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Health, Wealth, Fertility, Education and Inequality[†]

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Abstract

This paper uses a new cross-country dataset to estimate the strength of the links between different dimensions of social and economic development, including indicators of health, fertility and education as well as material wellbeing. The paper differs from previous studies in employing data for different income groups in each country in order to provide direct evidence on factors driving inequality, and in using a unique measure of material wellbeing that does not rely on PPP comparisons.

JEL classification: O15, I00, J13

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1. Introduction

Economists have long been aware of the importance of links between economic development and social development. There is a large literature tracing out the theory and evidence relating to the ways in which material wealth or income of a population is connected to standards of education and health, and also to fertility. Average standards of education and health are elements of human capital that are likely to determine a region's overall productivity level, and hence its *per capita* income. Moreover, with decreasing returns to scale higher fertility and population growth will result in lower labour productivity. On the other hand, a household's decisions about human capital investment and the number of children to produce may depend on its current income level, especially with imperfect capital markets (Becker, 1981).

However, we believe that the existing literature embodies a number of limitations, which this paper is designed to address. Firstly, empirical studies relating to the connections between different dimensions of development typically focus on a single link in the chain. There are studies of the impact of a region's education on its income (for example, Teulings and van Rens, 2003), of income on education (for example, Fernandez and Rogerson, 1997), of health on income (for example, Pritchett and Summers, 1993), of income on health (for example, Bloom *et al*., 2004), of fertility on income (for example, Ahlburg, 1996) and of income on fertility (for example, Strulik and Siddiqui, 2002).[1] Many of these studies present careful and compelling evidence on their chosen area of research, but taken as a whole they embody certain limitations. The heterogeneity of statistical methodologies and data sets across these papers means that they do not shed any collective light on the relative importance of the different causal links in the overall development process. It would be useful to know, for example, if any one link is particularly strong, and therefore a potential focus for development policy and expenditure. Moreover, while authors are aware of the likely simultaneity of different development indicators, the focus on a single link in the chain means that they never venture beyond an instrumental variables approach to estimation. Such an

[1] Briefly, the theoretical rationale for the effects is as follows. Higher standards of education and health embody human capital investments that increase productivity and so *per capita* income. Higher fertility entails a higher rate of population growth, and so a lower capital-labour ratio and (with decreasing returns to labour) lower productivity. Education and health are also normal consumption goods, so expenditure on them increases with *per capita* income. High fertility is a consequence of a low opportunity cost of labour (especially female labour), and is therefore decreasing in *per capita* income.

approach neglects the correlation of errors across equations for different indicators, which may be of interest in itself as well as affecting the statistical efficiency of the estimates.

Secondly, most existing cross-country studies use data on the average value of the development indicators in each country. The main aim of most empirical economic research has been to explain correlations in these indicators at the national level. Researchers in education and health sciences have often been more sensitive to the drawbacks of such an approach.[2] They point out that using mean income places a large weight on the income of the rich, because income distributions are left-skewed, so the mean figure reported for a country is higher than the median. Looking at the link between variations in mean income and, say, variations in infant mortality might be misleading, because high infant mortality is a consequence of the poverty of middle- and low-income groups in a developing country. One way of addressing this problem might be to include a measure of income distribution in the empirical model; however, a more direct approach would be to measure separately the income and health status of the rich and poor within a country.

Thirdly, most papers in the field measure material wellbeing in terms of average personal income in a region. In cross-country growth studies, the norm is to use PPP-adjusted *per capita* GDP or GNP.[3] There are a number of reasons why PPP-adjusted *per capita* income may be an unsatisfactory measure of material wellbeing. The price data on which PPP adjustments are based are collected only in certain countries and certain years. PPP adjustments for other countries and years, especially in the developing world, are based on extrapolations that may embody large measurement errors. Moreover, the prices used make little or no adjustment for variations in the quality of goods and services. Perhaps more importantly, many of the key goods and services that make a large difference to the utility of low-income households are consumed jointly by all the members of a single household. Examples include access to piped water and a flush lavatory, and the use of a refrigerator or radio. In this case *per capita* measures of prosperity may be less informative than measures based on wealth per household.

This paper differs from previous work on the determinants of the cross-country variation in the level of development in three ways. Firstly, we will be modelling simultaneously four dimensions of development. Our four endogenous variables capture the

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[2] See for example Dean Jamison's comments at the IMF Economic Forum *Health, Wealth and Welfare*, 15th April 2004 (www.imf.org/external/np/tr/2004/tr040415.htm).

[3] See Summers and Heston (1991) for a description of PPP adjustment to national accounts data.

level of material prosperity along with educational attainment, fertility and health. As outlined below, each of these dimensions of human development potentially has an impact on the others. Modelling all four simultaneously will permit us to identify the linkages that are the most quantitatively important. Identification of the key links between the different dimensions of human development can help to inform prioritisation of development goals, by suggesting areas of development expenditure that are likely to have the largest and widest impact.

Secondly, we will be using a newly compiled dataset that reports observations on a wide range of development indicators for wealth quintiles within a country, rather than just the average for the country as a whole. As a consequence, our model will give equal weight to the development outcomes of the rich and the poor within a country. We will also be able to say something about the factors driving the level of inequality between and within countries.

Thirdly, our measure of wealth is based on a household survey recording each household's possessions. We make no reference to *per capita* income or wealth: instead, our model employs a measure of wealth at the household, not the personal level. The assets recorded in the survey are basic enough for differences in quality across countries not to be a major worry. This approach also avoids any reference to PPP adjustments.

In the next section we outline the ways in which our four development indicators are defined and measured, before discussing the results of our statistical analysis in Section 3.

2. Data Definition and Measurement

The four development indicators that are the focus for our study are taken from the World Bank's *HNP Poverty Data* (http://devdata.worldbank.org/hnpstats/pvd.asp), which aggregates household survey data from 55 countries. 48 of these countries are included in our analysis; they are listed in Table 1.[4]

The most innovative part of this dataset is the way in which it measures material wealth. The measure is based on the presence or absence of various material assets in the household, and of certain characteristics of the household's dwelling place. The assets in question vary from one country to another, depending on the material possessions specific to a certain culture. Every household in the country survey is ascribed a value of zero or one for each asset or dwelling attribute, depending on whether that asset or attribute is present in the household. A household-specific wealth index is then constructed as the weighted sum of all

[4] For six countries – Armenia, Eritrea, Kazakhstan, Kyrgyz Republic, U.S. Virgin Islands and Uzbekistan – data on one or more of the conditioning variables in our regression equations were absent, so these countries are excluded from our analysis. See footnote 5 for the reasons for also excluding Turkey.

the binary asset variables. The weights are the coefficients in the first principal component of the whole set of asset variables, scaled so as to sum to unity. (A few of the weights are negative, and in these cases one might conclude that the presence of that characteristic is a sign of poverty.) Households are then ranked by the index and divided into quintiles; average health and education statistics are reported for the households in each quintile.

We wish to construct a cross-country measure of wealth. The wealth indices reported in the HNP database are not appropriate for this purpose, because they are based on country-specific sets of assets. Nevertheless, there is a subset of nine assets and attributes common to all countries in the database.[5] These are: the presence of an electricity supply; possession of a radio, of a television, of a refrigerator, of a car; access to piped water, to a flush toilet; use of a "bush or field latrine" (a euphemism for the complete absence of sanitary facilities); and the presence of a dirt or sand floor in the house. The last two of these characteristics are signs of poverty and take a negative weight in all countries.

If we look at the relative importance of each of these characteristics in each country, we find very little variation from one country to another. Table 2 reports the cross-country means of the weights on the nine characteristics (scaled so that these mean weights sum to unity[6]), along with the ratios of each median and standard deviation to its respective mean. The table shows that the standard deviations are quite small, and that the medians are close to the means, indicating an approximately symmetrical distribution. Therefore, we will construct a cross-country wealth measure for the k^{th} quintile of the n^{th} country as follows:

$$wlt_{kn} = \Sigma_h \, s_h \cdot z_{hkn}, \qquad (1)$$

where $h = 1,\ldots,9$ indexes the assets, s_h is the weight on the h^{th} asset, taken from the first column of Table 2, and z_{hkn} indicates the fraction of households in the quintile possessing the asset. In the case of "bush latrines" and dirt floors, $z_{hkn} \leq 0$, otherwise $z_{hkn} \geq 0$. (As can be seen from Table 2, there is not a great deal of variation in the s_h, so results from an alternative definition of wealth with $\forall h \; s_h = 1/9$ yields results very similar to the ones reported below.) Note that the wlt_{kn} variable is bounded, and therefore inappropriate for inclusion in a least squares regression, so we will use a logistic transformation:

[5] There is one exception to this statement: the presence of an electricity supply is not recorded in Turkey, where one might assume that all households have access to electricity. Turkish data are excluded from our analysis: Turkey is something of an outlier in the dataset, being by far the richest country surveyed.

[6] The numbers in the table are subject to rounding error.

$$\lg(wlt_{kn}) = \ln(wlt_{MIN} + wlt_{kn}) - \ln(wlt_{MAX} - wlt_{kn}) \tag{2}$$

where wlt_{MIN} and wlt_{MAX} are the minimum and maximum values of wealth that are theoretically possible.[7] Our other three dependent variables capture average levels of education, fertility and health of each quintile in each country. In the HNP database, educational attainment is measured as the fraction of adults aged 15-49 who have completed grade 5. Denoting this measure as sch_{kn}, we will use a logistic transformation in our regression equations:

$$\lg(sch_{kn}) = \ln(sch_{kn}) - \ln(1 - sch_{kn}) \tag{3}$$

In the HNP database, fertility (fer_{kn}) is measured as the average number of live births per woman aged 15-49. A wide range of family health indicators is reported, though not all are reported for every country. In the results reported below, we will use the mortality rate for children under five years (mor_{kn}). To summarise, our four development indicators are $\lg(wlt_{kn})$, $\lg(sch_{kn})$, $\ln(fer_{kn})$ and $\ln(mor_{kn})$. The distributions of these four variables are illustrated in Figure 1. We did also consider alternative definitions of wealth, education and health, using (i) uniform asset weights to define wealth, (ii) the fraction of women reading a newspaper at least once a week to measure education and (iii) the mortality rate for children under 12 months to measure family health. The seven alternative regression specifications combining the different measures produced similar results to the ones reported below.

In order to identify the impact of one development indicator on another, we need to include a range of exogenous conditioning variables in our regression equations. Restrictions on the coefficients on the conditioning variables will permit us to identify the links between the development indicators. Note that these exogenous national characteristics vary across countries but not across quintiles within a country. We will include in our model variables to capture (i) geographical factors, (ii) historical factors and (iii) cultural factors. Data sources for these variables are listed in Appendix 1. Included in (i) are: the country's surface area in square kilometres (*siz*), a measure of the value of its natural resources in US Dollars (*nat*), a

[7] The minimum value (-0.1997) is for a hypothetical quintile in which no household has any assets, and all use a bush latrine and have a dirt floor. The maximum value (0.8003) is for a hypothetical quintile in which all households have all assets, and none uses a bush latrine or has a dirt floor. There are two observations in our sample for which $wlt_{kn} = wlt_{MIN}$: the lowest quintiles in Chad and Niger. These two observations are extreme outliers in any sensible transformation of wlt that ascribes finite values to them; they are excluded from the figures below and dummied out of the regressions.

dummy for whether it has a maritime coastline (*coast*), its mean annual temperature in 0.1 degree centigrade (*tmp*), and the fraction of the population at risk from malarial infection (*malfal*). Given its significance in previous studies (for example, Easterly and Levine, 1997), we will also include a dummy for countries in Africa (*africa*). Included in (ii) are dummy variables for whether the country was colonised by Great Britain (*britain*) or by France (*france*). Included in (iii) are the fraction of the population that is Christian (*chr*), the fraction that is Muslim (*mus*) and an index of ethno-linguistic fractionalisation (*eth*).

Alongside these factors, it is possible that government policy variables and indicators of institutional quality or the nature of a country's polity play a role in the development process. We do not have enough observations on established instruments for political and institutional variables, such as settler mortality,[8] to estimate their impact using an instrumental variables approach. For this reason, we will include a subsidiary set of regressions that include institutional and political variables as well as the variables listed above, with the caveat that there may be some endogeneity bias in these regressions. The extra variables are the Sachs-Warner index of openness to trade (*sac*) and the institutional / political indices reported in Kaufmann *et al*. (2003), averaged over 1996-2002: "voice and accountability", "political stability", "government effectiveness", "regulatory quality", "rule of law" and "control of corruption".

3. Empirical Analysis

3.1 Descriptive Statistics

Table 3 and Figures 2-3 illustrate some of the characteristics of the data we are using. Figure 2 shows standard deviations for each of the four development indicators, disaggregated by quintile. For all variables (except wealth, for which the profile is flat), the highest cross-country variation appears in the fourth – that is, the second highest – quintile. The first and fifth quintiles show less cross-country variation. This "inverted-U" shape is reminiscent of the traditional Kuznets Curve. The Kuznets Curve shows the highest variation in income distribution *within* countries at middle levels of national income, whereas Figure 2 shows the highest variation *across* countries at the middle of the distribution.

Figure 3 further explores the cross-country variation in the development indicators. It plots the correlations between the indicators, again disaggregated by quintile, and the exogenous conditioning variables listed in Section 2. The correlation is measured as the R^2 from a regression of each quintile-specific development indicator on the conditioning

[8] See for example Acemoglu *et al*. (2001).

variables (which vary only across countries, not across quintiles). The R^2 statistics are generally increasing in the quintile for which the indicator is measured; this effect is particularly marked for wealth and fertility. So, although the indicators show relatively little cross-country variation for the first quintile, the fraction of this variation that is explained by the conditioning variables is relatively small. The *conditional* variances for the first quintile are in fact the highest. One interpretation of the lower correlation among lower quintiles is that in countries benefiting from auspicious predetermined characteristics the rich benefit from these characteristics more than the poor. For example, the rich may live closer to the coast, on average, or make better use of the institutions resulting from a particular colonial inheritance.

Table 3 provides data on the unconditional correlations of the development indicators, again disaggregating by quintile. The signs on individual correlation coefficients are what one might expect. Wealth and education (the "goods") are positively correlated; fertility and child mortality (the "bads") are also positively correlated. Correlations across these two pairs are always negative. As one might expect from Figure 3, the absolute size of the correlations increases as we move to higher quintiles. One reason for this is that for higher quintiles the development indicators are more highly correlated with the conditioning variables, and therefore also with each other.

These characteristics indicate that in our econometric model it would be unwise to try to impose any *a priori* structure on the covariance matrix of residuals for each development indicator and each quintile. Variances and covariances are unlikely to be uniform across quintiles, let alone across indicators. Outcomes at the upper end of the wealth distribution are likely to be somewhat more predictable than those at the lower end.

3.2 Model Structure

The descriptive statistics suggest strong inter-relations between our four development indicators. However, the descriptive statistics also suggest that conditional variances are unlikely to be constant across indicators or across quintiles, and it would be unwise to make any *a priori* assumptions about the corresponding covariances. So our model will take the following general form. Let the j^{th} development indicator for the k^{th} quintile in the n^{th} country (j = 4, k = 5, n = 48) be denoted y_{jkn}. Then

$$y_{jkn} = \alpha_{jk} + \Sigma_{i \neq j}\, \beta_{ij} \cdot y_{ikn} + \Sigma_p\, \varphi_{jp} \cdot x_{np} + u_{jkn} \qquad (4)$$

where x_{np} is the value of the p^{th} exogenous conditioning variable in the n^{th} country and u_{jkn} is a residual. *A priori* restrictions on the φ_{jp} coefficients will allow us to identify (most of) the β_{ij} coefficients. We allow the conditional cross-country mean of each development indicator, α_{jk}, to vary across quintiles, so we are in fact fitting a fixed effects model. We have $4 \times 5 \times 48 = 960$ observations of y_{jkn}, and hence 960 observations of the residuals u_{jkn}. We do not wish to assume any restriction on the correlation of residuals across indicators or across quintiles, so the model is fitted by stacking 20 regression equations – one for each j and each k – and estimating the coefficients in each equation simultaneously by 3SLS. With only 48 countries, we do not have enough degrees of freedom to allow the slope coefficients (β_{ij}, φ_{jp}) to vary across quintiles, so each of these should be interpreted as the mean effect of a particular explanatory variable across all countries and all quintiles. (It is possible to fit a quintile-specific model, but with 48 observations, standard errors on individual coefficients are so high as to preclude much economic interpretation.)

Identification of the β coefficients requires some *a priori* restrictions on the φ coefficients. These restrictions, summarised in Table 4, are as follows. Firstly, some of the geographical characteristics are unlikely to have a direct impact on anything other than material wealth (*wlt*) through an effect on factor productivity. These characteristics are country size (*siz*) and natural resource wealth (*nat*). Similarly, other geographical characteristics are unlikely to have a direct impact on anything other than health. These characteristics are temperature (*tmp*)[9] and malaria risk (*malfal*). Whether a country has a coastline (*coast*) might affect health and wealth, but it is unlikely to affect education or fertility directly, and so it can be excluded from the equations for these two indicators. These restrictions together allow us to identify the effects of material wealth (*wlt*) and of health (*mor*) in each of the other three equations. The effects of fertility (*fer*) and education (*sch*) in the wealth and health equations are identified by assuming that religious adherence, as captured by *chr* and *mus*, has no direct effect on wealth and health. However, it might affect attitudes towards contraception or the value of education (especially female education), and so have a role in determining *fer* and *sch*. The only effects we do not attempt to identify – because of an absence of any obvious instrument – are of *fer* in the *sch* equation and of *sch* in the *fer* equation.

[9] Temperature might affect the value of agricultural land and so factor productivity and material wealth, but we are already using *nat* to control for the value of natural resources in the *wlt* equation.

3.3 Regression Results

The regression results for the four development indicators are reported in Tables 5-6. The first part of Table 5 shows the β and φ coefficients in the *lg(wlt)* equation, along with corresponding standard errors and t ratios. The significant φ coefficients are those on *ln(nat)*, *coast* and *eth*. *Ceteris paribus*, resource-rich countries and those with a coastline can be expected to have a higher level of material wealth. Ethno-linguistic diversity has a negative impact on wealth, as in easterly and Levine (1997). All three of the β coefficients are large and statistically significant. As expected, better standards of education (higher *sch*) and health (lower *mor*) lead to higher levels of wealth: this is the human capital effect. A 1% increase in *sch*/(1 – *sch*) can be expected to lead to an increase in the wealth index of a little over 0.4%; a similar decrease in *mor* can be expected to raise the index by over 1%. These effects do not take into account any feedback from the effects of higher wealth on education and health, which will be discussed later.

The most surprising coefficient in the *lg(wlt)* equation is that on *ln(fer)*. A 1% increase in *fer* is estimated to *raise* the wealth index by over 0.9%. This effect contradicts both received wisdom and the negative unconditional correlation between *lg(wlt)* and *ln(fer)*. One explanation for the positive coefficient is that for a given level of education and health, higher fertility leads to larger households, and larger households are able to acquire more assets. (It is not possible to test this hypothesis directly, because household size is not reported in the dataset.) This effect will be magnified if there are scale economies in some types of household production. In this scenario, household production might not be subject to diminishing returns to labour – at least over some parts of the production function – so a larger family size might not in itself be a handicap. None of this implies that higher fertility is good for wealth in equilibrium, because – as we shall see shortly – higher fertility could be bad for education and health, and so bad for wealth overall.

The second part of Table 5 reports the results for the *lg(sch)* equation. Here, the statistically significant φ coefficients are those on *chr* and *britain*. *Ceteris paribus*, countries with a relatively large Christian population and those colonised by Britain can expect to have relatively high education levels. Both of the identified β coefficients are large and statistically significant. On average, wealthier households invest in more education: a 1% rise in the wealth index is associated with a level of *sch*/(1 – *sch*) that is almost 0.3% higher. But for a given level of wealth, healthier households also invest in more education. A 1% reduction in *mor* is associated with a level of *sch*/(1 – *sch*) that is almost 0.6% higher. One reason for this is that caring for the sick and dying takes up time that would otherwise be spent learning. Another is that a high rate of child mortality reflects the poor health status of the parents, in whose education few resources have been invested, because sickness reduces the returns to schooling. Unfortunately, there is no information in the dataset that would shed light on which of these reasons is the more important.

The third part of Table 5 reports the results for the *ln(fer)* equation. Here, the statistically significant φ coefficients are those on *chr*, *mus* and *eth*. Fertility is higher in countries with large Christian and Muslim populations, and lower in countries with a high level of ethno-linguistic fractionalisation. There is a large and significant β coefficient on *ln(mor*). That is, a higher level of child mortality leads to a higher fertility rate: to some extent, parents will seek to replace the children they have lost. A 1% increase in mortality leads to an increase in fertility of around 0.6%. There is also a much smaller but significant coefficient on *lg(wlt)*, a 1% rise in the index being associated with an increase in fertility of a little under 0.3%. On average, richer families are able to produce more children, but the effect is relatively small.

The final part of Table 5 reports the results for the *ln(mor)* equation. Here, the statistically significant φ coefficients are those on *britain* and *malfal*. Mortality rates are higher in British colonies, and countries with a climate favourable to malaria-bearing mosquitoes. (The fact that former British colonies tend to have better education and worse health outcomes than other countries might reflect a social preference inherent in a certain type of colonial history.) All three β coefficients are statistically significant. Higher levels of wealth and education are associated with lower mortality rates. The first effect is consistent with the conjecture that expenditure on health care is partly a consumption decision, and that health is a normal good; a 1% increase in the wealth index reduces mortality by around 0.25%. The second reflects either the complementarity of investment in education and investment in health, or a beneficial effect of education on household hygiene and therefore health outcomes. A 1% increase in $sch/(1 - sch)$ leads to a reduction in mortality of around 0.15%. Finally, a 1% increase in fertility increases child mortality by around 0.7%. A higher birth rate increases the risks facing each individual child.

Table 6 presents some descriptive statistics for the Table 5 model. These statistics mirror the results discussed in Section 2. The model explains a relatively small fraction of the sample variation in the characteristics of households at the bottom of their national wealth distributions (quintiles 1 and 2), and a relatively large fraction of the corresponding variation for their wealthier neighbours (quintiles 4 and 5). This difference is manifested in a systematic pattern in the R^2 statistics for our 20 regressions, and consequently in a systematic pattern in the corresponding equation standard errors, which are lower for the higher wealth quintiles. Non-modelled country-specific effects play a larger role in determining the outcomes for the poor than they do in determining the outcomes for the rich. The reasons for this discrepancy are an important subject for future study. Table 6 also reports some of the residual correlations from the fitted model. The positive correlation coefficients for the individual dependent variables across quintiles suggest that random variations in country-specific characteristics do play a role in determining outcomes for each particular development indicator, conditional on the observed levels of the others.

Which are the most important channels linking our four development indicators? Tables 7-8 shed some light on this question. Table 7 shows the consequences for each variable of a unit deviation in the error term of each equation, that is, the u_{jkn} term in equation (4) above.[10] Such a "shock" to one development indicator y_{jkn} entails changes in all of the others, since they all depend on y_{jkn}. Moreover, they in turn have some effect on y_{jkn}, so its equilibrium value will have changed by an amount different from u_{jkn}. (One way of thinking of the Table 7 figures is as a cross-sectional analogue of impulse response profiles in a structural VAR. However, there are no dynamics in our model, so the effects discussed here relate implicitly to the steady state.) Suppose, for example, that a particular country were suddenly able to achieve a higher level of education than one would normally expect, given its levels of wealth, fertility and health. How large can we expect the consequent effects on wealth, fertility and health to be, and what is the size of the multiplier effect for education itself?

The first, second and fourth rows of Table 7 show that the effects of idiosyncratic improvements in wealth, education and health are uniformly "good". Wealth improvements lead to better education and lower mortality in the steady state; education improvements lead to higher wealth and lower mortality; health improvements lead to higher wealth and better education. The figures in the table are much larger than the β coefficients in Table 5; this reflects the virtuous circles at work: higher wealth is both a cause and a consequence of better education and lower mortality, and better education is both a cause and a consequence of lower mortality. The third row in the table shows that the effects of higher fertility are

[10] Because the fitted slope coefficients are uniform across the k quintiles, the effects listed in Table 7 are also uniform across quintiles.

uniformly "bad". Although higher fertility raises wealth for a given level of education and health, it also makes health outcomes substantially worse. The latter effect dominates, so an idiosyncratic increase in fertility will worsen both health and wealth in equilibrium (wealth only marginally so), and therefore education also. The overall size of the multiplier effects is indicated by the main diagonal of the table. The estimated multipliers range from 1.8 for fertility to 3.3 for mortality.

It is striking that in each column the largest number (in absolute value) is always on the bottom row of Table 7. That is, the largest effects are those resulting from a unit deviation in the error term for the mortality equation. However, the variance of the u_{jkn} is not uniform across the j development indicators, so a unit deviation in the mortality equation is not equally as likely as a unit deviation in one of the other equations. A more informative measure of the relative magnitude of different effects is to scale the figures in each row of Table 7 by the standard deviations of the corresponding u_{jkn}. Table 8 shows such figures, calculated using the standard errors in Table 6 for the middle quintile. Aside from the multiplier effects on the main diagonal, the largest figures, which take values between 0.75 and 0.85, are for the impact of a shock to the wealth equation on education, for a shock to the education equation on wealth, and for a shock to the mortality equation on both wealth and education. The smallest figures are those measuring the effects of a shock to the fertility equation. (This is not surprising, given the different offsetting effects of fertility on wealth noted above.) This suggests that a marginal Dollar of development aid spent directly on improving health outcomes in a country is likely to be more productive than a marginal Dollar spent on reducing fertility. While it would be unwise to lean too heavily on the results in Table 8, it also appears that the effectiveness on development aid targeted at health improvements will be at least as effective overall as those targeted at education and material poverty.[11]

Another way of interpreting the figures in Table 7 is to ask what proportion of the average difference between the richest and the poorest in a typical country – in terms of material wealth, education, fertility or health – would be eroded by an initial 1% improvement in any one of the development indicators for the poorest alone. One way of answering this question is to scale the figures in each column of Table 7 by the absolute difference between

[11] The main caveat here is that we do not know for sure how the marginal impact of a Dollar spent on, for example, reducing child mortality (in terms of the reduction in the number of child deaths) compares to the variance of the error term in the mortality equation.

the quintile 5 mean for the relevant indicator and the quintile 1 mean.[12] Table 9 reports such figures. The first row of the table shows that a 1% improvement in the material wealth of quintile 1 has a substantial impact on the magnitude of inequality across the four development indicators, reducing the shortfall below quintile 5 by around 0.4% in the case of education, 0.6% in the case of fertility and 1.1% in the case of child mortality. The second row shows that the impact of a 1% improvement in the educational attainment of quintile 1 does relatively little to close the material wealth gap, reducing it by under 0.4%; however the other figures in this row are somewhat larger. The third row shows that a 1% improvement in quintile 1 fertility does little or nothing to close the education or material wealth gap, but does have some impact on the health gap, closing it by 1.7%. The fourth row shows that a 1% improvement in quintile 1 child mortality has a large impact on the gaps for all indicators, closing all of them by 0.8% or more. The costs of reducing child mortality rates among the poorest in would have to be very high for this not to be an effective way of reducing inequality more generally.

Finally, in Table 10, we examine the sensitivity of our regression results to the inclusion of conditioning variables reflecting trade openness and institutional quality. There are six different regression specifications. Each specification includes the trade openness index *lg(sac)* in the *ln(wlt)* equation. Openness might affect the efficiency of resource allocation and so material wealth, but it is unlikely to have a direct impact on any of our other development indicators. The difference between each specification lies in the choice of an institutional quality index. In each specification we add one of the six indices reported in Kaufmann *et al*. (2003) to each of our four equations. We do not rely on the assumption that the only direct effect of institutional quality is on material wealth, although the indices turn out to be statistically significant only in the wealth equation.[13] In all cases, both openness and institutional quality have a positive impact on wealth, *ceteris paribus*, although one should bear in mind the caveat about exogeneity noted above. The t ratios on our β coefficients are generally much larger than those in Table 4, because in *lg(sac)* we have an extra and highly significant instrument for *ln(wlt)*. However, the signs and magnitudes of the β coefficients are

[12] This gives us a rough answer to the question, assuming that there is not too much heterogeneity in the β and φ coefficients across quintiles.

[13] There is one polity t-ratio greater than the 1% critical value in one of the education equations. Otherwise there are no significant direct polity effects on education, fertility and mortality, so it would be rash to place any interpretation on this one.

very similar to those in Table 4, so our initial results appear to be robust to the inclusion of the extra conditioning variables.

4. Conclusion

This paper presents the results of a cross-country empirical model of social and economic development that estimates the relative importance of the many different causal links between wealth, education, fertility and health in a simultaneous equations system. Development indicators are measured separately for different wealth quintiles within each country, and wealth is defined in terms of the presence of a set of material attributes within the household, without recourse to any PPP comparisons.

The model identifies a large number of statistically significant effects linking the four development indicators; these effects are robust to many different regression specifications. The effects of fertility rates on other indicators of development are statistically significant, but the overall magnitude of fertility effects is relatively small. Higher fertility rates do worsen wealth, education and health outcomes in equilibrium, but not by much. This suggests that the beneficial effects of measures to control population growth in developing countries will be of limited scope. On the other hand, the effects of household health on other indicators are uniformly large. Small improvements in health outcomes can make large differences to standards of wealth and education, and are at least as important as innovations acting directly on wealth and education. Much of the existing economics literature stresses the importance of efficient markets and benign political institutions in promoting development. Our results suggest that at least as much attention should be paid to basic health, not only for its own sake, but also because of its impact on all other aspects of life.

Appendix 1: Data Sources for the Conditioning Variables

variable	***definition***	***source***
britain	dummy = 1 if colonized by Britain	La Porta *et al*. (1999)
france	dummy = 1 if colonized by France	La Porta *et al*. (1999)
eth	ethno-linguistic fractionalization index	Krain (1997)
s*iz*	country surface area	CIA (1997)
nat	natural resource capital value	Dixon and Hamilton (1996)
chr	fraction of the population that is Christian	La Porta *et al*. (1999)

mus	fraction of the population that is Muslim	La Porta *et al*. (1999)
tmp	temperature (in 0.1 degrees C)	Hoare (2005)
malfal	fraction of population at risk from Malaria	McArthur and Sachs (2001)

References

Acemoglu, D., S. Johnson and J. Robinson (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation", *American Economic Review* 91: 1369-1401.

Ahlburg, D. (1996) "Population Growth and Poverty" in Ahlburg, D., A. Kelley and K. Oppenheim Mason (eds.) *The Impact of Population Growth on Well-Being in Developing Countries*, Berlin: Springer-Verlag.

Becker, G. (1981) *A Treatise on the Family*, Cambridge, Massachusetts: Harvard University Press.

Bloom, D., D. Canning and J. Sevilla (2004) "The Effect of Health on Economic Growth: A Production Function Approach," *World Development*, 32: 1-13.

CIA (1997) *World Factbook*, Washington, DC.

Dixon, J. and K. Hamilton (1996) "Expanding the Measure of Wealth", *Finance and Development* (1996).

Easterly, W. and R. Levine (1997) "Africa's Growth Tragedy: Policies and Ethnic Divisions", *Quarterly Journal of Economics* 112: 1203-1250.

Fernandez, R. and R. Rogerson (1997) "The Determinants of Public Education Expenditures: Evidence from the States, 1950-1990" NBER Working Paper 5995.

Hoare, R. (2005) *World Climate*, http://www.worldclimate.com.

Kaufmann, D, A. Kraay and M. Mastruzzi (2003) "Governance Matters III: Governance Indicators for 1996-2002", World Bank Policy Research Department Working Paper.

Krain, M. (1997) "State-Sposored Mass Murder: The Onset and Severity of Genocides and Politicides", *Journal of Conflict Resolution* 41: 331-360.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer and R. Vishny (1998) "Law and Finance", *Journal of Political Economy* 106: 1113-55.

McArthur, J. and J. Sachs (2001) "Institutions and Geography: Comment on Acemoglu, Johnson and Robinson (2000)." NBER Working Paper 8114.

Pritchett, L. and L. Summers (1993) "Wealthier is Healthier" World Bank Country Economics Department Working Paper 1150.

Strulik, H. and S. Siddiqui (2002) "Tracing the Income−Fertility Nexus: Nonparametric Estimates for a Panel of Countries", *Economics Bulletin*, 15: 1−9.

Summers, R. and A. Heston (1991) "The Penn World Tables (Mark 5): An Expanded Set of International Comparisons: 1950-1988", *Quarterly Journal of Economics* 106: 327-368.

Teulings, C. and T. van Rens (2003) "Education, Growth and Income Inequality", CEPR Discussion Paper 3863.

Table 1: Countries Included in the Analysis

	survey year		*survey year*		*survey year*		*survey year*
Bangladesh	2000	Dom. Rep.	1996	Madagascar	1997	Paraguay	1990
Benin	2001	Egypt	2000	Malawi	2000	Peru	2000
Bolivia	1998	Ethiopia	2000	Mali	2001	Philippines	1998
Brazil	1996	Gabon	2000	Mauritania	2001	Rwanda	2000
Burkina Faso	1999	Ghana	1998	Morocco	1992	S. Africa	1998
Cambodia	2000	Guatemala	1999	Mozambique	1997	Tanzania	1999
Cameroon	1998	Guinea	1999	Namibia	2000	Togo	1998
C.A.R.	1995	Haiti	2000	Nepal	2001	Uganda	2001
Chad	1997	India	1999	Nicaragua	2001	Vietnam	2000
Colombia	2000	Indonesia	1997	Niger	1998	Yemen	1997
Comoros	1996	Jordan	1997	Nigeria	1990	Zambia	2002
Cote d'Ivoire	1994	Kenya	1998	Pakistan	1990	Zimbabwe	1999

Table 2: Descriptive Statistics for the Asset Weights

asset	*mean*	*median / mean*	*standard deviation / mean*
electricity	0.132	1.03	0.18
radio	0.084	1.01	0.27
television	0.128	1.04	0.11
refrigerator	0.130	1.00	0.16
car	0.080	1.07	0.26
piped water	0.126	0.93	0.22
flush toilet	0.121	0.99	0.38
bush / field latrine (–)	0.086	1.02	0.43
dirt / sand floor (–)	0.114	1.07	0.31

Table 3: Unconditional Correlations of the Development Indicators

Quintile		*lg(wlt)*	*lg(sch)*	*ln(fer)*
quintile 1	*lg(sch)*	0.263		
	ln(fer)	-0.134	-0.285	
	ln(mor)	-0.358	-0.580	0.432
quintile 2	*lg(sch)*	0.686		
	ln(fer)	-0.489	-0.484	
	ln(mor)	-0.769	-0.728	0.690
quintile 3	*lg(sch)*	0.741		
	ln(fer)	-0.657	-0.642	
	ln(mor)	-0.828	-0.784	0.850
quintile 4	*lg(sch)*	0.770		
	ln(fer)	-0.726	-0.722	
	ln(mor)	-0.861	-0.799	0.899
quintile 5	*lg(sch)*	0.715		
	ln(fer)	-0.604	-0.696	
	ln(mor)	-0.817	-0.810	0.843

Table 4: Variable Definitions and Model Structure

y variables

lg(*wlt*)	logistic transformation of wealth index
lg(*sch*)	logistic transformation of years of schooling
ln(*fer*)	log live births per woman
ln(*mor*)	log under-five mortality rate

x variables		***appearing in the equations for***			
africa	dummy = 1 if in Africa	ln(*wlt*)	lg(*sch*)	ln(*fer*)	ln(*mor*)
britain	dummy = 1 if colonized by Britain	ln(*wlt*)	lg(*sch*)	ln(*fer*)	ln(*mor*)
france	dummy = 1 if colonized by France	ln(*wlt*)	lg(*sch*)	ln(*fer*)	ln(*mor*)
eth	ethno-linguistic fractionalization index	ln(wlt)	lg(sch)	ln(fer)	ln(mor)
ln(*siz*)	log country surface area	ln(*wlt*)			
ln(*nat*)	log natural resource capital value	ln(*wlt*)			
coast	dummy = 1 if country has a coastline	ln(*wlt*)			ln(*mor*)
chr	fraction of the population that is Christian		lg(*sch*)	ln(*fer*)	
mus	fraction of the population that is Muslim		lg(*sch*)	ln(*fer*)	
tmp	temperature (in 0.1 degrees C)				ln(*mor*)
tsq	$tmp^2/100$				ln(*mor*)
malfal	fraction of population at risk from Malaria				ln(*mor*)

Table 5: The Fitted Regression Coefficients

		coefficient	*std. error*	*t ratio*
lg(wlt)	*ln(siz)*	0.056	0.063	0.893
equation	***ln(nat)***	**0.102**	**0.051**	**2.024**
	coast	**0.434**	**0.137**	**3.168**
	africa	-0.302	0.191	-1.578
	britain	-0.067	0.165	-0.405
	france	0.239	0.228	1.047
	eth	**-0.645**	**0.303**	**-2.131**
	lg(sch)	**0.423**	**0.078**	**5.409**
	ln(fer)	**0.963**	**0.213**	**4.513**
	ln(mor)	**-1.019**	**0.145**	**-7.031**
lg(sch)	***chr***	**0.644**	**0.24**	**2.683**
equation	*mus*	-0.260	0.218	-1.192
	africa	0.086	0.228	0.375
	britain	**0.756**	**0.193**	**3.913**
	france	-0.152	0.185	-0.820
	eth	0.327	0.351	0.931
	lg(wlt)	**0.281**	**0.048**	**5.874**
	ln(mor)	**-0.648**	**0.103**	**-6.296**
ln(fer)	***chr***	**0.411**	**0.046**	**8.995**
equation	***mus***	**0.148**	**0.047**	**3.118**
	africa	-0.055	0.062	-0.898
	britain	0.062	0.058	1.068
	france	0.044	0.054	0.825
	eth	-0.159	0.112	-1.419
	lg(wlt)	**0.062**	**0.016**	**3.978**
	ln(mor)	**0.603**	**0.028**	**21.207**
ln(mor)	*tmp*	-0.080	0.185	-0.433
equation	*tsq*/100	0.010	0.045	0.223
	coast	-0.018	0.033	-0.542
	malfal	**0.297**	**0.041**	**7.289**
	africa	0.053	0.084	0.637
	britain	**0.185**	**0.081**	**2.281**
	france	-0.031	0.076	-0.413
	eth	0.126	0.138	0.913
	lg(wlt)	**-0.233**	**0.029**	**-8.145**
	lg(sch)	**-0.132**	**0.024**	**-5.613**
	ln(fer)	**0.682**	**0.070**	**9.674**

Table 6: Regression Descriptive Statistics

	lg(wlt)	*lg(sch)*	*ln(fer)*	*ln(mor)*
R^2s				
Quintile 1	0.420	0.680	0.267	0.599
Quintile 2	0.641	0.758	0.551	0.837
Quintile 3	0.744	0.779	0.731	0.884
Quintile 4	0.806	0.784	0.834	0.912
Quintile 5	0.741	0.780	0.775	0.912
Regression standard errors				
Quintile 1	1.071	0.698	0.262	0.372
Quintile 2	0.785	0.687	0.207	0.269
Quintile 3	0.654	0.695	0.185	0.256
Quintile 4	0.577	0.673	0.161	0.238
Quintile 5	0.650	0.554	0.175	0.224

Some regression residual correlations

lg(wlt)

	Qnt. 1	*Qnt. 2*	*Qnt. 3*	*Qnt. 4*
Qnt. 2	0.825			
Qnt. 3	0.680	0.848		
Qnt. 4	0.253	0.542	0.768	
Qnt. 5	0.004	0.282	0.489	0.842

lg(sch)

	Qnt. 1	*Qnt. 2*	*Qnt. 3*	*Qnt. 4*
Qnt. 2	0.914			
Qnt. 3	0.813	0.946		
Qnt. 4	0.739	0.867	0.956	
Qnt. 5	0.608	0.687	0.790	0.856

ln(fer)

	Qnt. 1	*Qnt. 2*	*Qnt. 3*	*Qnt. 4*
Qnt. 2	0.838			
Qnt. 3	0.615	0.789		
Qnt. 4	0.341	0.609	0.737	
Qnt. 5	0.077	0.252	0.404	0.484

ln(mor)

	Qnt. 1	*Qnt. 2*	*Qnt. 3*	*Qnt. 4*
Qnt. 2	0.853			
Qnt. 3	0.686	0.757		
Qnt. 4	0.511	0.632	0.790	
Qnt. 5	0.287	0.300	0.522	0.556

Table 7: Multipliers Implicit in the Fitted Coefficients

		impact on			
		lg(wlt)	*lg(sch)*	*ln(fer)*	*ln(mor)*
unit shock to equation for	*lg(wlt)*	**2.00**	1.15	-0.42	-0.91
	lg(sch)	1.22	**1.87**	-0.42	-0.82
	ln(fer)	-0.01	-0.88	**1.82**	1.36
	ln(mor)	-2.84	-2.92	1.80	**3.27**

Table 8: More Multipliers Implicit in the Fitted Coefficients

		impact on			
		lg(wlt)	*lg(sch)*	*ln(fer)*	*ln(mor)*
σ shock to equation for	*lg(wlt)*	**1.31**	0.75	-0.27	-0.60
	lg(sch)	0.85	**1.30**	-0.29	-0.57
	ln(fer)	-0.00	-0.16	**0.34**	0.25
	ln(mor)	-0.73	-0.75	0.46	**0.84**

Table 9: Poverty Multipliers

		impact (scaled by |Q5 – Q1| mean) on			
		lg(wlt)	*lg(sch)*	*ln(fer)*	*ln(mor)*
unit shock to equation for	*lg(wlt)*	**0.59**	0.42	-0.63	-1.11
	lg(sch)	0.36	**0.69**	-0.63	-1.00
	ln(fer)	-0.00	-0.32	**2.71**	1.66
	ln(mor)	-0.84	-1.07	2.68	**3.99**

Table 10: Regressions with Openness and Polity Variables

		polity = voice & accountability		*polity = political stability*		*polity = govt. effectiveness*		*polity = reg. quality*		*polity = rule of law*		*polity = control of corruption*	
		coeff.	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*
lg(wlt)	*ln(siz)*	**0.074**	1.148	**0.041**	0.644	**0.013**	0.203	**0.04**	0.553	**0.019**	0.308	**0.021**	0.320
equation	*ln(nat)*	**0.096**	1.707	**0.131**	2.510	**0.130**	2.919	**0.096**	1.656	**0.130**	2.725	**0.103**	2.072
	coast	**0.574**	5.100	**0.464**	3.765	**0.450**	4.046	**0.569**	4.677	**0.568**	5.023	**0.569**	5.808
	africa	**-0.409**	-1.996	**-0.484**	-2.235	**-0.547**	-2.959	**-0.285**	-1.298	**-0.566**	-2.880	**-0.799**	-4.143
	britain	**0.001**	0.004	**0.038**	0.226	**-0.123**	-0.847	**-0.033**	-0.208	**-0.285**	-1.843	**-0.116**	-0.733
	france	**0.128**	0.587	**0.123**	0.544	**0.187**	0.968	**0.155**	0.760	**0.040**	0.211	**0.206**	1.117
	eth	**-0.906**	-2.582	**-0.623**	-1.929	**-1.102**	-3.589	**-1.370**	-3.827	**-1.049**	-3.940	**-0.743**	-2.719
	lg(sch)	**0.298**	3.539	**0.316**	3.901	**0.505**	6.740	**0.398**	4.517	**0.468**	6.027	**0.563**	7.197
	ln(fer)	**1.484**	7.093	**1.196**	6.029	**0.794**	4.012	**0.502**	2.302	**0.933**	4.674	**0.967**	4.508
	ln(mor)	**-1.302**	-10.206	**-1.222**	-9.299	**-0.619**	-3.880	**-0.597**	-3.609	**-0.692**	-4.664	**-0.504**	-3.438
	lg(sac)	**0.844**	2.702	**0.615**	1.964	**1.011**	3.160	**0.795**	2.533	**1.097**	2.873	**1.092**	3.270
	polity	**0.396**	3.085	**0.141**	1.123	**0.776**	5.128	**0.868**	5.121	**0.754**	4.220	**1.040**	6.219
lg(sch)	*chr*	**0.635**	2.971	**0.624**	2.538	**0.609**	3.048	**0.842**	3.801	**0.578**	2.71	**0.484**	3.111
equation	*mus*	**-0.276**	-1.322	**-0.320**	-1.419	**-0.182**	-1.022	**-0.210**	-0.994	**-0.274**	-1.389	**-0.170**	-1.113
	africa	**0.104**	0.492	**0.078**	0.346	**0.176**	0.916	**-0.007**	-0.038	**0.177**	0.865	**0.368**	1.877
	britain	**0.810**	4.177	**0.778**	3.930	**0.777**	4.041	**0.819**	4.261	**0.856**	4.242	**0.693**	3.752
	france	**-0.110**	-0.616	**-0.158**	-0.830	**-0.157**	-0.881	**-0.087**	-0.496	**-0.121**	-0.693	**-0.244**	-1.443
	eth	**0.360**	1.015	**0.304**	0.867	**0.405**	1.317	**0.522**	1.490	**0.400**	1.246	**0.311**	0.963
	lg(wlt)	**0.166**	3.447	**0.253**	5.268	**0.294**	7.289	**0.252**	5.748	**0.300**	6.918	**0.273**	6.267
	ln(mor)	**-0.903**	-11.268	**-0.686**	-7.785	**-0.782**	-8.424	**-0.769**	-8.73	**-0.795**	-8.606	**-1.000**	-13.911
	polity	**-0.185**	-1.566	**0.056**	0.411	**-0.187**	-0.825	**-0.349**	-1.349	**-0.274**	-1.569	**-0.576**	-3.536

Table 10 (continued)

		polity = voice & accountability		*polity = political stability*		*polity = govt. effectiveness*		*polity = reg. quality*		*polity = rule of law*		*polity = control of corruption*	
		coeff.	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*	***coeff.***	*t ratio*
ln(fer)	*chr*	**0.370**	8.016	**0.370**	8.266	**0.369**	7.902	**0.342**	6.897	**0.359**	7.759	**0.389**	8.193
equation	*mus*	**0.118**	2.534	**0.130**	3.124	**0.122**	2.897	**0.077**	1.630	**0.110**	2.578	**0.125**	2.820
	africa	**-0.030**	-0.488	**-0.030**	-0.484	**-0.045**	-0.718	**-0.034**	-0.556	**-0.044**	-0.680	**-0.052**	-0.788
	britain	**0.055**	0.948	**0.051**	0.893	**0.052**	0.89	**0.059**	0.952	**0.047**	0.767	**0.064**	1.059
	france	**0.037**	0.662	**0.030**	0.554	**0.038**	0.689	**0.038**	0.658	**0.027**	0.485	**0.044**	0.764
	eth	**-0.148**	-1.386	**-0.152**	-1.414	**-0.181**	-1.670	**-0.253**	-2.09	**-0.160**	-1.456	**-0.153**	-1.378
	lg(wlt)	**0.116**	8.308	**0.102**	7.135	**0.087**	5.960	**0.074**	4.733	**0.097**	6.354	**0.086**	5.374
	ln(mor)	**0.662**	26.311	**0.637**	24.122	**0.651**	24.919	**0.674**	29.714	**0.654**	24.987	**0.643**	22.456
	polity	**0.001**	0.039	**0.013**	0.373	**0.069**	1.154	**0.132**	2.112	**0.020**	0.374	**0.027**	0.467
ln(mor)	*tmp*	**-0.128**	-0.653	**-0.068**	-0.403	**-0.084**	-0.439	**-0.133**	-0.819	**-0.020**	-0.103	**-0.042**	-0.220
equation	*tsq*/100	**0.003**	0.576	**0.001**	0.178	**0.001**	0.243	**0.003**	0.665	**-0.000**	-0.037	**0.001**	0.118
	coast	**-0.036**	-1.513	**-0.036**	-1.369	**-0.040**	-1.807	**-0.030**	-1.425	**-0.047**	-1.973	**-0.042**	-1.909
	malfal	**0.257**	6.258	**0.321**	8.271	**0.289**	6.409	**0.258**	7.262	**0.313**	6.879	**0.250**	5.005
	africa	**0.038**	0.431	**0.002**	0.021	**0.068**	0.797	**0.042**	0.506	**0.056**	0.630	**0.120**	1.247
	britain	**0.198**	2.337	**0.188**	2.242	**0.199**	2.389	**0.189**	2.222	**0.202**	2.359	**0.195**	2.191
	france	**-0.045**	-0.553	**-0.051**	-0.601	**-0.056**	-0.697	**-0.047**	-0.587	**-0.042**	-0.523	**-0.082**	-0.938
	eth	**0.154**	1.095	**0.158**	1.119	**0.207**	1.517	**0.252**	1.825	**0.173**	1.247	**0.153**	1.017
	lg(wlt)	**-0.255**	-11.243	**-0.243**	-9.894	**-0.267**	-13.253	**-0.251**	-12.596	**-0.258**	-12.587	**-0.299**	-14.849
	lg(sch)	**-0.131**	-5.544	**-0.134**	-5.484	**-0.079**	-3.423	**-0.074**	-3.160	**-0.093**	-3.981	**-0.066**	-2.693
	ln(fer)	**0.693**	12.199	**0.719**	12.206	**0.687**	11.461	**0.756**	14.566	**0.674**	12.191	**0.624**	10.630
	polity	**-0.012**	-0.253	**0.036**	0.699	**-0.092**	-1.112	**-0.131**	-1.518	**-0.040**	-0.607	**-0.132**	-1.756

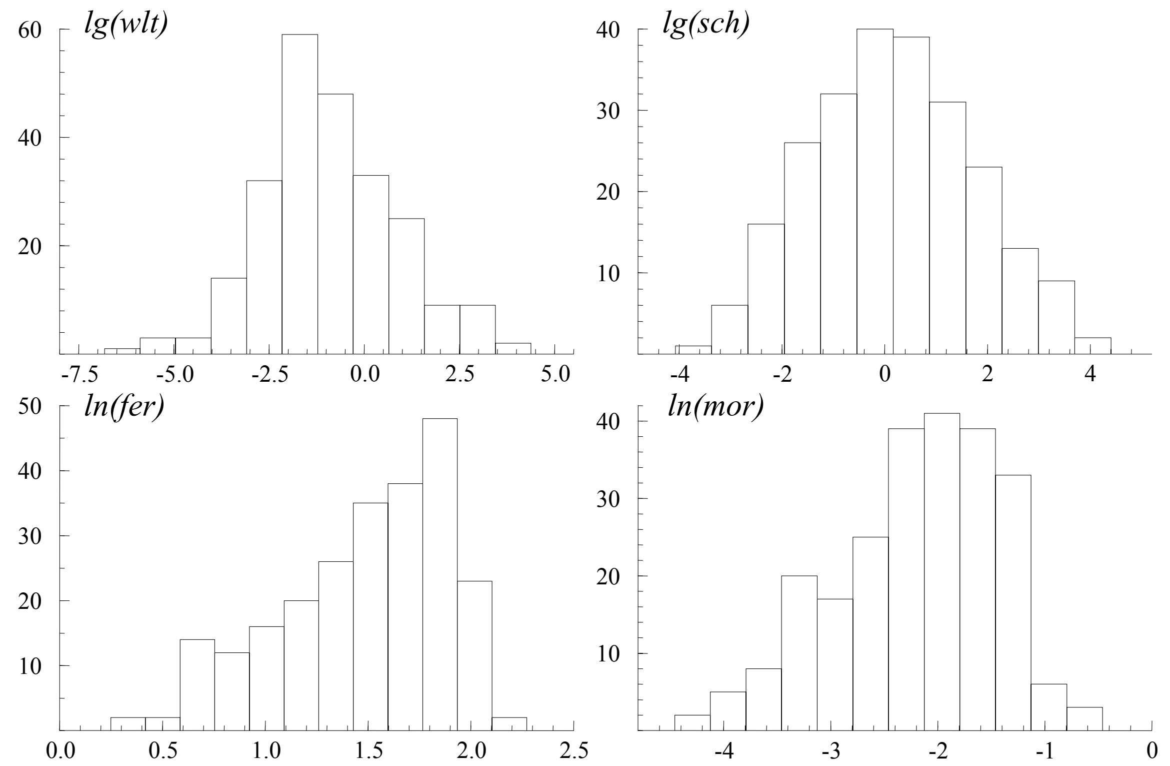

Figure 1: Frequency Distributions of the Four Development Indicators

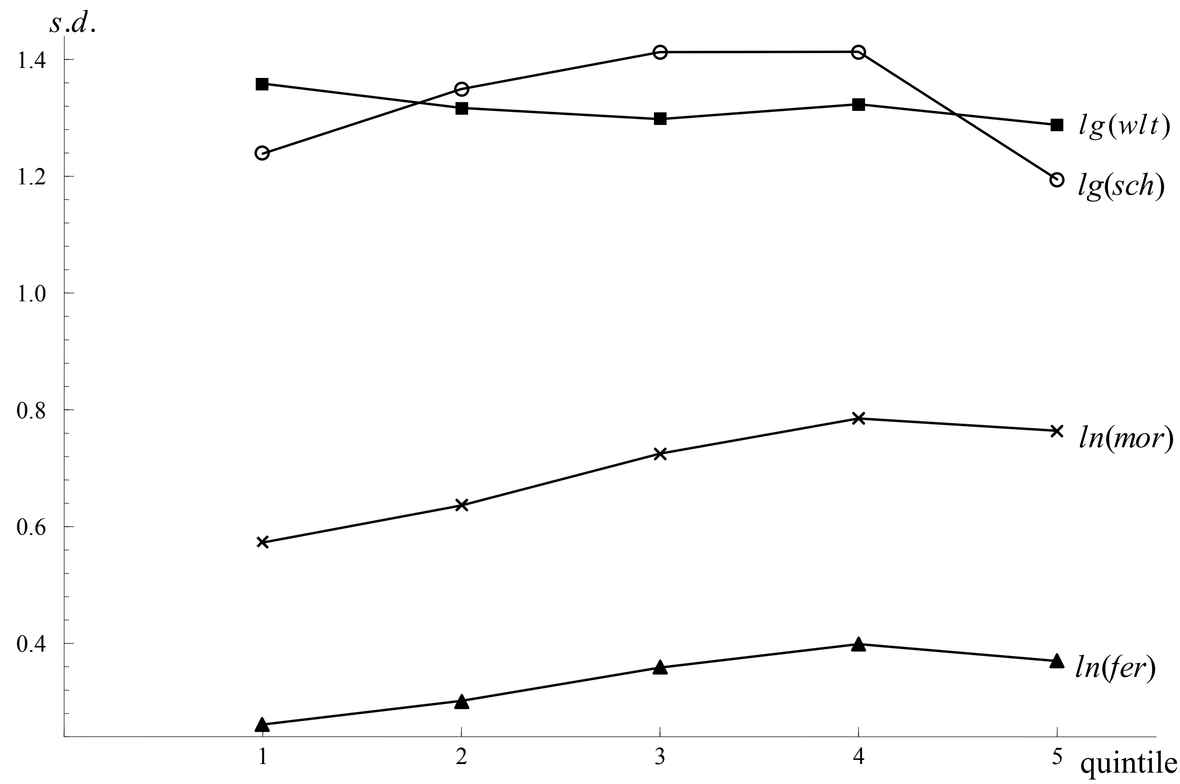

Figure 2: Cross-country Standard Deviations of the Development Indicators by Quintile

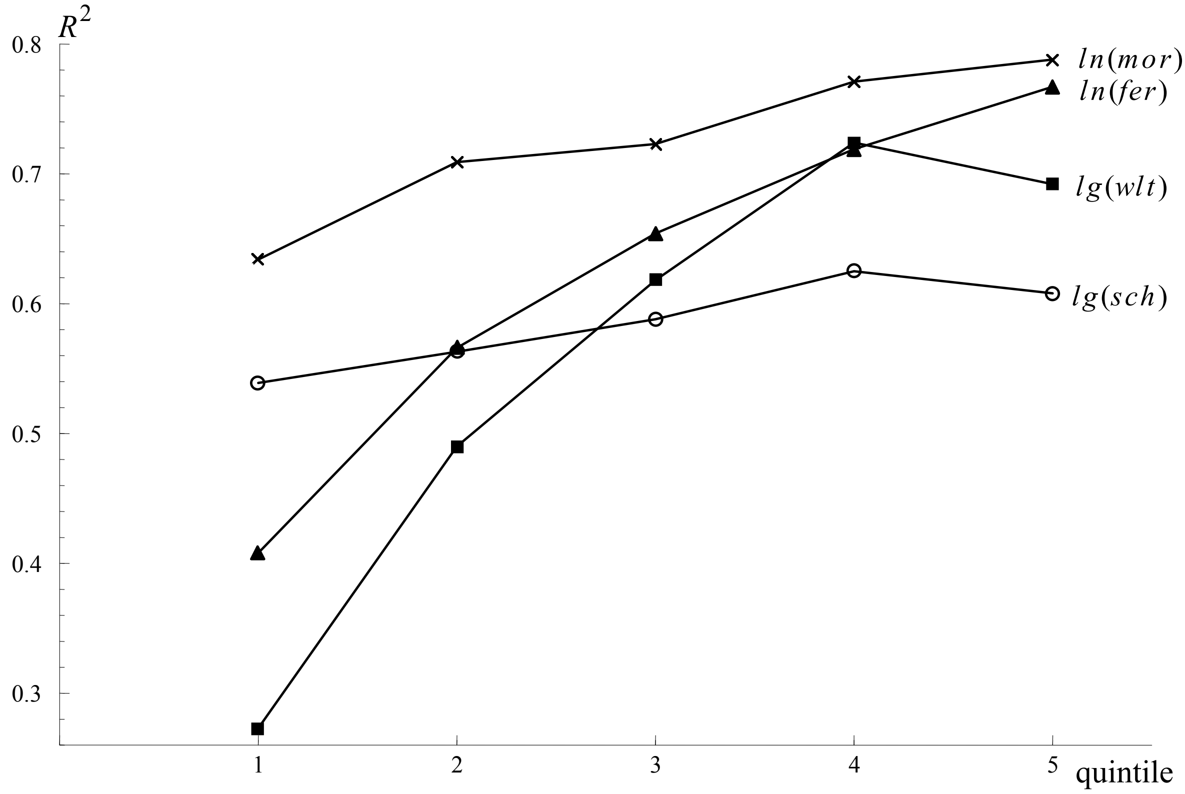

Figure 3: Correlations of the Development Indicators with the Conditioning Variables

Each point shows the R^2 from a regression for a particular indicator and a particular quintile. All conditioning variables are included in every regression. In each case there are 48 observations, one for each country. Slope coefficients are not constrained to be equal across quintiles.