating equations 2 through 4 for a common set of Z variables are shown in table 6. Column 1 shows the results of estimating equation 2, with growth of per capita income as the dependent variable. Column 2 estimates the relationship with the growth of the income of the poor as the dependent variable (equation 3), and column three shows the results of estimating equation 4 with the growth rate of the share of the income of the poor on the left-hand side.

¹¹ Equations (2) – (4) can be represented in matrix form as:

$$p = X\beta + \omega$$

$$y = X\alpha + v$$

$$s = X\gamma + \sigma$$

By Equation (1), $p \equiv y + s$, so $X(\beta - \alpha - \gamma) = \omega - v - \sigma$. Making the standard regression assumption of conditional mean zero error terms, i.e. $E(\omega | X) = E(v | X) = E(\sigma | X) = 0$, then

$E[\omega - v - \sigma | X] = E[X(\beta - \alpha - \gamma) | X] = 0$. Hence $\beta = \alpha + \gamma$. Note also that the OLS estimates b , a , and c of β , α , and γ automatically fulfill this restriction. $b = (X'X)^{-1}X'p$, $a = (X'X)^{-1}X'y$, and $c = (X'X)^{-1}X's$, so

$b - a - c = (X'X)^{-1}X'(p - y - s) = 0$ by Equation (1).

Initial Income. One of the key implications of the neoclassical growth model is that, all else being equal, poorer countries should grow faster than richer countries. For example, if two countries have the same long-run potential level of income, the country with lower current income should grow faster than the richer country. Poor countries tend to have a smaller capital stock (i.e., fewer machines, factories, and roads) than rich countries. Since capital is relatively scarce, the rate of return on new investments tends to be higher, leading to faster growth. Poor countries also have the advantage of being able to borrow new technologies and best management practices from richer countries without paying the costs of research and development. This idea has a powerful implication. If poorer countries grow faster, their income levels should begin to catch-up (or converge) with richer countries over time. Many growth studies have shown that once differences in other important structural and policy variables are taken into account, poor countries do, in fact, tend to grow faster than rich countries (e.g. Barro, 1991; Sachs and Warner, 1995a). This outcome is known as *conditional convergence*, since the income levels of countries converge over time, conditional on having similar policies, resource endowments, etc.

Given the close relationship between per capita growth and growth of the income of the poor, we similarly expect that the lower the initial average income of a country, the faster the subsequent growth rate of the income of the poor. All else being equal, we would expect that the greater rates of return on investment in low-income countries would be reflected in high growth rates for the income of the poor as well as overall income.

The results verify these expectations. The estimated coefficient on the log of initial income on overall economic growth (column one) is -2.5, with a t-statistic of 5.9. The estimated coefficient implies that if per capita income is half the level in one country as in another, the subsequent growth rate in the poorer country will be 1.7 percentage points faster per year.¹² The effect of initial income is very similar on the growth rate of the income of the poor, as shown in column 2. In this case, the estimated coefficient is -3.3, with a t-statistic of 4.96. As expected, the negative coefficients in both cases imply that the lower the average income of a country, the faster the subsequent growth rate of per capita income, and of the income of the poor.

If the estimated coefficients on initial income in columns one and two were significantly different from each other, it would further imply that initial income levels were somehow associated with changes in the share of the income of the poor. In fact, the estimated coefficients are not significantly different from each other. This is shown in column three, where the left-hand-side variable is the annual growth rate of the share of income of the poorest quintile. The estimated coefficient on initial income is -0.87, but is not statistically different from zero. Therefore, initial income levels are not associated with changes in the share of income of the poor. (Note that, as expected, the sum of the estimated coefficients in columns one and three (-2.461 + -0.868) is exactly equal to the estimated coefficient in column two (-3.329), a relationship that holds for all of the estimated coefficients described below).

Initial Income Distribution. Does the initial distribution of income directly affect either overall economic growth, or the growth of income of the poor? We test this hypothesis by including the

¹² This result is obtained by multiplying the estimated coefficient on initial income by the log of one-half: $-2.461 * \ln(1/2) = 1.71$.

initial share of the income of the poorest quintile as one of the independent variables. The results in column one indicate that initial income distribution is not related to subsequent overall economic growth. The estimated coefficient of -0.08 is not statistically different from zero.

However, we find a very strong relationship between initial income distribution and the subsequent growth of the income of the poor. The estimated coefficient on the initial distribution is -0.626 , with a t -statistic of 4.2 , indicating significance at the one-percent level. The estimated coefficient implies an increase of one percentage point in the initial share of the income of the poorest quintile is associated with a 0.6 percentage point increase in the subsequent growth rate of the income of the poor.

Taken together, the results in columns 1 and 2 imply that in countries with initially poor distribution of income, distribution tends to improve; conversely, in countries with more favorable initial distribution of income, distribution tends to get worse. This result is shown statistically in column three. The estimated coefficient on initial income distribution is -0.55 , and is highly statistically significant. These results are consistent with the results reported in section 3, where we controlled for the overall rate of growth of per capita income. Our results here show that the negative coefficient on initial income distributions holds even after controlling for all of the other Z variables listed in Table 5.

Initial Levels of Education and Health. Human capital, measured in terms of levels of education and health, is often suggested as a possible source of growth. A better-educated or healthier workforce is likely to be able to produce more from a given resource base than less-skilled workers. We examined education and health in turn. Our main measure of education is the average years of education of the adult population (drawn from Barro and Lee, 1993). To focus how education levels affect subsequent growth, we examine the average years of schooling in the initial year for each country. We are unable to find a statistically significant relationship between initial levels of education and subsequent economic growth in our sample of countries.¹³ This result is consistent with other studies that have found a weak direct link between education and growth (e.g., Pritchett, 1996). Somewhat more surprisingly, we were also unable to find a statistically significant relationship between education levels and growth of the income of the poor. One possible explanation is measurement problems. For example, available data do not make any adjustment for the quality of schooling, which arguably is a key determinant of human capital accumulation.

We obtained a much stronger relationship between initial levels of health and economic growth in this sample of countries (again consistent with previous studies, such as Barro, 1991 and Radelet et al., 1997). Our basic measure of overall health of the population is life expectancy at birth, measured in the initial year of observation in each country (drawn from United Nations (1996) data). We find that an increase in life expectancy of one year is associated with a 0.09 percentage point increase in subsequent growth in per capita income (column 1). The estimated coefficient is significant at the five-percent level. With respect to the growth of the incomes of the poor (column 2), the results are similar, and somewhat stronger. In this case, each one-year increase in life expectancy is associated with a 0.16 percentage point increase in subsequent

¹³ We explored several other measures of educational attainment (e.g., school completion rates, enrollment rates, literacy rates) and found similar results.

growth in the income of the poor. Although this estimated coefficient is slightly larger than for per capita growth, the difference is not statistically significant. Thus, column three shows that although there is a positive correlation between life expectancy and improved income distribution, the relationship is not significant at conventional levels. The results suggest that improved health is associated with faster overall economic growth, and with more rapid growth of the incomes of the poor.

Geography: Few cross-country growth studies take geography into account, but those that do have found strong results (Gallup, Sachs, and Mellinger, 1998; Radelet, Sachs, and Lee 1997; Sachs and Warner 1998; Hall and Jones 1997). In particular, countries located in the tropics tend to grow more slowly than countries in more temperate climates. Very few tropical countries have achieved sustained economic growth and high levels of income. Although the precise reasons for this negative relationship are unclear, two channels seem possible. First, tropical countries face a wide variety of parasitic diseases that are much less prevalent in the temperate zones. Second, soils tend to be more fragile, rains less reliable, and natural disasters more prevalent, all of which may make sustained agricultural growth more difficult in the tropics.

We find that growth of per capita income was about 1.3 percentage points slower for countries in the tropics than for countries in more temperate climates. The association was significant at the five percent level. With respect to the growth of the income of the poor, the impact was more than twice as large, with the growth rate of the income of the poor in tropical countries 3.0 percentage points slower than for the poor in more temperate climates. In this case, the *t*-statistic is 3.8, implying that the estimated coefficient is significant at better than the one percent level. These results suggest that the negative impact of tropical climates is larger for the poorest segments of the population. The poor are more vulnerable to parasitic diseases, since they tend to have poorer nutrition, sanitation, housing quality, and less access to medical care and clean water. The poor are also more handicapped than the rich by the difficulties facing tropical agriculture, since a greater share of the poor work in that sector. By contrast, richer people tend to work in manufacturing or service jobs, which are less affected by the natural environment (for example, many factories and office buildings are air-conditioned). These circumstances would shield richer workers from many of the difficulties associated with being in the tropics.¹⁴

A second geographical obstacle facing many countries is access to major shipping lanes and important markets. Landlocked countries are likely to be especially penalized in this way. For any given export (or import) product, landlocked countries generally must pay higher shipping costs, which would result in lower payments to labor, lower returns on capital, less investment, and slower growth. Landlocked countries must pay road transport costs across at least one international boundary in addition to sea freight costs, as well as face more shipping delays. A recent UNCTAD study found that landlocked countries in sub-Saharan Africa paid between 30% and 100% more in shipping costs than adjacent neighbors with direct access to the sea (UNCTAD, 1996). Although air shipments can help overcome many of these problems, only certain goods can be economically shipped by air, and most countries still import and export the majority of goods by the sea. The negative impacts of isolation may be particularly acute for the poor, since it may undercut a country's ability to compete in low-skilled, labor abundant manufactures. After all, Reebok is very unlikely to ever build a factory in Mongolia, Bolivia, or

¹⁴ For more discussion of these issues, see Gallup, Sachs, and Mellinger, 1998.

Rwanda, since shipping costs would be so much higher in those countries than for coastal economies. Radelet and Sachs (1998) show that shipping costs are strongly and negatively associated with manufactured exports, as well as with overall economic growth.

Our results indicate that growth in per capita income in landlocked countries has been about 2.1 percentage points lower than in coastal economies, after controlling for all the other variables. The result is significant at the five percent level. With respect to the growth rate of the income of the poor, the estimated coefficient is smaller and is not statistically significant. The difference in these two estimated coefficients is not statistically significant, as shown in the results in column three of table 6, implying that being landlocked is not associated with changes in income distribution.

Government Policies. We explore the relationship between three basic government policies -- openness to the global economy, government saving, and the composition of government expenditures -- and growth of per capita income, growth of the income of the poor, and changes in income distribution. First, we would expect that countries that have been consistently open to the global economy would record faster growth than closed economies. Open economies are likely to grow faster because they will tend to have a greater division of labor and production processes that are more consistent with their comparative advantage. In addition, open economies are in a better position to import new technologies and new ideas from the rest of the world. In addition, the poor are likely to obtain important benefits from openness, through greater employment opportunities for low-wage unskilled labor.

To test these relationships, we use the openness measure derived by Sachs and Warner (1995), which classifies a country as open if (i) import duties average less than 40%, (ii) less than 40% of imports are covered by quotas, (iii) the black market premium on the exchange rate is less than 20%, and (iv) export taxes are moderate. A country is considered to be open, and therefore assigned an index value of 1, in each year that it meets all four criteria. For the full time period, the index measures the share of years that a country is considered open. Thus for each country, the openness index is a number between 0 and 1.

The results strongly indicate that growth in both per capita income and the income of the poor has been much faster in open economies than in closed economies. With respect to per capita income, the estimated coefficient of 2.7 indicates that in countries that were completely open during the period (openness index = 1), per capita income grew 2.7 percentage points faster per year than in countries that were completely closed (openness index = 0). The t-statistic of 5.9 indicates a very strong relationship, significant at well below the one-percent level. The estimated coefficient is slightly larger (2.96) for the growth rate of the incomes of the poor, and is also significant at better than the one-percent level. However, the difference between the estimated coefficients for openness in columns one and two is not statistically significant, as shown in column three. The results in this column show that the estimated coefficient between openness and income distribution is positive, but is insignificant.

These findings indicate that open economies enjoy much faster growth, and that the growth is distributed fairly well throughout different income groups. There is no evidence from these results to suggest that the process of global integration leaves behind the poor (if anything, they

are mildly suggestive of the opposite effect). Openness to the global economy appears to have had a powerful effect on reducing poverty across countries.

A second important policy is the average central government saving rate, defined as the surplus of current government revenue over current government expenditures.¹⁵ We measure this variable as a share of GDP, and take an average over the period. There are two channels through which higher government saving is likely to support aggregate economic growth and the growth of the incomes of the poor. First, countries with higher rates of government savings tend to have greater overall savings and investment, and therefore faster growth. Second, higher government saving tends to be indicative of sound overall macroeconomic management, including lower aggregate budget deficits, more prudent monetary policies, and lower inflation. Macroeconomic stability, in turn, lowers the risks for investors and increases investment. The poor are likely to be hit hardest by high inflation and macroeconomic instability, since they are probably the first to lose their jobs in economic downswings and are the least able to diversify their risks.

We find a strong positive relationship between government saving and the growth of per capita income (column one of table 6). The estimated coefficient of 0.29 ($t=7.0$) implies that each one percentage point increase in the government saving rate is associated with an increase of about 0.3 percentage points in the growth rate of per capita income. The estimated coefficient for growth of the income of the poor is substantially larger, at 0.45 ($t=6.9$), suggesting that government savings is especially important for the poor. Taken together, the results in columns one and two suggest that higher government savings are associated with growth in the income of the poor at rates even faster than overall per capita income, and therefore with an improvement in the distribution of income. This result is verified in column three. Each one-percentage point increase in the rate of government savings is associated with a 0.17 percentage point increase in the rate of growth of the share of the income of the poor. The t -statistic of 2.75 indicates that this result is significant at the five-percent level. Prudent government fiscal policies appear to be associated with fast overall economic growth, even faster growth of the income of the poor, and improved distribution of income.

The third policy we examined is the *composition* of government spending. In particular, we examine the extent to which government expenditures on health and education may be associated with economic growth, the incomes of the poor, and income distribution. Public spending on health and education might be of particular importance to the poor, who may have limited access to private education and health facilities, and may be unable to pay full market prices for these services. We found a positive relationship between government spending on health and education (measured as a share of GDP) and growth of per capita income. The estimated coefficient of 1.1 indicates that a one-percentage point increase in spending in these areas is associated with a 1.1 percentage point increase in the growth rate. However, the standard error of the estimated coefficient is relatively large, so that the relationship is not statistically significant.

Turning to the growth of the income of the poor, the estimated coefficient is larger (2.9) and is significant at the six-percent level. This result suggests that each percentage point increase in

¹⁵ Current government spending (and revenues) excludes expenditures (and associated revenues) on investment projects. The logic is that the surplus on the current budget (savings) finances investment expenditures.

government spending on health and education is associated with an increase of about three-percentage points in the growth rate of the income of the poor. Since public spending on health and education is associated more strongly with growth of the incomes of the poor than with overall growth, it is possible that such spending is related to an improvement in distribution. The results in column three show that spending on health and education is indeed positively associated with growth in the share of income of the poor, but the estimated coefficient is not significant at conventional levels. Thus, the results are mildly suggestive, but not conclusive, of an association between spending on health and education and improved income distribution.

We note that if the central government saving variable is dropped from the regression, the positive relationship between education and health expenditures and income growth of the poor disappears (results not shown). This suggests that the increased spending on health and education must take place in the context of an overall prudent fiscal stance, not through a larger fiscal deficit. Overall, the results indicate that government spending on health and education programs, in the context of a stable macroeconomic framework, are supportive of income growth of the poor, and perhaps of improved distribution.

A wide range of other government policies could potentially affect overall growth and the incomes of the poor. Some policies, like monetary growth, are highly correlated with openness and central government savings, so their impact is to a large extent captured by these variables. It would be nearly impossible for a country to maintain consistently open trade policies and high government savings without also maintaining prudent monetary policies. Similarly, the openness index itself is a composite of four government policies, including a measure of exchange rate management. In other words, the openness index and central government savings probably capture the effects of a wider range of policies that influence overall macroeconomic stability. Other government policies that may be important to the poor, such as micro-credit programs or commodity price stabilization schemes, simply cannot be measured consistently across countries and examined in this type of framework. Thus, while this framework does not capture all of the policies that might help the poor, it does point to the fundamental importance of trade openness, appropriate exchange rate management and prudent government budgetary policies in supporting overall economic growth and the growth of the income of the poor.

Political Instability. Finally, we find a strong negative relationship between political instability and economic growth, especially for the poorest quintile. Our measure of political instability is taken from Barro and Lee (1994), and is based on the number of assassinations per million people per year, and the number of attempted coups per year. The three highest values are for Guatemala (0.43), El Salvador (0.41), and the Philippines (0.22).

We find that political instability is a large and statistically significant deterrent to economic growth. In particular, an increase in the political instability index from zero to one is associated with a 5.9 percentage point decline in the growth rate of per capita income. The result is highly statistically significant. The results are even stronger for the growth of the income of the poor. The estimated coefficient indicates that a change in the index from zero to one is associated with a remarkable 15-percentage point decline in the growth rate of the income of the poor. For a slightly more concrete example, consider the impact of a country moving from an index of 0.05 (the value for India) to 0.15 (the value for Jordan). The results indicate that the increased

instability in Jordan would be associated with a 0.6 percentage point fall in overall economic growth, and a 1.5 percentage point drop in the annual growth rate of the income of the poor.

Since the impact of political instability is larger for the growth of the income of the poor than for overall economic growth, it follows that political instability would adversely affect the distribution of income. This outcome is verified in the results shown in column three of table 6. An increase in political instability is stronger associated with a decrease in the share of income of the poorest quintile of the population. A change in the index from zero to one is associated with a fall of 9.4 percentage points in the growth rate of the poor's income share. The *t*-statistic (3.1) indicates that the result is significant at the one-percent level.

These results suggest that the consequences for political instability are most severe for the poor. The poor, for example, may be less able to protect their safety and property or keep their jobs during periods of political strife. Unrest may choke off domestic transport, cutting off rural dwellers from the rest of the economy. Richer individuals may be better able to weather instability by relying on accumulated assets. Political instability undermines overall economic growth, but is particularly detrimental to the income of the poor, and therefore has a negative impact on income distribution.

Regressions of growth in real income of the poor after holding constant total economic growth.

We now return to the earlier regressions that examined whether the relation between growth in real income of the poor and growth was one-to-one, and add additional regressors. We are interested in seeing whether additional regressors eliminate the simple one-to-one relation. From the previous discussion and from equation (1), we expect to get consistent results as in the previous section.

To motivate these regressions further, it has been argued that in countries that follow enlightened social policies, the poor would benefit more from economic growth. To explore this question, we would like to use data on the health, and education population growth, *of the poor* in each country, but these data do not exist for most countries, so we use the values for the whole population instead. The data on life expectancy and population growth are from United Nations (1996) while data on the average years of education overall, and for women, are from Barro and Lee (1993).¹⁶

We were startled to find that neither the population growth rate, the growth of life expectancy, nor the growth of total education and women's education has a statistically significant correlation with income growth of the poor after average income growth and initial income share are taken into account (Table 5). It is likely that some of these variables affect growth, but apparently not distribution.¹⁷ The variable that is closest to having a statistically significant coefficient, the

¹⁶ The five-year data of the United Nations (1996) and Barro and Lee (1993) were converted to annual data by linear interpolation when the years did not match the poverty data.

¹⁷ Changes in population, health, and education are likely to be endogenously affected by economic growth (as in Pritchett and Summers, 1996, for health), and these variables also affect economic growth (for health status, for example, see Barro, 1991). Since overall growth and these other variables are all independent regressors, though, these mutual paths of causation do not present econometric problems.

growth of life expectancy, has the “wrong” sign: faster improvement in life expectancy is correlated with lower income growth for the poor. We have experimented with many other related measures of population pressure, health and education, but none of these alternatives have significant correlations with the income growth of the poor, once we control for overall economic growth. Besides population growth as a measure of population pressure, we have tried the growth of the rural population on arable land (to better capture population pressure on the poor in agriculture) as well as initial population densities and initial rural population densities on arable land. Besides the growth of the life expectancy, we have tried the change in the infant mortality rates, and the initial levels of both indicators. Besides the average years of schooling completed, we have tried the percent of students completing primary school and the ratio of female to overall years of education. None of these alternative measures are significantly correlated with income growth of the poor once overall growth is included (none of these results are shown).

The variables that are robustly correlated with the income growth of the poor are overall growth and (inversely) the initial income share of the poor. Controlling for these variables, population growth, and health and education improvements are not clearly correlated with the poor’s income growth. Two clarifications are in order, though. First, this does not mean that the “social” variables do not affect the incomes of the poor, since factors like health and education are likely to contribute to overall economic growth. The impact of these variables on the poor may already be reflected in the effect of economic growth on the poor. Second, *average* health and education levels are not necessarily good measures of the health and education *of the poor*, which is what we would really like to measure.

A limitation of this analysis is our focus on income alone as a measure of the well-being of the poor. Factors like the health and education of the poor would provide important measures of the welfare of the poor independent of income, and need to be collected. The focus of our study is narrowed to income alone since the data are available. Our conjecture, though, is that making use of the alternative measures of welfare would not change our broad conclusions – that economic growth is crucial for improving the welfare of the poor, and that the poor benefit from economic growth as much as the overall population. These additional measures of the welfare of the poor are likely to be highly correlated with income levels just as we know that country averages of these measures are highly correlated with income levels (though there are some important exceptions). It is rare for countries to be able steadily to improve education and health of the poor in the absence of economic growth, and redistribution of education and health services away from the rich and towards the poor is just as rare and politically difficult as redistributing income and assets.

5. Conclusions

This analysis is an initial attempt to examine the factors associated with growth in the incomes of the poor across countries. Obviously, this line of research itself does not completely explain the process of income growth of the poor, nor does it fully identify the precise channels through which various factors operate. We are not able to address broader measures of poverty besides

the income of the poor, such as the health and education status of the poor, although as an empirical matter, they are highly correlated with income levels.

The most important conclusion is that aggregate economic growth is highly correlated with the incomes of the poor, and this relationship is *one-for-one*. On average across countries, one percent higher average income *levels* corresponds to one percent higher income levels of the poor, and one percent higher *growth* in average income corresponds to one percent higher growth of income of the poor, both in the long term and in the short term. While there are some countries in which the incomes of the poor grow more slowly, there are an equal number in which the incomes of the poor grow even faster than overall growth.

Several factors appear to have a strong effect on the rate of growth of the income of the poor, and these tend to be the same factors that affect overall income growth. The real income of the poor tends to grow faster in countries that have a lower level of initial income and in countries with a healthier population. Faster income growth for the poor is also recorded in countries located in temperate (rather than tropical) climates, suggesting that the poor face especially difficult challenges in tropical countries. In addition, the incomes of the poor tend to grow rapidly in countries that are open to the global economy and have higher government savings rates. These policies provide a stable environment for investment and job creation, providing the poor with the opportunity for income growth. Foreign trade openness is just as good for the incomes of the poor, on average, as for the rest of the population. We found moderately strong evidence that higher government spending on education and health supports income growth of the poor, provided it is undertaken within a prudent fiscal stance and not through larger budget deficits. We also found that political instability is strongly detrimental to the growth of the income of the poor.

Turning to income distribution, the finding that the income of the poor tends to grow just as fast as average income implies that the income distribution tends to remain unchanged as incomes grow. It is heartening that the poor do not fall behind during rapid growth; even though we may be disappointed that income distribution does not systematically improve with growth. However, while this overall tendency remains, there are some countries in which the income of the poor grows faster than overall income (i.e., distribution improves) and others in which the income of the poor lags behind the average (i.e., distribution worsens).

We did not detect any relationship between education, health, or population growth on income distribution. We did not find evidence that existing health, education, or population programs specially benefit the poor, over above how they affect overall economic growth. It is possible that improvements in the health and education *of the poor* relative to the rest of the population would disproportionately raise the incomes of the poor, but data limitations preclude us from testing this possibility.

Finally, economic and political stability are especially good for the income of the poor, and thus are strongly associated with improved income distribution. Countries with higher levels of government savings – which we take as a proxy for prudent macroeconomic management more generally – record faster economic growth, but even faster growth for the income of the poor, and thus improved distribution. The opposite is true for political instability. Political instability

(as measured by the number of coups and assassinations) hurts everyone, but has a much larger adverse affect on the income growth of the poor than it does on overall income growth. Countries with more stable political situations have recorded substantially faster growth rates of the income of the poor and thus improved income distribution, relative to politically unstable countries.

References

- Ahluwalia, Montek. 1974. "Dimensions of the Problem," in Hollis B. Chenery et al., eds., *Redistribution with Growth*, pp. 3-37. New York: Oxford University Press.
- Barro, Robert J. 1991. "Economic Growth in a Cross-Section of Countries," *Quarterly Journal of Economics* 106(2): 407-43.
- Barro, Robert J., and Jong-Wha Lee. 1993. "International Comparisons of Educational Attainment," *Journal of Monetary Economics* 32:363-394.
- Barro, Robert J., and Jong-Wha Lee. 1994. "Data Set for a Panel of 138 Countries," at <http://www.nber.org/pub/barro.lee/>.
- Barro, Robert J., and Xavier Sala-I-Martin. 1995. *Economic Growth*. New York: McGraw Hill.
- Deininger, Klaus and Lyn Squire. 1996a. "New Ways of Looking at Old Issues: Inequality and Growth," mimeo, World Bank (July).
- Deininger, Klaus and Lyn Squire. 1996b. "A New Data Set Measuring Income Inequality," *World Bank Economic Review* 10(3, September):565-91.
- Fields, Gary S. 1980. *Poverty, Inequality, and Development*. Cambridge: Cambridge University Press.
- Gallup, John Luke, and Jeffrey D. Sachs with Andrew Mellinger. 1998a. "Geography and Economic Development," in *Annual World Bank Conference on Development Economics 1998 (forthcoming)*. Washington, D.C.: World Bank. Available at <http://www.hiid.harvard.edu/pub/other/geodev.html>.
- Mankiw, Gregory, David Romer, and David Weil. 1992. "A Contribution to the Empirics of Economic Growth," *Quarterly Journal of Economics* 106(2):649-706.
- Pritchett, Lant. 1996. "Where has all the schooling gone?" Policy Research Working Paper 1581, The World Bank (March).
- Pritchett, Lant, and Lawrence Summers. 1996. "Wealthier is Healthier," *Journal of Human Resources*, 31(4):841-68.
- Radelet, Steven and Jeffrey D. Sachs. 1998. "Shipping Costs, Manufactured Exports, and Economic Growth." Unpublished paper, January, 1998.
- Radelet, Steven C., Jeffrey D. Sachs, and Jong-Wha Lee. 1997. "Economic Growth in Asia," HIID Development Discussion Paper No. 609.
- Ravallion, Martin, and Shaohua Chen. 1996. "What Can Recent Survey Data Tell Us about Recent Changes in Distribution and Poverty?" World Bank Policy Research Working Paper 1694 (December).
- Robbins, Donald. 1996. "Trade, Trade Liberalization, and Inequality in Latin America and East Asia: Synthesis of Seven Countries. Harvard Institute for International Development, Cambridge, MA.
- Roemer, Michael, and Mary Kay Gugerty. 1997. "Does Economic Growth Reduce Poverty?" CAER Discussion Paper No. 5, Harvard Institute for International Development (April).

- Sachs, Jeffrey D., and Andrew M. Warner. 1995a. "Economic Reform and the Process of Global Integration," *Brookings Papers on Economic Activity* 1(August): 1-118.
- Sachs, Jeffrey D., and Andrew M. Warner. 1995b. "Natural Resource Abundance and Economic Growth," HIID Development Discussion Paper No. 517a, Harvard University.
- Sachs, Jeffrey D., and Andrew M. Warner. 1997. "Sources of Slow Growth in African Economies," *Journal of African Economies*, 6(3):335-380.
- Squire, Lyn. 1993. "Economic Development: Recent Lessons," *American Economic Review* 83(2):377-382.
- Solow, Robert M. 1956. "A Contribution to the Theory of Economic Growth," *Quarterly Journal of Economics* 70(February):65-94.
- Summers, Robert, and Alan Heston. 1991. "The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988," *Quarterly Journal of Economics* 106(2):327-368.
- Summers, Robert, and Alan Heston. 1995. Penn World Tables Mark 5.6. (website version). Philadelphia: University of Pennsylvania.
- Timmer, C. Peter. 1997. "How Well Do the Poor Connect to the Growth Process," CAER II Discussion Paper No. 17 (December), Harvard Institute for International Development.
- United Nations. 1996. *World Population Prospects 1950-2050 (The 1996 Revision)*. New York: United Nations. Computer diskettes.
- Williamson, Jeffrey. 1997. "Globalization and Inequality: Past and Present." *The World Bank Research Observer*, 12-2 (August).
- Wood, Adrian. 1994. North-South Trade, Employment, and Inequality: Changing Fortunes in a Skill-Driven World. Oxford, Clarendon Press.
- World Bank. 1998. *World Development Indicators 1998 CD-ROM*. Washington, D.C.: World Bank.

Table 1. Income Growth and Income Distribution

Country	Year of Observation		Trend Annual Growth Rates of Income (%)			Initial Share of Income of Poorest Quintile (%)	Countries Not in Section 4 (*)	
	First	Last	Poorest Quintile	Whole Population	Difference			
I. Income Growth of the Poorest Quintile Exceeds Overall Income Growth								
1	Trinidad	1971	1981	10.4	4.7	5.7	2.0	
2	Honduras	1968	1992	4.2	0.6	3.6	1.6	
3	Turkey	1968	1987	5.5	2.5	2.9	3.0	
4	Zambia	1976	1991	-0.7	-3.5	2.7	3.7	
5	Jamaica	1975	1993	1.6	-1.0	2.6	4.0	
6	Puerto Rico	1969	1989	4.7	2.3	2.4	1.9	*
7	Philippines	1965	1994	3.0	1.0	1.9	3.4	
8	Mexico	1968	1992	3.5	1.8	1.7	2.6	
9	Sweden	1967	1992	3.2	1.6	1.6	5.3	
10	Jordan	1980	1991	-0.7	-1.9	1.3	6.0	
11	Italy	1977	1991	3.3	2.2	1.0	7.4	
12	Malaysia	1970	1989	5.3	4.3	1.0	3.6	
13	Norway	1967	1991	4.1	3.1	1.0	5.0	
14	France	1979	1989	2.3	1.6	0.7	6.6	
15	Yugoslavia	1978	1990	-0.4	-1.0	0.7	6.7	*
16	Indonesia	1976	1995	5.2	4.5	0.7	7.7	
17	Germany	1969	1989	2.6	2.0	0.6	6.7	
18	Czechoslovakia	1965	1988	4.0	3.4	0.6	10.3	*

19	Panama	1970	1989	1.0	0.4	0.6	2.6
20	Bangladesh	1967	1992	2.2	1.7	0.5	7.0
II. Income Growth of the Poorest Quintile is Roughly Equal to Overall Income Growth							
21	Hong Kong	1971	1991	6.1	5.8	0.4	5.1
22	Brazil	1970	1989	2.9	2.5	0.3	2.7
23	Belgium	1979	1992	2.1	1.8	0.3	8.1
24	Canada	1965	1994	2.7	2.5	0.2	6.7
25	Japan	1965	1982	4.6	4.4	0.2	6.0
26	Ireland	1973	1987	2.3	2.1	0.2	4.8
27	India	1965	1994	2.6	2.4	0.2	8.6
28	Tunisia	1965	1990	3.5	3.4	0.1	5.7
29	Finland	1966	1991	2.9	2.8	0.1	6.9
30	Sri Lanka	1970	1990	2.9	2.9	0.0	6.6
31	Venezuela	1971	1990	-1.8	-1.7	0.0	4.6
32	Greece	1974	1988	1.6	1.9	-0.2	6.6
33	Korea, R.	1965	1988	6.6	6.9	-0.3	7.0
34	Spain	1980	1990	2.3	2.7	-0.4	9.0
35	Pakistan	1969	1991	1.3	1.7	-0.4	9.1
36	Costa Rica	1971	1989	0.0	0.4	-0.4	4.1
37	Taiwan	1966	1990	5.8	6.3	-0.5	9.0
III. Income Growth of the Poorest Quintile is Less Than Overall Income Growth							
38	Soviet Union	1980	1989	2.1	2.7	-0.6	9.6
39	Mauritius	1980	1991	3.0	3.6	-0.6	6.8
40	Singapore	1978	1988	4.2	4.9	-0.7	6.9
41	USA	1965	1994	0.8	1.6	-0.8	5.7
42	Hungary	1972	1993	0.2	1.1	-0.9	11.0
43	UK	1965	1991	1.2	2.0	-0.9	10.6
44	Chile	1968	1994	0.3	1.2	-0.9	4.5
45	Bulgaria	1980	1993	1.8	2.8	-1.0	10.6
46	Bahamas	1979	1993	-1.3	-0.2	-1.1	3.8
47	Australia	1969	1990	0.4	1.6	-1.3	6.0
48	Thailand	1969	1992	3.1	4.4	-1.3	5.2
49	Poland	1976	1993	-2.5	-1.1	-1.4	10.8
50	Netherlands	1975	1991	-0.2	1.3	-1.5	9.0
51	Portugal	1973	1991	1.6	3.2	-1.6	7.5
52	New Zealand	1973	1990	-0.7	0.9	-1.6	6.8
53	Nepal	1984	1995	0.5	2.1	-1.6	9.1
54	El Salvador	1977	1995	-2.1	-0.4	-1.7	5.0
55	Colombia	1970	1994	0.2	2.0	-1.8	4.8
56	Denmark	1976	1992	-0.1	1.8	-1.8	7.0
57	Peru	1981	1994	-3.8	-1.9	-1.9	6.3
58	China	1980	1995	1.0	4.4	-3.4	9.3
59	Sierra Leone	1968	1989	-5.7	-0.8	-4.8	2.8
60	Guatemala	1979	1989	-11.9	-2.1	-9.8	5.7

*

*

Table 2: Income Growth and Income Shares of the Poor by Region

Regions	Number of Countries	Income growth of poor (%)	Average income growth (%)	Difference of poor - average (%)
East and Southeast Asia	10	4.5	4.7	-0.2
Middle East and North Africa	3	2.8	1.3	1.5
Western Europe	14	2.1	2.1	0.0
South Asia	5	1.9	2.2	-0.3
Transition economies	6	0.9	1.3	-0.4
Latin America	15	0.5	0.6	-0.1
Sub-Saharan Africa	3	-1.1	-0.2	-0.9
Other	4	0.8	1.6	-0.8
Total	60	1.8	1.9	-0.1

Table 3: Growth of the Income of the Poor in the Long Run

	(1) Income Growth of Poorest 20%: All Countries	(2) Income Growth of Poorest 20%: Low Income Economies	(3) Income Growth of Poorest 20%: All Countries	(4) Income Growth of Poorest 40%: Low Income Economies	(5) Income Level of Poorest 20%: Latest Year
Growth of GDP p.c.	1.164 (6.08)**	1.168 (5.27)**	1.074 (8.68)**	1.076 (7.49)**	
log of GDP p.c.					1.043 (16.35)**
Constant	-0.469 (0.85)	-0.390 (0.52)	-0.111 (0.41)	0.079 (0.22)	-1.646 (2.93)**
Observations	60	35	60	35	69
R ²	0.59	0.58	0.70	0.69	0.83

Robust t-statistics in parentheses

** significant at 1%

Table 4: Growth of the Income of the Poor in the Short Run

	(1) Growth of Poorest 20%: OLS	(2) Growth of Poorest 20%: Fixed Effects	(3) Growth of Poorest 40%: OLS
Growth of GDP p.c.	1.091 (12.10)**	1.088 (9.48)**	1.098 (15.12)**
Constant	-0.999 (2.89)**	-0.992 (2.16)*	-0.762 (3.00)**
Observations	488	488	488
R-squared	0.21	0.18	0.34
Number of Countries		69	

Robust cluster t-statistics in parentheses for (1) and (3); (2) has regular t-statistic

* significant at 5% level; ** significant at 1% level

Table 5: Determinants of Economic Growth, Income Growth of the Poor, and Income Distribution

	(1) Income Growth, Whole Population	(2) Income Growth, Poorest 20%	(3) Growth of Income Share, Poorest 20%
Initial per capita Income(log)	-2.245 (6.03)**	-1.948 (2.74)**	0.298 (0.47)
Average Schooling (years)	0.016 (0.14)	-0.285 (1.31)	-0.302 (1.56)
Life Expectancy (years)	0.084 (2.29)*	0.085 (1.22)	0.002 (0.03)
Tropical (% of Land Area)	-1.107 (2.57)*	-1.352 (1.65)	-0.245 (0.34)
Landlocked	-2.138 (2.36)*	-1.033 (0.60)	1.105 (0.72)
Openness (0-1)	2.683 (5.88)**	2.694 (3.09)**	0.011 (0.01)
Central Government Savings Rate (%)	0.274 (6.86)**	0.391 (5.12)**	0.117 (1.72)
Political Instability	-6.242 (3.03)**	-17.729 (4.50)**	-11.487 (3.28)**
Constant	13.924 (6.01)**	13.447 (3.04)**	-0.477 (0.12)
Observations	54	54	54
R ²	0.75	0.61	0.28

Absolute value of *t*-statistics in parentheses

* significant at 5%; ** significant at 1%

Table 6: Growth of Income of the Poor and Population, Health, Education, in the Long Run

	Income Growth of Poorest 20%
Growth of GDP p.c. (%)	1.076 (7.19)**
Population Growth (%)	0.518 (1.54)
Growth of Life Expectancy (%)	0.069 (0.05)
Growth of Avg. Years of Education (%)	0.089 (0.09)
Growth of Avg. Years of Female Education (%)	-0.056 (0.09)
Political instability	-11.185 (1.73)+
Constant	-0.476 (0.92)
Observations	56
R ²	0.66

Robust *t*-statistics in parentheses
+ significant at 10%

Income of average vs. poorest

