Consulting Assistance on Economic Reform II

DISCUSSION PAPERS

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Out of Poverty: On the Feasibility of Halving Global Poverty by 2015

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OUT OF POVERTY:
On the feasibility of halving global poverty by 2015

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1. Health and poverty

1.1 Introduction

Few statements in the development literature command as much universal assent as the claim that higher incomes lead to higher human development. The reverse statement, that human development can lead to higher incomes, is a different matter. It is less familiar, more new, and has the ability to surprise people in a way that the first no longer does. The first statement enjoys the status of a truism. Its reverse requires argument.

Bloom and Canning (2000) provide such an argument. They argue that the demographic transition from high mortality and fertility rates to low mortality and fertility rates, with the changes it produces in the age structure, life expectancies, and demographic patterns of a population, provides a powerful stimulus to economic growth. The present paper takes this argument a step further. To the extent that human development, in the form of improved health, facilitates more rapid economic growth, and to the extent that economic growth lifts people out of poverty, then human development can be an effective mechanism for poverty alleviation. In other words, more health means less poverty.

We argue the relevance of this effect in a very concrete setting, using the global poverty alleviation target established by the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD). Its target is to halve the proportion of the world's population living in absolute poverty between 1990 and 2015, using the United Nation's definition of absolute poverty as living on less than one US dollar per day. This implies cutting the proportion of those living in absolute poverty from 30 percent of the world's population in 1990 to 15 percent by 2015.

Most multilateral organizations concerned with international development, such as the United Nations (UN) and the World Bank, have adopted this target, as have many national governments. In the UK, for example, the Minister for the Department for International Development (DFID) has explicitly focused the work of her department on the target. Recently, in a publication intended for the British electorate, DFID described poverty reduction as "the first and foremost target," with the OECD target seen as "very simple but very difficult," a target that is "one of the great challenges of our day." (DFID/Christian AID 1999)

In this paper, we explore how difficult it will be to meet the poverty reduction target. We focus on health and the contribution of health improvements, as measured by increased life expectancy, to poverty reduction. We also explore the relationship between health and wealth, demonstrating the need for a stronger focus on health-led development.

1.2 From health to wealth

Health has traditionally been seen as an output of rising incomes, a "good" that people consume as they become richer. In the second half of the twentieth century, however, human and social capital have gradually been accepted as critical determinants of the development process. Great value is clearly contained in people and the strength of their society. In the absence of a sufficient accumulation of human and social capital, economies do not perform well. This effect is undoubtedly becoming even more potent, as economies become both more global and based, increasingly, on intangible assets such as knowledge (Bloom and River Path 2000).

The relation between health and wealth is strong. There is a close correlation between life expectancy and national absolute poverty rates (figure 1). Further, countries with high life expectancies tend to have higher standards of living as well as higher growth rates (figures 2 and 3). They also tend to have more equitable income distributions (figure 4).

There are a number of mechanisms through which health improvements can improve incomes. For example, health interacts with:

- *Demography*: As child mortality falls and life expectancies rise, people tend to invest more resources in fewer children. This demographic transition slows population growth and results in a period where there is a significantly increased proportion of workers to dependents.

- *Education*: Healthy children miss less school and learn more effectively when in school. If their family is healthy, they are less likely to be removed from school due to the illness of a family member.

- *Investment in Education*: The likely returns rise steeply. Increased life expectancy increases the period over which returns to education can be earned. In addition, due to the demographic transition, people tend to spend more resources educating fewer children to a higher level.

- *The Labor Market*: Healthier workers are physically and mentally more energetic and robust. They are more productive and earn higher wages. They are also less likely to be absent from work due to illness (or illness in their family).

- *Savings*: Healthy people expect to live longer and are therefore more likely to save for retirement. The money they save increases the amount of capital in the economy.

The relationship also continues to run from wealth to health, of course. Societies can therefore enter a period in their development where a large number of factors positively reinforce each other, creating a "virtuous spiral" that significantly boosts their development. For example, just such a virtuous spiral drove the East Asian economic miracle.

1.3 Quantifying the effect of health on poverty

Approximately 28 percent of the developing world is currently thought to be living in extreme poverty (see Table 1, although this by necessity offers evidence taken from different countries at different times). The highest rates of poverty are found in India

Figure 1. Absolute Poverty Rate in 1981-1995 and Life Expectancy

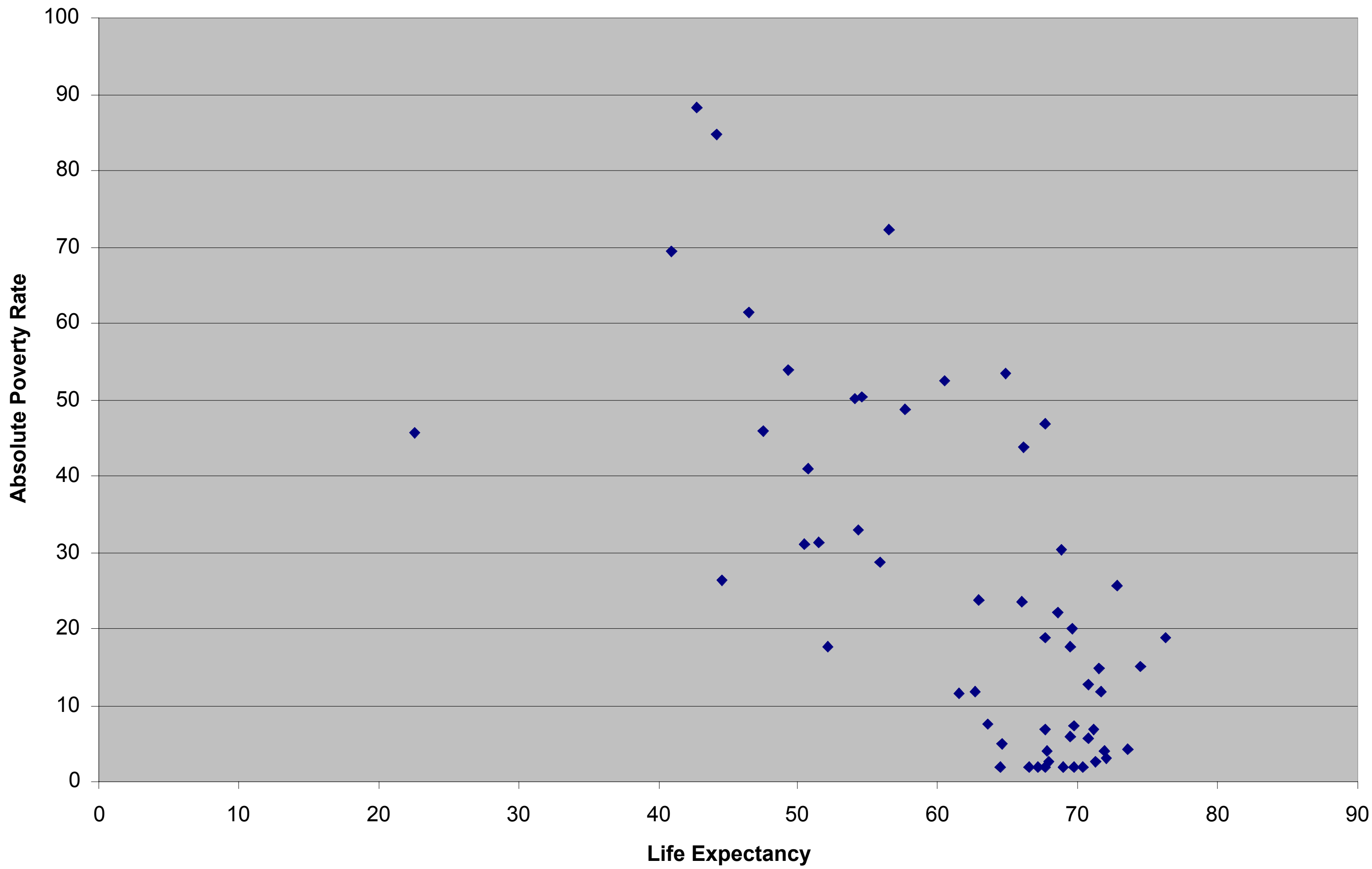


Figure 2. Per Capita GDP in 1990 and Life Expectancy

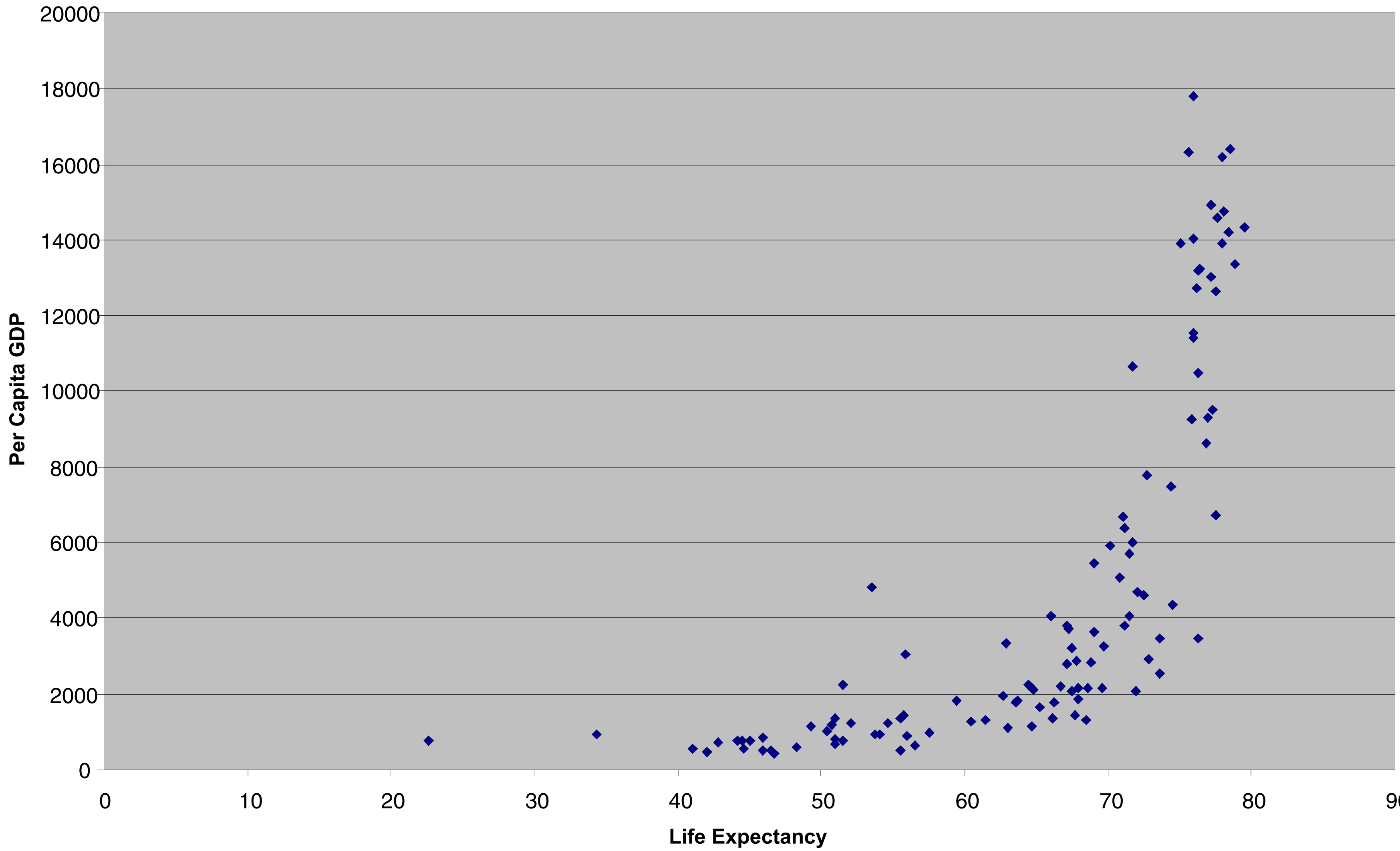


Figure 3. Annual Growth Rate in Per Capita GDP from 1965 to 1990 and Life Expectancy

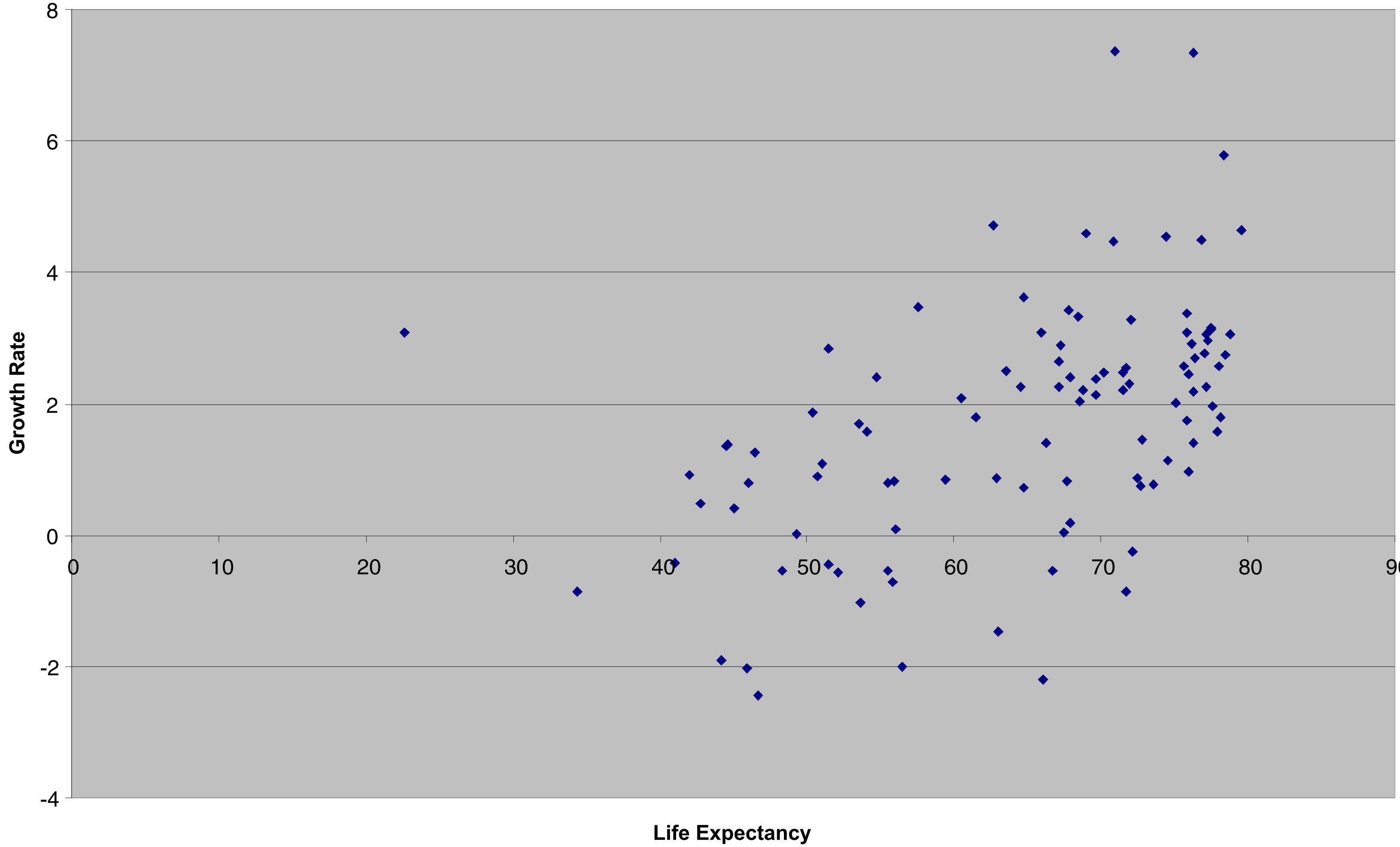


Figure 4. Average Gini Coefficient from 1985 to 1995 and Life Expectancy

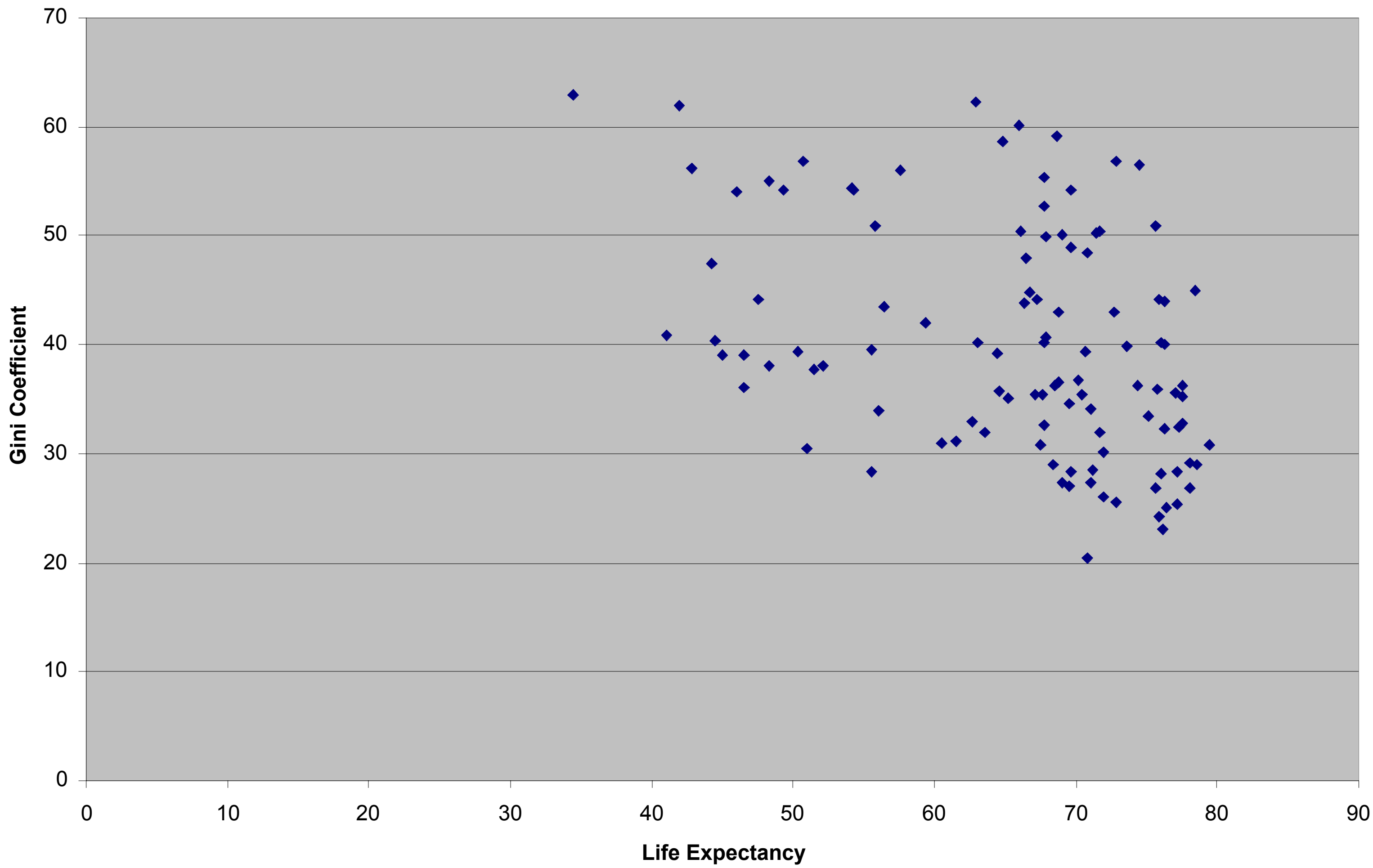


Table 1. Population Weighted Descriptive Statistics, 1990

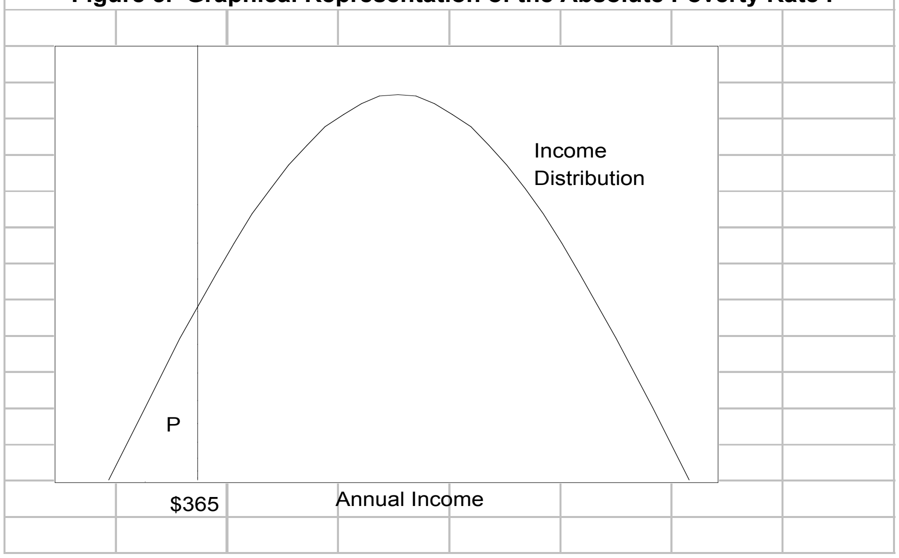
Region	Per Capita GDP in 1990 (1985 $)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty, 1981-1995 ('000)
Africa	1,166	45	39	486,930	124,363
Asia*	2,457	35	11	865,759	50,073
China	1,324	36	22	1,155,305	256,478
India	1,264	31	53	850,793	446,666
E. Europe	4,424	38	4	345,004	11,763
Other Dev. Countries	3,796			62,900	
L. America	4,146	54	20	432,486	68,585
Middle East	2,639	35	5	277,681	5,684
Total	1,977	37	28	4,476,858	963,612

Notes:
The columns on Per capita GDP, the Gini Coefficient, the Absolute Poverty Rate, and the Population in Absolute Poverty in 1990 contain population-weighted averages of these statistics only for the countries for which they are available. They do not represent averages across all countries in the continent. The column on Population in 1990, on the other hand, represents all countries within the continents.
A list of the countries included in each region, along with underlying country level data, is given in Table 8.
*Asia does not include China and India which are described separately.

(53 percent) and Africa (39 percent). As of 1990, 1.2 billion people were estimated to be living on less than one US dollar a day (measured in terms of purchasing power over a standard international basket of goods).

We quantify the effect of health on poverty using three equations. The first uses the fact that absolute poverty is related both to income growth and to the extent which poor people benefit from that growth (World Bank 1998). It therefore expresses absolute poverty as a function of average incomes and income distribution (a graphical representation of this model is shown in figure 5).

Figure 5. Graphical Representation of the Absolute Poverty Rate P



The second equation is an orthodox growth equation expressing growth in real incomes as a function of its current level, the health status of a population as measured by average life expectancy, and other covariates. These include the secondary school gross enrollment rate, the working age share of the population, the difference in the growth rates of the total population and the working age sub-population, the geographical location of a country, its openness to trade, and the quality of its institutions.

The third equation expresses income distribution as a function of average incomes and health. This allows improvements in average health status to have differential effects on people's incomes, as would be the case, for example, if health improvements raise the material welfare of the poor more than they do that of the rich.

Taken together, these estimated relationships between health, economic growth, income distribution, and poverty allow us to simulate the consequences of recent and foreseeable improvements in life expectancy on poverty. The simulations cover 31 countries for which sufficient data is available, with a combined population of 3.1 billion as of 1990. At that time, about 28 percent of their populations, or some 900 million people, were estimated to live in extreme poverty. The simulations were conducted using three different scenarios:

- *Simulation A*: Life expectancy is as predicted by the UN's *low* projections for 2015;
- *Simulation B*: Life expectancy is 10 percent higher than the UN low projection for 2015; and
- *Simulation C*: As in Simulation B, but additionally exploring the impact of a life expectancy at 10 percent higher than that actually observed in 1990.

1.4 Health and poverty – the results

The results of these simulations are arresting. Even Simulation A, with its conservative assumptions, shows a dramatic rate of absolute poverty reduction (Table 5). This simulation predicts poverty rates will fall by at least half in Asia and the Middle East, and by 45 percent in Africa. Dramatic falls are also seen in the world's most populous countries, India and China. In China, the fall is over 75 percent. Meanwhile, poverty rates will fall less steeply in Latin America. Against these positive expectations, poverty is predicted to rise sharply in Eastern Europe, with many people likely to fall into poverty for the first time in their lives. Overall, however, good outcomes outweigh the bad, with global rates of extreme poverty predicted to fall to just over 12 percent.

Simulation A demonstrates that the OECD/DAC poverty target – far from being challenging – is in fact distinctly conservative. The target can be met merely by relying on the persistence of current trends, and with no special commitment to pro-poor policies by developing country governments or development organizations.

Simulations B and C show the power of the interaction between health and wealth. Simulation B, where life expectancy is 10 percent higher than predicted by the UN in 2015, shows only minor improvement over Simulation A, with only a million or so more people escaping poverty. However, the improvement shown by Simulation C is more significant. If life expectancy had been 10 percent higher in 1990, this would have had a powerful effect on growth over the following 25 years. By 2015, thirty million more people would have been lifted from poverty. Two thirds of these would have lived in India and a third in Africa, showing the huge importance of health for regions at an early stage of development.

1.5 Policy implications

These results have a number of intriguing implications. Reaching the OECD/DAC targets will not be a notable achievement. However, to miss them, when the signs are so good, would be a humiliating catastrophe. We therefore suggest increased attention to those factors that could derail the poverty reduction process.

To escape poverty, the poor need both opportunity and security. If education is framed as the main source of improved opportunity, then better health in turn is crucial to enhanced security. Health shocks can quickly drive people back into poverty[1], often reversing years

[1] There are, of course, other issues. People are pushed back into poverty by economic and environmental shocks, natural disasters and war. Clearly, much work is needed to create a more stable global economy and to ensure wider access to the opportunities offered by the knowledge economy – but this is beyond the scope of this paper.

of painfully made gains. Health is especially important to poor people for a number of reasons. While rich households possess an array of material and financial assets, the assets of the poor consist almost entirely of their labor and human capital. Ill health therefore has a disproportionate impact on a poor household. Healthcare costs can quickly appropriate a large fraction of a poor family's income and divert expenditure from, for example, schooling costs.

Such problems are magnified when health across a society starts to deteriorate. In Eastern Europe and Sub-Saharan Africa, the significant health gains of the twentieth century are under assault. In Russia, in particular, life expectancy is tumbling, as a vicious spiral of deteriorating health, falling incomes, and evaporating social capital overtakes the region. In Sub-Saharan Africa, one disease – HIV/AIDS – has sent life expectancies back to levels not seen since the 1950s. Eighty percent of those dying are in their twenties, thirties and forties. Rather than enjoying the benefits of a demographic dividend conferring a higher proportion of energetic and productive workers, many African countries are seeing dependency levels rising, as adults become sick and children are orphaned (Bloom, Rosenfield and River Path 1999).

Such health reversals must therefore be targeted for swift and decisive action. Beyond that, health-led development offers a natural partner for improved access to education. Opportunity and security thus yoked together offer poor people the best chance to pull themselves – and their families – out of poverty.

2. Empirical Methodology

2.1 A poverty model

We model poverty as a function of average income and income distribution. We measure the former by per capita GPD and the latter by the Gini coefficient. That is,

$$p_t = f_0(y_t, g_t)$$

where p, y, and g represent a nation's poverty rate, per capita GDP, and Gini coefficient respectively. The subscript t denotes time.

We argue that the level of health in an economy, which we denote by h and measure by life expectancy, has important effects on the annualized growth rate of per capita incomes and on income distribution:

$$\frac{\ln y_t - \ln y_{t-1}}{\Delta t} = f_1(y_{t-1}, h_{t-1}, x_{t-1})$$
$$g_t = f_2(y_t, h_t, z_t)$$

where x and z are vectors of other variables that determine income growth and income distribution, and Δt is the number of years between $t-1$ and t. A reduced form statement of our central argument –that health can be an effective tool for reducing poverty – is obtained by substituting the expressions for y and g implied by f_1 and f_2 into p:

$$p_t = f_3(y_{t-1}, h_{t-1}, x_{t-1}, h_t, z_t).$$

In other words, both past and present health matters for poverty.

Our objective is to simulate the effect that health improvements over the fifty-year period 1965 to 2015 could have on global poverty in 2015, as defined by the UN. We proceed in the following stages. First we econometrically specify and estimate our model's three equations f_0, f_1, and f_2 using historical data from 1965 to 1990 on $p, y, g, h, x,$ and z. Next, we construct alternative counterfactual trajectories for h over the period 1990-2015. In particular, we imagine the following cases:

Scenario A. Health in 1990 is at historical values, and health in 2015 follows the UN's low projections;

Scenario B. Health in 1990 is at historical values, and health in 2015 is 10 percent higher than the UN's medium projections; and

Scenario C. Health in 1990 is 10 percent higher than historical values, and health in 2015 is 10 percent higher than the UN's low projections.

For each of these cases, we combine the hypothesized values for h_{1990} with actual data on y_{1990} and x_{1990}, and the estimated function $\hat{f}_1$ to obtain a predicted value for y_{2015}. Analogously, we combine the hypothesized value for h_{2015}, projected values for z_{2015}, and the estimated function $\hat{f}_2$ to obtain a predicted value for g_{2015}. The predicted values for y_{2015} and g_{2015} yield predictions for p_{2015} through the estimated function $\hat{f}_0$.

2.2 Poverty as a function of income and its distribution

Figure 5 showed the absolute poverty rate as the area under the distribution of annual incomes, and to the left of the vertical line representing an annual income of $365. The poverty rate can thus be modeled as a function of the mean and dispersion of the distribution of annual incomes. In other words, absolute poverty is a function of mean income and the distribution of income. We measure the former using per capita GDP and the latter using the Gini index.

This functional dependence is intuitive and evident from figures 6 and 7. For a given level of inequality, we expect that when mean incomes rise, absolute poverty falls because the entire income distribution shifts to the right without changing its shape. Since everyone is wealthier, there are fewer poor. In figure 6, the area A+B gives the initial absolute poverty rate. When mean income rises, the income distribution shifts to the right and the absolute poverty rate is lower at B. Analogously, for a given average income, we expect that the more unequal the distribution of this income, the higher the average poverty rate. From figure 7, we see that as the dispersion of income increases, the income distribution becomes flatter, leaving its center in the same place, but putting larger numbers of people in the tails. This causes the absolute poverty rate to rise from B to A+B.

Figure 6. For a given level of inequality, higher mean income means lower poverty

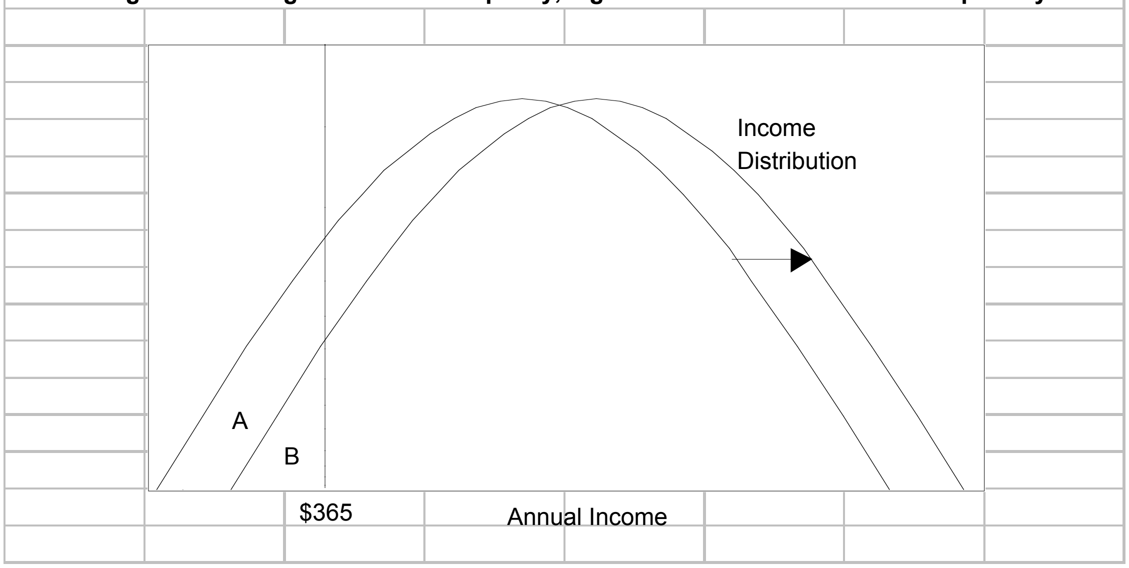
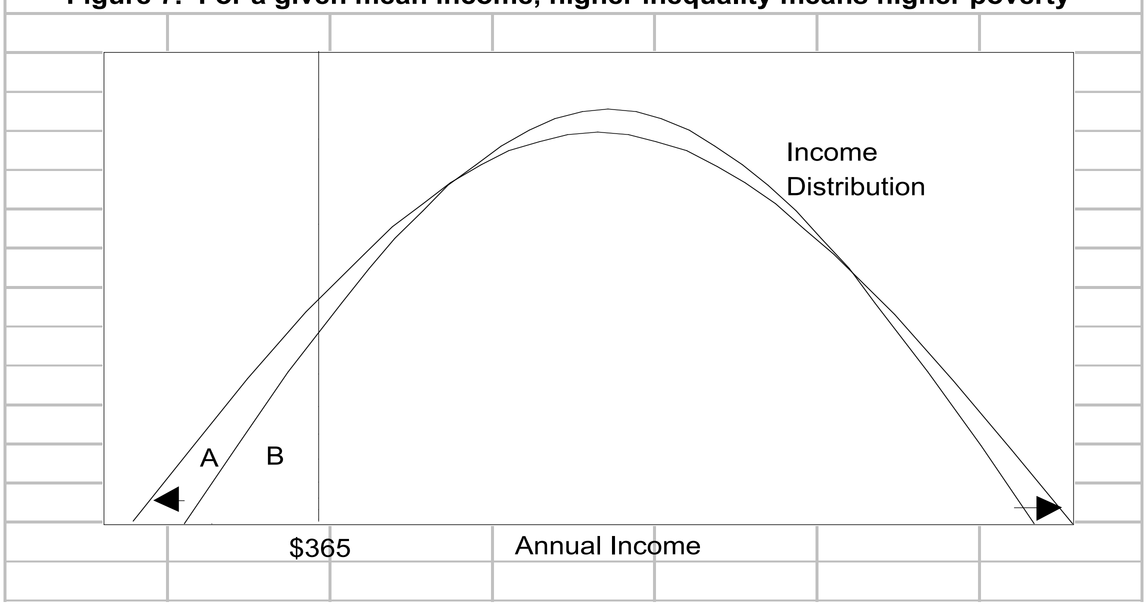


Figure 7. For a given mean income, higher inequality means higher poverty



To formalize this intuition into a specification we can estimate econometrically, we start with the UN's absolute poverty rate p^a, defined as the fraction of the population living on less than a dollar a day, and transform it logistically in the following way:

$$p = \ln\left(\frac{p^a}{100 - p^a}\right)$$

The reason for this transformation is simply that the absolute poverty rate is expressed as a fraction of a population. It is therefore naturally bounded between 0 and 100, and not suited to linear regression techniques that assume the dependent variable is not constrained to be in any fixed interval. The logistic transformation avoids this problem by mapping the absolute poverty rate onto the entire real number line so that a poverty rate of zero implies a logistic poverty rate of negative infinity while a poverty rate of 100 implies a logistic poverty rate of positive infinity. The transformation is fully invertible. We can derive the absolute poverty rate from the logistic transformation with

$$p^a = \frac{100e^p}{1+e^p}.$$

For f_0, which expresses the functional dependence of poverty on mean incomes and the distribution of income, we choose the specification

$$p_t = \alpha_0 + \alpha_1(\ln y_t) + \alpha_2(\ln y_t)^2 + \alpha_3(\ln g_t) + \alpha_4(\ln g_t)^2 + e_t^{\,p}.$$

That is, logistic poverty is a linear function of the logarithms of per capita GDP and the Gini coefficient, and the squares of these logarithms.

We estimate the poverty equation for 1990 using a cross-section of 42 countries for which absolute poverty data are available. This data comes from the World Development Indicators (1998) and although we treat this data as cross-sectional, it is actually observed at different times for different countries, though only once for each country. They are observed from as early as 1981 and as late as 1995. One should therefore keep in mind this underlying (and ignored) difference in the timing of the data. For our Gini data, we take quinquiennial Gini data from Deininger and Squire (1996) for the two periods 1985-1989 and 1990-1994, and average them to obtain an average Gini coefficient for the decade centered around 1990. Per capita GDP figures from 1990 come from version 5.6 of the Penn World Tables and are measured in 1985 PPP dollars. The countries in the sample are given in Table 2a and summary statistics for the variables are in Table 2b.

Our preferred way of estimating the poverty equation is by simple ordinary least squares (OLS). Unfortunately, this causes a problem. It yields predicted values that are at considerable variance with the actual data. For example, OLS estimation yields a predicted absolute poverty rate for India of 15 percent, a very long way from the actual value of 53 percent. We conclude from this that there are important unobserved country specific determinants of absolute poverty rates that cannot be observed in cross-sectional data or measured by OLS. Unfortunately, we do not have the panel data that would allow us to control for these country specific unobservables. We cannot perform useful simulations of future poverty rates using the simple OLS results because if they imply 15 percent poverty rates for India in 1990, they will imply even more implausibly optimistic poverty rates in 2015. This is particularly damaging since almost half of the developing nations' absolute poor are in India.

To remedy this situation in a simple way, we perform OLS on the poverty equation anyway and treat the residuals as estimates of the fixed effects. This implies that when we compute predicted values for absolute poverty rates in 2015, we include these fixed effects in the natural way. The OLS estimation results are given in Table 2c.

Table 2a. Sample of Countries for Poverty Regression (n=42)

Algeria	Egypt	Kenya	Panama	Zambia
Brazil	Guatemala	Lesotho	Papua New Guinea	Zimbabwe
Bulgaria	Guinea	Madagascar	Poland	
Chile	Guinea-Bissau	Malaysia	Senegal	
China	Honduras	Mauritania	South Africa	
Columbia	Hungary	Mexico	Sri Lanka	
Costa Rica	India	Morocco	Thailand	
Cote d Ivoire	Indonesia	Nicaragua	Tunisia	
Dominican Republic	Jamaica	Nigeria	Uganda	
Ecuador	Jordan	Pakistan	Venezuela	

Table 2b. Summary Statistics of Data for Poverty Regression

	Mean	Stand. Dev.	Min.	Max.
Poverty Rate	26.717	23.711	2	88.2
Per Capita GDP	2422	1606.93	543.385	6397.24
Gini Coefficient	44.624	10.035	27.302	62.3

Table 2c. Results of OLS Poverty Regression

Logistic Poverty Rate	dependent variable
Intercept	127.795 (38.781)
Log of per capita GDP	-12.814 (4.183)
Log of per capita GDP, Squared	0.732 (0.276)
Log of Gini Coeff.	-43.103 (19.138)
Log of Gini Coeff. Squared	6.163 (2.567)

Standard errors in parentheses

2.3 Determinants of economic growth

Much attention has been paid in recent years to the determinants of economic growth across countries. According to neo-classical growth theory, the growth rates of countries depend on two things. First, it depends on the inherent long run ceiling on the level of income per worker that a country can attain. This ceiling, usually denoted by the country's steady state level of income, depends on those characteristics of a country that dictate its long run growth potential. For our purposes, we focus on the following:

i. The log of life expectancy. Life expectancy is our measure of health. We expect this to have a positive effect on economic growth for all the reasons explained in section 1.2: its positive impact on labor supply, accumulation of financial wealth, and human capital.

ii. The log of the secondary school gross enrollment ratio. Higher enrollment rates imply higher stocks of human capital and a more productive workforce, allowing for more rapid growth.

iii. The working age share of the population. This measures the fraction of the population that is potentially economically productive. A higher working age share implies a higher potential growth rate.

iv. The difference in growth rates between the working age sub-population and the entire population (GDIF). This measures evolution in the age structure of a population that can be caused by demographic transitions from high mortality and fertility rates to low ones. More rapid growth in the working age sub-population relative to the entire population implies changes in the age structure that raise the share of the potentially economically productive segment of the population. It is a dynamic counterpart to (iii).

v. The percentage of a country's land mass in the tropics. Geography has recently been shown to be a crucial determinant of economic growth (see Bloom and Sachs 1999, for example). Proximity to the tropics, for example, implies a higher incidence of disease burdens and greater difficulty in growing cash crops. A higher percentage of a country's landmass in the tropics should imply slower growth.

vi. A measure of openness to trade. Openness to the world economy enables a country to harness world demand for its outputs as well as source world supply for its inputs. More openness should be associated with more rapid growth.

vii. An interaction between the degree of openness to trade and GDIF. The potential for more rapid growth made possible by the changes in a country's age structure are not automatic and depend for their realization on the quality of policies that harness this potential. Openness is one such policy. Therefore the interaction between GDIF and openness can be a significant determinant of growth.

viii. A measure of the quality of institutions. Higher quality of institutions implies less corruption, more consistent application of rules of law, and a stable and predictable environment for economic activity. They also facilitate capital accumulation and entrepreneurship and should be conducive to growth.

The second determinant of growth is the current distance of a country from its long-run potential. The theory assumes diminishing returns to capital accumulation. This implies that countries that are relatively far away from their steady states, or equivalently, countries that have low incomes relative to their long-run potential incomes, should experience relatively larger returns to capital accumulation than countries with high incomes relative to their long-run potential. More rapid capital accumulation and growth can therefore be expected in these countries that are poor relative to their steady states.

To capture both these sets of determinants of economic growth, we specify our growth equation f_1 as

$$\frac{\ln y_t - \ln y_{t-1}}{\Delta t} = \beta_0 + \beta_1 \ln y_{t-1} + \beta_2 \ln h_{t-1} + \overline{\beta}_3 \overline{x}_{t-1} + \varepsilon_{t-1}{}^{y}$$

where an overbar denotes vectors of either parameters or regressors. This specification is traditional in the empirical growth literature (e.g. Barro and Sala-i-Martin 1995, Sachs and Gallup 1999, Bloom and Williamson 1998, Bloom and Sachs 1999). The dependent variable is the annualized growth rate in per capita GDP. The log of life expectancy $\ln h$ and the vector of independent variables $\overline{x}$ are determinants of the long-run steady states, while the log of initial per capita income $\ln y_{t-1}$ captures the conditional convergence effects of distance from the steady state.

We estimate our growth equation on a cross section of 82 countries. The dependent variable is the annualized growth rate of GDP per capita between 1965 and 1990, constructed as the difference in log per capita GDP in those years divided by 25 (t=1990, t-1=1965). Per capita GDP data are $1985 PPP adjusted data from the Penn World Tables 5.6. All independent variables except GDIF are observed in 1965. GDIF is constructed as the difference in growth rates of the working age and total population from 1965 to 1990.

The possibility of reverse causation from income to population growth makes GDIF an endogenous regressor, leading to biases in Ordinary Least Squares estimates. This endogeneity problem leads us to instrument GDIF and its interaction with the openness indicator using the following instrumental variables: the logs of infant mortality, fertility, and the youth dependency ratio in 1965, and the average growth of working age and total population from 1960 to 1965. This procedure is equivalent to regressing the endogenous regressors on the instrumental variables and using the predicted values of the endogenous regressors as the data in the actual growth regression. These predicted values are purged of endogeneity and restore unbiasedness of the coefficients. Data sources are in Appendix 3. The sample of countries and summary statistics of the data are in Appendices 1a and 1b. The IV regression results are in Table 3.

Table 3. Results of 2SLS Growth Regression

Growth rate, 65-'90	dependent variable
Intercept	2.717 (6.215)
Log of GDP Per capita, '65	-1.69 (0.315)
Log of working Age share of the Population, '65	2.158 (3.277)
Percentage of Area in tropics	-1.043 (0.360)
Log of secondary School gross Enrollment rate, '65	0.409 (0.314)
Percentage of Years open to Trade, '65-'90, OPEN	0.597 (0.589)
Quality of Institutions, '80.	0.103 (0.116)
Log of life Expectancy, '65	2.81 (1.56)
Difference in Growth rate b/n Working age and Total pop., GDIF	0.386 (1.179)
OPEN*GDIF	3.388 (1.204)

Standard errors in parentheses

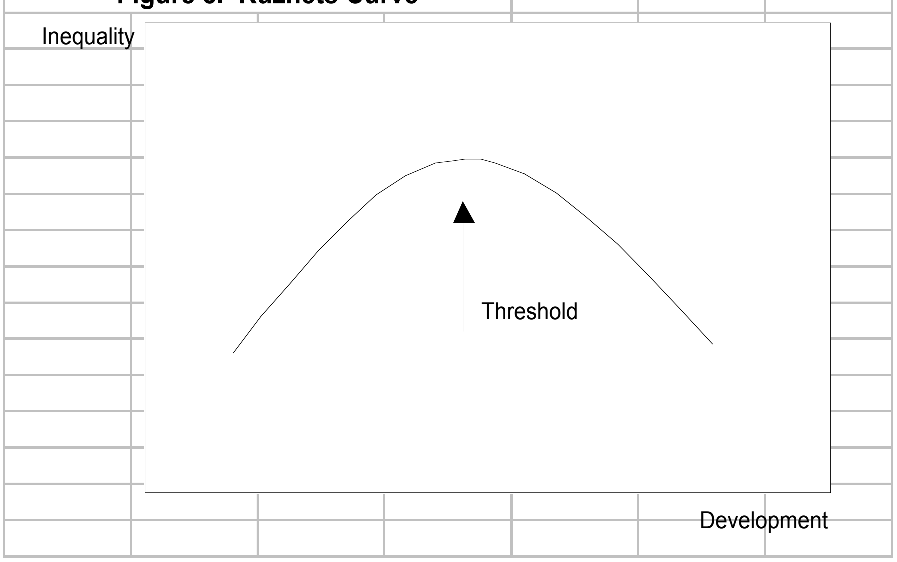
The estimation results are as follows. The log of initial per capita incomes and unfavorable geography have the expected negative coefficients and are both significant at the one percent level. While neither openness nor dynamics in the age distribution are significant, their interaction is at the one percent level, as we hypothesized. Life expectancy is significant at the 10 percent level while the log of the working age share of the population in 1965, the log of the secondary school enrollment ratio, and the measure of institutional quality are not.

Life expectancies seem to have some effect on the pace of economic growth. To anticipate our simulation results, we use our estimates to predict growth from 1990 to 2015 using 1990 data on independent variables and the sample of 31 developing countries for whom both absolute poverty data and data on the independent variables in the growth equation exist. When we do so, we find that the average per capita incomes in these countries will grow from $1,812 in 1985 dollars to $3,685. When we assume, counterfactually, that life expectancies in 1990 were 10 percent higher than they actually were, average per capita incomes are almost three hundred dollars higher at $3,953. The 10 percent higher life expectancy raises the annualized growth rate from 2.84 percent to 3.12 percent.

2.4 Determinants of the distribution of income

We extend recent research on the determination of inequality (Barro 1999, Higgins and Williamson 1999, Lundberg and Squire 1999) to include a role for health improvements. Economic theories about the long run evolution of inequality center on the idea of the Kuznets curve, a stylized graph of which is shown in figure 8.

Figure 8. Kuznets Curve



According to Kuznets (Kuznets 1955), inequality tends to worsen as a poor country develops and it is only after it passes some threshold level of development that the relationship inverts itself and inequality diminishes as living standards rise. Current research is divided as to the empirical relevance of the Kuznets curve. Some authors such as Gallup, Radelet, and Warner (1997) find little evidence for it, arguing that on average, the income of the poor grows as quickly as average income. This implies that the distribution of income tends to remain stable as a country grows, displaying neither a tendency to increasing or decreasing inequality. Others argue that interactions between growth and inequality exist. For example, according to Timmer (1997), growth exacerbates inequality where a great deal of inequality exists, and reduces it where there is little of it to begin with. On the other hand, greater inequality seems to retard growth, and lesser inequality speeds it up. While testing for the presence of a Kuznets effect is not the focus of this paper, we allow the log of per capita incomes to have a non-linear effect on inequality in a manner consistent with its existence. We do this because previous experience shows that these non-linear effects are usually strongly statistically significant.

To this specification, we add health as measured by life expectancy as another determinant of inequality. There are good reasons to believe that improvements in health have a progressive impact – that is, their benefits are larger for the poor than for the rich. This is so because the poor have more of their assets concentrated in their labor and so disproportionately benefit from the labor enhancing effects of improved health. Our specification for $\hat{f}_2$ which relates inequality to income and health is

$$g_{t,i} = \gamma_0 + \gamma_1 (\ln y_{t,i}) + \gamma_2 (\ln y_{t,i})^2 + \gamma_3 (\ln h_{t,i}) + z_i + \varepsilon_{t,i}{}^g .$$

That is, we model the Gini coefficient as a function of log per capita income, its square, health, and country-specific fixed effects. Log income and its square capture Kuznets effects, and the log of life expectancy captures the health effects. We include fixed effects to capture unobservable omitted variables that are constant through time and may be important determinants of cross-country differences in inequality.

In contrast to the poverty and growth regressions, we estimate the Gini equation on a panel of 97 countries observed over a number of five-year periods from 1960-1964 to 1990-1994. We attempted to include explicit conditioning variables such as measures of openness to trade and working age fraction of the population but these were not significant, so we limit ourselves to time invariant country-specific fixed effects. The countries in the sample are given in Appendix 2 and the estimation results are in Table 5.

Table 4. Results of Gini Coefficient Panel Regression

Gini Index	dependent variable
Intercept	15.899
	(29.441)
Log of per capita GDP	20.158
	(8.472)
Log of per capita GDP, Squared	-1.24
	(0.490)
Log of Life Expectancy	-9.966
	(5.192)
Number of Observations	97

Standard errors in parentheses

We see from the estimates that both components of the Kuznets effect are significant at the two percent significance level and have the expected signs: the coefficient on log per capita income is positive while the coefficient on its square is negative. That is, a country becomes more unequal as it grows, except at higher incomes when the relationship inverts itself. The inflection point at which this inversion occurs is $8,100. Life expectancy has a negative effect on the Gini coefficient, and is significant at the six percent level. Longer-lived populations will tend to be more equal: a 10 percent increase in life expectancy reduces the Gini coefficient by about one.

2.5 Simulations

We now use our estimates of the three equations of our model to simulate absolute poverty rates in the year 2015 according to three scenarios.

Simulation A is our baseline case. It reflects our best guess of what poverty outcomes will be in the year 2015 if historical patterns in the evolution of income growth, income distribution, life expectancy, and absolute poverty hold.

Simulations B and C are designed to measure the contribution that improvements in life expectancy can make to reducing absolute poverty. In our model, poverty in 2015 is a function of per capita incomes in 2015 and the Gini coefficient in 2015, both of which are themselves functions of life expectancy. More specifically, the Gini coefficient in 2015 is a function of life expectancy in 2015, and per capita income in 2015 is a function of the growth in per capita income from 1990 to 2015, which is a function of life expectancy in 1990. So to measure the contribution of life expectancy improvements to reducing poverty, we need to trace its impact through two channels: through its contemporaneous effect in the Gini coefficient in 2015 (Simulation B) and through its effect on growth from 1990 to 2015 (Simulation C).

In particular, simulation B allows a 10 percent improvement in life expectancy in 2015 to affect poverty in 2015 through its contemporaneous effect on inequality in 2015 as measured by the Gini coefficient. In this simulation, per capita GDP in 2015 is completely determined by the values of the independent variables of the growth regression in 1990. The Gini index in 2015, by contrast, is a function of life expectancy in 2015, and is the intermediate channel through which the improvement in life expectancy reduces poverty.

Simulation C adds to this effect the added benefit from more rapid economic growth that would result from higher life expectancy in 1990.

For each of these cases, we combine the hypothesized values for h_{1990} with actual data on y_{1990} and x_{1990}, and the estimated function $\hat{f}_1$ to obtain a predicted value for y_{2015}. We combine the hypothesized value for h_{2015}, projected values for z_{2015}, and the estimated function $\hat{f}_2$ to obtain a predicted value for g_{2015}. The predicted values for y_{2015} and g_{2015} yield predictions for p_{2015} through the estimated function $\hat{f}_0$, appropriately augmented by the fixed effects estimated in section 2.2. From the predicted value of p_{2015}, we obtain the predicted absolute poverty rate by using the inverse function mentioned above. Lastly, we obtain predicted numbers of people living in absolute poverty by multiplying the predicted absolute poverty rate by the low variant of the UN's population projections for 2015.

The results of the simulations are in Table 2. We report simulations for four outcomes: per capita GDP, the Gini coefficient, the rate of absolute poverty, and the size of the population living in absolute poverty. We present each of these four outcome variables under the three simulated conditions A, B, and C, with the real data for 1990 presented for comparison. Results are first listed by country, then summarized by population-weighted continental outcomes, and finally summarized across continents. The simulation results can be computed for only 32 countries because credible prediction of future poverty rates requires estimating the fixed effects we described in section 2.2. These effects can only be computed from the 42 countries that have observed poverty data. Of these countries, 10 have missing 1990 data on the independent variables of the growth regression.

Looking at the poverty rates under Simulation A at a continental level, we see that the UN's objectives will be more than met. Poverty rates fall most dramatically in India, China, the rest of Asia, and the Middle East. Poverty rates are also projected to fall significantly, if less dramatically, in Africa and Latin America. Poverty increases in Eastern Europe, but overall, the good outcomes outweigh the bad. Our baseline simulation shows that poverty rates in 2015 should be around 12 percent, comfortably within half of the absolute poverty rate of our sample in 1990.

The results from Simulation B show that improvements in life expectancy seem to have small effects on contemporaneous poverty rates. A 10 percent increase in life expectancy in 2015 should reduce global poverty rates by only about .03 percent. This is sufficient to reduce the number of people living in poverty by about one million.

Simulation C shows that the more powerful channel, whereby life expectancy can dramatically affect poverty rates, is through its effect of causing more rapid economic growth. If a 10 percent life expectancy improvement occurs in 1990, this will cause sufficiently more rapid economic growth to make global per capita incomes to be about $300 higher in 2015. This is sufficient to reduce global absolute poverty rates by .72, and lift about thirty million additional people out of poverty. Of this thirty million, almost two thirds will be Indian and almost a third African.

Table 5. Simulation Results for the year 2015

	Per Capita GDP, 1985$				Gini Coeff.			
COUNTRY	1990	A	B	C	1990	A	B	C
Algeria	2,777	4,740	4,740	5,085	35.33	35.82	34.87	34.81
Brazil	4,042	4,946	4,946	5,307	60.05	55.94	54.99	54.91
Chile	4,338	9,267	9,267	9,942	56.49	49.55	48.60	48.42
China	1,324	3,477	3,477	3,730	36.20	33.54	32.59	32.58
Colombia	3,300	4,882	4,882	5,237	54.27	51.18	50.23	50.16
Costa Rica	3,499	5,182	5,182	5,559	44.03	45.00	44.05	43.97
Cote d'Ivoire	1,213	1,701	1,701	1,825	38.00	38.39	37.44	37.55
Ecuador	2,755	6,872	6,872	7,372	43.00	41.82	40.87	40.74
Egypt	1,912	3,847	3,847	4,127	32.00	36.11	35.16	35.13
Guinea	767	1,187	1,187	1,273	40.40	39.78	38.83	39.00
Hungary	5,357	8,595	8,595	9,220	27.42	21.33	20.38	20.21
India	1,264	2,625	2,625	2,816	30.99	30.84	29.90	29.93
Indonesia	1,974	5,522	5,522	5,924	32.98	31.73	30.78	30.69
Jamaica	2,545	5,658	5,658	6,070	39.83	41.39	40.44	40.35
Kenya	911	1,827	1,827	1,960	54.39	55.79	54.84	54.94
Madagascar	675	1,286	1,286	1,379	43.44	44.35	43.40	43.57
Malaysia	5,124	12,886	12,886	13,824	48.35	46.26	45.31	45.07
Mexico	5,827	8,353	8,353	8,961	50.31	52.11	51.16	51.00
Morocco	2,151	4,942	4,942	5,301	39.20	37.62	36.67	36.60
Nicaragua	1,294	2,129		2,284	50.32	50.16	49.21	49.29
Nigeria	995	1,405		1,507	39.31	37.63	36.68	36.83
Pakistan	1,394	2,711	2,711	2,908	31.15	30.55	29.60	29.64
Poland	3,820	6,821	6,821	7,318	27.30	24.24	23.29	23.17
Senegal	1,145	1,537	1,537	1,649	54.12	52.76	51.81	51.94
South Africa	3,248	5,394	5,394	5,786	62.30	64.10	63.15	63.06
Sri Lanka	2,096	4,002	4,002	4,293	30.10	38.97	38.02	37.99
Thailand	3,580	8,503	8,503	9,122	50.15	41.92	40.97	40.80
Tunisia	2,910	5,498	5,498	5,898	40.24	40.39	39.44	39.35
Uganda	554	784	784	841	40.78	36.10	35.15	35.40
Venezuela	6,055	6,508	6,508	6,982	50.34	45.16	44.21	44.09
Zambia	689	1,058	1,058	1,135	47.46	47.70	46.75	46.95
Zimbabwe	1,182	1,889	1,889	2,027	56.83	57.32	56.37	56.46
Africa	1,312	1,876	1,876	2,013	46.39	44.66	43.71	43.84
Asia*	2,174	5,086	5,086	5,457	35.43	33.43	32.48	32.42
China	1,324	3,477	3,477	3,730	36.20	33.54	32.59	32.58
India	1,264	2,625	2,625	2,816	30.99	30.84	29.90	29.93
E. Europe	4,149	7,161	7,161	7,682	27.33	23.69	22.74	22.60
L. America	4,483	6,148	6,148	6,595	55.17	52.56	51.61	51.51
Middle East	2,225	4,392	4,392	4,712	34.85	36.63	35.68	35.63
Total	1,812	3,685	3,685	3,953	37.16	35.74	34.79	34.78

*Asia does not include China and India which are described separately
Regional results are weighted summaries of results for the countries listed above.
The weights used are UN population projections for 2015.

Table 5. Simulation Results for the year 2015, continued

	Absolute Poverty Rate				Population in Absolute Poverty ('000)			
COUNTRY	1990	A	B	C	1990	A	B	C
Algeria	2.00	1.33	1.30	1.27	499	526	514	501
Brazil	23.60	14.65	13.33	13.00	34,928	27,829	25,327	24,699
Chile	15.00	7.73	7.08	7.25	1,965	1,323	1,212	1,242
China	22.20	5.40	5.39	5.11	256,478	73,985	73,950	70,067
Colombia	7.40	4.19	3.81	3.71	2,412	2,154	1,958	1,904
Costa Ric	18.90	16.65	15.59	15.29	574	839	785	770
Cote d'Iv	17.70	9.95	9.57	8.53	2,068	1,915	1,842	1,643
Ecuador	30.40	20.26	19.25	19.33	3,120	3,101	2,947	2,958
Egypt, Ar	7.60	3.11	3.03	2.90	4,280	2,509	2,449	2,340
Guinea	26.30	9.18	8.75	7.57	1,514	947	903	781
Hungary	2.00	5.37	6.84	7.41	207	494	630	682
India	52.50	22.75	23.32	21.80	446,666	262,237	268,819	251,211
Indonesia	11.80	4.70	4.79	4.76	21,572	11,054	11,273	11,201
Jamaica	4.30	2.67	2.51	2.48	102	74	70	69
Kenya	50.20	20.38	18.67	17.03	11,784	7,289	6,676	6,091
Madagasca	72.30	26.27	24.83	22.19	9,140	5,958	5,630	5,032
Malaysia	5.60	6.47	5.98	6.31	1,002	1,697	1,569	1,656
Mexico	14.90	18.28	16.82	17.04	12,401	20,918	19,240	19,499
Morocco	2.00	0.90	0.87	0.85	481	298	287	280
Nicaragua	43.80	23.75	22.05	20.38	1,563	1,654	1,536	1,420
Nigeria	31.10	15.19	14.72	12.99	29,904	22,731	22,023	19,436
Pakistan	11.60	3.60	3.73	3.44	13,820	7,746	8,021	7,397
Poland	6.80	8.12	9.41	9.73	2,592	3,155	3,657	3,779
Senegal	54.00	34.65	32.35	29.64	3,957	4,589	4,286	3,926
South Afr	23.70	22.82	20.76	20.39	8,785	9,420	8,571	8,417
Sri Lanka	4.00	2.19	2.09	2.01	682	468	447	428
Thailand	2.00	0.84	0.79	0.81	1,112	559	525	538
Tunisia	3.90	2.59	2.46	2.42	318	286	271	267
Uganda	69.30	34.80	34.23	29.79	11,538	11,117	10,936	9,516
Venezuela	11.80	7.56	7.02	7.01	2,301	2,216	2,059	2,055
Zambia	84.60	69.34	67.42	63.78	6,112	8,354	8,123	7,684
Zimbabwe	41.00	21.35	19.54	17.88	4,041	2,701	2,471	2,262
Africa	38.99	21.51	20.49	18.58	88,841	75,021	71,461	64,789
Asia*	9.73	3.81	3.87	3.76	38,188	21,525	21,835	21,219
China	22.20	5.40	5.39	5.11	256,478	73,985	73,950	70,067
India	52.50	22.75	23.32	21.80	446,666	262,237	268,819	251,211
E. Europe	5.77	7.59	8.92	9.28	2,799	3,649	4,287	4,461
L. America	18.81	13.90	12.75	12.63	59,366	60,109	55,134	54,616
Middle East	4.92	2.20	2.14	2.06	5,578	3,619	3,521	3,388
Total	28.93	12.26	12.23	11.51	897,916	500,144	499,007	469,751

*Asia does not include China and India which are described separately

Regional results are weighted summaries of results for the countries listed above.

The weights used are UN population projections for 2015.

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Appendix

Appendix 1a. Sample of Countries for Growth Regression

Algeria	Chile	Finland	India	Malawi	Pakistan	Sri Lanka	Uruguay
Argentina	China	France	Indonesia	Malaysia	P. N. Guinea	Sweden	Venezuela
Australia	Colombia	Gabon	Ireland	Mali	Paraguay	Switzerland	Zambia
Austria	Congo	Gambia	Israel	Mexico	Peru	Syria	Zimbabwe
Bangladesh	Costa Rica	Ghana	Italy	Morocco	Philippines	Thailand	
Belgium	Cote d Ivoire	Greece	Jamaica	Mozambique	Portugal	Togo	
Bolivia	Denmark	Guatemala	Japan	Netherlands	Senegal	Trinidad	
Brazil	Dominican Rep.	Guinea	Jordan	New Zealand	Sierra Leone	Tunisia	
Burkina Faso	Ecuador	Guinea-Bissau	Kenya	Nicaragua	Singapore	Turkey	
Cameroon	Egypt	Honduras	Korea, Rep.	Nigeria	South Africa	Uganda	
Canada	El Salvador	Hong Kong	Madagascar	Norway	Spain	U. K.	

Appendix 1b. Summary Statistics of Data for Growth Regression

	Mean	Stand. Dev.	Min.	Max.
Growth rate, 65-'90	1.807	1.899	-2.449	7.367
Log of GDP per capita, '65	7.456	0.931	5.67	9.363
Log of working age share of the population, '65	-0.595	0.093	-0.761	-0.388
Percentage of area in tropics	0.487	0.477	0	1
Log of secondary school gross enrollment rate, '65	2.638	1.256	-1.609	4.419
Percentage of years open to trade, '65-'90, OPEN	0.249	0.397	0	1
Quality of institutions, '80.	5.683	2.257	2.271	9.984
Log of life expectancy, '65	4.013	0.218	3.512	4.306
Difference in growth rate b/n working age and total pop., GDIF	0.236	0.372	-0.417	1.362
OPEN*GDIF	0.084	0.209	-0.129	1.228

Appendix 2. Sample of Countries for Gini Regression

Algeria	Canada	Finland	Hungary	Lesotho	Nicaragua	Senegal	U. K.
Australia	Cent. Af. Rep	France	India	Luxembourg	Nigeria	Sierra Leone	U. S.
Austria	Chile	Gabon	Indonesia	Madagascar	Norway	Singapore	Venezuela
Bahamas	China	Gambia	Iran	Malawi	Pakistan	South Africa	Yugoslavia
Bangladesh	Colombia	Germany	Ireland	Malaysia	Panama	Spain	Zambia
Barbados	Costa Rica	Ghana	Israel	Mali	Paraguay	Sri Lanka	Zimbabwe
Belgium	Cote d Ivoire	Greece	Italy	Mauritania	Peru	Sweden	
Bolivia	Denmark	Guatemala	Jamaica	Mauritius	Philippines	Switzerland	
Botswana	Dominican Rep.	Guinea	Japan	Mexico	Poland	Thailand	
Brazil	Ecuador	Guinea-Bissau	Jordan	Morocco	Portugal	Trinidad	
Bulgaria	Egypt	Guyana	Kenya	Nepal	Puerto Rico	Tunisia	
Burkina Faso	El Salvador	Honduras	Korea, Rep.	Netherlands	Romania	Turkey	
Cameroon	Fiji	Hong Kong	Laos	New Zealand	Rwanda	Uganda	

Appendix 3. Data Sources

Variable	Source
Absolute Poverty Rate in 1990	WDI 1998
Per capita GDP, various years	PWT, 5.6
Gini Coefficient, various years	DS, 1996
Working age share of population	UN Pop, 1998
Percentage of area in tropics	Gallup, Sachs, and Mellinger, 1998
Secondary school gross enrollment rate	WDI, 1998
Percentage of years open to trade	Sachs and Warner, 1995
Quality of Institutions	Knack and Keefer, 1995
Life Expectancy	UN Pop, 1998
Growth rate of working age population	UN Pop, 1998
Growth rate of total population	UN Pop, 1998

WDI: World Development Indicators
PWT: Pen World Tables
DS: Deininger and Squire
UN Pop: UN Population Statistics

Appendix 4. Country-level statistics by continent

Africa	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Angola				9,229	
Benin	920			4,684	
Botswana			33	1,272	420
Burkina Faso	511	39		9,082	
Burundi	550			5,487	
Cameroon	1,226			11,484	
Cape Verd	1,058			341	
Central African R.	579	55		2,929	
Chad	399			5,552	
Comoros	564			523	
Congo, Dem.				37,405	
Congo, Rep.	2,211			2,232	
Cote d'Ivoire	1,213	38	18	11,682	2,068
Djibouti				517	
Equatoria				352	
Eritrea				2,881	
Ethiopia			46	48,140	22,144
Gabon	3,958			935	
Gambia	799	39		921	
Ghana	902	34		15,018	
Guinea	767	40	26	5,755	1,514
Guinea-Bisseau	689	56	88	964	850
Kenya	911	54	50	23,475	11,784
Lesotho	972		49	1,783	870
Liberia				2,575	
Madagascar	675	43	72	12,642	9,140
Malawi	519	62		9,329	
Mali	531	54		9,212	
Mauritania	791	38	31	2,003	629
Mauritius	5,838	37		1,057	
Mozambique	760			14,182	
Namibia	2,854			1,352	
Niger		36	62	7,731	4,755
Nigeria	995	39	31	96,154	29,904
Reunion				604	
Rwanda	756		46	6,954	3,178
Senegal	1,145	54	54	7,327	3,957
Sierra Leone	901			3,997	
Somalia				8,623	
South Africa	3,248	62	24	37,066	8,785
Swaziland				744	
Tanzania		38	11	25,483	2,676
Togo	641			3,524	
Uganda	554	41	69	16,649	11,538
Zambia	689	47	85	7,224	6,112
Zimbabwe	1,182	57	41	9,855	4,041

Appendix 4. Country-level statistics by continent, continued

Asia	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Afghanistan				14,754	
Armenia				3,545	
Azerbaijan				7,159	
Bangladesh	1,390	28		109,765	
Bhutan				1,645	
Brunei				257	
Cambodia				8,695	
China	1,324	36	22	1,155,305	256,478
Fiji	4,007			726	
Georgia				5,460	
Hong Kong	14,849	45		5,705	
India	1,264	31	53	850,793	446,666
Indonesia	1,974	33	12	182,812	21,572
Kazakhstan		33	2	16,742	335
Korea, Dem.				20,363	
Korea, Rep.	6,673			42,869	
Kyrgyz Rep.		55	19	4,395	831
Lao PDR	1,385	30		4,202	
Malaysia	5,124		6	17,891	1,002
Maldives				216	
Mongolia	1,842			2,216	
Myanmar				41,354	
Nepal			50	18,772	9,442
Pakistan	1,394	31	12	119,141	13,820
Papua New Guinea	1,425		29	3,839	1,098
Philippines	1,763	44		60,779	
Samoa	2,064			160	
Seychelle	3,973				
Singapore	11,710			3,016	
Solomon Is.				320	
Sri Lanka	2,096	30	4	17,057	682
Taiwan	8,063	31			
Tajikistan				5,303	
Thailand	3,580	50	2	55,580	1,112
Turkmenistan		36	5	3,668	180
Uzbekista		31		20,515	
Vanuatu	1,677			149	
Vietnam		35		66,689	

Appendix 4. Country-level statistics by continent, continued

E. Europe	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Albania				3,289	
Belarus		28	2	10,260	205
Bosnia and Herz.				4,308	
Bulgaria	6,203	28	3	8,718	227
Croatia				4,517	
Czech Rep.	4,095	26	3	10,306	319
Estonia		35	6	1,571	94
Hungary	5,357	27	2	10,365	207
Latvia		29		2,684	
Lithuania		35	2	3,737	75
Macedonia				2,046	
Moldova		35	7	4,364	297
Poland	3,820	27	7	38,119	2,592
Romania		27	18	23,207	4,108
Russian Fed.		48	2	148,292	2,966
Slovak Rep.		20	13	5,256	673
Slovenia		26		1,918	
Ukraine		37		51,891	
Yugoslavia	4,548	32		10,156	

Appendix 4. Country-level statistics by continent, continued

L. America/ Caribbean	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Argentina	4,706			32,527	
Bahamas		43		255	
Barbados				257	
Belize	3,464			187	
Bolivia	1,658	42		6,573	
Brazil	4,042	60	24	148,002	34,928
Chile	4,338	56	15	13,099	1,965
Colombia	3,300	54	7	32,596	2,412
Costa Rica	3,499		19	3,035	574
Cuba				10,628	
Dominican Rep.	2,166	49	20	7,110	1,415
Ecuador	2,755	43	30	10,264	3,120
El Salvador	1,824	50		5,031	
Grenada	2,881				
Guatemala	2,127		53	9,197	4,902
Guyana	1,094	40		795	
Haiti				6,473	
Honduras	1,377	53	47	4,879	2,288
Jamaica	2,545	40	4	2,366	102
Mexico	5,827	50	15	83,226	12,401
Nicaragua	1,294	50	44	3,568	1,563
Panama	2,888	57	26	2,398	614
Paraguay	2,128	59		4,219	
Peru	2,188	45		21,569	
St. Kitts	5,037				
Suriname				400	
Trinidad	7,764			1,236	
Uruguay	4,602			3,094	
Venezuela	6,055	50	12	19,502	2,301

Appendix 4. Country-level statistics by continent, continued

Middle East	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Algeria	2,777	35	2	24,935	499
Bahrain				490	
Egypt	1,912	32	8	56,312	4,280
Iran	3,392			59,219	
Iraq				18,078	
Israel	9,298	36		4,660	
Jordan	2,919	41	3	4,259	106
Kuwait				2,143	
Lebanon				2,555	
Libya				4,545	
Morocco	2,151	39	2	24,043	481
Oman				1,785	
Qatar				485	
Saudi Arabia				16,048	
Sudan	757			24,061	
Syria	3,897			12,388	
Tunisia	2,910	40	4	8,162	318
UAE				1,921	
Yemen		39		11,592	

Appendix 4. Country-level statistics by continent, continued

Other Dev. Countries	Per Capita GDP in 1990 (1985$)	Gini Coefficient in 1990	Absolute Poverty Rate 1981-1995	Population in 1990 ('000)	Population in Absolute Poverty ('000) 1981-1995
Cyprus	8,368			681	
French Polynesia				197	
Guadeloupe				391	
Guam				134	
Macao				372	
Malta				354	
Martinique				360	
Micronesia				429	
Monaco		33			
Netherland Ant.				188	
New Caledonia				168	
Puerto Rico				3,528	
Turkey	3,741			56,098	