Outcomes, Opportunity and Development

Why Unequal Opportunities and Not Outcomes Hinder Economic Development

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Abstract

This paper studies the relationship between inequality of opportunity and development outcomes in a cross-country setting. Scholars have long debated the impact of inequality on growth, development, and the quality of institutions in a society. The empirical relationships are however confounded by the notion that “inequality” can be seen as a composite of inequality arising from differences in effort and ability, which would tend to encourage competition and productivity, and inequality attributable to unequal opportunities, particularly in terms of access to basic goods and services, which might translate to wasted human potential and lower levels of development. The analysis in this paper applies a measure

of educational opportunities that incorporates inequality between “types” or circumstance groups. Theories from economic history are used to instrument for this type of inequality in a large cross-country dataset. The results seem to confirm the hypothesis that this measure of inequality of opportunity is a better fit for structural inequality than the Gini index of income. The results suggest that inequality of endowments at the outset of history led to unequal educational opportunities, which in turn affected development outcomes such as institutional quality, infant mortality, and economic growth. The findings are robust to several checks on the instrumental variable specification.

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1. Introduction

Do unequal opportunities among different members or groups in a society hinder economic and social development? Using recently developed distributional measures of opportunity, this paper studies the relationship between opportunities for a country's citizens and its development outcomes.

For years scholars have discussed whether the way wealth is distributed has an impact on the level of economic development of society as well as the quality of its institutions. Aided by increasing availability of data on income inequality, many researchers have studied this relationship empirically. The relationship is however complicated by the notion that inequality of outcomes can be thought of as combining elements of "good" and "bad" inequality (World Bank, 2005). "Good" inequality is the one traced to differences in effort or talent, which drives investment and competition that play a key role to increase productivity. "Bad" inequality is the one caused as a consequence of some individuals not having basic opportunities to develop their human potential, due to circumstances beyond their control. If this were true, one could argue that *net* of the effect of opportunities, inequality of outcomes can even be good for economic development. In other words, once the effect of "bad" inequality is accounted for, inequality of outcomes could drive competition and efficiency, and encourage economic growth.

In this paper we argue that most of the existing empirical studies have been missing an important variable – given that the theoretical link between inequality and development is based on the concept of unequal opportunities rather than unequal outcomes. We present results that appear to confirm this hypothesis – once we account for the effect of unequal opportunities, inequality of outcomes does not appear to play any role in hindering economic development.

The World Development Report 2006 on Equity and Development (World Bank, 2005) focused on equality of opportunity and concluded that institutions and policies that promote a level playing field, where all members of society have similar chances to become socially active, politically influential, and economically productive, contribute to sustainable growth and development. However, as there were no indicators that could be computed for a large number of countries with the data that were available, there was no rigorous empirical evidence to show that higher equality of opportunity causes social and economic development at the country level. The WDR 2006 was followed by several World Bank reports measuring equality of opportunity for different countries and regions. These analytical studies developed several indicators to measure how countries rank in terms of distribution of opportunities among groups in each society.

Whether there is a causal link between inequality of opportunity in a country and its overall level of development remains an open question that has been examined only to a limited extent in existing literature. This paper intends to make a contribution to this literature, by using the recently developed measures of opportunities to investigate the causal link between (the level and distribution of) opportunities and development outcomes, such as gross domestic product per capita and institutional quality. It examines the extent to which empirical evidence supports a hypothesis that relates historical factors to the distribution of opportunities, in explaining a country's development trajectory. The hypothesis, drawn from seminal literature on the history of economic development of nations, is based on the idea that factor endowments at the outset of history influenced the type of human capital institutions

that each country developed. The quality of a country's institutions was manifested in the distribution of opportunities among its population, which in turn has had an effect on its level of development.

2. Motivation and links to recent literature

The empirical literature at the individual level is unambiguous. People who face better opportunities in life, attend better schools, have a more customized educational experience, and enjoy a better family environment are more likely to be able to develop their full human potential, achieving better outcomes in terms of income, education, and so on. Furthermore, increasing opportunities for disadvantaged groups has proved to increase cognitive as well as non-cognitive skills, including improvements in personality, social and emotional traits. This general set of skills has also been proved to be essential in producing social and economic success (Herrnstein et al, 1994, Heckman et al, 2006 and Borghans et al, 2008).

Interventions to equalize opportunities earlier in life are also found to be significantly more cost-effective and successful than those attempted later in life. Research shows that preschoolers with low levels of cognitive development have lower school achievement and earn lower wages in adulthood (Currie and Thomas, 1999; Case and Paxson, 2006). More recent studies suggest that early childhood education has substantial long-term impacts, ranging from adult earnings to retirement savings (Chetty et al., 2010). Reynolds et al. (2003) present a comprehensive review of the impact of early childhood programs directed toward disadvantaged children. Their findings also support a causal link between opportunities and productivity. Lost opportunities during childhood cannot always be compensated for. Child malnutrition, for example, can generate life-long learning difficulties, poor health and lower productivity and earnings over a lifetime (Alderman et al, 2006 and Hoddinott et al, 2008). But do these findings at the individual level extend to the aggregate level? Our paper attempts to address this question by empirically analyzing whether countries where opportunities are more widely available and distributed independent of an individual's circumstances at birth have better development outcomes.

Extrapolating from the micro-level evidence mentioned above, one would expect that increased opportunities in childhood in a country would have positive impacts on its growth prospects. The rich cross-country empirical literature linking economic growth with human capital has relevance to this hypothesis. For example, Barro (2001) finds growth to be positively related to the average years of school attainment of adult males at the secondary and higher levels at the beginning of the period, in a panel of 100 countries observed from 1965 to 1995. While "quantity" of schooling is important, quality of schooling as measured by internationally comparable test scores is even more so. A number of studies in recent years have shown the effect of health on economic growth to be important (see Grimm, 2011 for an overview).

Thus improving opportunities for children – by improving coverage and reducing inequality of opportunity – is not just about "fairness" and building a "just society", important as these principles are, but also about realizing a society's aspirations of economic prosperity. Notably, the dividends of investing in opportunities among children, micro and macro level evidence seems to suggest, are likely to accumulate over time and across generations.

The empirical literature on *inequality* and economic development has largely neglected the role of opportunities and focused on the relationship between inequality of outcomes and economic development,

with inconclusive findings (see Banerjee and Duflo, 2003 and Boix, 2010). In contrast, our paper combines the literature on equality of opportunity – brought into prominence by John Roemer’s seminal 1998 book “Equality of Opportunity”¹ – with recent theoretical and empirical work on the effect of the historical distribution of wealth and its effects on economic development. Our paper is also related to preceding work by scholars who have argued for a change in focus from inequality of outcomes to inequality of opportunities. In particular, Ferreira and Walton (2006) argue for inequality of opportunity as a more suitable concept to test the leading theories on economic development.² They provide a detailed account of the literature where the empirical tests rely on measures of inequality of outcomes, even though the best theoretical fit would be a measure of opportunities.

A case in point is the theory suggested by Engerman and Sokoloff (1997). In their seminal study, they argue that historical dominance of some crops like wheat in agriculture lead to more equal societies over time; while that of others, like sugarcane, which have large economies of scale, are associated with the growth of large plantations and structural inequality. These inequalities later translate to inferior education systems, weaker institutions and less democratic societies. Weak institutions, which are persistent, have a negative impact on economic growth and development. Easterly (2007) tested the Engerman and Sokoloff theory empirically, measuring structural inequality as the Gini coefficient of a country averaged over the period 1960–98. Using an agricultural endowment instrument for factor endowments, he assesses the causal effect of inequality of outcomes on development outcomes, namely GDP per capita, institutional quality and secondary enrollment.

Several other studies have complemented the theory suggested by Engerman and Sokoloff, suggesting alternate plausible channels through which inequality can affect economic development. Acemoglu et al. (2001, 2002 and 2005) highlighted the importance of unequal power in the process of economic development. Differences in settlers’ mortality led Europeans to establish different institutional set-ups, with extractive institutions in places where they could not settle and inclusive institutions in places they could. As a consequence, some societies enjoy equal distribution of power among members while others were ruled by the elites. These elites maximize their power by blocking enfranchisement and reforms to the education system that the rest of the population can benefit from. In contrast, Glaeser et al. (2004) argue that human capital is a more fundamental source of growth than political institutions, and human capital accumulation is the key factor that leads to institutional improvement and economic development.

Galor et al. (2009) formally model the mechanisms through which inequality in the distribution of land ownership negatively impacts the development of institutions that promote human capital (such as public schooling and child labor regulation), delaying the transition from agricultural to industrial society. Ferreira (2001) develops a model that highlights the political economy channel through which unequal educational opportunities may affect institutions and economic development. Educational opportunities are modeled as a function of wealth, and low educational opportunities translate into political inequality. Under some assumptions, the author finds opportunity traps, where low levels of wealth translate into low educational opportunities and political inequality, which in turn perpetuates inequalities in wealth, generating a vicious cycle.

¹ For more on this literature, see, for example, Roemer (2002), Van der Gaer (1993) and Ferreira and Gignoux (2011).

² Deininger and Olinto (2000) make a similar argument that what matters for growth is not inequality of outcomes but assets, which might be a better proxy for opportunity.

The above papers have something in common. Structural inequality, educational inequality and inequality of power are symptoms of a more encompassing concept: *inequality of opportunity*.

The hypothesis we empirically test in this paper is compatible with the above literature. It is based on the idea that factor endowments at the outset of history influenced the type of human capital institutions that each country developed and as a result of that, affect education opportunities among its population. Low and unequal education opportunities tend to create a failure in the political market due to multiple agents (citizens) who vastly differ in their bargaining power, through no fault of their own. All agents do not have the same power to influence the principal (government), since the political power of influence is a function of information, resources and the capability to mobilize groups. In countries where broad segments of the population do not have information, resources or capabilities for mobilization, the politicians are likely to be less accountable, as they recognize that the population is not able to monitor and punish them for their misdeeds.

A recent paper (Jakiela et al. 2010), finds experimental evidence in favor of the idea that improving educational opportunities creates a better environment to design institutions. They combine data from a field experiment and a laboratory experiment to measure the causal impact of educational opportunity on respect for earned property rights. The paper finds that higher academic achievement reduces the willingness of young Kenyan women to appropriate others' labor income, and shifts players toward a 50-50 split norm in the dictator game.

Thus it seems reasonable to suggest that greater equality of opportunity promotes more engaged citizens, who have more respect for property rights and more information and intellectual resources to “punish” corrupt principals. To empirically assess such an argument in a cross-country setting, we analyze the extent to which equality of opportunity, which we proxy with measures of educational opportunities, have an impact on development outcomes – namely, the level of economic development and institutional quality at the country level. We also assess the extent to which inequality of outcomes explains variation in GDP per capita or institutional quality, once the level and distribution of opportunities are controlled for (using recently developed measures that are new to the cross-country literature).

While research establishing a causal link between inequality of opportunity and growth in a cross-country framework is at a nascent stage, the evidence so far seems to suggest that inequality of opportunity has an adverse impact on growth and development. Marrero and Rodríguez (2013), using income-based measures of inequality of opportunity that are quite different from ours, have found such evidence in an entirely different data set. They test the hypothesis that inequality of opportunity (attributable to two circumstances, namely parental education and race) and inequality of effort affect economic growth in different directions, using refined data of the PSID database for 26 states distributed throughout the United States in 1970, 1980 and 1990. They find robust support for a negative relationship between inequality of opportunity and growth and a positive relationship between inequality of effort and growth. While the results are encouraging, the authors acknowledge the need for caution because only two circumstances were used in the analysis, which implies that the results shed no light on the impact of other opportunity-related inequalities (for example, those attributable to parental occupation or

geographical location) on growth.³ The likely underestimation of inequality of opportunity could also lead to their measure of inequality of effort containing some amount of inequality of opportunity. This would imply that their finding of a positive impact of inequality of returns to effort on growth merits more scrutiny through research, as the authors themselves point out.

Also of relevance is a paper by Grimm (2011), which assesses the effect of inequality in health on economic growth, using a cross-national panel data set of 62 low and middle-income countries between 1985 and 2007. The gradient in child mortality over mothers' education groups, used as a proxy for disparity in health conditions to which different socioeconomic groups of a country are exposed, is closely related to inequality in health opportunities. Even with such a narrow measure, the paper finds a significant negative effect of health inequality (between different socioeconomic groups) on economic growth, which is robust to different specifications, estimation methods, and time spells.

3. Methodological approach

Data and measures of equality of opportunity

This paper incorporates new measures of opportunities. The first is the Human Opportunity Index (henceforth, HOI), which is a measure developed by Barros et al. (2009). The HOI is a composite indicator that combines two elements:

- (i) The level of coverage of *basic opportunities* necessary for human development, such as primary education, water and sanitation, and electricity.
- (ii) The degree to which the distribution of those opportunities is conditional on circumstances exogenous to children, such as gender, parental income, or household characteristics.

The formula to compute this index is

$$HOI = \bar{p}(1 - D)$$

where $\bar{p}$ is the average coverage of an opportunity and D is the Dissimilarity Index (henceforth, D-Index) that measures inequality in opportunity due to circumstances that are exogenous. D is defined by:⁴

$$D = \frac{1}{2\bar{p}} \sum_{k=1}^m a_k |p_k - \bar{p}|$$

where p_k is the coverage rate for group k (where each group is defined by a set of circumstances unique to that group), and a_k is the share of group k in total population. The D-Index is then a measure of the weighted average of the distance between group access and population access. It ranges from 0 to 100, in percentage terms, and in a situation of perfect equality of opportunity, takes the value zero. The D-Index has an interesting interpretation as the fraction of all available opportunities that need to be reallocated

³ Also, the likely underestimation of inequality of opportunity could lead to their measure of inequality of effort containing some amount of inequality of opportunity. This would imply that their finding of a positive impact of inequality of returns to effort on growth needs to be subjected to more scrutiny through research.

⁴ We also make use of the geometric version of the D-Index, which is more sensitive to inequalities within each subgroup and is decomposable by subgroups.

from circumstance groups (or “types”, as defined in the inequality of opportunity literature) with coverage rate higher than $\bar{p}$ to groups with coverage rate lower than $\bar{p}$ to restore equal opportunity across all groups.

HOI has a number of desirable properties, including sensitivity to scale and inequality and its reward to Pareto improvements (see Barros et al. 2010). Of particular relevance is its sensitivity to inequality. HOI improves when inequality between types decreases with a fixed number of opportunities in a society, or when the number of opportunities increases and inequality among types stays constant.⁵ The D-Index, on the other hand, improves if inequality among types, for a given number of total opportunities, declines. Importantly, while D is an indicator of inequality of opportunity, it is *not independent* of the level of coverage. Clearly, as the coverage of an opportunity increases, the share of total opportunities allocated unequally among types is likely to fall, which is to say D is likely to fall. This is an inevitable consequence of the opportunity being a binary (zero-one) indicator, which implies that the coverage of an opportunity has an upper limit (100 percent). It also implies that the estimated effect of D on level of development will also reflect, in part, the effect of the level (coverage) of the opportunity, albeit to a much smaller extent than for the estimated effect of HOI.

Computing D and HOI when the number of circumstances is relatively large, as is the case here, requires an econometric exercise to obtain a prediction of HOI from observed access to the opportunity and circumstances among children (see Barros et al., 2010). This involves running a logistic regression model to estimate the relationship between access to a particular opportunity and the circumstances of the child, on the full sample of children for whom the HOI measure will be constructed. The estimated coefficients of the regression are used to obtain for each child his/her predicted probability of access to the opportunity, which is then used to estimate the coverage rate $\bar{p}$, D and HOI (see Appendix 2).

We compute the HOI and the D-Index using data from the Program for International Student Assessment (PISA). PISA surveys 15-year-olds and assesses the extent to which students near the end of compulsory education have acquired the knowledge and skills essential for full participation in society. This is done through the use of standardized test scores. The scores range from 0 to 700, and six cut-off values or levels have been established by PISA. An “opportunity” is defined as achieving proficiency of Level 2 for the topics covered in all three tests (Mathematics, Reading and Science), which indicates a basic level of understanding of the topics covered.⁶ The circumstances used are a measure of household wealth, calculated using principal component methodology based on asset ownership; gender of the child; parental education; school location;⁷ and occupation of the head of the child’s household. For the child, these are all attributes s/he has no control over and are likely to have been determined at birth.

One of the drawbacks of using PISA is that the standardized tests are not carried out in all countries. To expand the sample of countries to a larger set, we also make use of Montenegro⁸ et al. (2011)

⁵ The D-index and HOI are sensitive to the set of circumstances chosen for analysis. But this is mitigated by an additional property: the D-Index (HOI) will not be lower (higher) if more circumstances are added to the existing set of circumstances in the analysis. This implies that the computed D-index serves as a lower bound to the “actual” inequality if all circumstances of interest could be included in the analysis.

⁶ The results are robust to the use of proficiency levels 3 or 4. See PISA 2009 for a description of what proficiency level 2 implies for each test.

⁷ The location of the school is classified as: a) Village, b) Small Town, c) Town, d) City or e) Large City.

⁸ Not all surveys had the necessary variables to compute the indicator. As a result, we end up with 80 surveys in which we could compute it.

Harmonized Micro data from Household Surveys that cover almost 100 developing countries to compute the HOI for another set of indicators: completing sixth grade on time, school attendance for children 10–14 years old, and starting primary school on time for children between 6 and 7 years old. While these opportunities are not as attractive as PISA scores, since they cannot capture the quality of learning, they are reasonable proxies for educational opportunities. This is particularly true for timely completion of sixth grade (or six years of education), which correlates with variables like timely start to school and (absence of) grade repetition that are useful predictors for learning achievement. Taking advantage of the richer information available from household data, the circumstances considered here are: gender of the child, location, head of household education, per capita family income, number of children in the household and family structure (presence of both parents in the household).

Appendix 1 includes a description of the variables (with basic statistics included) for all the relevant measures used in the study, as well as a brief explanation of how these were constructed. Furthermore, Table A.2-2 in Appendix 2 shows correlations between all the opportunity measures computed for the study.

Identification strategy

Below we present our structural equation model for identification.

$$Y_i = \alpha_1 + \gamma E_i + X_i^T \varepsilon_1 + \varepsilon_{i1} \quad (1)$$

$$E_i = \alpha_2 + X_i^T \varepsilon_2 + \varepsilon_{i2} \quad (2)$$

Equation (1) denotes our outcome variable “ Y_i ” indicating level of GDP, institutional quality, or infant mortality. These outcomes can be explained by different control variables (X_i) as well as our main variable of interest (E_i), which proxies for unequal opportunities.

The problem with estimating equation (1) is the possibility that the outcome variables also affect unequal opportunities, meaning that we have an endogenous variable. This would imply that if we replace E_i in Equation (1) we will end up with

$$Y_i = \alpha_1 + \gamma(\alpha_2 + X_i^T \varepsilon_2 + \varepsilon_{i2}) + X_i^T \varepsilon_1 + \varepsilon_{i1} \quad (3)$$

$$Y_i = \alpha_3 + X_i^T \varepsilon_3 + \varepsilon_{i3} \quad (4)$$

$$\text{where } \alpha_3 = \alpha_1 + \gamma\alpha_2, X_i^T \varepsilon_3 = X_i^T \varepsilon_1 + \gamma X_i^T \varepsilon_2 \text{ and } \varepsilon_{i3} = \varepsilon_{i1} + \gamma\varepsilon_{i2} \quad (5)$$

In order to be able to use an Ordinary Least Squares (OLS) approach, we need the classical assumptions to hold, which would require ε_{i1} to be independent of ε_{i2} . Since we suspect that our variable is endogenous, we know the errors from Equations (1) and (2) will not be independent. As a result, OLS results would be biased. To address this problem we use Instrumental Variables (IV). In Equations (6) and (7) the instrument is represented by Z_i .

$$Y_i = \alpha_1 + \beta_1 Z_i + \gamma E_i + X_i^T \varepsilon_1 + \varepsilon_{i1} \quad (6)$$

$$E_i = \alpha_2 + \beta_2 Z_i + X_i^T \varepsilon_2 + \varepsilon_{i2} \quad (7)$$

For the IV approach to be valid and allow valid inferences of our variables of interest, we need two conditions to hold.

- a) *Exclusion Restriction*: The instrument is uncorrelated with the error term, that is, $Cov(Z_i, \epsilon_{i1}) = 0$. Or, to put it differently, the instrument has no direct effect on Y_i . This means that $\beta_1 = 0$ in Equation (6).
- b) Z_i is correlated with E_i , our opportunity measure. $Cov(Z_i, E_i) \neq 0$.

The literature on economic development suggests a few different potential instruments.

- a) *Log of Wheat Sugar Suitability Ratio*: Abundance of land suitable for growing wheat relative to that suitable for growing sugarcane (Easterly, 2007).
- b) *Share of Tropical Land*. Percentage of land area in geographical tropics (Sachs, 1997).⁹
- c) *Ethnic Fractionalization*. Ranges from 0 and 1 and describes how ethnically segregated a society is (Alesina et al., 2003).
- d) *Legal Origin*.¹⁰
- e) *Latitude of Country Centroid*.¹¹
- f) *Longitude of Country Centroid*.¹²

Table A.2-3 in Appendix 2 presents a correlation table across all these measures. We choose agricultural endowments as our preferred instrument, which was first introduced by Easterly (2007). The variable “wheat–sugar suitability ratio” is defined as

$$LWHEATSUGAR = \log[(1 + \text{share of arable land suitable for wheat}) / (1 + \text{share of arable land suitable for sugarcane})].$$

The idea behind this instrument is that the higher the ratio (share of arable land suitable for wheat to sugar in total arable land) in a society, the lower would be economies of scale in production, and the society would be less likely to need structural inequality (in its most extreme form, slavery) for efficiency. As a result, societies with a higher wheat-sugar ratio of arable land are likely to be more equal in terms of opportunities.

As Easterly points out, the wheat–sugar ratio could simply be proxying for whether the country is in the tropics. There is certainly a strong correlation (correlation = -0.66 , t-statistic = -10.75), but also enough variation in this measure within tropical and non-tropical areas alike to suggest that the two measures are not the same. The measure comes from FAO and takes into account factors like soil, rainfall, temperature and elevation. Easterly (2007), using different studies, argues that this measure has

⁹ This instrument is similar to settler mortality, so we will not use it to avoid concerns about the validity of the historical data in the latter. See Acemoglu et al. (2012) and Albouy (2012) for a debate on the validity of settler mortality data.

¹⁰ Indicates which type of legal system the country ascribes to: British, French, Germany, Scandinavian or Communist.

¹¹ Ranges from 0 at the Equator to 90 (North or South) at the poles and refers to a geographic coordinate that specifies the north-south position of a point on the Earth's surface.

¹² Ranges from -180 to 180 and refers to the angle between a plane containing the Prime Meridian and a plane containing the North Pole, South Pole and the location in question.

remained constant over time. Hence, he can use current data on agricultural endowment to construct this measure, as the data would be highly correlated with historical agricultural endowments.

In order for it to qualify as a good instrument, we need to argue that the two necessary conditions stated above hold. The first condition, namely the *exclusion restriction*, captures the notion that any effect of the instrument on the outcome must occur via the effect of the instrument on the treatment. In other words, we argue that conditional on the controls included in the regression, the wheat–sugar ratio has no effect on GDP per capita today, other than the effect through opportunities. The second condition, namely the *nonzero average causal effect of the instrument on the treatment*, implies that there should be a relationship (linear in this case) between the wheat–sugar ratio and educational opportunity. If the relationship is weak, we would have weak instruments. In our case, the correlations are strong (see Figures 1 and 2) between the log wheat–sugar ratio and our measures of educational opportunities, namely the HOI and D-Index for PISA scores (Level 2 proficiency).

Figure 1

Figure 2

Finally, for our theory to be consistent, we need to show that *firstly*, factor endowments are related with historical measures of unequal educational opportunities; and *secondly*, there is persistence of unequal educational opportunities from those historical measures to our current measures of unequal opportunities.

For historical data on educational achievement, we use Tutu Vanhanen’s data (in press). In particular, we use the Index of Knowledge Distribution, which is computed as the arithmetic mean of the percentage of students and literates in the country. The number of students refers to students in universities and other higher education institutions, per 100,000 inhabitants of the country.¹³ Using this data comes at the cost of possible inaccuracies and methodological problems involved in using data from many different sources. However, the data are valuable for testing whether our story about a high endowment of wheat land relative to sugarcane land predicts a high value of the index of knowledge distribution. As this index is itself a measure of unequal opportunities, we can also perceive whether there is persistence over time, which is to say, whether today's educational opportunities are correlated with those in the past.

¹³ Two ways are used to calculate the percentage of Students (%): before the year 1988 the value 1000 of the variable “number of students” is equivalent to 100%; and between the years 1988-1998 the value 5000 of the same variable is equivalent to 100%. For percentage of literates we use all the adult population.

Table 1 shows a positive and strong correlation between our measure of factor endowments and educational achievement, as measured by the aforementioned Index of Knowledge Distribution, over a long period of history between 1858 and 1998. Countries with a higher wheat-sugar ratio of arable land have had a higher percentage of students and literates throughout this period (measured with 10-year intervals). Tables 2A and 2B show strongly positive correlations between educational achievement during the period 1858-1998 (measured once every 10 years) and our measures of equality of opportunity (HOI and D-Index) using PISA data from 2009. Thus unequal educational opportunities appear to persist over time, all the way to our current measures of unequal opportunities. Taken together, the two types of correlation in Tables 1 and 2 seem to support the use of our measure of factor endowments, the wheat-sugar ratio of arable land, as an instrument for educational opportunities.

<Tables 1, 2A and 2B here>

4. Empirical results

We start by showing the strong correlations between our measures of Equality of Opportunity and GDP per capita. The HOI and D-Index (derived from PISA test scores or timely completion of primary school) have strong positive and negative correlation, respectively, with the log of GDP per capita (Figure 3) – consistent with our hypothesis. The correlations with GDP are weaker for measures derived from school attendance (10-14 years) and starting primary school on time (6-7 years) (Figure 4).¹⁴

¹⁴ See Appendix 2, Figures A-2.1 and A-2.2.

Before introducing our IV results, some results using OLS are helpful in setting the stage. Table 3 with the OLS results shows that once we take into account the effect of educational opportunity, measured by the HOI or D-Index using PISA data, inequality of outcomes (as measured by the Gini index of income) does not have a relationship with the level of economic development.¹⁵

The next step is to assess the effect of unequal opportunities on development outcomes using the wheat–sugar ratio as an instrument for opportunities. The first stage regression shows a highly significant relationship between the wheat–sugar endowment ratio and the two measures of equality of opportunity. The F-statistics for the first stage regressions are above the critical values identified by Stock and Yogo (2005), which indicates a problem with weak instruments.¹⁶

Table 4 shows the IV estimates of the effect of equality of opportunity (as measured by the HOI and D-Index) on economic development, measured by GDP per capita. Higher influence of circumstances on available opportunities is associated with lower degree of economic development. Once we account for the effect of opportunities, inequality of outcomes – measured by the Gini coefficient of income – has no causal effect on economic development. The relationship between opportunities and economic

¹⁵ The results are similar with equality of opportunity measures constructed with other variables (e.g. timely completion of primary school). But for the sample of countries for which we have those variables, the Gini coefficient does not have a significant negative relationship with GDP per capita in OLS regressions. Then we cannot make the case that accounting for equality of opportunity makes the Gini insignificant.

¹⁶ Staiger and Stock (1997) suggest that the F-statistic in the first stage regression should exceed 10. In most of our specification this value holds true for our case. For some specifications the F from the first stage are below 10, we also conduct sensitivity analysis for weak instruments and compute alternative confidence intervals following Chernozhukov and Hansen (2008). This confidence intervals are larger but produce the same insight the once we found using the small sample robust statistics we report in this paper.

development is also robust to inclusion of the Gini coefficient, which is averaged over 1960-2010 to mitigate the noise associated with the measure.¹⁷

<Tables 3 and 4 here>

Following up from the discussion earlier (in Section 3), the effect of HOI on GDP per capita is a combination of the effects of coverage *and* inequality of educational opportunity. The effect of the D-Index on GDP, on the other hand, reflects the effect of inequality of opportunity, which is however also related (in part) to coverage in the sense that inequality by this measure is likely to be higher when coverage is lower and vice-versa. Given this feature, should the IV estimates of the D-Index be interpreted as the effect of *inequality* of opportunity on economic development?

We would argue that such an interpretation is correct, because of the way opportunities are defined here – as binary variables, where coverage is bounded above (at 100 percent). This is due to the nature of these variables – the rate of school completion or attainment of proficiency cannot exceed 100 percent – and the type of data available. Given the binary nature of these variables, an intuitive measure of inequality of opportunity cannot be fully independent of coverage. Rather the measure should capture the notion that inequality of educational opportunity in a country is likely to be higher when the basic proficiency level in education is not universal, and that there would be no inequality when every child attains the basic proficiency level.¹⁸ Therefore, the estimated effect of the D-Index on per capita GDP *does* reflect the effect of inequality of opportunity, even though the measure of the D-Index itself is partly dependent on coverage.

As in Easterly (2007), Table 4 also expands on the basic results by adding two quick robustness checks. The first check excludes the Western Hemisphere, to which Engerman and Sokoloff's original case study was limited. Excluding countries from this region, the hypothesis that inequality of opportunities inhibits development with the wheat–sugar ratio as an instrument holds “out of sample” for the rest of the world. The second check involves the inclusion of three regional dummy variables – a classification that is exogenous to the level of development of countries.¹⁹ The results are robust to both the changes in specifications, although the results with the regional dummies have smaller F-statistics that could imply weak instruments.²⁰

Similar results are obtained when the HOI and D-Index are constructed using timely completion of six years of education as an alternative indicator of educational opportunity (see Table 5).²¹ In this case, we use the “share of tropical land” as an instrument, which is related to the previously used wheat-sugar ratio, but allows for a larger number of observations for this particular opportunity measure. For all

¹⁷ As controls, we also use Gini coefficient adjusted to gain comparability across countries and surveys following Easterly (2007) and an alternative adjustment proposed by Solt (2009). Both of these measures produce very similar results as the one using the World Development Data.

¹⁸ Note that this would not apply when education proficiency is not a binary variable, but rather a continuous and unbounded variable reflecting that learning achievement is, in fact, unbounded.

¹⁹ The dummies correspond to Americas (includes Latin America & Caribbean region, Canada and United States); Europe and Central Asia (includes Western Europe), and Middle East & Africa; the omitted region is East Asia & Pacific (includes Japan, Australia and New Zealand).

²⁰ All specifications compute robust standard errors to account for potential heteroscedasticity. See also footnote 13 regarding weak instruments.

²¹ This is interesting as the sample of countries is not the same between PISA data and Montenegro et al. (2011).

instruments that are correlated with our measure, we find a significant positive effect on the level of GDP per capita, with similar coefficients in every case.²²

<Table 5 here>

Next, we examine the relationship between equality of opportunity and other development outcomes, namely institutional quality and infant mortality.²³ Table 6A presents the results. Higher equality of opportunity (measured using PISA scores) predicts higher institutional quality of a country (see Appendix 2 for how this variable was created). Controlling for inequality of outcomes with the Gini index of income, whose coefficient is not statistically significant, the coefficients of both the HOI and the D-Index remain statistically significant. These coefficients also increase in size once we take into account the Gini of income. Interestingly, the magnitude of the effects is higher using IVs than for OLS, suggesting that the causal effect of inequality of opportunity on development outcomes is actually understated by the OLS estimation.

Table 6B shows the results from the same analysis as above, re-defining the “opportunity” as timely completion of six years of education. Equality of opportunity measured with this variable does not have a clear relationship with institutional quality, with some specifications having significant results and others not. For the other development outcomes, infant mortality and malnutrition, the results are clear: equality of opportunity measured by the HOI or D-Index of timely completion of six years of education predicts lower infant mortality and malnutrition rates.²⁴

<Tables 6A and 6B here>

Estimated magnitude of economic impacts

How much does equality of opportunity matter as a driver of development? Using the data from PISA, a one standard deviation increase in the Human Opportunity Index (33 percentage points) increases income by 0.718 standard deviations, increases institutional quality by 0.814 standard deviations, and reduces infant mortality by almost one standard deviation (Table 7). An increase of one point (9.4 percentage points) in inequality of opportunity or the D-Index reduces per capita income by almost 10 percentage points and institutional quality by 2.3 percentage points, and increases infant mortality by almost 3 percentage points. By these estimates, the extent to which inequality of opportunity hinders development is economically meaningful, in addition to being statistically significant.

We also compute the elasticity of GDP per capita to HOI and find that a 1 percent higher HOI for a given country would lead to 2.3 percent higher GDP per capita. This means, for example, that if the current HOI for Argentina were higher by 1 percent (around 0.4 points), its GDP per capita would be higher by 150 USD.

²² With school attendance (10-14 years) or starting primary school on time (6-7 years) as the indicator of opportunity, there appears to be no causal relation. We believe this result is due to the fact that attendance in school and timely start to schooling are not good proxies for education achievement, which is what determines opportunities. Therefore, in the rest of the paper we use only the measure derived from PISA test scores and timely completion of six years of schooling.

²³ For this specification we do not use malnutrition as a development outcome as only few observations were available to estimate the first stage.

²⁴ As results with D-Index are very similar, we omit them from Table 6B to reduce the number of tables. Results are available upon request.

Using our alternative opportunity variable of completing sixth grade on time, we find that increasing the Human Opportunity Index by one point increases GDP per capita by 3.8 percentage points, reduces infant mortality rate by 0.6 percentage points, and reduces malnutrition by 0.8 percentage points. A one point increase in inequality of opportunity or the D-Index (4 percentage points) reduces per capita income by 6.7 percentage points, and increases infant mortality by 1.12 percentage points and malnutrition by 1.46 percentage points.

<Table 7 here>

5. Robustness of the results

Testing different model specifications

To test the robustness of our results in more detail, we first explore how sensitive the findings are to the choice of different model specifications. As we suggested when introducing the instrumental variable approach, there are some plausible competing alternatives to our theory of equality of opportunity being a key variable in explaining development outcomes. In particular, the literature has highlighted the role of inequality of outcomes, ethnic fractionalization, legal origins, latitude and longitude as well as tropical location (see Section 3). To test the alternative variables against our hypothesis, we adopt the approach of controlling for each variable in turn (taking them as exogenous), while continuing to run an IV regression of development outcomes on the inequality measures with the wheat–sugar endowment ratio as an instrument for the PISA test scores data.

Tables 8A and 8B show the estimated effects of the HOI and D-Index (based on PISA test scores) on log of GDP per capita, after controlling for the effects of ethnic fractionalization, legal origin, share of tropical land, latitude and longitude, in succession. When the effects of ethnic fractionalization are controlled for, the coefficients on the HOI and D-Index drop modestly but still have high statistical and economic significance. Introducing dummies for British, French and German or Scandinavian legal origin (Socialist legal origin is the omitted category) also leaves the significance of the HOI and D-Index unchanged, and actually increases the magnitude of the coefficients. The tropical location measure – the share of a country's cultivated land area in tropical climate zones²⁵ – was introduced by Sachs and coauthors. The tropics variable is not significant and its inclusion does not affect the significance of the HOI and D-Index. The inclusion of latitude and longitude variables reduces the coefficients on the HOI modestly and increases the coefficients on the D-Index.

Therefore, the effects of equality of opportunity – measured by the HOI and D-Index of PISA test scores – are robust to the exclusion of different variables that provide competing explanations for economic development. Interestingly, three of these variables – ethnic fractionalization, share of tropical land and latitude – have strong and significant effects on GDP per capita when the opportunity variables are not included in the specification, which disappear upon the inclusion of the HOI or D-Index.

<Tables 8A and 8B here>

²⁵ Tropical climate zone is characterized as “hot and humid with no winter”, which is the most precise measure of tropical conditions.

As before, the same exercise is repeated defining the opportunity as timely completion of sixth grade (results available upon request). The coefficients on the HOI and D-Index are always statistically and economically significant with only modest reductions seen when ethnic fractionalization is controlled for.

Tables 9A and 9B show the estimates for the effects of the HOI and D-Index PISA test scores on institutional quality using the same controls as before. As in Tables 8A and 8B, the coefficients on the HOI and D-Index are always statistically and economically significant, with modest reductions in the coefficients seen when ethnic fractionalization is controlled for.²⁶

< Tables 9A and 9B here >

Overidentification test

To check the robustness of our results, we also need to test the validity of our instruments in more detail. For an IV approach to work, the instrument must be: (i) uncorrelated with the unobserved error term and (ii) correlated with the endogenous explanatory variable. As shown in Section 3, our instrument, the wheat-sugar suitability ratio in arable land, appears to satisfy the second condition quite well.

The first requirement, however, cannot be tested definitively as it arises from a correlation between the instrument and an unobserved component of the error. One of the most problematic parts of any IV exercise is establishing that the selected instrument meets this so-called exclusion restriction. In our case it would imply that conditional on the pre-treatment controls, the wheat-sugar ratio affects the outcome, i.e. GDP per capita today, infant mortality or institutional quality, only through its effect on educational opportunities and not through any other variable. And it would imply that the share of tropical land does not directly affect the level of development, infant mortality and institutional quality, other than through its effect on the HOI and D-Index of completing sixth grade on time.

If we have more than one instrumental variable, we can effectively test whether these are uncorrelated with the structural error, with the null hypothesis being that all instruments are uncorrelated with the error term. The usual econometric approach is to run a test of overidentification. These tests are far from definitive, as “passing the test” merely implies a failure to reject the exclusion restriction. To run the test, we need an alternative instrument for equality of opportunity. The variable “share of tropical land” described earlier is a good candidate, as it is used as an instrument for the variable completing sixth grade on time. There is considerable consensus in the literature that the tropics variable affects income through social and political institutions rather than directly. For the tropics variable to be of use here as an instrument, its effects on institutions also must go through equality of opportunity rather than through any other mechanism.

The results on the over-identification tests fail to reject the exclusion restriction, by a considerable margin in all of the specifications, when the outcome variable is GDP per capita, institutional quality or malnutrition (see Table 10). When the outcome variable is infant mortality, the over-identification tests fail to reject the exclusion restriction in all cases but one.²⁷ Thus in almost all cases the over-identification

²⁶ Results are qualitatively similar using other development measures as well as the different measures of equality of opportunity used in this paper. These regression outputs are available upon request.

²⁷ The one where the hypothesis of exclusion restriction is rejected is for the case for infant mortality using the HOI and D-Index for PISA test scores data. However, the overidentification test fails to reject the hypothesis when the opportunity is defined as completing sixth grade on time, using data from household surveys.

tests, even as they are less than definitive due to the nature of the test, yield results favorable to the validity of the instruments.

<Table 10 here>

6. Final Remarks

The findings of this paper suggest that the conflicting results in the literature on inequality of outcomes and economic growth can be attributed to the omission of an important variable – what really matters is inequality of opportunities and not of outcomes. A recent paper (Marrero and Rodriguez, 2013) finds evidence in favor of this hypothesis using a measure of inequality of opportunity that is derived from a decomposition of income. Our innovation is to apply a measure of educational opportunities that incorporates inequality between “types” or circumstance groups, using theories from economic history to instrument for this type of inequality. We argue that our measure of inequality of opportunity is a better fit for structural inequality than the Gini index of income, and the results seem to support this argument.

Consistent with the hypothesis of the literature, our paper supports the prediction that agricultural endowments – specifically the relative abundance land suitable for wheat to that suitable for sugarcane – predict unequal educational opportunities and this, in turn, predicts development outcomes. After controlling for the measures for unequal opportunity we construct, the Gini index that measures income inequality has no explanatory power. We test the robustness of our results using different country samples and sources of data, measures of opportunity and development outcomes, and controlling for the effects of other variables that have been shown in earlier literature to influence economic development. For almost all cases, our results remain statistically and economically significant.

Although the IV approach using cross-country data may not be the best identification strategy to establish causality, the results in this paper support a well-defined a priori hypothesis at the individual and aggregate levels, whereby unequal educational opportunities hinder development. The validity of the instrument, the wheat-sugar land ratio or the share of tropical land, both of which have been used in past literature, is typically a subject of debate in work such as ours. The evidence we offer on the instrument satisfying the condition of the exclusion restriction, which is the failure to reject the overidentifying restrictions in the system, is subject to important caveats about the power of such tests. In spite of these tests being less than definitive by their very nature, we find it encouraging that they fail to find evidence of the wheat–sugar land ratio having any effect on underdevelopment other than its effect through the opportunity variables defined on the basis of PISA test scores. The tests also fail to find evidence that the share of tropical land has any effect on underdevelopment other than through equality of opportunity, measured by timely completion of sixth grade from household survey data.

Future research could focus on disentangling the effects of higher coverage of opportunities (the level) from pure inequality of opportunities (which is independent of the level), which is not possible in the model we estimate. A related question to examine will be whether the relative importance of reducing inequality or increasing coverage is related to the existing level of opportunities in a society or the level of development. It is possible to argue, for example, that inequality in educational opportunity is relevant for development only after a country reaches a certain threshold level of education and/or income level.

Whether such an argument has any merit is an empirical question that could be a subject of future research.

Tables

TABLE 1
Historical Equality of Opportunity and Agricultural Endowments

Regression	Dependent Variable: Log of Wheat Sugar Ratio Sustainability														
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Index of Knowledge Distribution (1858)	0.00913*** (0.00)														
Index of Knowledge Distribution (1868)		0.00847*** (0.00)													
Index of Knowledge Distribution (1878)			0.00889*** (0.00)												
Index of Knowledge Distribution (1888)				0.00894*** (0.00)											
Index of Knowledge Distribution (1898)					0.00913*** (0.00)										
Index of Knowledge Distribution (1908)						0.00887*** (0.00)									
Index of Knowledge Distribution (1918)							0.00816*** (0.00)								
Index of Knowledge Distribution (1928)								0.00776*** (0.00)							
Index of Knowledge Distribution (1938)									0.00681*** (0.00)						
Index of Knowledge Distribution (1948)										0.00602*** (0.00)					
Index of Knowledge Distribution (1958)											0.00610*** (0.00)				
Index of Knowledge Distribution (1968)												0.00438*** (0.00)			
Index of Knowledge Distribution (1978)													0.00538*** (0.00)		
Index of Knowledge Distribution (1988)														0.00405*** (0.00)	
Index of Knowledge Distribution (1998)															0.00435*** (0.00)
Number of Observations	35	37	39	40	40	43	46	53	53	62	71	92	100	101	116
R-squared	0.341	0.323	0.379	0.409	0.443	0.425	0.398	0.409	0.355	0.321	0.357	0.288	0.14	0.197	0.202

* p<0.05, ** p<0.01, *** p<0.001

TABLE 2A - Persistence of Equality of Opportunity in History

Regression	Dependent Variable: Human Opportunity Index - Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009														
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Index of Knowledge Distribution (1858)	0.782*** (0.18)														
Index of Knowledge Distribution (1868)		0.774*** (0.17)													
Index of Knowledge Distribution (1878)			0.756*** (0.16)												
Index of Knowledge Distribution (1888)				0.735*** (0.16)											
Index of Knowledge Distribution (1898)					0.762*** (0.15)										
Index of Knowledge Distribution (1908)						0.855*** (0.14)									
Index of Knowledge Distribution (1918)							0.890*** (0.14)								
Index of Knowledge Distribution (1928)								0.891*** (0.14)							
Index of Knowledge Distribution (1938)									0.881*** (0.14)						
Index of Knowledge Distribution (1948)										0.632*** (0.14)					
Index of Knowledge Distribution (1958)											0.765*** (0.13)				
Index of Knowledge Distribution (1968)												0.723*** (0.14)			
Index of Knowledge Distribution (1978)													0.725*** (0.15)		
Index of Knowledge Distribution (1988)														0.822*** (0.15)	
Index of Knowledge Distribution (1998)															0.801*** (0.19)
Number of Observations	24	26	28	29	29	33	34	39	38	41	44	45	51	51	59
R-squared	0.455	0.46	0.463	0.455	0.493	0.55	0.56	0.543	0.52	0.339	0.457	0.397	0.334	0.387	0.242

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 2B - Persistence of Equality of Opportunity in History

Regression	Dependent Variable: Dissimilarity Index - Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009														
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Index of Knowledge Distribution (1858)	-0.258** (0.07)														
Index of Knowledge Distribution (1868)		-0.253** (0.07)													
Index of Knowledge Distribution (1878)			-0.246*** (0.06)												
Index of Knowledge Distribution (1888)				-0.235*** (0.06)											
Index of Knowledge Distribution (1898)					-0.243*** (0.06)										
Index of Knowledge Distribution (1908)						-0.292*** (0.06)									
Index of Knowledge Distribution (1918)							-0.305*** (0.06)								
Index of Knowledge Distribution (1928)								-0.302*** (0.06)							
Index of Knowledge Distribution (1938)									-0.297*** (0.06)						
Index of Knowledge Distribution (1948)										-0.207*** (0.05)					
Index of Knowledge Distribution (1958)											-0.254*** (0.05)				
Index of Knowledge Distribution (1968)												-0.234*** (0.05)			
Index of Knowledge Distribution (1978)													-0.258*** (0.05)		
Index of Knowledge Distribution (1988)														-0.275*** (0.06)	
Index of Knowledge Distribution (1998)															-0.266** (0.08)
Number of Observations	24	26	28	29	29	33	34	39	38	41	44	45	51	51	59
R-squared	0.362	0.361	0.367	0.354	0.382	0.448	0.466	0.446	0.423	0.268	0.387	0.323	0.318	0.325	0.161

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 3 - Basic Results for Development Outcomes (Ordinary Least Squares)**Equality of Opportunity Measures versus Inequality of Outcomes Measures**

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010				
	OLS	OLS	OLS (Comparison Sample)	OLS	OLS
Human Opportunity Index*	0.038*** (0.004)			0.038*** (0.005)	0.042*** (0.004)
Gini Index, Average 1960-2010		-0.050*** (0.013)	-0.047** (0.016)	0.005 (0.013)	-0.005 (0.012)
Americas - LAC plus Canada and United States					0.656** (0.191)
Europe and Central Asia					0.273 (0.182)
Middle East and Africa					1.101 (0.738)
constant	7.163*** (0.287)	10.140*** (0.538)	11.308*** (0.580)	6.915*** (0.675)	6.664*** (0.664)
R-sqr	0.587	0.093	0.135	0.599	0.647
Number of Observations	63	152	59	59	59
	0.000	0.000	0.000	0.000	0.000
Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010				
	OLS	OLS	OLS (Comparison Sample)	OLS	OLS
Dissimilarity Index*	-0.094*** (0.012)			-0.090*** (0.013)	-0.097*** (0.013)
Gini Index, Average 1960-2010		-0.050*** (0.013)	-0.047** (0.016)	-0.004 (0.013)	-0.018 (0.013)
Americas - LAC plus Canada and United States					0.624* (0.271)
Europe and Central Asia					0.159 (0.225)
Middle East and Africa					0.863 (0.832)
constant	10.672*** (0.156)	10.140*** (0.538)	11.308*** (0.580)	10.706*** (0.444)	11.030*** (0.468)
R-sqr	0.508	0.093	0.135	0.522	0.557
Number of Observations	63	152	59	59	59

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 4 - Basic results for Development Outcomes (Instrumental Variables - Log of Wheat Sugar Sustainability)**Human Opportunity Index**

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
Human Opportunity Index*	0.035*** (0.006)	0.033** (0.012)	0.040*** (0.009)	0.034*** (0.008)
WDI Gini Index - Average for 1960-2010		-0.008 (0.021)		
Americas - LAC plus Canada and United States				0.465 (0.302)
Europe and Central Asia				0.357 (0.259)
Middle East and Africa				0.136 (0.433)
constant	7.243*** (0.425)	7.696*** (1.477)	6.852*** (0.610)	6.997*** (0.621)
Number of Observations	49	46	39	49
F-statistics from first stage	23.43	20.58	14.51	7.87

D-Index

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
D-Index*	-0.097*** (0.019)	-0.086** (0.034)	-0.122*** (0.028)	-0.091*** (0.023)
WDI Gini Index - Average for 1960-2010		-0.012 0.019		
Americas - LAC plus Canada and United States				0.517 (0.375)
Europe and Central Asia				0.424 (0.315)
Middle East and Africa				0.013 (0.504)
constant	10.590*** (0.219)	10.910*** 0.423	10.770*** (0.267)	10.151*** (0.348)
Number of Observations	49	49	39	49
F-statistics from first stage	19.6	19.95	10.33	6.37

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Gini Index

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
Gini*	-0.157*** (0.030)	0.078 (0.071)	-0.246*** (0.044)	-0.295** (0.099)
Human Opportunity Index*		0.061** (0.018)		
Americas - LAC plus Canada and United States				4.286** (1.335)
Europe and Central Asia				-0.126 (0.746)
Middle East and Africa				0.872 (0.957)
constant	14.526*** (1.199)	2.732 (3.682)	17.418*** (1.656)	19.001*** (3.763)
Number of Observations	112	48	89	112
F-statistics from first stage	57.27	15.09	37.44	42.47

* p<0.05, ** p<0.01, *** p<0.001

*Average 1960-2010

Table 5 - Basic results for Development Outcomes . (Instrumental Variables - Share of Tropical Land)

Human Opportunity Index

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
Human Opportunity Index*	0.038*** (0.01)	0.050*** (0.01)	0.049** (0.02)	0.039*** (0.01)
WDI Gini Index - Average for 1960-2010		0.039* (0.02)		
Americas - LAC plus Canada and United States				0.901** (0.31)
Europe and Central Asia				0.294 (0.75)
Middle East and Africa				0.133 (0.29)
constant	6.154*** (0.29)	4.126*** (0.66)	5.704*** (0.32)	5.797*** (0.37)
Number of Observations	70	68	53	70
F-statistics from first stage	11.776	9.648	9.19	6.055

D-Index

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
D-Index*	-0.067*** (0.02)	-0.084*** (0.02)	-0.075*** (0.02)	-0.083*** (0.02)
WDI Gini Index - Average for 1960-2010		0.039** (0.01)		
Americas - LAC plus Canada and United States				0.992** (0.30)
Europe and Central Asia				-0.053 (0.69)
Middle East and Africa				0.379 (0.26)
constant	8.789*** (0.41)	7.485*** (0.80)	8.791*** (0.49)	8.734*** (0.50)
Number of Observations	70	68	53	70
F-statistics from first stage	18.386	15.004	17.007	8.216

* p<0.05, ** p<0.01, *** p<0.001

*Completing Six Years of Education on Time - HHS

Gini Index

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010			
	IV	IV	IV Excluding Americas	IV
Gini*	-0.178*** (0.03)	-0.028 (0.04)	-0.265*** (0.04)	-0.487 (0.28)
Human Opportunity Index*		0.031*** (0.01)		
Americas - LAC plus Canada and United States				7.026 (3.76)
Europe and Central Asia				-1.133 (1.77)
Middle East and Africa				2.467 (2.17)
constant	15.285*** (1.12)	7.576*** (1.65)	18.116*** (1.62)	26.001* (10.52)
Number of Observations	142	68	116	142
F-statistics from first stage	78.67	6.656	49.503	3.01

* p<0.05, ** p<0.01, *** p<0.001

*Average 1960-2010

Table 6A - Basic results for Development Outcomes . (OLS and Instrumental Variables using Log of Wheat Sugar Sustainability)

Human Opportunity Index controlling for Gini Index

Regression	Dependent Variable: Institutional Index, Average WBGI 2009					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Human Opportunity Index*	0.775*** (0.07)		0.783*** (0.09)	0.806*** (0.12)	0.842*** (0.23)	0.890*** (0.14)
Gini Index*		-1.014** (0.31)	0.052 (0.23)		0.108 (0.46)	
Americas - LAC plus Canada and United States						12.512* (6.06)
Europe and Central Asia						3.288 (4.90)
Middle East and Africa						7.808 (5.88)
constant	18.992*** (5.00)	106.242*** (11.28)	16.461 (12.32)	15.907* (7.84)	9.649 (30.37)	5.27 (10.17)
R-sqr	0.659	0.162	0.658			
Number of Observations	63	59	59	49	49	49
Wald F-statistics from first stage				21.945	6.304	9.514

Regression	Dependent Variable: Infant Mortality					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Human Opportunity Index*	-0.358*** (0.03)		-0.355*** (0.04)	-0.436*** (0.06)	-0.538*** (0.09)	-0.510*** (0.08)
Gini Index*		0.515*** (0.14)	0.006 (0.11)		-0.308* (0.14)	
Americas - LAC plus Canada and United States						-3.469 (4.11)
Europe and Central Asia						1.704 (3.33)
Middle East and Africa						-4.663 (4.15)
constant	34.486*** (2.38)	-7.145 (5.16)	34.234*** (6.03)	40.159*** (4.70)	57.996*** (10.37)	44.950*** (6.57)
R-sqr	0.649	0.194	0.645			
Number of Observations	61	58	58	49	49	49
Wald F-statistics from first stage				21.945	6.304	9.514

D-Index controlling for Gini Index

Regression	Dependent Variable: Institutional Index, Average WBGI 2009					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Dissimilarity Index*	-1.853*** (0.22)		-1.762*** (0.26)	-2.221*** (0.46)	-2.219** (0.76)	-2.383*** (0.56)
Gini Index*		-1.014** (0.31)	-0.165 (0.26)		-0.002 (0.47)	
Americas - LAC plus Canada and United States						13.884 (6.97)
Europe and Central Asia						5.049 (5.27)
Middle East and Africa						4.586 (6.24)
constant	89.681*** (2.87)	106.242*** (11.28)	94.410*** (8.56)	92.457*** (4.82)	92.523*** (10.73)	87.858*** (6.69)
R-sqr	0.544	0.162	0.544			
Number of Observations	63	59	59	49	49	49
Wald F-statistics from first stage				14.806	4.999	6.916

Regression	Dependent Variable: Infant Mortality					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Dissimilarity Index*	0.866*** (0.10)		0.805*** (0.12)	1.203*** (0.25)	1.420*** (0.39)	1.367*** (0.34)
Gini Index*		0.515*** (0.14)	0.108 (0.12)		-0.237 (0.20)	
Americas - LAC plus Canada and United States						-4.256 (3.73)
Europe and Central Asia						0.693 (2.39)
Middle East and Africa						-2.815 (3.93)
constant	1.776 (1.36)	-7.145 (5.16)	-1.243 (3.97)	-1.3 (1.94)	4.976 (4.72)	-2.432 (3.52)
R-sqr	0.551	0.194	0.553			
Number of Observations	61	58	58	49	49	49
Wald F-statistics from first stage				14.806	4.999	6.916

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

*Gini Index: Average 1960-2010

Table 6B - Basic results for Development Outcomes. (OLS and Instrumental Variables using Share of Tropical Land)

Human Opportunity Index controlling for Gini Index

Regression	Dependent Variable: Institutional Index, Average WBGI 2009					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Human Opportunity Index*	0.348*** (0.06)		0.378*** (0.08)	0.303 (0.21)	0.536* (0.22)	0.373 (0.24)
Gini Index*		0.34 (0.23)	0.32 (0.20)		0.35 (0.23)	
Americas - LAC plus Canada and United States						10.483 (6.28)
Europe and Central Asia						0.768 (13.76)
Middle East and Africa						3.378 (4.68)
constant	25.313*** (2.57)	19.555 (10.26)	11.044 (9.05)	25.728*** (5.15)	5.237 (10.37)	19.492** (6.44)
R-sqr	0.268	0.03	0.283			
Number of Observations	82	74	74	70	68	70
Wald F-statistics from first stage				11.776	9.648	6.055

Regression	Dependent Variable: Infant Mortality					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Human Opportunity Index*	-0.999*** (0.11)		-1.178*** (0.14)	-1.036** (0.35)	-1.183*** (0.33)	-0.791* (0.39)
Gini Index*		(0.47) (0.51)	(0.39) (0.36)		(0.42) (0.49)	
Americas - LAC plus Canada and United States						-21.276 (13.41)
Europe and Central Asia						-8.194 (20.76)
Middle East and Africa						20.969* (8.94)
constant	87.795*** (4.40)	82.214*** (22.94)	108.719*** (16.53)	88.882*** (9.17)	111.057*** (18.81)	77.130*** (9.46)
R-sqr	0.506	0.012	0.512			
Number of Observations	82	74	74	70	68	70
Wald F-statistics from first stage				11.776	9.648	6.055

Regression	Dependent Variable: Malnutrition					
	OLS	OLS (Comparison Sample)	OLS	IV	IV	IV
Human Opportunity Index*	-0.275*** (0.05)		-0.278*** (0.05)	-0.365** (0.11)	-0.453*** (0.12)	-0.424* (0.17)
Gini Index*		-0.384* (0.16)	-0.402** (0.13)		-0.430* (0.16)	
Americas - LAC plus Canada and United States						-14.360** (5.21)
Europe and Central Asia						-8.778 (8.82)
Middle East and Africa						-11.196** (3.53)
constant	25.389*** (1.75)	35.754*** (7.24)	43.137*** (6.12)	27.308*** (2.95)	48.249*** (7.79)	38.653*** (4.36)
R-sqr	0.296	0.082	0.385			
Number of Observations	66	65	65	62	61	62
Wald F-statistics from first stage				11.805	11.248	5.528

* p<0.05, ** p<0.01, *** p<0.001

*Completing Six Year of Education on Time, Household Survey Data

*Gini Index: Average 1960-2010

Table 7 - Magnitude of Effect on Development Outcomes**Human Opportunity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009**

Dependent Variable	Coefficient on HOI in IV regression (for whole sample without regional dummies)	Change in dependent variable in response to 1 standard deviation change in HOI	Ratio to 1 standard deviation dependent variable	% change as a result of a 1 point increase in HOI	% change as a result of a 1 % increase in HOI
Log of GDP per capita, Average 2005-2010	0.035	0.773	0.718	3.50	2.31
Institutional Index, Average WBGI 2009	0.806	17.8	0.814	0.82	0.54
Infant Mortality	-0.436	-9.6	-0.956	-1.03	-0.68

D-Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009

Dependent Variable	Coefficient on HOI in IV regression (for whole sample without regional dummies)	Change in dependent variable in response to 1 standard deviation change in HOI	Ratio to 1 standard deviation dependent variable	% change as a result of a 1 point increase of D-Index	% change as a result of a 1 % increase in HOI
Log of GDP per capita, Average 2005-2010	-0.097	-0.827	-0.767	-9.70	-1.02
Institutional Index, Average WBGI 2009	-2.221	-18.930	-0.865	-2.27	-0.24
Infant Mortality	1.203	10.253	1.017	2.85	0.30

Human Opportunity Index - Completing Six Year of Education on Time

Dependent Variable	Coefficient on HOI in IV regression (for whole sample without regional dummies)	Change in dependent variable in response to 1 standard deviation change in HOI	Ratio to 1 standard deviation dependent variable	% change as a result of a 1 point increase in HOI	% change as a result of a 1 % increase in HOI
Log of GDP per capita, Average 2005-2010	0.038	0.910	0.803	3.76	0.99
Infant Mortality	-1.036	-25.079	-0.646	-0.63	-0.16
Malnutrition	-0.365	-8.836	-0.773	-0.84	-0.22

D-Index - Completing Six Year of Education on Time

Dependent Variable	Coefficient on HOI in IV regression (for whole sample without regional dummies)	Change in dependent variable in response to 1 standard deviation change in Dindex	Ratio to 1 standard deviation dependent variable	% change as a result of a 1 point increase of D-Index	% change as a result of a 1 % increase in HOI
Log of GDP per capita, Average 2005-2010	-0.067	-0.894	-0.789	-6.70	-1.65
Infant Mortality	1.846	24.641	0.635	1.12	0.28
Malnutrition	0.63	8.409	0.736	1.46	0.36

Table 8A - Robustness Checks: Effect of Equality of Opportunity on Economic Development
Human Opportunity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009

Controlling for Ethnic Fractionalization

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Index of Ethnic Fractionalization (0-Low to 1-high)	-2.505*** (0.43)	0.343 (0.47)	-1.075 (0.66)
Human Opportunity Index*		0.040*** (0.01)	0.028** (0.01)
constant	9.420*** (0.22)	6.942*** (0.44)	8.054*** (0.81)
R-sqr	0.158	0.577	
Number of Observations	183	60	48
Wald F-statistics from first stage			13.591

Controlling for Legal Origin

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Human Opportunity Index*		0.038*** (0.00)	0.043*** (0.01)
British Legal System	-0.344 (0.36)	0.658*** (0.17)	0.673** (0.22)
French Legal System	-0.467 (0.32)	0.579*** (0.14)	0.626*** (0.15)
Germany Legal System	2.267** (0.72)	0.692** (0.22)	0.606 (0.33)
Scandinavian Legal System	2.653*** (0.72)	1.082*** (0.22)	0.975*** (0.25)
constant	8.246*** (0.26)	6.545*** (0.20)	6.252*** (0.35)
R-sqr	0.199	0.875	
Number of Observations	142	55	48
Wald F-statistics from first stage			21.485

Controlling for Share of Tropical Land

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
% land area in geographical tropics	-1.927*** (0.23)	0.075 (0.33)	-0.237 (0.64)
Human Opportunity Index*		0.038*** (0.01)	0.031* (0.02)
constant	9.116*** (0.15)	7.133*** (0.36)	7.536*** (1.12)
R-sqr	0.315	0.58	
Number of Observations	158	59	49
Wald F-statistics from first stage			3.306

Controlling for Latitude

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
latitude of country centroid	0.030*** (0.01)	0 (0.00)	0.002 (0.00)
Human Opportunity Index*		0.038*** (0.01)	0.034*** (0.01)
constant	7.565*** (0.15)	7.179*** (0.30)	7.253*** (0.44)
R-sqr	0.207	0.58	
Number of Observations	158	59	49
Wald F-statistics from first stage			17.839

Controlling for Longitude

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
longitude of country centroid	-0.002 (0.00)	-0.003 (0.00)	-0.003** (0.00)
Human Opportunity Index*		0.039*** (0.00)	0.036*** (0.01)
constant	8.250*** (0.14)	7.154*** (0.29)	7.242*** (0.37)
R-sqr	0.006	0.599	
Number of Observations	158	59	49
Wald F-statistics from first stage			21.201

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 8B - Robustness Checks: Effect of Equality of Opportunity on Economic Development
Dissimilarity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009
Controlling for Ethnic Fractionalization

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Index of Ethnic Fractionalization (0-Low to 1-high)	-2.505*** (0.43)	0.192 (0.51)	-1.004 (0.73)
Dissimilarity Index*		-0.095*** (0.01)	-0.079* (0.03)
constant	9.420*** (0.22)	10.622*** (0.20)	10.714*** (0.19)
R-sqr	0.158	0.496	
Number of Observations	183	60	48
Wald F-statistics from first stage			11.346

Controlling for Legal Origin

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Dissimilarity Index*		-0.092*** (0.01)	-0.115*** (0.02)
British Legal System	-0.348 (0.36)	0.679** (0.20)	0.600* (0.29)
French Legal System	-0.494 (0.32)	0.489** (0.16)	0.548** (0.19)
Germany Legal System	2.213** (0.72)	0.852** (0.25)	0.682* (0.31)
Scandinavian Legal System	2.599*** (0.72)	1.193*** (0.25)	1.016*** (0.25)
constant	8.300*** (0.27)	10.070*** (0.16)	10.342*** (0.24)
R-sqr	0.2	0.82	
Number of Observations	142	55	48
Wald F-statistics from first stage			12.814

Controlling for Share of Tropical Land

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
% land area in geographical tropics	-1.927*** (0.23)	-0.119 (0.35)	-0.207 (0.66)
Dissimilarity Index*		-0.090*** (0.01)	-0.088* (0.04)
constant	9.116*** (0.15)	10.623*** (0.17)	10.520*** (0.37)
R-sqr	0.315	0.503	
Number of Observations	158	59	49
Wald F-statistics from first stage			2.313

Controlling for Latitude

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
latitude of country centroid	0.030*** (0.01)	0.002 (0.00)	0.003 (0.00)
Dissimilarity Index*		-0.089*** (0.01)	-0.093*** (0.02)
constant	7.565*** (0.15)	10.530*** (0.26)	10.451*** (0.35)
R-sqr	0.207	0.505	
Number of Observations	158	59	49
Wald F-statistics from first stage			11.074

Controlling for Longitude

Regression	Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
longitude of country centroid	-0.002 (0.00)	-0.002 (0.00)	-0.003* (0.00)
Dissimilarity Index*		-0.094*** (0.01)	-0.099*** (0.02)
constant	8.250*** (0.14)	10.684*** (0.17)	10.650*** (0.22)
R-sqr	0.006	0.517	
Number of Observations	158	59	49
Wald F-statistics from first stage			14.576

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 9A - Robustness Checks: Effect of Equality of Opportunity on Institutional Quality

Human Opportunity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009

Controlling for Ethnic Fractionalization

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Index of Ethnic Fractionalization (0-Low to 1-high)	-44.247*** (6.76)	0.073 (8.06)	-9.338 (11.02)
Human Opportunity Index*		0.783*** (0.09)	0.740*** (0.17)
constant	67.794*** (3.44)	18.444* (7.60)	23.131 (14.37)
R-sqr	0.188	0.658	
Number of Observations	187	60	48
Wald F-statistics from first stage			13.591

Controlling for Legal Origin

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Human Opportunity Index*		0.762*** (0.08)	0.957*** (0.12)
British Legal System	2.821 (5.75)	9.493* (4.29)	7.547 (4.46)
French Legal System	-6.042 (5.14)	9.046* (3.54)	11.288* (4.92)
Germany Legal System	42.788*** (11.44)	10.966 (5.54)	7.406 (8.22)
Scandinavian Legal System	51.321*** (11.44)	19.569*** (5.53)	16.394** (4.95)
constant	44.444*** (4.21)	11.598* (5.37)	-1.385 (9.17)
R-sqr	0.239	0.79	
Number of Observations	144	55	48
Wald F-statistics from first stage			21.485

Controlling for Share of Tropical Land

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
% land area in geographical tropics	-26.318*** (3.92)	1.676 (5.77)	12.03 (9.74)
Human Opportunity Index*		0.794*** (0.09)	1.005*** (0.23)
constant	58.603*** (2.65)	17.599** (6.33)	1.051 (16.23)
R-sqr	0.219	0.655	
Number of Observations	163	59	49
Wald F-statistics from first stage			3.306

Controlling for Latitud

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
latitude of country centroid	0.376*** (0.08)	-0.09 (0.07)	-0.119 (0.10)
Human Opportunity Index*		0.830*** (0.08)	0.878*** (0.15)
constant	37.923*** (2.63)	18.646*** (5.13)	15.343 (7.67)
R-sqr	0.12	0.665	
Number of Observations	163	59	49
Wald F-statistics from first stage			17.839

Controlling for Longitude

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
longitude of country centroid	-0.043 (0.04)	-0.055* (0.03)	-0.082* (0.03)
Human Opportunity Index*		0.803*** (0.07)	0.821*** (0.11)
constant	46.779*** (2.21)	18.086*** (5.04)	15.866* (7.11)
R-sqr	0.008	0.678	
Number of Observations	163	59	49
Wald F-statistics from first stage			21.201

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 9B - Robustness Checks: Effect of Equality of Opportunity on Institutional Quality
Dissimilarity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009
Controlling for Ethnic Fractionalization

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Index of Ethnic Fractionalization (0-Low to 1-high)	-44.247*** (6.76)	-4.193 (9.35)	-7.488 (13.41)
Dissimilarity Index*		-1.794*** (0.26)	-2.069** (0.61)
constant	67.794*** (3.44)	90.581*** (3.57)	93.098*** (4.32)
R-sqr	0.188	0.541	
Number of Observations	187	60	48
Wald F-statistics from first stage			11.346

Controlling for Legal Origin

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
Dissimilarity Index*		-1.744*** (0.23)	-2.573*** (0.55)
British Legal System	2.821 (5.75)	10.711* (5.10)	5.979 (5.98)
French Legal System	-6.042 (5.14)	7.527 (4.19)	9.748 (6.76)
Germany Legal System	42.788*** (11.44)	15.047* (6.50)	9.146 (8.12)
Scandinavian Legal System	51.321*** (11.44)	22.728** (6.53)	17.319** (5.42)
constant	44.444*** (4.21)	79.935*** (4.08)	89.522*** (6.41)
R-sqr	0.239	0.703	
Number of Observations	144	55	48
Wald F-statistics from first stage			12.814

Controlling for Share of Tropical Land

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
% land area in geographical tropics	-26.318*** (3.92)	-3.104 (6.55)	12.987 (17.30)
Dissimilarity Index*		-1.792*** (0.26)	-2.815** (1.04)
constant	58.603*** (2.65)	89.347*** (3.14)	96.860*** (8.55)
R-sqr	0.219	0.538	
Number of Observations	163	59	49
Wald F-statistics from first stage			2.313

Controlling for Latitude

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
latitude of country centroid	0.376*** (0.08)	-0.041 (0.08)	-0.102 (0.11)
Dissimilarity Index*		-1.901*** (0.25)	-2.392*** (0.58)
constant	37.923*** (2.63)	91.473*** (4.83)	97.848*** (8.69)
R-sqr	0.12	0.539	
Number of Observations	163	59	49
Wald F-statistics from first stage			11.074

Controlling for Longitude

Regression	Dependent Variable: Institutions, Average WBGI 2009		
Instrument: Log of Wheat Sugar Sustainability	OLS	OLS	IV
longitude of country centroid	-0.043 (0.04)	-0.048 (0.03)	-0.087* (0.04)
Dissimilarity Index*		-1.893*** (0.23)	-2.267*** (0.42)
constant	46.779*** (2.21)	90.692*** (3.17)	93.971*** (4.34)
R-sqr	0.008	0.554	
Number of Observations	163	59	49
Wald F-statistics from first stage			14.576

* p<0.05, ** p<0.01, *** p<0.001

*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009

Table 10 - Overidentification Test

A) GDP per capita		B) Institutional Quality	
Dependent Variable: Logarithm of Per Capita Income, Average 2005-2010		Dependent Variable: Institutions, Average WBGI 2009	
	IV		IV
Human Opportunity Index* - PISA Test Scores	0.036*** 0.005	Human Opportunity Index* - PISA Test Scores	0.749*** 0.109
Constant	7.17*** 0.354	Constant	19.61** 7.107
Number of Observations	49	Number of Observations	49
Wald F Statistic (First Stage)	46.515	Wald F Statistic (First Stage)	46.515
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic	0.668	Hansen J Statistic	0.203
D-Index* - PISA Test Scores	-0.099*** 0.021	D-Index* - PISA Test Scores	-2.053*** 0.4308713
Constant	10.62*** 0.222	Constant	90.682*** 4.725435
Number of Observations	49	Number of Observations	49
Wald F Statistic (First Stage)	16.832	Wald F Statistic (First Stage)	16.832
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic	0.740	Hansen J Statistic	0.329
		* p<0.05, ** p<0.01, *** p<0.001	
		*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009	
		**Completing Six Year of Education on Time, Household Survey Data	
		C) Infant Mortality	
		Dependent Variable: Infant Mortality	IV
Human Opportunity Index* - PISA Test Scores		Human Opportunity Index* - PISA Test Scores	-0.367*** 0.057
Constant		Constant	35.61*** 4.141
Number of Observations		Number of Observations	49
Wald F Statistic (First Stage)		Wald F Statistic (First Stage)	46.515
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic		Hansen J Statistic	0.012
D-Index* - PISA Test Scores		D-Index* - PISA Test Scores	1.00*** 0.203
Constant		Constant	0.8 1.815
Number of Observations		Number of Observations	49
Wald F Statistic (First Stage)		Wald F Statistic (First Stage)	16.832
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic		Hansen J Statistic	0.038
D) Malnutrition			
Dependent Variable: Malnutrition			
	IV		
Human Opportunity Index** - Six Grade on Time	-0.49*** 0.146	Human Opportunity Index** - Six Grade on Time	-1.16*** 0.315
Constant	30.24*** 4.053	Constant	89.69*** 9.675
Number of Observations	48	Number of Observations	53
Wald F Statistic (First Stage)	4.405	Wald F Statistic (First Stage)	4.853
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic	0.303	Hansen J Statistic	0.128
Dissimilarity Index** - Six Grade on Time	0.843*** 0.145	Dissimilarity Index** - Six Grade on Time	2.00*** 0.465
Constant	-3.83944 3.226	Constant	8.813 10.326
Number of Observations		Number of Observations	53
Wald F Statistic (First Stage)	8.649	Wald F Statistic (First Stage)	10.635
Overidentification test p-value:		Overidentification test p-value:	
Hansen J Statistic	0.979	Hansen J Statistic	0.589
		* p<0.05, ** p<0.01, *** p<0.001	
		*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009	
		**Completing Six Year of Education on Time, Household Survey Data	
		* p<0.05, ** p<0.01, *** p<0.001	
		*Average Mathematics, Reading and Science Outcomes Level 2 - PISA 2009	
		**Completing Six Year of Education on Time, Household Survey Data	

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Appendix 1

Table A1 - 1 - Description of Variables

Equality of Opportunity Measures

INDICATOR NAME	DESCRIPTION
HOI - Level 2 PISA Test Scores	A basic opportunity is defined as achieving level 2 understanding of the topics cover in each test, Mathematics, Reading and Science. Level 2 indicates very basic understanding of the topics covered that should be covered in class. The circumstances used are the following: A measure of wealth, calculated using principal component methodology based on asset ownership, gender, parental education, school location and head of household occupation. The formula to compute this index is $HOI = \bar{p} (1 - D)$ where $\bar{p}$ is the average access and D is the Dissimilarity Index (henceforth, D-Index) that measures the inequality in access due to circumstances that are exogenous
Dindex HOI - Level 2 PISA Test Scores	See the formula used to compute this formula in the text.
HOI, Dindex, Coverage - Completing Six Years of Education on Time	In this case the opportunity is completing six grade on time. It is considered that the opportunity is met if for the population of children between 12 and 16 years old they achieve at least six years of education. The circumstances used are: gender of the child, location, head of household education, per capita family income, number of children in the household, family structure (both parents present).
HOI, Dindex, Coverage - School Attendance for children among 10-14 years old	In this case the opportunity is school attendance for children between 10 and 14 years old. The circumstances used are: gender of the child, location, head of household education, per capita family income, number of children in the household, family structure (both parents present).
HOI, Dindex, Coverage - Starting Educational Experience on Time	In this case the opportunity is starting the educational experience on time. It is considered that the opportunity is met if for the population of children between 6 and 7 years old is currently attending school and this is his/her first year of education or more. The circumstances used are: gender of the child, location, head of household education, per capita family income, number of children in the household, family structure (both parents present).

Historical Proxies for Equality of Opportunity Measures

INDICATOR NAME	DESCRIPTION
Index of Knowledge Distribution	Tutu Vanhanen's index of knowledge distribution. The index is computed by calculating the arithmetic mean of Students and Literates. Number of students: the variable denotes how many students there are in universities and other higher education institutions per 100.000 inhabitants of the country. Two ways are used to calculate the percentage of Students (%): before the year 1988 the value 1000 of the variable Number of students is equivalent to 100% and between the years 1988-1998 the value 5000 of the same variable is equivalent to 100%. 4) Literates (%) (as a percentage of adult population).

Historical Proxies for Institutional Quality

INDICATOR NAME	DESCRIPTION
VHcomp	Tutu Vanhanen's measure on political competition. Measure used to denote the electoral success of the smaller parties, i.e., the proportion of the votes won by those parties in parliamentary and/or presidential elections, to indicate the degree of competition in a given political system. This figure is calculated by subtracting the percentage of the votes won by the largest party from 100 percent.
VHpart	Tutu Vanhanen's measure on political participation. The percentage of the population that actually voted in these elections is used as a measure of the degree of electoral participation. It should be noted that this percentage is calculated from the total population, not from the adult population or from the enfranchised population. Because these two variables are assumed to represent different dimensions of democratization, it is plausible to assume that a combination of the two would be a more realistic indicator of democratization than either of them alone.
Index of Democratization	Tutu Vanhanen's index of democracy. The index is computed by multiplying the competition and participation variables and by dividing the outcome by 100.
Polity Index	Revised Combined Polity Score: This variable is a modified version of the POLITY variable added in order to facilitate the use of the POLITY regime measure in time-series analyses. It modifies the combined annual POLITY score by applying a simple treatment, or "fix," to convert instances of "standardized authority scores" (i.e., -66, -77, and -88) to conventional polity scores (i.e., within the range, -10 to +10). Please See POLITY codebook for more details

Development Outcome Measures

INDICATOR NAME	DESCRIPTION
Average Indicator Institutional Quality (WBGI)	Average for 2009 of all 6 measures of World Bank Governance Indicator. The explanation of the six component is describe below. Source WGI- World Bank
Voiceacc	Voice and Accountability: Measures the extent to which country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Coded from -2.5 to 2.5 with higher values corresponding with better governance outcomes. Source WGI- World Bank
Polstab	Political Stability: Measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including domestic violence and terrorism. Coded from -2.5 to 2.5 with higher values corresponding with better governance outcomes. Source: WGI- World Bank
Govteffec	Government Effectiveness: Measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Coded from -2.5 to 2.5 with higher values corresponding with better governance outcomes. Source: WGI-World Bank
Regqual	Regulatory Quality: Measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Coded from -2.5 to 2.5 with higher values corresponding with better governance outcomes. Source: WGI-World Bank
Ruleoflaw	Rule of Law: Measures the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. Coded from -2.5 to 2.5 with higher values corresponding with better

	governance outcomes. Source: WGI- World Bank
Corruptcont	Corruption Control: Measures the extent to which public power is exercised for private gain, including petty and grand forms of corruption, as well as “capture” of the state by elites and private interests. Coded from -2.5 to 2.5 with higher values corresponding with better governance outcomes. Source: WGI- World Bank
Log of GDP per capita	GDP (constant 2005 US\$). Log GDP per capita is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2005 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2005 official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used. I use the average from 2005-201 of this measure. Source: World Bank national accounts data, and OECD National Accounts data files.
Average GINI 1960-2010	Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality. Source: World Bank staff estimates based on primary household survey data obtained from government statistical agencies and World Bank country departments. For more information and methodology, please see PovcalNet (http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp).
Malnutrition	Malnutrition prevalence, weight for age (% of children under 5). Prevalence of child malnutrition is the percentage of children under age 5 whose weight for age is more than two standard deviations below the median for the international reference population ages 0–59 months. The data are based on the WHO’s new child growth standards released in 2006. Source: World Health Organization, Global Database on Child Growth and Malnutrition.
Infant Mortality	Mortality rate, infant (per 1,000 live births). Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year. Source: Harmonized estimates of the World Health Organization, UNICEF, and the World Bank, based mainly on household surveys, censuses, and vital registration, supplemented by World Bank estimates based on household surveys and vital registration.

Appendix 2

Computation of the HOI and D-Index

We estimate the HOI and D-Index econometrically as follows. To obtain the conditional probabilities of access to an opportunity for each individual in the sample based on his/her circumstances, a logistic model is estimated, linear in the parameters β , where the event I corresponds to accessing the opportunity and x the set of circumstances:

$$\ln \left(\frac{\Pr\{I = 1 | X = (x_1, \dots, x_n)\}}{1 - \Pr\{I = 1 | X = (x_1, \dots, x_n)\}} \right) = \sum_{k=1}^n x_k \beta_k$$

where x_k denotes the row vector of variables representing n circumstances and β_k a corresponding column vector of parameters. From the estimation of regression above, one obtains estimates of the parameters $\{\beta_k\}$, denoted as $\{\hat{\beta}_{k,m}\}$, where m denotes the sample size. Given the estimated coefficients, one can obtain for each individual in the sample his/her predicted probability of the opportunity in consideration:

$$\hat{p}_{i,m} = \frac{\text{Exp}(x_i \hat{\beta}_m)}{1 + \text{Exp}(x_i \hat{\beta}_m)}$$

Using the predicted probabilities ($\hat{p}$) and sample weights (w_i), we can find the predicted overall coverage rate ($\hat{\bar{p}}$) and D-index ($\hat{D}$) as:

$$\begin{aligned} \hat{\bar{p}} &= \sum_{i=1}^m w_i \hat{p}_{i,m} \\ \hat{D} &= \frac{1}{2\hat{C}} \sum_{i=1}^m w_i |\hat{p}_{i,m} - \bar{p}| \quad (\text{Note: } \hat{\bar{p}} = \bar{p}) \\ \hat{H} &= \hat{C}(1 - \hat{D}) \end{aligned}$$

An important caveat is that the list of regressors does not include any interaction terms between circumstances (e.g. between parental education and location). Given the number of circumstances we have (all of which are dummy variables), limited sample sizes, and the large number of countries and opportunities for which these regressions have to be run, including interactions would lead to intractable problems in at least some of the cases. The interaction terms are thus omitted, even though translating the exact definition of D-Index to the logistic regression model would require including these terms. If the interactions were included, it would result in a higher D-Index (and lower HOI), just as it would happen if more circumstances were added. This in turn implies that the estimated D-Index for all countries and opportunities is the *lower bound* of inequality of opportunities (and the estimated HOI is the upper bound) for a given set of circumstances.

Table A.2-1: Summary statistics of the Variables

Variable Name	N	Mean	Std. Dev.	Min	Max
<i>Equality of Opportunity Measures</i>					
Human Opportunity Index - Level 2 PISA Test Scores	65	67.32	21.98	9.61	95.47
Dissimilarity Index - Level 2 PISA Test Scores	65	10.08	8.29	1.41	42.46
Coverage - Level 2 PISA Test Scores	65	73.02	19.92	16.53	96.83
Geometric HOI - Level 2 PISA Test Scores	65	70.16	22.24	8.99	96.58
Geometric D- Index - Level 2 PISA Test Scores	65	6.1	8.78	0.2	46.77
HOI - Completing Six Years of Education on Time	82	29.57	26.96	0.72	90.85
D-Index - Completing Six Years of Education on Time	82	22.91	13.65	1.55	65.73
Coverage - Completing Six Years of Education on Time	82	34.33	27.22	1.45	93.34
Geometric HOI - Completing Six Years of Education on Time	82	31.44	27.87	0.6	92.99
Geometric D-Index - Completing Six Years of Education on Time	82	17.38	14.79	0.09	66.1
HOI - School Attendance for children 10-14	69	74.38	20.6	13.46	98.94
D-Index - School Attendance for children 10-14	69	6.33	6.28	0.3	28.9
Coverage -School Attendance for children 10-14	69	78.27	18.49	17.88	99.24
Geometric HOI - School Attendance for children 10-14	69	77.11	19.81	14.13	99.24
Geometric D-Index - School Attendance for children 10-14	69	5.24	6.72	0	30.44
HOI - Starting Educational Experience on Time	78	48.4	29.09	3.14	99.24
D-Index - Starting Educational Experience on Time	78	11.24	8.77	0.1	38.48
Coverage - Starting Educational Experience on Time	78	52.18	28.58	4.26	99.4
Geometric HOI - Starting Educational Experience on Time	78	50.78	29.26	3.39	99.34
Geometric D-Index - Starting Educational Experience on Time	78	5.51	6.97	0	30.44
<i>Historical Proxies for Equality of Opportunity Measures</i>					
Index of Knowledge Distribution (1858)	37	13.54	15.4	0.5	47.5
Index of Knowledge Distribution (1868)	39	15.21	15.92	0.5	48.5
Index of Knowledge Distribution (1878)	41	17.5	16.74	0.5	49.5
Index of Knowledge Distribution (1888)	42	19.43	17.25	0.5	53
Index of Knowledge Distribution (1898)	42	21.69	17.68	1	56
Index of Knowledge Distribution (1908)	47	24.85	17.8	1.5	60
Index of Knowledge Distribution (1918)	51	26.77	18.4	0.5	65
Index of Knowledge Distribution (1928)	59	29.59	19.18	0.5	66
Index of Knowledge Distribution (1938)	60	32.42	20.52	0.5	75.5
Index of Knowledge Distribution (1948)	71	33.35	21.26	1	92.5
Index of Knowledge Distribution (1958)	83	35.24	21.53	1.5	98.5
Index of Knowledge Distribution (1968)	113	34.45	25.2	0.5	99
Index of Knowledge Distribution (1978)	114	41.02	27.37	1	99.5
Index of Knowledge Distribution (1988)	145	40.8	22.14	0	99.5
Index of Knowledge Distribution (1998)	172	48.42	20.82	9.5	99.5
<i>Development Outcomes</i>					
Log of GDP per capita at current USD - Average for 2005-2010	195	8.34	1.64	4.88	12.04
Average Indicator Institutional Quality (WBGI)	210	49.9	26.51	0.4	97.95
Infant Mortality	191	38.1	35.9	2.08	165
Malnutrition	104	16.51	12.25	0.6	43.5

Table A.2-2: Correlations Among Different Measures of Equality of Opportunity

	HOI - PISA 2009	Dindex - PISA 2009	HOI - PISA- Geometric	Dindex - PISA- Geometric	HOI - Finish 6 on Time - Geo	DIndex - Finish 6 on Time - Geo
HOI PISA 2009	1	-0.969***	0.998***	-0.864***	0.4156	-0.4854
p-value	0.00000	0.00000	0.00000	0.00000	0.1791	0.1097
Number of Observations	65	65	65	65	12	12
D Index - PISA 2009	-0.969***	1	-0.969***	0.966***	-0.4775	0.5764*
p-value	0.00000	0.00000	0.00000	0.00000	0.1164	0.0498
Number of Observations	65	65	65	65	12	12
Coverage - PISA 2009	0.998***	-0.962***	0.998***	-0.869***	0.39	-0.4626
p-value	0.00000	0.00000	0.00000	0.00000	0.2100	0.13
Number of Observations	65	65	65	65	12	12
HOI - Finish 6 on Time	0.4216	-0.4863	0.4594	-0.5276	0.999***	-0.851***
p-value	0.1722	0.1089	0.1329	0.0779	0.00000	0.00000
Number of Observations	12	12	12	12	82	82
DIndex - Finish 6 on Time	-0.507	0.6056*	-0.5429	0.6353*	-0.764***	0.978***
p-value	0.0925	0.0369	0.0681	0.0264	0.00000	0.00000
Number of Observations	12	12	12	12	82	82
Coverage - Finish 6 on Time	0.4031	-0.4604	0.4411	-0.5049	0.996***	-0.844***
p-value	0.1938	0.1321	0.1512	0.0941	0.00000	0.00000
Number of Observations	12	12	12	12	82	82
HOI - Attendance 10-14	-0.1031	0.2176	-0.1195	0.2264	0.531***	-0.613***
p-value	0.7918	0.5738	0.7594	0.558	0.00000	0.00000
Number of Observations	9	9	9	9	69	69

* p<0.05, ** p<0.01, *** p<0.001

Table A.2-3: Correlations Among Different Instruments

	Log of Wheat Sugar Sustainability	Share of Tropical Land	Legal Origin	Ethnic Fractional.	Longitude	Latitude
Share of Tropical Land	-0.7437***	1				
p-value	0.00000					
Number of Observations	115	168				
Legal Origin	3 of 5	5 of 5	1			
p-value						
Number of Observations	109	141	144			
Ethnic Fractionalization	-0.3398***	0.5020***	3 of 5	1		
p-value	0.0002	0.0000				
Number of Observations	117	157	144	189		
Longitude	0.1312	-0.223**	2 of 5	-0.1256	1	
p-value	0.1623	0.004		0.1169		
Number of Observations	115	164	141	157	164	
Latitude	0.498***	-0.622***	5 of 5	-0.335***	0.0747	1
p-value	0.0000	0.0000		0.0000	0.3419	
Number of Observations	115	164	141	157	164	164

* p<0.05, ** p<0.01, *** p<0.001

Table A.2-4: Correlations Among Different Instruments and Measures of Equality of Opportunity

	Log of Wheat Sugar Ratio	Share of Tropical Land	Ethnic Fractionaliz.	Latitude	Longitude	Legal Origin - Fstat
Human Opportunity Index PISA 2009	0.5768***	-0.4873***	-0.4842***	0.421***	0.1402	4.62**
p-value	0.0000	0.0001	0.0001	0.0009	0.2894	0.0029
Number of Observations	49	59	60	59	59	56
D Index - PISA 2009	-0.5425***	0.4587***	0.4859***	-0.394***	-0.1296	3.43*
p-value	0.0000	0.0003	0.0001	0.0020	0.3278	0.0148
Number of Observations	49	59	60	59	59	56
HOI - Finish 6 on Time	0.2259	-0.441***	-0.383***	0.0564	-0.1002	1.72
p-value	0.0972	0.0001	0.0005	0.6430	0.4091	0.1873
Number of Observations	55	70	79	70	70	64
DIndex - Finish 6 on Time	-0.1639	0.449***	0.426***	-0.1925	0.0955	3.21
p-value	0.2318	0.0001	0.0001	0.1103	0.4316	0.047*
Number of Observations	55	70	79	70	70	64
HOI - Attendance 10-14	-0.0643	-0.0831	-0.311*	-0.1925	0.0955	2.38
p-value	0.6642	0.5313	0.011	0.1103	0.4316	0.1027
Number of Observations	48	59	66	70	70	54

* p<0.05, ** p<0.01, *** p<0.001

Table A.2-5: Effects of Geometric Measures of HOI or D-Index on Development Outcomes**Geometric Human Opportunity Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009**

Dependent Variable	Coefficient on HOI or D in IV regression (for whole sample without regional dummies)	Change in dependent variable in response to 1 standard deviation change in HOI or D	Ratio to 1 standard deviation dependent variable	% change as a result of a 1 point increase in HOI or D	% change as a result of a 1 % increase in HOI or D
Log of GDP per capita, Average 2005-2010	0.034	0.767	0.677	3.41	2.35
Institutional Index, Average WBGI 2009	0.781	17.6	1.025	0.80	0.55
Infant Mortality	-0.423	-9.5	-0.943	-1.00	-0.69

Geometric D-Index - Average Mathematics, Reading and Science Outcomes for Level 2 - PISA 2009

Log of GDP per capita, Average 2005-2010	-0.096	-0.888	-0.824	-9.56	-0.62
Institutional Index, Average WBGI 2009	-2.186	-20.301	-0.927	-2.23	-0.14
Infant Mortality	1.184	10.995	1.091	2.80	0.18

Geometric Human Opportunity Index - Completing Six Year of Education on Time

Log of GDP per capita, Average 2005-2010	0.038	0.910	0.803	3.76	0.99
Infant Mortality	-1.036	-25.079	-0.646	-0.63	-0.16
Malnutrition	-0.365	-8.836	-0.773	-0.84	-0.22

Geometric D-Index - Completing Six Year of Education on Time

Log of GDP per capita, Average 2005-2010	-0.066	-0.887	-0.782	-6.64	-1.63
Infant Mortality	1.829	24.418	0.629	1.11	0.27
Malnutrition	0.615	8.210	0.718	1.42	0.35

Figure A.2-1

Figure A2-2