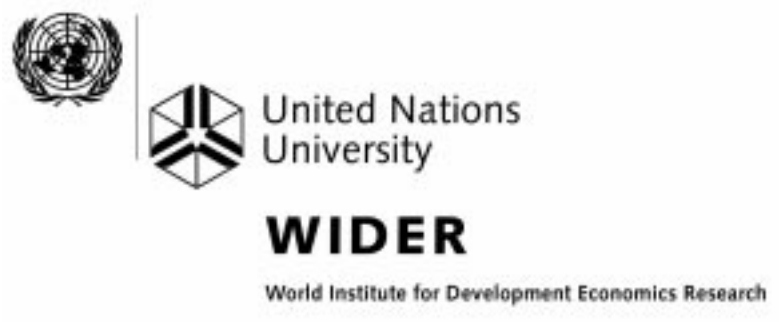

Discussion Paper No. 2001/137

Education Is Good for the Poor

A Note on Dollar and Kraay (2001)

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Abstract

A recent paper by Dollar and Kraay (2001) finds that higher primary educational attainment of the workforce does not increase the income of the poor except for its effect on average income. We test the robustness of their finding by using a broader measure of human capital that accounts for international differences in the quality of education. Our findings suggest that more quality-adjusted education does increase the income of the poor in addition to its positive effect on average income. Hence effective education policies should be an essential component of any poverty-reduction strategy.

Keywords: poverty, income distribution, education, growth

JEL classification: O15

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I. Introduction and background

A recent paper by Dollar and Kraay (2001) finds that growth is good for the poor, but that the income of the poor does not respond systematically to supposedly 'pro-poor' policies such as public expenditure on education. Using a sample covering 137 countries over the period 1950-99, they report that the income of the poor rises one-for-one with average income. However, the primary educational attainment of the workforce (and the level of primary enrollment, as in an earlier version of their paper) does not seem have a measurable effect on the income of the poor beyond its effect on average income. Hence, their work tends to suggest that a focus on education rather than on growth might be misplaced as an essential component of any poverty-reduction strategy.

We test the robustness of the findings by Dollar and Kraay (2001) by using a broader measure of human capital, which considers all levels of education and accounts for international differences in the quality of education. Contrary to Dollar and Kraay, we find that a higher stock of human capital increases the income of the poor, not only through its effect on average income, but also through its effect on the distribution of income. Our results appear to be robust to a number of alternative specifications. We interpret our findings as suggesting that effective education policies would be a first-best poverty reduction strategy.

Our interpretation of the empirical evidence seems to be more in line with a policy strategy favored by the Development Report 2000 (World Bank 2000a) than the paper we seek to criticize, which in fact emanated from the World Bank's research department. With its focus on attacking poverty, the Development Report goes significantly beyond the message conveyed by Dollar and Kraay (2001) in that economic growth is merely considered to be a necessary condition for achieving development and reducing poverty, but it is not deemed a sufficient force. Effective anti-poverty strategies are meant to focus on three additional issues: strengthening the participation of poor people in local decision-making and fighting discrimination; reducing vulnerability of the poor to economic and natural shocks, sickness and violence; and lastly, expanding economic opportunity and access to assets, such as education, capital and land. An additional study by the World Bank on growth and poverty (World Bank 2000b) further emphasized the centrality of education in the development process. This study argues that human capital appears to be the main asset of most poor people. Hence, investment in the human capital of the poor should be a powerful way to augment their assets, redress asset inequality and reduce poverty.

Recent analyses of international differences in output per worker and growth rates have also raised the awareness of the role of human capital in development, either as a direct or as an indirect factor.[1] The endogenous growth literature emphasizes the centrality of human capital for innovation and technological progress. Most empirical cross-country studies of long-run growth now include some measure of human capital. Regardless of the underlying model, it is a fairly robust empirical finding that a country's human capital is almost always identified as an essential ingredient for achieving growth.[2] However, the

[1] See, e.g., Mankiw et al. (1992), Benhabib and Spiegel (1994), Hall and Jones (1999).

[2] See, e.g., Temple (1999) and Krueger and Lindahl (2000).

quantitative impact of human capital on growth has not been precisely estimated up to now.

The centrality of education in poverty-reduction policies stems from the belief that education is a powerful equalizer. However, this belief cannot command strong theoretical support. Ram (1989) reviews several theoretical frameworks linking the level of schooling and its dispersion with income inequality, such as human capital or dual-economy-type models. He finds that these models do not generate any clear theoretical hypotheses about the effect of education on income inequality or absolute poverty. For instance, traditional human-capital models of earnings provide two opposing insights with regard to the relationship between education and income distribution. First, holding other things equal these models imply a partial positive relation between the mean level of schooling and earnings inequality, such that if the mean level of schooling rises, wages of educated workers go up relative to wages earned by non-educated workers. But these models also feature a partial positive relation between schooling inequality and earnings inequality in that a more equal distribution of schooling leads to a more equal distribution of earnings.

Knight and Sabot (1983) show these effects in a dual-economy version of the human capital model. Educational expansion has again two different effects on the distribution of earnings and thus on overall income inequality as it raises the supply of educated labour. On the one hand, the composition effect (or Kuznets effect) increases the relative size of the group with higher education (and higher earnings) and thus tends to increase inequality. On the other hand, the wage compression effect resulting from the relatively greater supply of educated labour reduces inequality. Which effect dominates is again unclear and will ultimately depend on the country's level of development, the relative size of the different educational groups, the degree of substitutability between workers with different levels of education, and the wider social, political and economic aspects that affect the structure of relative wages for different educational groups and the demand for labour.

To the extent that formal schooling is a significant component of human capital investment, the recent endogenous growth literature might provide a more conclusive theoretical framework regarding the relationship between educational expansion and income distribution. Tamura (1991) explains income convergence in the developed world by an endogenous growth model with human capital spillovers and heterogeneous agents. In his model, human capital convergence results in income convergence. Human capital convergence can be induced by educational expansion and the promotion of research activity, and arises because for a given stock of existing knowledge, agents with below average human capital have a higher rate of return to human capital investment.

With a more explicit focus on the formal schooling component of human capital investment, Glomm and Ravikumar (1992) construct an overlapping generations model with heterogeneous agents that provides similar results. The human capital possessed by each individual agent is a function of the parents' stock of human capital, the level of schooling acquired, and the quality of education provided, which is modeled as an increasing function of tax revenue and determined endogenously by majority-voting. Furthermore, they assume that the learning technology exhibits at least constant returns to the quality of schools and the parents' stock of human capital. While they are mainly interested in comparing the effects of public and private investment in human capital on growth and the distribution of income, they also show that income inequality unambiguously declines over time in an economy with a public education sector where the

quality of schooling is homogenous. Since the growth rate of any agent's income is inversely related to his initial level, income convergence results in their model.

By contrast, the endogenous growth model suggested by Lucas (1988) does not predict income convergence. In this model, the human capital is supposed to generate internal and external effects, where the latter means that the average level of education also contributes to the productivity of all other factors of production. Assuming that a given percentage increase in human capital requires the same effort independent of the level of human capital already attained, the model generates sustainable growth through the accumulation of human capital. Due to the presumed linearity in the production of human capital, the model is capable of predicting permanent income differences of any size. Incomes would not converge because the incentive to invest in human capital, as measured by the rate of return to education, would be the same across all levels of income and human capital.

Given the various theoretical possibilities, it is probably not surprising that it has proved to be difficult to identify a clear empirical link between education and income inequality up to now. Intertemporal studies are rare in number and, as Ram (1989) notes, also do not appear to point to general conclusions regarding the relationship between education and inequality.[3] Fields (1980) and Psacharopoulos and Woodhall (1985) provide extensive surveys of the empirical literature. Some older cross-section studies tend to confirm the equalizing function of education. Ram (1984) challenges these findings by pointing out that the empirical evidence appears generally inconclusive. More recently, a study by De Gregorio and Lee (1999) based on international panel data finds that higher educational attainment (and a more equal distribution of education) plays a significant role in making the distribution of income more equal. Their finding appears to be in conflict with the results by Dollar and Kraay (2001).

Our paper is structured as follows. Section 2 presents the data and the basic specification for our empirical analysis. Section 3 presents our empirical results. Section 4 summarizes our argument and points out directions for future research.

2. Data and specification of variables

2.1 Income distribution

As the source for internationally comparable data on the distribution of income, we draw on the data set initially provided by Deininger and Squire (1996). This data set contains Gini coefficients and cumulative quintile shares for 111 countries over a period of 40 years. In line with Dollar and Kraay (2001), we define the average per capita income of the poor as the average per capita income of the poorest 20 percent of the population.

[3] There may also exist several indirect mechanisms which influence the relation between educational expansion and reduced inequality. In particular, there appears to be some empirical evidence for the favorable impact of female education on reducing inequality. For instance, Ram (1989) notes that the expansion of female schooling may improve the income distribution through increasing female labour force participation as well as through reducing fertility.

At this point, it is worth stressing that this definition does not provide a very homogenous measure of poverty, neither across countries nor across time. For example, in Indonesia it was only in 1997, just before the Asian crises, that absolute poverty (as defined by the World Bank) was reduced to 20 percent of its population. In this case, our measure would be an appropriate indicator of absolute poverty. However, countries such as Bangladesh have 60 percent of their population living on less than one dollar a day. In that case, our measure would only reflect how the poorest of the poor are faring—without capturing the extent of absolute poverty. Another drawback of this measure is that its capacity to register changes in the mass of the desperately poor across time is not very accurate. Again, if extraordinary growth in Bangladesh were to halve absolute poverty, our measure may not reflect any change at all. These ambiguities should be kept in mind when we use the term incomes of the poor. Our approach focuses on relative poverty rather than on absolute poverty.

The poverty data we use are taken from an updated version of the Deininger and Squire (1996) data set. As a first step, we derive a sample of 102 countries for which 'high quality' Gini coefficients are available. In order to be included in their 'high quality' data set, an observation must be drawn from a published household survey, provide comprehensive coverage of the population and be based on a comprehensive measure of income or expenditure. We only use data around 1990 and restrict our sample to one observation per country. For 89 of the 102 countries with high quality Gini coefficients, there is also information about the share of income accruing to the poorest 20 percent of the population (quintile 1). For these countries, we measure average per capita income of the poor as average per capita income times the share of income accruing to the poorest quintile divided by 0.2, where data for average per capita income are taken from the Penn World Tables (PWT 1994).

We estimate the average per capita income of the poor for the remaining 13 countries in our sample under the assumption that the distribution of income is lognormal.[4] If so, we can approximate the missing quintiles for these countries on the basis of Gini coefficients by using

$$(1) \qquad \ln y_p = -\gamma \cdot G + \ln y$$

where $\ln y_p$ denotes the natural logarithm of average per capita income in the poorest quintile of the population; G denotes the Gini coefficient; $\ln y$ denotes the natural logarithm of average per capita income in the entire population, and $-\gamma = 0.036$ is a constant. The resulting numbers for the average per capita income of the poor are listed in the appendix table, together with all other variables used in the analysis.

With our data set, we find that income of the poor and average income of the total population are highly correlated. Regressing per capita income of the poor on average per capita income yields an adjusted *R*-squared of 0.86 and a slope coefficient of 1.06 (with a standard error of 0.04). Our result comes pretty close to the result of Dollar and Kraay (2001) for their basic specification in levels, which they estimate for a sample of 269 pooled cross-country and time series observations. Hence using the same initial

[4] Such a procedure was also suggested in an earlier version of Dollar and Kraay.

specification but a much smaller sample which only includes one observation per country, we also find that growth is good for the poor: higher average income would translate one-for-one into higher income of the poor.[5] The question is whether other variables could have an additional positive impact on the income of the poor. Our focus is on education.

2.2 Education

In the empirical growth literature, it has been common practice to use enrollment rates or average years of education as proxies for the change and the level in the stock of human capital. Dollar and Kraay (2001), for instance, focus on years of primary education (and on primary enrollment rates in an earlier version of their paper) as their measure of differences in education across countries because deviations from complete primary school enrollments are most likely to reflect the low enrollment among the poorest in society. But given that international variation in primary education tends to be small relative to broader measures of education, their finding of insignificant effects of education on incomes of the poor may not be robust when compared with other measures of education which cover a larger degree of international variation.

As discussed in Wößmann (2000), the standard specification of human capital in macroeconomic production functions is problematic for methodological and empirical reasons. For instance, a large body of microeconometric evidence based on the Mincerian wage equation would suggest a semi-logarithmic and not a log-linear relation between output per worker and average years of education, which, restricted to primary education, is the measure used in the level equations of Dollar and Kraay (2001). In addition, rates of return to education tend to decline with rising levels of schooling (Psacharopoulos 1994), and the quality of a year of education may substantially differ across countries. All these aspects should be taken into account when constructing an empirical measure of the stock of human capital. Hall and Jones (1999) address these problems by specifying the stock of human capital (*H*) in a way that is consistent with a microeconomic Mincerian wage equation. Their measure of human capital is given by

$$(2) \qquad H_i = e^{\sum r_j \cdot S_{ij}} L_i$$

where r_j is the world average of the Mincerian rate of return to investment in the *j*-th level (primary, secondary, or higher) of education, S_{ij} is average years of schooling taken from Barro and Lee (1996) at the *j*-th level of education in country *i*, and L_i is the number of working-age persons in country *i*.

Gundlach et al. (forthcoming) improve this empirical measure of human capital by using social rates of return to education derived on the basis of the so-called elaborate method as reported in Psacharopoulos (1994) and by accounting for country-specific duration of each level of education as reported in UNESCO's Statistical Yearbook. In addition, Gundlach

[5] This result does not change if we exclude countries with a population of less than 1 million persons in 1990 countries, if we exclude the 13 countries for which we estimated the income of the poor according to equation (1), or if we exclude formerly socialist countries. In all cases, the estimated slope coefficient remains statistically significantly indifferent from 1. This also holds if we exclude all three subsamples together.

et al. (forthcoming) use an index of schooling quality calculated by Hanushek and Kimko (2000) on the basis of international cognitive achievement tests of students in mathematics and natural sciences to account for international differences in the quality of education. The resulting measure of human capital per working-age person in country *i*, which we also use in this paper, is given by

$$(3)\quad \ln(H_i / L_i) = \begin{cases} r^{Pri} \cdot S_i \cdot Q_i & \text{if } S_i \le Pri_i \\ \left(r^{Pri} Pri_i + r^{Sec} \cdot (S_i - Pri_i)\right) \cdot Q_i & \text{if } Pri_i < S_i \le Pri_i + Sec_i \\ \left(r^{Pri} \cdot Pri_i + r^{Sec} \cdot Sec_i + r^{High} \cdot (S_i - Pri_i - Sec_i)\right) \cdot Q_i & \text{if } S_i > Pri_i + Sec_i \end{cases}$$

where r^{Pri}, r^{Sec} and r^{High} are world-average social rates of return to primary, secondary, and higher education (20 percent, 13.7 percent, and 10.7 percent, respectively); Pri_i and Sec_i are country-specific measures of the duration of the primary and the secondary level of schooling; S_i is average years of educational attainment in country *i* taken from Barro and Lee (1996), and Q_i is an index of schooling quality, measured on a 0 to 1 scale.[6]

Multiplying quantity of schooling by quality of schooling to arrive at a measure of quality-adjusted schooling appears to be justified because estimated regression coefficients on quantity and quality did not differ when the log values of these variables were entered separately on the right-hand side of a conventional production function by Hanushek and Kimko (2000).

3. Empirical results

To estimate the potential impact of quality-adjusted human capital on the incomes of the poor, we estimate an OLS-regression which controls for the impact of average per capita income. Accordingly, our regression equation reads

$$(4)\quad \ln yp = c + a_1 \ln y + a_2 \ln(H / L) + a_i X_i$$

where X_i denotes a set of further possible control variables. Without including any further control variables, we find that the regression coefficients are statistically significant and have the expected sign (Table 1, column (1)). The coefficient a_1 is statistically not different from 1, which preserves the finding that growth in average income is translated one-for-one in growth of income of the poorest quintile of the population. But in contrast to Dollar and Kraay (2001) we find that the income of the poor increases with rising quality-adjusted human capital. This distributional effect comes on top of the growth effect of rising quality-adjusted human capital, which works through higher average income. Our point estimates suggest that a 10 percent increase in the stock of quality-adjusted human capital per worker would increase the average income of the poor by an additional 3.2 percent.

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[6] For details of the calculation, including the imputation of missing values for selected countries, see Gundlach et al. (1998). Their data set includes 1990 data, while our data set is adjusted where appropriate to match as closely as possible the distribution data from Deininger and Squire (1996) for different years.

Table 1
OLS Estimates

Dependent Variable: $\ln yp$					
	(1)	(2)	(3)	(4)	(5)
c	-0.85	-1.00	-0.88	-0.70	-1.00
	(0.46)	(0.06)	(0.46)	(0.49)	(0.65)
$\ln y$	0.90	0.90	0.90	0.88	0.91
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
$\ln(H/L)$	0.32	0.34	0.30	0.32	0.31
	(0.10)	(0.11)	(0.10)	(0.10)	(0.11)
$\ln INV$	-	-0.04	-	-	-0.05
		(0.09)			(0.10)
MINING	-	-	-0.48	-	-0.56
			(0.65)		(0.66)
MALFAL	-	-	-	-0.02	-0.01
				(0.02)	(0.02)
Sample	n=101	n=101	n=99	n=91	n=89
Adjusted R^2	0.87	0.87	0.87	0.88	0.88
s.e.e.	0.43	0.44	0.43	0.43	0.42

Source: Authors' compilation

To test the robustness of our basic result, we include further variables in our regression equation (4). In most empirical growth studies, a measure of physical capital accumulation is found to be a robust variable (Levine and Renelt 1992). We measure physical capital accumulation (*INV*) as the average share of real investment in GDP in 1960-90.[7] In our specification, this variable yields a statistically insignificant negative regression coefficient (column (2)). This result most likely reflects that the inclusion of average income as a conditioning variable already accounts for the potential distributional effect of physical capital accumulation on the income of the poor. But conditioning for average income obviously does not fully account for the distributional effects of human capital accumulation, since the estimated regression coefficient remains statistically significant and more or less unchanged in size.

In further specifications, we include poverty-related variables such as the share of mining in GDP (*MINING*) and the incidence of malaria in a country (*MALARIA*) as further checks of the robustness of our results.[8] A high share of mining in GDP may lead to a relatively unequal distribution of income due to rent seeking activities, and hence to slower growth (Rodriguez and Sachs 1999). The incidence of malaria may limit economic development through poor health, high mortality, and absenteeism of the workforce. Accordingly, Bloom and Sachs (1998) have argued for the importance of malaria in explaining African poverty. However, we find statistically insignificant regression coefficients both for *MINING* (column (3)) and for *MALARIA* (column (4)).

[7] The share of real investment in GDP is taken from the Penn World Tables (PWT 1994).

[8] The share of mining in GDP is taken from Hall and Jones (1999); the proportion of a country's population at risk of falciparum malaria transmission is taken from McArthur and Sachs (2001).

Table 2
IV Estimates

Dependent Variable: $\ln yp - \ln y$			
Instruments	MEANTEMP	*DISTANCE*	*DISTANCE, MEANTEMP*
c	-1.69	-1.79	-1.69
	(0.10)	(0.12)	(0.10)
$\ln(H/L)$	0.34	0.43	0.34
	(0.09)	(0.11)	(0.09)
Sample	n=86	n=100	n=86
Adjusted R^2	0.08	0.08	0.08
s.e.e.	0.43	0.47	0.43
Over ID test			
Test value	-	-	0.63
Test result	-	-	accept

Source: Authors' compilation

Our basic result also remains intact if we enter all additional variables together (column (5)). We still find that quality-adjusted human capital has a statistically significant positive effect on the income of the poor in addition to the one-for-one effect of higher average income on the income of the poor. To compare the effects of the two statistically significant variables on the income of the poor more directly, the different units of measurement have to be accounted for. Beta coefficients measure changes in all variables in units of standard deviations. With a standard deviation of 1.21 of the dependent variable ($\sigma_{yp} = 1.21$), our point estimates imply beta coefficients of 0.028 for quality-adjusted human capital and of 0.053 for average income. This suggests that improving quality-adjusted human capital by one standard deviation could generate about half of the effect on the income of the poor that would result from changing average income by one standard deviation.

We also consider the possibility that OLS-estimation of equation (4) might lead to upward biased coefficients because the stock of quality-adjusted human capital is an endogenous variable which depends, through the political process, on the level of the income of the poor. For instance, in countries where the income of the poor is relatively high, relatively more resources may be available for investment in education. In that case, the causality could run from the income of the poor to the stock of quality-adjusted human capital, and not the other way round as presumed in equation (4). A similar reasoning could also be applied with respect to average per capita income, as discussed in Dollar and Kraay (2001). However, they find that the possible endogeneity of average per capita income (ln *y*) does not cause an upward bias in the estimated regression coefficient. Since we estimate basically the same regression coefficient on average per capita income of about 1 as do Dollar and Kraay (2001), we impose their empirical result as restriction on equation (4) such that

$$\ln yp - \ln y = c + a_2 \ln(H/L) \tag{5}$$

which we estimate by using the absolute distance of a country from the equator (*DISTANCE*) and the mean temperature of a country (*MEANTEMP*) as instruments for our human capital variable.[9] These geographical variables can be considered as truly exogenous. They may be useful instruments for human capital accumulation in so far as they proxy for the institutional framework of a country, as suggested by Hall and Jones (1999) and Acemoglu et al. (2000). If so, these variables should be correlated with ln (*H/L*), but not with the error term of equation (5).

The results of our IV-estimation are presented in Table 2. In all three specifications, the estimated effect of our human capital measure on the difference between the per capita income of the poor and the average per capita income is positive and statistically significant. When we use both instruments together, a chi-squared test on overidentifying restrictions does not reject the underlying hypothesis that both instruments are uncorrelated with the error term (critical value for 1 degree of freedom at the 5 percent level of statistical significance: 3.84).

On average, our three IV point estimates imply that a 10 percent change in our measure of human capital would generate a 3.7 percent increase in the average income of the poor relative to average income (which may also rise because of an increase of human capital). This distributional effect is larger than the effects estimated with OLS (see Table 1). A possible interpretation of the difference between IV- and OLS-results is that a potential positive effect of simultaneity on the estimated coefficient is outweighed by a potential negative effect of measurement error. Hence taken together, our findings suggest that in addition to its growth effect, improving the stock of human capital may have a substantial distributional effect on the average income of the poor.

4. Outlook

From a political economy perspective as well as according to some endogenous growth models, a more equal distribution of income should be conducive to growth if it reduces social conflict and guarantees a greater protection of private property rights. If, for instance, imperfect capital markets are responsible for observed inequality, then a certain amount of redistribution is believed to enhance growth and welfare because it would transfer resources to agents with potentially higher returns to investment. Redistribution through state-funded access to primary and secondary education for all children might be an efficient why to implement such a transfer of resources.

Overall, our empirical results confirm that education is not distribution-neutral. Education seems to improve the income distribution and thus may allow the poor to benefit from growth to a greater extent. Accordingly, a focus of economic policies on education in order to reduce poverty and to speed up development appears to be justified. Our empirical findings indicate that improving the quality of education rather than merely expanding access to education should play a crucial role in development strategies.

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[9] Absolute distance from the equator is taken from Hall and Jones (1999); mean temperature is taken from McArthur and Sachs (2001).

Several issues for future research are immediately apparent from our analysis. First, the direction of causality between inequality and human capital accumulation somehow remains an open question. Notwithstanding our results in Table 2, more empirical research based on alternative instrumental variables is probably necessary to support the interpretation given in our paper. Second, while our findings provide an encouraging impetus for the use of education policies as part of anti-poverty programs, a rigorous theoretical framework supporting such a claim is still missing.

Third, and most importantly, highlighting the importance of education policy, as we do, should be accompanied by a more precise identification of effective education policies that would actually generate the expected effects. This is an important caveat because recent empirical evidence for OECD countries and for selected East Asian countries tends to suggest that additional schooling resources do not automatically guarantee improved schooling outcomes (Gundlach et al. 2001; Gundlach and Wößmann 2001). The international empirical evidence presented in Wößmann (2001) indeed reveals that schooling outcomes depend more on schooling institutions than on schooling resources. Hence creating efficient schooling systems is probably more important for improving the stock of human capital than increasing schooling expenditure.

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Appendix Table

	Year	Income of the poor (int. $)	Average income (int. $)	Human cap. per worker (index)	Invest. share in GDP	Mining share in GDP	Malaria share in pop	Mean temp. (Celsius)	Dist. from equator (index)
Algeria	1988	941	2769	1,400	0,214	0,053	0,000	19,30	0,408
Australia	1990	3322	14445	9,140	0,286	0,038	0,000	20,90	0,358
Bahamas (a)	1989	1910	12610	3,808	0,094	0,006	n.a.	n.a.	0,247
Bangladesh	1989	653	1375	1,503	0,042	0,000	0,158	25,68	0,265
Barbados (a)	1979	717	6373	5,297	0,123	0,006	n.a	n.a.	0,131
Belgium	1988	5610	13232	6,636	0,238	0,000	0,000	8,40	0,565
Bolivia	1990	466	1658	1,619	0,165	0,075	0,005	21,50	0,169
Botswana	1986	479	2662	1,379	0,191	0,533	0,390	21,07	0,239
Brazil	1989	530	4271	1,743	0,193	0,017	0,194	23,70	0,217
Bulgaria (c)	1990	3269	6203	4,543	0,411	n.a	0,000	10,70	0,420
Burkina Faso	1994	203	514	1,462	0,076	0,001	1,000	28,10	0,134
Cameroon (b)	1983	230	1342	1,427	0,085	0,088	1,000	24,43	0,119
Canada	1990	6474	17173	7,692	0,239	0,034	0,000	-0,20	0,486
Chile	1989	807	4361	1,921	0,196	0,155	0,000	13,40	0,373
China	1990	464	1324	4,138	0,203	0,045	0,006	11,70	0,329
Colombia	1988	609	3293	1,990	0,158	0,062	0,250	22,50	0,053
Costa Rica	1989	690	3451	2,903	0,162	0,051	0,000	25,10	0,111
Côte d'Ivoire	1988	481	1419	1,805	0,112	0,029	1,000	26,00	0,061
CSSR(c)	1988	2445	4110	8,234	0,276	0,040	0,000	n.a.	0,491
C. Afr. Rep.	1992	51	514	1,146	0,065	0,030	n.a.	n.a.	0,043
Denmark	1992	3861	14091	11,377	0,258	0,006	0,000	6,80	0,619
Djibuti (a,b)	1996	345	1362	1,805	0,095	0,000	n.a.	n.a.	0,115
Dom. Rep.	1989	510	2430	1,880	0,152	0,024	0,000	25,60	0,206
Ecuador	1994	859	3206	2,532	0,220	0,098	0,137	19,10	0,023
Egypt	1991	833	1913	1,503	0,046	0,034	0,000	22,60	0,333
El Salvador	1977	561	2244	1,318	0,083	0,002	0,000	23,57	0,153
Ethiopia	1996	111	312	1,462	0,049	0,001	0,750	n.a.	0,100
Fiji (a,b)	1977	765	3532	3,294	0,174	0,039	n.a.	n.a.	0,173
Finland	1991	4926	12663	8,598	0,348	0,004	0,000	0,20	0,669
France	1984	3959	12034	4,076	0,272	0,005	0,000	11,20	0,543
Gabon	1977	895	6170	2,244	0,218	0,215	1,000	24,50	0,372
Gambia	1992	160	1735	1,153	0,050	0,000	1,000	25,66	0,132
Germany	1984	4054	12302	4,323	0,279	0,005	0,000	7,20	0,535
Ghana	1989	314	902	1,359	0,062	0,016	1,000	26,35	0,074
Greece	1988	1999	6459	4,707	0,247	0,017	0,000	16,90	0,423
Guatemala	1989	224	2137	1,551	0,091	0,003	0,012	21,70	0,163
Guinea (b)	1995	183	783	1,462	0,061	0,077	1,000	24,43	0,130

table continues…

Guinea Bissau	1991	61	593	1,462	0,172	0,000	1,000	26,49	0,132
Guyana (a)	1993	343	1095	3,259	0,242	0,087	n.a.	n.a.	n.a.
Honduras (b)	1990	197	1377	1,571	0,139	0,014	0,011	25,40	0,158
Hong Kong	1991	3814	15601	10,327	0,199	0,001	0,000	22,60	0,252
Hungary(c)	1991	1650	4947	8,777	0,263	0,038	0,000	9,00	0,474
India	1990	575	1264	1,372	0,138	0,017	0,281	25,90	0,281
Indonesia	1990	908	1974	2,065	0,165	0,121	0,426	26,80	0,073
Iran (b)	1984	860	4027	1,221	0,150	0,049	0,152	23,30	0,354
Ireland	1987	1859	7541	4,687	0,247	0,009	0,000	9,20	0,607
Italy	1989	5214	12488	3,397	0,280	0,002	0,000	13,40	0,505
Jamaica	1990	761	2545	2,553	0,218	0,089	0,000	26,50	0,201
Japan (b)	1990	4063	14331	9,758	0,342	0,003	0,000	14,60	0,397
Jordan	1991	1039	3212	2,573	0,139	0,037	0,000	18,10	0,351
Kenya	1992	155	914	1,434	0,155	0,002	0,910	22,60	0,006
Korea, R.	1988	2072	5607	7,713	0,232	0,007	0,000	13,10	0,417
Laos	1992	678	1420	1,963	0,024	n.a.	0,863	25,41	0,165
Lesotho	1987	136	949	2,024	0,111	0,003	0,000	n.a.	0,295
Luxembourg (a)	1985	5764	13175	4,289	0,297	0,003	n.a.	n.a.	0,498
Madagascar	1993	186	634	1,462	0,014	0,077	1,000	23,30	0,211
Malawi (b)	1993	58	543	1,475	0,098	0,081	1,000	22,00	0,176
Malaysia	1989	1070	4674	3,630	0,229	0,103	0,467	26,70	0,036
Mali (b)	1994	66	458	1,125	0,061	0,012	0,620	29,30	0,139
Mauritania	1988	139	788	1,462	0,151	0,069	25,300	25,30	0,199
Mauritius	1991	1996	5959	3,417	0,105	0,001	0,000	23,50	0,225
Mexico	1989	891	5566	2,546	0,165	0,032	0,000	19,00	0,186
Morocco	1991	736	2241	1,832	0,090	0,029	0,000	18,50	0,373
Nepal	1984	424	930	1,146	0,053	0,001	0,047	19,00	0,308
Netherlands (b)	1989	4508	13029	6,059	0,247	0,027	0,000	8,60	0,576
New Zealand	1990	2636	11513	14,527	0,246	0,011	0,000	12,80	0,410
Nicaragua	1993	297	1415	1,468	0,114	0,041	0,044	26,63	0,136
Niger	1992	189	1043	1,091	0,087	0,076	0,660	28,40	0,154
Nigeria	1992	323	978	1,482	0,125	0,208	1,000	26,65	0,073
Norway	1991	4063	15047	7,507	0,310	0,079	0,000	3,20	0,666
Pakistan	1988	601	1396	1,523	0,106	0,006	0,527	23,50	0,346
Panama	1989	279	2785	4,097	0,203	0,001	0,138	27,50	0,102
Peru	1986	678	2188	2,560	0,177	0,022	0,002	20,50	0,131
Philippines (b)	1991	455	1749	2,539	0,153	0,019	0,617	26,50	0,155
Poland (c)	1990	1818	3820	12,173	0,327	0,043	0,000	6,40	0,502
Portugal	1990	2131	7478	1,976	0,227	0,033	0,000	16,00	0,431
Puerto Rico	1989	1265	8727	2,951	0,222	0,001	n.a.	n.a.	0,203
Romania (c)	1989	1019	2043	4,529	0,290	0,048	0,000	8,40	0,442
Rwanda	1983	404	834	1,235	0,039	0,002	1,000	n.a.	0,023

table continues…

Senegal	1991	196	1120	1,366	0,051	0,005	1,000	27,20	0,164
Seychelles (a,b)	1984	517	2811	2,244	0,163	0,001	n.a.	n.a.	0,046
Sierra Leone	1968	151	1097	1,084	0,015	0,061	1,000	26,20	0,097
Singapore (b)	1989	2715	11059	5,407	0,309	0,001	0,000	26,20	0,015
South Africa	1993	310	3068	2,889	0,184	0,111	0,000	17,70	0,324
Soviet Union (c)	1989	3449	7741	6,080	0,384	0,015	n.a.	n.a.	0,556
Spain	1989	3875	9238	3,657	0,253	0,006	0,000	15,90	0,416
Sri Lanka	1990	935	2096	2,614	0,091	0,014	0,200	27,60	0,076
Sudan	1968	337	2420	1,064	0,135	0,000	0,810	28,50	0,140
Sweden	1990	5462	14762	7,644	0,235	0,003	0,000	2,40	0,659
Taiwan	1990	3128	8063	n.a	0,220	0,043	0,000	23,30	0,252
Tanzania	1993	164	478	1,462	0,107	0,002	1,000	25,09	0,024
Thailand	1990	716	3580	2,786	0,174	0,017	0,471	27,20	0,153
Trinidad	1981	2013	11738	3,705	0,124	0,157	0,000	25,90	0,116
Tunisia	1990	853	2910	1,681	0,147	0,079	0,000	19,60	0,409
Turkey	1987	902	3441	1,654	0,211	0,020	0,000	13,20	0,458
Uganda	1992	186	548	1,256	0,024	0,001	1,000	21,57	0,003
United Kingdom	1990	5141	13217	8,097	0,181	0,022	0,000	8,80	0,572
United States	1990	4152	18054	6,862	0,214	0,018	0,000	11,20	0,382
Venezuela	1990	1093	6055	2,264	0,178	0,110	0,070	24,80	0,109
Yugoslavia (c)	1990	1665	4541	3,980	0,298	0,025	0,000	n.a.	0,437
Zambia	1991	195	699	1,887	0,219	0,204	1,000	21,30	0,144
Zimbabwe	1990	235	1182	1,482	0,172	0,060	0,700	16,90	0,199

Source: Authors' compilation

Note: (a) Population of less than 1 million in 1990; (b) Income of the poor estimated on the basis of equation (1); (c) Formerly socialist country. For definition of variables, see text