The Colonial and Geographic Origins of Comparative Development

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Abstract

While the direct impact of geographic endowments on prosperity is present in all countries, in former colonies, geography has also affected colonization policies and institutional outcomes. Thus, one can disentangle the partial effects of endowments and institutions on income by utilizing the interaction of geography and colonial experience. I first document that climate and disease did affect institutional development in the group of former colonies while this is not the case in the rest of the world. Second, I develop an empirical strategy that identifies the relation between institutions and income but that also accounts for the direct effect of endowments. I find that institutions are the main determinant of development and that endowments also have a sizeable direct impact on development. Third, I highlight the importance of disease environment for both colonization policies and income directly.

Keywords: Growth, Institutions, Geography, Comparative Development, Colonialism

JEL Codes: O11, P16, P51, R11, N50, F54

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Is the large inequality in the wealth of nations a result of man-made history, or is it the inevitable consequence of nature and geography that some countries are poor while others prosper? In this paper, I estimate the partial effects of institutions and geographic endowments on income.

The paper's main contribution is to show how the interplay of geographic variation and historical events can be utilized to identify the determinants of development. While the direct impact of climate and disease on development is present in all countries, geography had an additional effect on institutional development in former colonies through its impact on how a country was colonized. This difference in how geography affected development can be used to distinguish the geographic from the institutional channel of development.

I find that both geographic endowments and institutional outcomes are statistically and economically significant determinants of prosperity. I also document that the rivalling literatures arguing for the importance of either endowment or institutions both overestimate the importance of their starting hypothesis.

The second contribution of this paper is to document that by and large, the main channel through which endowments shape economic development is the prevalence of disease. I first construct a measure of the geographic potential for disease and then show that disease environment – via its influence on settler mortality rates – was a major determinant of colonization policies and that it continues to have a strong direct impact on prosperity, even today.

1 Introduction

Two rivaling schools of thought emphasize either geographic endowments or institutions as the main determinant of comparative development. The "endowments" school of thought, developed among others by Diamond (1997), Bloom and Sachs (1998), and Gallup et al. (1998), argues that climate, the quality of soil, and other geographic features directly impact the prevalence of disease, the productivity of labor, and prosperity.

In contrast, the "institutions" school, pioneered in its modern form by North (1981), emphasizes the organization of society as the main determinant of comparative development. This hypothesis has received strong support from the work of Mauro (1995), La Porta et al. (1998), Acemoglu et al. (2001 and 2002), and Feyrer and Sacerdote (2007). These authors instrument for the endogenous quality of institutions with the ones induced by the course of history. They find that a large share of the variation in international income levels can be attributed to differences in institutional quality. Moreover, a frequent finding of this literature is that, once the quality of institutions is accounted for, endowments matter only marginally for development.

It is fair to say that the literature arguing for the importance of institutions – termed the "new comparative economics" by Djankov et al. (2003) – is now the dominant view of development.[1] This view, however, it is not free from criticism. A major concern is that the instrumental variables used to establish the effect of institutions are collinear with endowment and early economic development and that the instrumentation strategies are, therefore, invalid. In essence, it can be argued that, while the new comparative economics literature has come up with natural experiments that caused variation in the quality of institutions, it has not come up with a clear control group that distinguishes the impact of institutions from the direct effects of geography. I set out to build such a control group.

The key insight of this study is that one can use the interaction of history and geography to estimate the partial effects of institutions and geographic endowments on prosperity. Historical events created variation in how endowments have shaped development: in the course of colonization, geographic location has affected the nation by whom a country was colonized. Disease environment, the resulting mortality rates of European settlers and early prosperity levels have determined the way in which a country was colonized. What distinguishes the direct impact of endowments on income from the indirect impact of endowments on colonization policies is the following. While the direct impact is present in all countries, the institutional channel applies only to a subset of countries, namely former colonies.[2]

The analysis of this paper proceeds in three steps. In the first step, I note that most instrumental variables put forward by the new comparative economics literature are highly collinear with geography. I also document that simple measures of geography, such as temperature, eleva-

[1] See also Easterly and Levine (2003) or Rodrik et al. (2004).

[2] This insight is related to Nunn and Puga (2007), who argue that internal transportation costs played a different role in Africa and in the rest of the world. The insight is also related to Acemoglu et al. (2005), who argue that the rise of Atlantic trade had a different effect in countries with different initial institutions.

tion, or rainfall, had a different effect on development in former colonies and in the rest of the world. I then show how the partial effects of endowments and institutions on prosperity can be disentangled in a sample including both former colonies and non-colonized countries.

The difference between the empirical analysis developed in this study and the existing literature is the following: I identify the relation between income and institutions by assuming that the difference in how endowments have shaped development in former colonies and in the rest of the world is the exclusive result of the institutions brought about by colonization.[3] In contrast to the existing literature, this identification does not restrict the common effect of endowments on prosperity to be absent. It therefore allows testing whether endowments do have a direct impact on development.

In the second step of the analysis, I demonstrate that both institutions and endowments are statistically significant and economically relevant determinants of development. I first instrument for institutions by utilizing the differential effect of single measures of geographic endowments (such as temperature, rainfall, elevation). Thereafter, I turn to an estimation in a larger sample, including multiple measures of endowments.

In a typical specification, I find that for a former colony, a 0.01 standard deviation difference in institutional outcomes is associated with a difference of roughly 1.9% in income per capita. A 0.01 standard deviation difference in geographic endowments is associated with a difference of roughly 1.8% in income per capita.

In the third step of the analysis, I document that disease environment is the main channel through which endowments have shaped development. To this end, I construct a measure of the geographic potential for disease, i.e., the level of germs that would prevail if a country was untouched by (Western) civilization. This is done by first estimating the relation between the settler mortality rates collected by Acemoglu et al. (2001) and selected geographic variables, and by then predicting the estimated model for a large set of countries. I then estimate the partial effects of disease environment on colonization policies, institutions, and income.

In a typical specification, I find that, in the group of former colonies, a 1% higher (worse)

[3] This paper does not distinguish the narrow definition of institutions emphasizing laws and the structure of government from the "thicker" definition of institutions, which relates institutional outcomes to an informal set of rules intrinsic to a society.

level of disease is associated with a roughly 1.2% lower level of income per capita. In a baseline estimation of this paper, around 0.9% of the total effect is attributed to the institution-building channel, i.e., the impact that settler mortality rates had on colonization policies and institutions. The remaining 0.3% is attributed to the direct impact of disease on income.[4] Moreover, I document that, once the level of disease is accounted for, variables that are often used as general proxies for endowments – a "tropics" dummy or measures of climate – do not matter for development.

After presenting the two main results of this study, I engage in an extensive robustness analysis. I first document that the presented results are not dependent on the inclusion of certain groups of countries such as Africa or the four European offshoots. I address the fact that colonization is endogenous to early development. I adopt different definitions to classify countries into the group of former colonies or the group of non-colonized countries. Last, I include other instruments for institutions to the estimation and present the associated overidentification-tests.

For these robustness tests, I find results that emphasize the basic finding of this study: both geography and institutions are statistically significant and economically relevant determinants of development. This study also reconciles the contrasting findings of the existing literature arguing for the importance of either endowments or institutions. In the new comparative economics literature, identifying the relation between institutions and income attributes all of the correlation between endowments and income to the impact of institutions. Similarly, the economic geography literature attributes all of this correlation to the direct impact of endowments. Consequently, any study that does not allow for the presence of both channels of development is biased in the direction of its starting hypothesis.

The structure of this paper is the following. The Section 2 discusses the instruments of the new comparative economics literature and Section 3 demonstrates how the partial effects of endowment and institutions can be estimated. Section 4 presents the results. Section 5 analyzes the role of disease environment. Sections 7 presents the robustness analysis and Section 8 concludes.

[4] This finding is in line with the results of Weil (2007), who estimates that health has a significant but small effect on income per capita.

2 Two Theories, One Correlation?

The importance of constraints on the government for economic growth has been acknowledged at least since the work of Smith (1776). North (1981) defines institutions as the "norms designed to constrain the behavior of individuals in the interest of [...] the principal" (p. 202). Institutions, however are endogenous to income and the early empirical literature – see for example Knack and Keefer (1995) hence was struggling to establish the causal effect of institutions on economic outcomes.

Starting with Mauro (1995), the literature arguing for the importance of institutions on income therefore instruments for the quality of institutions with the institutions brought forward by a nation's colonization experience.[5] Because also colonization is endogenous to early development, the authors exploit exogenous variation in colonization policies rather than colonization itself to instrument for institutions.

La Porta et al. (1998) propose dummies for the identity of the colonizer as an instrument for institutional outcomes. These authors argue that owing their fundamentally different legal systems, different colonizers such as France and Britain installed different institutions in the countries they colonized.

Acemoglu et al. (2001) put forward the mortality rates of European settlers as a measure of colonization policies. They argue that in places unfavorable to European physiology, the main objective of the colonizers was to extract resources by corrupting local institutions. In contrast, when chances of survival where high, European settlers came in large numbers and the focus of the colonizers was to produce rather than to extract, leading them to install institutions geared towards facilitating production and ensuring property rights.

Related to the settler mortality rates are measures of early prosperity used by Acemoglu et al. (2002). The authors argue that colonizers were more likely to install extractive institutions in initially rich areas, while they installed institutions geared towards investment in initially poor colonies.

[5] Mauro (1995) was the first to instrument for instutions. His work does not focus on colonzation and is tehrefore not discussed in this section. Early empircal studies also include the work of Knack and Keefer (1995).

Feyrer and Sacerdote (2007) instrument for the timing of colonization of islands with the prevailing winds. The authors argue that wind speed and direction influenced the timing of discovery by European sailors and the resulting length of colonization.

These four papers and the large literature deriving from them hold in common the set of four underlying assumptions:

1. The colonization policies adopted by the colonizers created differences in early institutional arrangements.
2. Colonization policies themselves depended on the local conditions prevailing in the respective colony.
3. Early institutional arrangements persist until today.
4. The local conditions shaping colonization policies did not affect development directly and are also not correlated with some unobservable characteristics that influence prosperity.

This paper examines the last of these four assumptions.

It is evident that the instrumental variables developed in the current literature are highly colinear with geographic endowments (see Dollar and Kray (2003) and also Table 1). The mere collinearity between these variables, however, does not invalidate the results of the comparative economics literature: it is possible to control for the effects of endowments by including the respective variables.

What is essential for the analysis of this paper is the fact that variation in geographic endowments itself caused variation in the proposed instruments for institutions. The naval power Britain was more likely to conquer coastal and farther from Europe territories, than was France. The quality of soil, the abundance of natural resources, and climate determined early development and pre-colonial income levels. Climate and landscape also determined the natural prevalence of disease and, therefore, settler mortality rates. While it is very reasonable to argue that the prevailing winds do not have any sizeable direct impact on prosperity, wind directions are correlated with latitude and climate.

To some extent, the literature arguing for the importance of institutions and the literature arguing for the importance of endowments interpret the same correlation very differently. For example, Hall and Jones (1999) use latitude as a measure of "social capital," while others have used it as a proxy for endowments. The settler mortality rate of Acemoglu et al. (2001) were "obviously a function of ecological conditions, and this raises the question of whether [Acemoglu et al. (2001)] unwittingly gave a starring role to geography" (Rodrik (2005), p. 4).

Endowments have shaped colonization policies, but they also have a direct impact on prosperity. The strategy of the current literature is to control for endowments and to then document that the proposed instruments also predict institutional quality conditional on the included variables. This somewhat misses the point: geography itself affected the way in which a country was colonized. Therefore, simply running a horse race between direct measures of endowments and the proposed instruments does not distinguish between the two theories of development. While the impact of endowments and of colonization policies are observationally equivalent in a sample of former colonies, they can be disentangled in a larger sample that also includes non-colonized countries.

The methodology of this paper is best exemplified for the theory of Acemoglu et al. (2001). These authors argue that differences in the mortality rates of European settlers in former colonies led to very different institutional policies pursued by the colonizing nations. This stands in contrast to the endowment view predicting that geography determines a country's disease environment, which has direct consequences for prosperity.

In total, disease environment may have affected development through three distinct channels. First, the geographic view of development predicts a direct effect of disease on income that is common to all countries. Second, geography may also have direct effects on institutions or "culture." Third, the colonial origins theory predicts an effect of disease environment on institutional outcomes for the group of former colonies. These three channels are summarized schematically below.

Geographic Endowments ⇒ Disease Environment
- All Nations ⇒
  - Technology ⇒ Income ⇒ Institutions
  - "Culture" ⇒ Institutions ⇒ Income
- Colonies ⇒ European Settlements ⇒ Institutions ⇒ Income

Since the effect of colonization policies on development is present only in former colonies, it is necessary to show that endowments did affect development differently across former colonies and non-colonized nations. Figure 1 displays two scatter plots relating a simple measure of geography – average temperature from Parker (1997) – to the 1996-to-2004 average of the "rule of law" from Kaufmann et al. (2005), a measure of institutional outcomes. The score for the rule of law is standardized and measured on a continuous scale, and higher values are associated with better outcomes. The upper scatter plot presents this relation for countries that have not been colonized. The lower scatter plot presents the same relation for former colonies. Graphical inspection suggests that there is a negative relation between temperature and the rule of law in the group of former colonies but not in the rest of the sample.

Table 2 formally establishes this observation. In Table 2 and the remainder of this study, the sample consist of all 151 countries in the world that have an available score for the rule of law in Kaufmann et al. (2005), an available 2003 GDP per capita estimate (not PPP adjusted) in the Worldbank's Development Indicators, and a population of more than 500,000. A country is classified as a former colony if it ever has either been an official colony, was under the complete control of an empire-affiliated organization such as the Dutch and British East Indies Companies, had the status of protectorate of a non-adjacent empire, or lost sovereignty over its foreign policy following a military conflict with a non-adjacent empire. This definition classifies 95 countries as former colonies and 56 as countries that have never been colonized ("non-colonies").

3 Identifying the Channels of Development

In Column 1 of Table 2, I regress the score for the rule of law on the standardized average temperature in the sample of former colonies, and I repeat the same estimation in the non-colonies in Column 2. While the relation between temperature and the score for the rule of law is significant and negative in the sample of former colonies, it is positive and insignificant in the sample of non-colonies.

Temperature is not the only variable that had a differential effect on development. Columns 3 and 4 document that the correlation of average rainfall and the rule of law is significantly positive in the group of non-colonies, while there is only a very weak correlation between these two variables in the group of former colonies. Average rainfall is defined as the standardized sum of minimum plus maximum monthly rainfall from Parker (1997).

Also, the influence of average elevation on institutional development is significant in the group of non-colonies, while this is not the case in the rest of the world. The reverse is true for "temperature at maximum humidity," a measure that is low under cold and moist climate conditions. For the case of temperature at maximum humidity, the coefficients in the two groups of countries are even of opposite signs. Both average elevation and temperature at maximum humidity are standardized and come from Parker (1997).

Last, in Columns 9 and 10 of Table 2, I document that also malaria had a differential effect on development. Malaria Ecology is constructed by Kiszewski et al. (2004) and measures the geographic potential for the disease. The correlation between the geographic potential for malaria is significant and negative in the group of former colonies, and the coefficient is estimated at -0.27. In the group of non-colonies, the coefficient is estimated at -0.18 and is not significant.

Many aspects of geography did affect development in one group of countries, yet not in the rest of the sample. This difference in how endowments have shaped development can only be rationalized by the role that endowments played in shaping colonization policies.

I next show how the differential impact of geography can be exploited to estimate the partial effects of institutions and endowments on income. Let Y_i denote the logarithm of GDP per capita and denote the measure of institutional quality in country i by R_i. Denote the measure of geographic endowments by E_i, and denote the measure summarizing European colonization policies by S_i. Last, the dummy C_i equals 1 for former colonies and 0 otherwise. Abstracting from covariates, the joint model of colonization, institutions, and income is given by

$$Y_i = \widetilde{\lambda}_Y + \widetilde{\delta}_Y C_i + \widetilde{\alpha} R_i + \widetilde{\eta}_Y E_i + \widetilde{\nu}_{Y,i} \tag{1}$$

$$R_i = \widetilde{\lambda}_R + \widetilde{\delta}_R C_i + \widetilde{\eta}_R E_i + \widetilde{\beta} Y_i + C_i \widetilde{\theta}_R S_i + \widetilde{\nu}_{R,i} \tag{2}$$

$$S_i = \widetilde{\lambda}_S + \widetilde{\theta}_S E_i + \widetilde{\nu}_{S,i} \tag{3}$$

where (3) applies only to former colonies.

A country's institutions and income level depend on endowments through three potential channels. First, endowments may directly affect technology and income. This channel is measured by $\widetilde{\eta}_Y$ in Equation (1). Second, the analysis allows for a potential direct effect of endowments on institutions, measured by $\widetilde{\eta}_R$ in Equation (2). The latter channel accounts for the possibility that the organization of society and therefore, the quality of institutions, depends directly on climate, disease, and other endowments. Third, the theories relating institutional origin to colonial experience predict that endowments affect colonization policies and, therefore, institutional outcomes in former colonies. The institution-building effect of endowments in former colonies is measured by $\widetilde{\theta}_S$ in (3).

Equation (3) is a reduced-form relation measuring the combined impact of the colonizer identity and on the adopted colonization policies. Implicit in Equation (1) is the assumption that these colonization policies did not influence income per capita directly. I document below that colonization policies did not directly affect growth via the accumulation of human capital, as is argued by Glaeser et al. (2004).

With these three distinct effects in mind, consider an estimation of the reduced form of (1), (2), and (3) in a sample composed of former colonies such that $C_i = 1$ for all observations. In the estimation of Equation (2) in such a sample, the coefficient of endowments could be significant either because colonization policies were affected by endowments ($\widetilde{\theta}_S \widetilde{\theta}_R$), because endowments have a direct effect on institutions ($\widetilde{\eta}_R$), or because endowments directly impact income, which in turn affects institutions ($\widetilde{\beta}\widetilde{\eta}_Y$).

The same reasoning applies when trying to disentangle institutions and income in the (second stage) estimation of Equation (1). The effect of institutions on income could be overstated because the restriction that endowments do not directly affect development ($\widetilde{\eta}_Y = 0$) is needed to identify the system. Due to this restriction, all of the correlation between endowments and income is attributed to the institutional channel, and the coefficient of instrumented institutional quality in (1) is biased if geography also has a direct effect on income.

In contrast, consider an estimation of the reduced form of (1), (2), and (3) in a sample including non-colonized nations.[6]

$$Y_i = \lambda_Y + \lambda'_Y C_i + \alpha \widehat{R}_i + \eta_Y E_i + \upsilon_{Y,i} \quad (4)$$

$$\widehat{R}_i = \lambda_R + \lambda'_R C_i + \eta_R E_i + \theta_R (E_i C_i) + \nu_{R,i} \quad (5)$$

The interpretation of the coefficients in the reduced-form estimation of institutional quality in (5) is as follows. η_R captures the direct effect that geography has on institutional development, while θ_R captures the institution-building effect of endowments, which is exclusively present in former colonies. θ_R in Equation (5) tests the joint hypothesis that endowments affected European settlement policies, European settlement policies affected early institutions, and early institutions persist until today.

The first-stage estimation of the reduced form model in (5) includes the main effect of endowments, a colony dummy, as well as the interaction of these two variables. Since the additional variation in the group of non-colonized countries pins down the coefficient for the direct impact of endowments on development, the estimation can disentangle the relation between institutions and income.

[6] The following relations hold between the coefficients in (1), (2), and (3) and in (5) and (4): $\vartheta_R = \widetilde{\vartheta}_R / \left(1 - \widetilde{\alpha}\widetilde{\beta}\right)$, $\theta_R = \widetilde{\theta}_R \widetilde{\theta}_S / \left(1 - \widetilde{\alpha}\widetilde{\beta}\right)$ and $\vartheta_Y = \widetilde{\vartheta_Y} / \left(1 - \widetilde{\alpha}\widetilde{\beta}\right)$. Furthermore, $\nu_{Ri} = \left(\widetilde{\nu}_{Ri} + C_i \widetilde{\theta}_R \widetilde{\nu}_{Si}\right) / \left(1 - \widetilde{\alpha}\widetilde{\beta}\right)$ demonstrating that there may be heterscedasticity between the two groups of countries. All results presented below are thus estimated with heteroscedasticity robust standard errors.

4 The Partial Effects of Endowments and Institutions

In this section, I present the main result of this paper. In Table 3, I exploited the differential effect of single geographic variables to identify the relation between endowments, institutions, and income. In Table 4, I use a more extensive model of endowments, estimate the partial effects of institutions and endowments, and present some robustness tests.

Table 3 presents the relation between geography, institutions, and income. I use the 2003 GDP per capita estimates from the Worldbank Development Indicators (not PPP adjusted) to measure income. Panel A displays the first stage estimation relating geography to institutional quality, and Panel B displays the second stage estimation relating endowments, instrumented institutional quality, and income.

Columns 1 to 3 highlight the methodology of this paper. In all three models, the independent variable is average temperature. In Column 1, I present the raw correlation between this measure and the logarithm of GDP per capita (Panel B) and the rule of law (Panel A) in the group of former colonies. In Column 2, I reproduce the same regression for the group of non-colonized countries. While average temperature is highly correlated with both institutions and income in the sample of former colonies, this is not the case in the sample of non-colonized nations.

Column 3 exploits the differential impact of temperature to identify the relation between institutions and income. The sample includes all 151 countries, and in the first stage, I introduce the interaction of average temperature and a dummy that equals 1 for former colonies. In the first stage in Panel A, the interaction coefficient is significant and equal to -0.57, the difference between the first stage coefficients in Columns 1 and 2.

The restriction identifying the relation between institutions and income assumes that the difference in how temperature affected development is exclusively driven by institutional outcomes. The instrumented rule of law in Panel B is highly significant, and the coefficient is estimated at 1.92; i.e., a one standard deviation difference in the rule of law is associated with a roughly seven-fold difference in income per capita.[7] Up to rounding, this coefficient equals the difference in how

[7] The instrumental variable varies only in the group of former colonies. The coefficient of 1.92 should, thus, be interpreted as the causal relation between the rule of law and income within the group of former colonies. The relation between these two variables, however, might be different for the rest of the sample.

temperature affected income per capita in the two groups of countries divided by the difference in how temperature affected institutional outcomes in the two groups of countries.

Column 3 also documents that temperature does not have a sizeable direct impact on development. The total direct impact of average temperature estimation is equal to the sum of the direct effect of temperature on income plus the direct effect of temperature on institutions times the effect of institutions on income. At the bottom of Table 3, I report the point estimate for the total effect of temperature on income – 0.11 log points in Column 3 – and a corresponding standard error. The latter information is computed from a reduced-form estimation of income per capita on average temperature, a colony dummy, and the interaction of the two.

I apply the same methodology using average rainfall in Column 4, humidity at maximum temperature in Column 5, average elevation in Column 6, and Malaria Ecology in Column 7. The interaction coefficient is significant at the 5% level in all but one case (Column 7) and is significant at the 1% level in three out of five cases. The point estimate for the importance of institutions for the logarithm of income – with the exception of Column 7 where the instrument is weak – is estimated to lie in the range of 1.54 and 2.26.

The evidence on the direct impact of endowments on prosperity is mixed. Though the direct effect of the geographic variable (in Panel B) on income for a given level of the rule of law is not significant in any of the regressions, in most cases, geography does have an effect on institutions also in countries that have not been colonized. The total effect of geography on income – reported at the bottom of Table 3 – is significant for average rainfall, average elevation, and malaria ecology. The size of the direct impact of geography is economically relevant and also comparable in magnitude to the indirect impact of geography on colonization policies. For example, in the model of Column 4, the interaction effect of average rainfall is of the opposite sign and nearly equal in magnitude to the main effect.

In Table 4, I present a larger model of endowments that uses average temperature, average elevation, and average rainfall to identify the determinants of development. The structure of Table 4 mirrors the one of Table 3. Panel A presents the first stage relating geography and colonial history to institutional outcomes measured by the 1996-to-2004 average for the score of the rule of law. Panel B presents the second-stage estimation relating institutional outcomes and endowments to income per capita differences.

In Column 1 of Table 4, I present the OLS relation between the three geographic variables and the logarithm of 2003 GDP per capita. Next, in Column 2, I introduce the three interactions in the first-stage estimation, and I instrument for the rule of law in Panel B. I address several robustness tests in the rest of Table 4.

What is the contribution of the direct and indirect impact of geography on colonization policies? Consider first the main effect of rainfall in the model of Column 2. For given colonization policies, a one standard-deviation difference in average rainfall is associated with a 0.33 difference in the rule of law and a direct effect on income per capita of -0.04 log points. For given colonization policies, a one standard-deviation difference of average temperature is thus associated with a difference in income per capita of 0.59 (0.33*1.92-0.04) log points. This compares to the indirect effect of average temperature on colonization policies and thus income per capita of 0.32 times 1.92, or 0.61 log points.

A similar calculation implies that a one standard deviation difference in temperature is associated with a direct effect on income per capita of 0.22 log points, while the indirect colonization effect is associated with a difference of 1.88 log points. Last, a one standard deviation difference in elevation is associated with a direct effect of 0.89 log points and an indirect institution building effect of 0.12 log points.

Table 4 highlights the fact that geographic endowments and institutions are both important forces of development. In the model of Column 2, for a given level of endowments, a one standard-deviation difference in institutions is associated with a difference in income per capita of 1.92 log points. For given colonial history, a one standard-deviation difference in all three endowments (higher temperature, lower elevation, and higher rainfall) is associated with a difference in income per capita of 1.80 log points.

In both Panel A and Panel B, it is important to note that the significance levels of the single variables convey limited information because the three measures of geography are highly collinear. At the bottom of Table 4, I present the Anderson Canonical Correlation statistic testing for the joint significance of the three instruments (three geographic variables interacted with the colony dummy) and, therefore, weak identification. This test is rejected at the 5% level in all specifications of Table 4, and it is rejected at the 1% level in seven out of the eight two-stage least square estimations.

I also report a Wald test corresponding to the null hypothesis that the direct effect of all three geographic variables equals zero. The latter test is computed from a reduced-form estimation of income per capita on the three measures of geography, a colony dummy, and the three interactions. This statistic tests whether endowment affected developments also conditional on a country's colonization experience. The joint test that the effects of rainfall, temperature and elevation all equal zero is rejected at the 0.1% level in all estimations.

I present several robustness tests from Column 3 onwards. An initial concern might be that the inclusion of African countries, which have very low scores for the rule of law and an adverse geography, is solely responsible for these findings. In Column 3, I hence exclude all African countries from the estimation.

A second concern might be that, among the group of former colonies, the four rich European offshoots (Australia, Canada, New Zealand, and the USA) are driving the differential impact of disease. I thus exclude these countries in Column 4.

Instead of excluding former colonies, in Column 5, I exclude the 20 former members of the Warsaw Pact (six Eastern European countries and 14 countries that were part of the Soviet Union) since these countries could be seen as "Russian Colonies." This sample yields the only specification where the test of weak identification is not rejected at the 1% level, but it is rejected at the 5% level.

Geography and economic outcomes vary widely across the different continents. To document that the results presented so far are not the result of the variation of endowments between continents, but rather the result of the within-continent variation of endowments and economic outcomes, I include continent dummies in Column 6.

Because colonization may be endogenous to early economic development, the colony dummy itself has no economic interpretation. The fact that colonization is endogenous, however, is not a source of bias for the other coefficients as long as the true relation between economic development and geography is linear. The endogeneity of colonization could be a source of bias if the relation between endowments and development is nonlinear. For example, the average of the "average rainfall" variable is 0.17 in the group of former colonies, while it is -0.29 in the rest of the sample. Correspondingly, a positive interaction effect could also result from a relation between rainfall and prosperity that is weaker for higher values of rainfall.

I use two different strategies to address this possible non-linearity. First, in Column 7, I include square terms for the three geographic variables. These variables are constructed by subtracting the minimum observed value of each variable and then squaring the result.

For reasons of brevity, the coefficients are not reported in Table 4. In the first stage estimation in Column 7, the coefficients (standard errors) are 0.055 (0.095) for average temperature squared, 0.06 (0.046) for average elevation squared and 0.073 (0.059) for average rainfall squared. A joint test of significance for the three variables is rejected at the 10% level. The interaction coefficients remain significant.

For the case of average temperature and average rainfall, the absolute size of the interaction coefficient increases when the squared main effects are added. In these two cases, the square effect is of the opposite sign as the interaction effect, implying that even if the data exhibits a non-linearity, it would tend to bias tends the interaction coefficients towards zero, thus underestimating the importance of the institution-building effect on colonization.

Next, in Column 8, I restrict the sample so that the range of observed values for the independent variables is the same as in the group of non-colonized nations and in the group of former colonies.[8] For example, the maximum of average annual temperature in the group of non-colonies is 1.28, and I exclude the two former colonies that have an average temperature higher than 1.28. In total, I exclude 35 countries following this methodology.

For the model with restricted variation of the independent variables of Column 8, I find that all three interaction coefficients become larger in magnitude when the sample variation is restricted by the independent variable. Therefore, I conclude that even if the relation between endowments and prosperity is non-linear, the nonlinearity tends to bias the interaction coefficients towards zero in a linear model, thus underestimating the importance of the institution-building effect on colonization.

Two further robustness checks are presented in Table 5. Columns 1 and 2 document that the

[8] This selection by the *independent* variable is not to be confused with selection by the dependent variable.

results are robust to using other measures of institutional quality. The two alternative measures for institutions are the 1996 to 2004 average of "Control of Corruption" and of the "Quality of Government" from Kaufmann et al. (2005). Both measures can be well explained by colonial experience (Panel A) and both measures are significant predictors of economic outcomes (Panel B).

Next, I examine the identification restriction of this study in more detail. As is argued by Glaeser et al. (2004), colonizers could also have shaped prosperity via influencing the accumulation of human capital directly. I address their criticism in Columns 3 to 7 of Table 5.

In Column 3, I add a second endogenous variable to the estimation, the percentage of the total population (measured from 0 to 100) having attained high school from Barro and Lee (2000). Since the rule of law and education are highly collinear, the first stage partial R-squares are low, and the estimation is not well identified (i.e. weak) in Column 3.

In Column 4, I thus enlarge the model and add the interactions of "variation of rainfall" and "high humidity at maximum temperature" with a colony dummy. Variation of rainfall equals the standardized square of maximum minus minimum monthly rainfall. In Column 5, I then add the percentage of the population that has attained high school to the estimation. In this enlarged model, both the rule of law and the measure of education are well explained by the set of five instruments (see Panel A).

Column 5, Panel B, documents that the level of education induced by colonization has no effect on development conditional on the rule of law. The coefficient of high school attendance is far from significant. In contrast, the estimated coefficient for the rule of law is significantly and also affected relatively little when human capital is added to the estimation (compare Column 4 to Column 5).

This result does not imply that human capital does not matter. I merely documents that human capital is the result of the institutions induced by colonization and not a direct consequence of colonization (also see Gallego (2003)). This finding is confirmed in Column 6, which adds an alternative measures of education as endogenous variables, the percentage of "primary school attained" in the total population in 1995 from Barro and Lee (2000).

I conclude that while the precise channels through which colonization has shaped institutions are somewhat unclear, colonization policies do not seem not to have contributed to income directly, hence supporting the identification assumption used in this study.

5 Disease and Development

The previous section demonstrates that both institutions and endowments matter for development, but it does not offer an interpretation of the precise mechanism at work. This section first develops a measure of the geographic potential for disease and then documents that disease is the major channel through which endowments have shaped colonization policies. I also highlight the fact that disease environment has a sizeable direct impact on prosperity.

5.1 The Geographic Potential for Disease

This section constructs measures of the geographic potential for disease, which I term "Early Disease Environment" (EDE). I construct this measure following a two-step methodology developed by Kiszewski et al. (2004), who instrument for the prevalence of malaria with the geographic potential for the disease. EDE is constructed by first estimating the relation between the settler mortality rates from Acemoglu et al. (2001) and a set of geographic variables that are *ex ante* likely to be correlated with disease. Second, I predict the estimated model to a sample of 151 countries.

The empirical strategy of this section is motivated by two arguments. First,

> "[s]ettler mortality measures the disease environment as European settlers arrived and thereby provides an exogenous indicator of "germs""
>
> (Easterly and Levine (2003), p. 12).

This exogenous indicator of germs is well suited to estimating the direct and the indirect effects of disease.

Second, it is straightforward to enlarge the sample of Acemoglu et al. (2001). Ultimately, the natural prevalence of disease is a consequence of a country's climate and landscape. One can estimate the relation between geography and disease by using the mortality rates collected from historical sources and a set of geographic variables. The estimated relation between germs and geography can then be used to construct a measure of early disease environment using the widely available geographic information.

In Column 1 of Table 6, I present a simple model of geography and mortality. The dependent variable is the natural logarithm of the settler mortality rate collected by Acemoglu et al. (2001).[9] The independent variables are average annual temperature, minimum monthly rainfall, and maximum monthly rainfall from Parker (1997). Warmer climate and areas with pronounced dry (low minimum monthly rain) or wet seasons (high maximum monthly rain) are characterized by high mortality rates. All three regressors are significant, and I also report the p-value corresponding to the joint null-hypothesis that the included geographic variables together do not matter for mortality. I reject this null hypothesis at the 0.1% significance level in all regressions of Table 6.

In Column 2, I enlarge the geographic model of disease[10] and add dummies that equal one if a country has natural incidence of savanna, natural incidence of either temperate grassland or temperate forest, is characterized by Mediterranean climate, or has mountains. I also add a measure of the average temperature at maximum humidity. All variables are from Parker (1997). With the exception of the mountain dummy, all added variables are significant.

Is the selection of the geographic variables in Column 2 exhaustive? I next add distance from the equator (Column 3) and the fraction of the population living in temperate areas (KGPTEMP from Mellinger et al. (2000), Column 4) to the estimation. On the basis of the information in the previous model, these two variables are not significant predictors of mortality, and the F-score of the model decreases when including these variables.

The settler mortality data of Acemoglu et al. (2001) has been criticized by Albouy (2008),[11] who argues that the mortality rates are not comparable because they are sampled from different populations. In Column 5, I control for the sampling population and add three dummies that

[9] In Table 3, Malta and the Bahamas are missing because their population is smaller than 500,000. See sampling criterion above.

[10] In most specifications of Table 3, maximum monthly rainfall is not significant; however, this is symptomatic of the high degree of collinearity between the minimum and maximum rainfall. Inclusion of maximum rainfall improves the total fit of the model considerably.

[11] An earlier version of Albouy's work also criticizes the mortality rates collected by Acemoglu et al. (2001). The working paper of this study also constructs a measure of Early Disease Environment using Albouy's revised mortality series, with results identical to the ones presented below.

respectively equal one if the mortality rate was sampled from soldiers in a campaign, from bishops, or from forced laborers. Indeed, the population the data were sampled from has a sizeable influence on mortality. Compared to the omitted group – soldiers stationed in barracks – soldiers in a campaign are $Exp[0.71] \approx 2$ times as likely to die from disease. Also forced laborers are more likely to die from disease, whereas bishops faced a slightly lower mortality rate. I also report the p-value corresponding to the joint null-hypothesis that these three population dummies equal zero, which is always rejected at the 5% level.

Using the estimated relation between geography and settler mortality in Table 6, I next predict several measures of the geographic potential for disease in 151 countries. In the analysis below, I refer to this measure as "Early Disease Environment," or EDE. Paralleling the definition of "settler mortality" in Acemoglu et al. (2001), EDE refers to the logarithm of the annualized probability of death for European males in the age cohort of soldiers.

It is important to note that the use of EDE – measuring the hypothetical mortality rate rather than the actual one – is in accordance with the institution-building hypothesis of Acemoglu et al. (2001), who provide evidence that knowledge about the widespread prevalence of disease alone was enough to deter migration to a colony.

The main measure of disease environment in this paper is taken from predicting the model of Column 5 in Table 6. The estimation takes into account the sampling population, and when predicting, I partial out the population dummies. Since soldiers stationed in barracks are the omitted group, EDE measures the potential annual mortality of a soldier stationed in barracks for all countries of the sample.

Table 7 presents summary statistics and a pair-wise correlation diagram for the mortality series of Acemoglu et al. (2001) and Albouy (2006), the constructed measures of Early Disease Environment, the 1996-2004 average of the score for Rule of Law from Kaufmann et al. (2004), and income per capita. The measures of Early Disease Environment are predicted using the models of Table 6. If appropriate, the sampling population has been partialled out when predicting the measure of disease environment. For the sample criterion see above.

5.2 The Colonial Origins of Institutions

In this section, I demonstrate that institutional outcomes have been strongly influenced by early disease environment in former colonies, yet not at all in the rest of the world. This differential effect of disease on development can only be rationalized in the context of the theory of the colonial origins of development put forward by Acemoglu et al. (2001).

Figure 3 displays the relation between disease environment and institutional outcomes, measured by the rule of law from Kaufmann et al. (2005), where a higher value corresponds to better enforcement of laws. In the lower scatterplot of Figure 3, I display the relation between the geographic measure of settler mortality and institutions for former colonies, reproducing Acemoglu et al.'s (2001) basic finding of a strong negative correlation between these two variables in former colonies. In the upper scatterplot of Figure 3, I display the same relation, but for the group of non-colonized nations. Graphical inspection suggests that there is no negative relation between the two variables.

Table 8 establishes this differential effect of geography formally. Columns 1 to 4 serve to document that the proposed strategy of directly instrumenting for institutions with the constructed measure of early disease environment. Columns 5 to 7 then establish the main result of this section, while Column 8 presents a key robustness test.

Consider first the upper Panel B of Table 8. In all specifications the dependent variable is the 1996 to 2004 average of the score for the rule of law. In Column 1, I repeat the basic specification of Acemoglu et al. (2001) for the 62 countries of their sample that fulfill this paper's sample criterion. The relation between the standardized settler mortality rate and the score for rule of law is highly significant, and the coefficient is economically large. In Table 8, I have standardized the historical mortality rate of Acemoglu et al. (2001). A one standard deviation difference in settler mortality is associated with a 0.587 standard deviation difference in the Rule of Law. Furthermore, this single variable can explain more than 43% of the variation in institutional outcomes.

In next instrument for the mortality rate from historical sources with geographic variables in Column 2 and with the main measure of Early Disease Environment (EDE) in Column 3. In

Column 2, I instrument for mortality with the geographic variables introduced in the previous section. I use the variables from the large model of Early Disease Environment in Column 3 of Table 6. The first stage regression is identical to Column 3 of Table 6, and I therefore do not report the first stage in Panel A of Table 8. The instrumented mortality rate is again highly significant and the coefficient is economically large.[12]

In Column 3, I again I instrument for the historical mortality rate directly with Early Disease Environment (EDE). This measure is predicted (from Column 5 in Table 6) partialling out the sampling population dummies, and it is thus no longer possible to instrument for mortality with the geographical variables directly. While adjusting for the sampling population made a substantial difference for the model of disease (compare Columns 2 and 5 of Table 6), accounting for this difference does not change the relation between mortality and institutional outcomes. Again, the instrumented mortality rate is a highly significant determinant of institutions, and the coefficient is comparable with the one in the OLS regressions in Column 1.

Instead of instrumenting for the historical mortality rate, I next estimate a reduced form equation in Column 4 that relates early disease environment to institutional outcomes directly. This regression tests the joint hypothesis that EDE is a significant determinant of colonization policies, and that settlement policies is a significant determinant of institutional outcomes. The coefficient of -0.609 is equal to the product of the first stage coefficient of 0.879 and the second stage coefficient of -0.693 in Column 3.[13] I next evaluate this relation in the group of additional former colonies that are not part of the sample of Acemoglu et al. (2001) in Column 5. Also for the 33 additional colonies there is a strong negative relation between Early Disease Environment.

I next turn to the main result of this section in Columns 6 to 8 of Table 8. In Column 6, I document that there is a strong relation between early disease environment and institutional outcomes for the 95 former colonies in my sample. Next, in Column 7, I document that there is only a very weak relation between the same two variables in the 56 non-colonized countries.

Is this difference in how early disease environment affected development statistically signifi-

[12] For both (2) and (3), I do however report the Cragg-Donald (1993) F statistic and the Stock-Yogo (2005) critical value for underidentification.

[13] Since the underlying geographic information is different for all 62 countries and there is no extrapolated informaiton anymore, the number of clusters is now equal to 62.

cant? In Column 8, I allow for a differential effect of early disease environment in these two groups of countries by adding an interaction term of EDE and a dummy that equals 1 for former colonies. This interaction is highly significant, and since the main effect is equal to the coefficient of -0.022 in Column 7, the interaction coefficient is equal to -0.543 (up to rounding equal to -0.566+0.022).

The full model in Column 8 establishes that early disease environment had a very strong impact on institutional outcomes in former colonies, yet not in the rest of the world. This can be rationalized in the context of the theory of Acemoglu et al. (2001), yet one immediate robustness test is in order.

A potential concern with this outcome is that colonization is endogenous and therefore the coefficient of EDE or the interaction is biased. This is not the case, since the estimation of these two coefficients only uses the within group (colony and non-colony) variation of EDE and economic outcomes. If indeed, the true relationship of the direct effect of geography and indirect effect of settler mortality are both linear, then, even if the selection into these two groups is endogenous the estimated coefficients are unbiased. The results presented so far, however, could be an artefact of a nonlinear relation between disease and economic outcomes. As can easily be made out from Figure 3, former colonies are on average characterized by high levels of settler mortality. Correspondingly, a positive interaction θ_R could also have resulted from the fact that the relation between disease and prosperity is stronger for higher values of early disease environment. I document that this is not the case in the next section.

This section demonstrates that there is a strong differential relation between disease end development, which can only be rationalized in the context of the theory of the colonial origins brought forward by Acemoglu et al. (2001). The next section estimates the partial effects of geography and institutions on development.

5.3 Disease, Institutions, and Prosperity

In this section, I show that institutions and geography are both significant and economically relevant determinants of development. Second, I reconcile the conflicting results of the two literatures arguing for the importance of either institutions or geography. Both theories are valid, yet they both overestimate the importance of their starting hypothesis since they restrict the other channel of development to equal 0.

In Table 9, I display the relation between early disease environment, institutions and income differences. The structure of Table 9 is the following. In Columns 1 to 4, I adopt the view that early disease environment only matters for development through its impact on institutional development. Next, In Columns 5 and 6, I adopt the rivaling view that disease environment only matters for development through its direct impact income. Finally, in Column 7 I reconcile these two views, and I show how much of the correlations between early disease environment and development can be attributed to either channel.

In Columns 1 and 2, I instrument for institutions with settler mortality and then Early Disease Environment. The upper Panel B of Table 9 presents the second stage relation between instrumented institutional outcomes and income, and the lower Panel A presents the relation between germs and institutional outcomes. In Panel B, the dependent variable is the logarithm of 2003 GDP per capita and in Panel A, the dependent variable is the 1996 to 2004 score of the rule of law.

In Column 1, I present the basic instrumental variable regression for the 62 countries of Acemoglu et al. (2001) that are part of the sample of this paper. In Column 2, I repeat this regression for the same set of countries, but I instrument for institutional outcomes with EDE instead of the logarithm of the mortality. In Column 3, I add all former colonies of the sample. In all Columns 1, 2, and 3, institutions are highly significant determinants of development. Moreover, the estimated effect is very large and comparable to the results of Acemoglu et al. (2001). In Column 4, I estimate the same specification, but for the sample of non-colonized nations. The instrument has no power in this group, and the estimation thus predicts a huge coefficient of institutions that is far from significant.

I present the second stage equation in Panel B of Table 9. Paralleling the specifications in the preceding section, I first estimate Equation (4) using the settler mortality rate from Acemoglu et al. (2001) as the instrument for institutions (Column 1), then, I repeat the estimation in the same sample but with EDE as instrument (Column 2). In Column 3, I still use EDE as the instrument for the rule of law, however I enlarge the sample to encompass all 95 former colonies. Finally, in Column 4, I estimate the relationship for the sample of non-colonies. While the instrumented institutional quality rate is highly significant determinant of development, this is not at all the case in the group of non-colonies.

The specifications of Columns 1 to 4 identify the relation between institutions and income by the restriction that the only channel through which germs and disease matter for development is indirectly via their impact on institutional development. Since settler mortality rates are actually a measure of the natural prevalence of disease, the mortality rate and the measure of early disease environment are very well suited to test for the direct impact disease environment has on development. In addition to being measured exogenously mortality rates are also highly relevant, since after all, a low level of health is associated with tremendous direct consequences on prosperity. In Columns 5 and 6, I thus adopt a different view of development and assume that the only way in which early disease environment has influenced development is via its impact on current prevalence of disease and income levels.

In Column 5, I thus directly regress income on EDE using the full sample of 151 countries. This regression is in the logic of the "geographic" view of development since for the direct impact of development it should not matter whether a country has been colonized or not. The coefficient of EDE is significant at the 5 percent level. Again, this economically very large: a one standard deviation difference in early disease environment is associated with a 0.943 log points (2 and a half fold) difference in income per capita. In Column 6, I show that the same finding is when adding a colony dummy, and the coefficient is estimated at .

The model of Column 7 reconciles these two views of development and disentangles the two channels of development. I estimate the full model of Equation (4). In the first stage estimation (Panel A), I include EDE, a colony dummy, and the interaction of the colony dummy with EDE. The IV estimation in Panel B includes the instrumented rule of law, EDE and a colony dummy. In this specifications the exclusion restriction in the instrumental variable specifications is that the interaction term of the colony dummy times the measure of disease environment only affects institutions and has no further direct effects on income.

The two main questions of this section are whether the instrumented institutional quality is a significant determinant of income and whether there is an additional effect disease environment has on income. Only if the latter is not the case, the settler mortality variable used by Acemoglu et al. (2001) has no effect other than through early institution building and is a valid instrument for institutions. If, on the other side, ϑ_Y is different from 0, some of the effects the authors attribute to the institutional channel is in fact a direct consequence of disease environment on prosperity and therefore the importance of institutions is overstated.

First, I show that indeed the instrumented rule of law is an important determinant of economic growth. Consider first the separate second stage estimation for colonies and non-colonies in Panel A of Table 9, Columns 3 and 4. As is to be expected from the results presented above, the instrumented quality of institutions is highly significant in the group of former colonies, while this is not the case in the group of independent nations, where the instrument has no power. For former colonies, the coefficient of Rule of Law is highly significant and estimated at 2.077. Incorporating the first stage results, for a former colony, a 1% lower rate of EDE is associated with a $0.566 * 2.077 = 1.18\%$ higher income per capita.

I next examine the full model (4), where the estimation exploits the interaction of mortality and a colony dummy instead of the relying on the main effect of settler mortality to instrument for institutions. Because the main effect of mortality or disease environment is not used as an instrument, I can test for a direct impact of germs on income levels in the second stage estimation. The data confirms Acemoglu et al.'s (2001) primary results that institutions are a major determinant of development. The estimated coefficient as well as the associated economic importance are highly significant: if a country where to improve its institutional score of Rule of Law by one standard deviation, it is predicted to increase its income by a factor of 4.

While confirming that institutions installed during colonization are a major determinant of current prosperity, I also find that the estimated coefficients of the quality of institutions are about one fourth smaller when using the interaction of disease and a colony dummy rather than the main effect of mortality to instrument for institutions. Comparing Columns 4 and 5, the coefficient of Rule of Law drops from 2.077 to 1.624.

Why is the importance of institutions smaller in the full sample than in an estimation restricted to former colonies? Compare the models in Columns 3 and 7. In order to identify the system, the specification in Column 3 imposes the restriction that the direct coefficient of disease environment on income per capita ϑ_Y is equal to 0. This restriction is not present in model Column 3 and mortality is estimated to have a direct effect on incomes with a coefficient of -0.256.

Consider first a 1% decrease of settler mortality in a former colony in the full model of Equation (4) including both independent nations and former colonies. In Column 7 of Panel A of Table 9, a 1% lower mortality score is associated with an score of rule of law that is 0.00566 points higher, where the total effect is the sum of interaction (-0.00543) and main (-0.0022) effect. In Column 7 of Panel A in Table 9, this improvement is associated with an indirect (institution building) effect of a 0.566 times 1.624% higher level of per capita income. In addition, the change of settler mortality is associated with a direct increase of income levels by 0.256%, hence resulting in a total 1.18% increase of income for a 1% drop in mortality.

Consider the same 1% decrease of settler mortality in a former colony in the model including only colonies from Column 3: a 1% lower score of mortality is again associated with an increase of the rule of law score by 0.00566 points. However, because the direct effect of mortality in Column 3 is restricted to equal 0, the estimation attributes all of the 1.18% GDP increase to changes of institutional quality and hence estimates a coefficient of 1.771, which - up to a rounding error - satisfies $0.566 * 2.077 = 0.566 * 1.624 + 0.256$. The importance of institutions is overstated by around a fourth in the model that encompasses only former colonies because it wrongly attributes the direct effect geography has on income difference to the institutional channel.

The same kind of bias is present for the specifications of Columns 5 and 6 that restrict the indirect effect of EDE to equal 0. Because all of the correlation between EDE and income is attributed to the direct effect, this estimation is biased.

While Acemoglu et al. (2001), and all papers that derive from them overstate the importance of institutions, the geographic school of development overstates the direct effect of the prevalence of disease on economic outcomes. Consider next Column 7, where I take a geographic perspective of development and argue that disease environment only affects development directly. The regression thus only includes the colony dummy and EDE. The coefficient of EDE is estimated to be -0.88 whereas the estimation is only -0.26 in model Column 5. That is, because these papers. In the next section, I examine whether also other variables such as Latitude, Malaria Ecology, or KGTEMP suffer from this problem.

The finding that both channels of development matter represents the second finding of this paper. Because disease environment affected both early institutions as well as income directly, Acemoglu et al.'s (2001) specifications overestimate the importance of institutions. It is important to point out that while the overall importance of settler mortality for economic prosperity remains unchanged, the interpretation is different.

In total, I conclude that while the effect of the prevalence of disease on institutions is the main factor for economic prosperity, the results are smaller than Acemoglu et al. (2001) predict because disease environment has a direct effect on development. Comparing the magnitude of the two forces of economic development, I find that about one fourth of the combined effect of disease environment on development is associated with direct effects of development, while the other three quarters are associated with the institution building channel of development.

One important robustness check is presented in Column 8 of Table 9. As can easily be made out from Figure 2, former colonies are on average characterized by high levels of settler mortality. Correspondingly, a positive interaction θ_R could also have resulted from the fact that the relation between disease and prosperity is stronger for higher values of early disease environment. Thus, I add a "EDE Square" term to the estimation. The regressor EDE Square equals EDE minus the minimum observed value of EDE, and this difference is taken to the square.

In Column 8, the interaction coefficient is changed little and is highly significant. Moreover, the coefficient of EDE Square is positive, implying that the relation between disease environment and institutions becomes weaker for high values of mortality. Even if the data exhibits a nonlinearity, this would bias the interaction term of mortality towards being positive, yet not towards being negative. Indeed, comparing the magnitude of the interaction coefficient in Column 8 of Table 9 to the magnitude of the corresponding coefficients in Column 7, the interaction effect becomes larger in absolute terms when a squared mortality regressor is added to the specification. I have also added higher order terms of mortality to the estimation, with identical results: taking the second order condition of a third or fourth degree polynomial, the relation between mortality and institutions becomes weaker rather than stronger over the range of observed values of mortality. I conclude that the results presented so far are not the result of a non linear relation between EDE and economic outcomes.

It has to be noted however that colonization is likely to be endogenous, and the colony dummy thus has no economic interpretation. In all specifications, since EDE is standardized and of mean 0, the colony dummy measures the average effect of colonization (or selection bias) for a country with average disease environment.

In total, I conclude that while the effect of the prevalence of disease on institutions is the main factor for economic prosperity, the results are smaller than Acemoglu et al. (2001) predict because disease environment has a direct effect on development. Comparing the magnitude of the two forces of economic development, I find that for a former colony, about one fourth of the combined effect of disease environment on development is associated with the direct impact of disease, while the other three quarters are associated with the institution building channel.

I present some basic robustness checks in Table 10, where again the first stage relation between EDE and institutions is estimated in Panel A and the second stage relation between institutions and income is presented in Panel B. Are the results driven by the inclusion of certain groups of former colonies? A first worry might be that inclusion of African and especially Sub-Saharan countries – which have very low scores for the Rule of Law and an adverse disease environment – is solely responsible for the findings presented so far. In Columns 1 and 2 of Table 10, I hence exclude all African countries from the estimation. The exclusion of African countries does not weaken the results, instead the interaction is larger and significant at higher levels in this specification.

A second worry might be that among the group of former colonies, the four rich "Neo-Europes" (Australia, Canada, New Zealand, and the USA) are driving the presented results. I thus exclude these countries in Columns 3 and 4. Instead of excluding former colonies, in Columns 5 and 6, I next exclude 20 former members of the Warsaw Pact (6 Eastern European members and 14 of countries that were part of the Soviet Union. Germany is not counted as a former member of the Warsaw Pact.). This is motivated since these countries have all been under communist regimes, and they could thus be seen as "Russian Colonies." Again, excluding this group of countries leads to a larger importance of institutions. Finally, I include continent dummies for Africa, the Americas, Asia, and Oceania in Columns 7 and 8, again with unchanged findings.

6 Disease, Other Endowments, and Development

In this section, I check whether geographic endowments do have a significant impact on development also conditional on disease. This is in order, since "geography" is in essence a black box that is often proxied with vague measures such as latitude or the fraction of the population living in temperate areas. But do these measures correlate with growth because they are correlated with disease, correlated with labor productivity directly, or do they affect growth through some other channel?

There are two noteworthy findings. First, disease environment seems to be by far the most important channel by which geography affects development. Once the level of disease environment is accounted for, variables that are often used as proxies for geography – distance from equator, a "tropics" dummy, or the fraction of the population living in temperate areas – do not matter for development. Second, however, variables that either measure an aspect of geography orthogonal to disease environment (a landlocked dummy to measure transportation costs and a dummy for oil-rich countries) or that measure a narrow and well defined aspect of disease environment (malaria) are significant determinants of development also conditional on disease and institutions.

In Columns 1 to 3 of Table 11, I analyze the effect of latitude. In Column 1, I first show that in a regression including only this measure and a colony dummy, there is a strong positive correlation between how far a country is away from the equator and how rich it is. This correlation vanishes once I control for disease and institutions in Column 2, but latitude is estimated to affect institutions. I find no evidence that institutions have been affected by latitude differentially in former colonies and in the rest of the sample (see Column 3).

In Columns 4 to 6 of Table 11, I analyze the effect of access to the open sea. The estimation adds a landlocked dummy that equals one if a country does not have access to the open sea. Being landlocked is associated with a lower income per capita (see Column 4) and this is also true when controlling for institutions and disease (see Column 5). I find no evidence that institutions have been affected by access to the open sea differentially in colonies and in other nations (see Column 6).

In Columns 1 to 3 of Table 12, I check whether oil abundance is a determinant of income also conditional on institutions and disease environment. The measure employed is a dummy that equals 1 if Parker (1997) lists the country to have more that 50,000 barrels of proven oil reserves per capita in 1994. Not surprisingly, oil rich countries are richer on average (see Column 1). This is also true conditional on disease and institutions (see Column 2), and again, there is no evidence that resource abundance has affected develop differentially in former colonies as opposed to in the rest of the world (see Column 3).

In Columns 4 to 6 of Table 12, I analyze the relation between the fraction of the population living in temperate areas – the measure "KGPTEMP" from Mellinger et al. (2000) – and economic outcomes. In a specification that includes a colony dummy and this measure, there is a strong positive relation between the fraction of the population living in temperate areas and GDP per capita. This relation vanishes once I control for disease and institutions in Column 5, and the coefficient of KGPTEMP is even estimated positive. Last, I check whether this variable had a differential effect in former colonies and non-colonized nations, which is not the case.

In Table 13, I check for the influence that average temperature and the maximum of monthly rainfall have on economic outcomes. I find that the raw correlation between temperature and income is negative in Column 1 and that the same is true for maximum monthly rainfall (see Column 4). However, this negative correlation vanishes once I control for disease (see Columns 2 and 5, respectively). Also, I find that these two variables have not affected economic outcomes differentially in former colonies and in other nations (see Columns 3 and 6).

What is the interpretation of the results of Table 13? The variables are also used in the construction of Early Disease Environment, and the interpretation of the coefficients in Columns 2 and 5 is thus the following. Both higher average temperature and higher maximum rain tend to cause higher prevalence of germs and disease, which is strongly detrimental for growth. However, conditional on the level of disease, these two measurers are not detrimental to growth. In the case of average temperature, the coefficient is nearly significantly positive, which seems reasonable since warmer climate is associated with better crops and living conditions.

In Table 14, I analyze the effect of Malaria Ecology (ME) from Kiszewski et al. (2004) and a dummy for countries that are located in the tropics. In Column 1, I regress the logarithm of GDP per capita in 2003 on standardized ME and a colony dummy. A one standard deviation difference in ME is associated with a 0.7 log points lower GDP per capita. In Column 2, I add the instrumented rule of law and EDE to the estimation. The coefficient of ME is still significant, yet it drops from 0.7 to 0.23. The first stage coefficient of ME on the rule of law is even estimated positive.

Malaria could have had an additional effect on the development of institutions in former colonies since it may have affected European settlement decisions. I demonstrate that this is not the case in Column 3, where I add the interaction of malaria ecology with the colony dummy. Doing so does not alter the results, and I thus conclude that malaria ecology indeed does have a strong direct effect on economic outcomes. For example, if it were possible to reduce the prevalence of certain mosquito vectors in Nigeria to a level comparable to that of Neighboring Benin (from 2.62 to 2.01), this would be associated with a 15% increase in GDP per capita. Although the coefficients is much smaller than a simple regression would suggest, malaria is associated with a large detrimental impact on economic development.

In contrast, being in the tropics is not per se associated with worse economic outcomes. The effect of a tropics dummy – equal to one if Parker (1997) lists the country to have either "Tropical Wet" or "Tropical Dry/Wet" climate - is analyzed in Columns 4 to 6 of Table 14. In Column 4, I regress the tropics dummy and a colony dummy on the logarithm of GDP per capita in 2003. A country with tropical climate is 0.77 log points poorer. However, when I add the tropics dummy to the IV estimation in Column 5, the same cannot be said: the dummy is far from being significant, and both the first and the second stage coefficients actually imply that countries in the tropics have a higher level of development. In Column 6, I allow for the tropics dummy to affect development differentially in colonies and non-colonized nations, but I find no evidence for a differential effect.

Tables 11 to 14 emphasize that the main channel through which geography affects development is via disease environment. The proxies that the literature has put forward to measure geography are shown to matter because they are correlated with disease. Proxies for "geography" such as latitude are not important for development once I control for EDE and institutional quality. This should be expected, since it is not detrimental for growth to be close to equator. Rather, being close to the equator is associated with warmer and moister climate, higher prevalence of disease, and therefore lower prosperity. In contrast, other measures such as a landlocked dummy are important to explain development also conditional on early disease environment and on institutional outcomes. Also this is as expected, since transportation costs should also matter conditional on the potential for disease.

7 Robustness Analysis

In this section, I examine four sets of different robustness tests. First, I show that the results hold up to various alternative models of early disease environment. Second, I use alternative rules to classify countries into the group of former colonies or former non-colonized nations. Third, I show that the results of this paper also hold up when using the revised mortality series of Albouy (2006). Fourth, I include a variety of sociological and historic controls and show that the results presented so far also hold conditional on these variables. Fifth, I introduce further instruments for institutions and examine the associated robustness tests.

7.1 Alternative Models of Disease Environment

I next show that the results are not dependent on the precise way in which EDE is constructed. In Table 15, I display the basic specification using alternatives measures of early disease environment, the colony dummy and the interaction of the two variables. I also include one robustness test that adds the distance from the equator to the regression.

In 1 and 2, I include the measure "EDE Small" that is predicted from Column 1 of Table 6. EDE Small is not adjusted for the sampling population, and I thus also construct "EDE Small & Adjusted" that reproduces the specification of Column 1 of Table 6, yet also includes and then partials out the population dummies. The corresponding regressions are reported in Columns 3 and 4 of Table 15.

Next, in Columns 5 and 6 of Table 15, I use the model of early disease environment from Column 3 of Table 6. This measure includes the set of 8 geographic variables, but not the population dummies. Last, in Columns 7 and 8, I use a the model of Column 4 of Table 6 that also adds latitude to the estimation of early disease environment.

For these four alternative specifications, I find results that are very similar to the ones that I find when using the main measure of disease environment EDE. First, the interaction of early disease environment and the colony dummy is significant. Second, the instrumented institutions are significant. Third, the coefficients are very comparable to what I find when using the main measure of disease environment EDE.

7.2 Alternative Definitions of Former Colonies

Are the results presented so far dependent on the precise way in which countries are being classified as former colonies versus non-colonized nations? In this section, I repeat the main robustness tests using two alternative colony dummies.

A country is classified as a former colony if it ever has either been an official colony, was under the control of an empire-affiliated organization such as the Dutch and British East Indies Companies, had the status of protectorate of a non-adjacent empire, or lost the sovereignty over its foreign policy following a military conflict with a non-adjacent empire. With this definition, 56 countries are classified as non-colonized nations, while 95 are classified as former colonies.

In Table 16, I adopt a definition that also classifies countries into the group of former colonies if the country was under a League of Nations mandate after World War I. This in addition classifies Israel, Jordan, Lebanon, the Syrian Arab Republic and West Bank and Gaza as former colonies. There are thus 100 former colonies and 51 non-colonized nations. In Table 17, I adopt a narrower definition of former colonies. The colony dummy equals one only if the country ever has been an official colony, was under the complete control of an empire-affiliated organization such as the Dutch and British East Indies Companies, or had the status of protectorate of a non-adjacent empire. This classifies the United Arab Emirates and Bhutan as non-colonized nations, leading to 93 former colonies.

For each of these two alternative definitions of former colonies, I repeat the basic specification from Table 9 and also present several robustness tests. I only find one case where the instrument – EDE times the colony dummy – is not significant. In the latter case - Column 6 of Table 16 - the estimation excludes Australia, Canada, New Zealand, and the USA and also controls for latitude. In all specifications of Tables 16 and 17 instrumented institutions are significant, and the magnitude is comparable to ones presented earlier.

7.3 Addressing Albouy's (2006) Critique

In this section, I address the revisions of the mortality rates made by Albouy (2006). I repeat the basic analysis of Table 9 using the measure of early disease environment that is predicted from his revised mortality data. The results are nearly identical to the ones presented in the main section.

The reason for this is the following. I do not directly use the mortality rates sampled from historical data, but I use the geographic projection of the mortality rates, i.e. that part of mortality that can be explained by geography. While the mortality rates of Albouy (2006) and Acemoglu et al. (2001) differ substantially, their geographic projection is nearly identical, and it thus does not matter which data I use.

This observation is summarized in Figure 5, which presents a scatter plot of the two mortality series (upper scatter plot), and also a scatter plot of the two corresponding measures of Early Disease Environment (lower plot). For better comparison, the two measures of EDE – predicted from Columns 2 and 6 of Table 6 respectively – are not standardized. While there are 17 countries where the mortality rates differ by more than 0.3 log points (35%), this is only the case for 2 countries (Singapore and Malaysia) for the constructed variables of the geographic potential for disease.

In Tables 18 and 19, I repeat the basic specification from Table 9 and I also present several robustness tests using "EDE Albouy," predicted from Column 8 of Table 6. I find that the instrument has somewhat less power in some of the robustness tests of Table 19, but overall, the interaction of EDE Albouy and the colony dummy is still a strong instrument for institutions.

7.4 Additional Controls

In Columns 1 to 4 of Table 20, I add three different measures of internal conflict to the analysis. These three variables measure fractionalization along ethnic (in 1), religious (in 2) and linguistic lines (see 3) and have been constructed by Alesina et al. (2003) following the methodology of Mauro (1995). The respective indices take values from 0 (the entire population is from the same group) to 1 (the population consists of a continuum of different groups). In Column 4, I add all three measures together to the estimation. For these four specifications, I find that ethnic fractionalization is detrimental to institutional development, whereas the evidence on the other two indicators of fractionalization is less clear. For Columns 1 to 4, the interaction of EDE and the colony dummy is a strong predictor for institutions, and instrumented institutions are an important determinant of economic success.

Next, in Columns 5 to 7, I include measures of a country's legal origin. In Column 5, I add a dummy that equals 1 if the country was a member of the Warsaw Pact, which is shown to affect development negatively though the impact on institutions. Second, I add dummies for countries that have French or British Legal Origins in Column 6. These measures are from La Porta et al. (1998). In this specification, both institutions with a British or French origin are favorable for economic performance. In Column 7, the omitted group are all legal origins except French or British, which includes many economies in transition. In Column 8, I thus add the communist origins dummy to the specification of Column 7, demonstrating that most of the results in Column 7 are driven by the fact that countries with French and British legal origins were not communist. For all robustness tests of Table 20, I find that the interaction is a significant instrument for institutions and that institutions are highly relevant for prosperity.

7.5 Additional Instruments for Institutions

In this section, I introduce further instruments for institutions and check whether the instrumented institutional scores are mutually consistent, i.e., I test the over-identified system. The additional instruments that I use are scores of democracy in the early 19^{th} century, ethnolinguistic fractionalization, and legal origin dummies.

The results are reported in the now familiar way, where Panel A of Table 21 reports the first stage results with the new instruments included. In all specifications except Column 2, the interaction of EDE and the colony dummy is significant, while also the added instruments are significant (or at least one of the added dummies in the case of legal origins). Panel B reports second-stage estimation. In Panel C, I report a heteroscedasticity robust Hansen C-test for over-identification, which never rejects at the 5% level and rejects at the 10% level in one instance.

The findings are similar to those presented before. Institutions are a main determinant of economic performance, while disease environment has a significant direct effect on economic development. I first include the Polity Score from the Polity IV database as an additional instrument. This measure takes values between -10 and +10 and is higher for more democratic societies. In Column 1 of Table 21, I include all countries with an available score in 1900 to 1910 and use the earliest available score. Few countries that still exist today were independent at that time, and there are thus only 52 observations. Still, both instruments (Polity Score and interaction of EDE and the colony dummy) are significant, and Polity in 1900 is a significant determinant of current institutions. I repeat this estimation in Column 2, but this time, I include all countries with an available Polity Score before 1961. This inclusion yields the only specification where the interaction of disease and the colony dummy is not significant.

In Columns 3 and 4 of Table 21, I repeat this exercise, but I focus on a sub-indicator of the Polity database, "Constraints on the Executive." This variable takes values between 1 and 7 and measures whether superimposed structures and rules effectively constrain a nation's executive. I again include first all countries that have a Polity Score in 1900 to 1910 and still exist today (Column 3) and then those with a polity score before 1961 (Column 4). In both regressions, constraints on the executive as well as the interaction are significant determinants of institutions.

I next include Ethnic Fractionalization from Alesina et al. (2003) in the specification. This specification is motivated by the finding from the previous section that ethnic fractionalization matters for development mostly through institutions. Finally, I turn to the "Legal Origins" dummies form La Porta et al. (1998). Socialist origin is associated with lower institutional outcomes (Column 6). The estimation in Column 7, which includes a British and a French legal origin dummy, yields the only model where the Hansen C-test of overidentification is rejected at the 10 % level. In Column 8, I add all three legal origins dummies, thus eliding only the dummies for German and Scandinavian origin.

8 Conclusion

In this paper, I estimate the partial effects of geographic endowments and institutions on income. The existing literature fails to distinguish between these two channels of development: Endowments have influenced colonization policies and, therefore, institutions, but they may also have a direct effect on economic growth.

The paper's main insight is that one can utilize the interaction of history and geography to estimate the partial effects of institutions and geographic endowments on prosperity. Specific historical events – such as colonization or the rise of trade with the new world – have influenced how climate, transportation costs, and disease have affected development. For example, during colonization, the mortality rates of European settlers have affected colonization policies, which in turn determined the quality of property rights institutions in the respective colonies. Disease environment may however also directly affect economic outcomes.

What distinguishes the direct impact of endowments on income from the indirect impact of endowments on colonization policies is the following. While the direct impact is present in all countries, the institutional channel only applies to a subset of countries, namely former colonies.

I next develop an instrumental variable framework that identifies the relation between income and institutions and, at the same time, also allows for geographic endowments to directly affect growth. I identify the relation between institutions and income by exploiting the fact that climate and disease has affected development differently in different groups of countries. The identification restriction employed does not require the main effect of disease environment to be absent in the estimation. I am thus able to estimate the partial effects of disease and institutions.

I find that institutions are the main determinant of development, that endowments also have a sizeable direct impact on development, and that endowments influence development mainly through the prevalence of disease. For example, I find that a 0.01 standard deviation difference in institutions is associated with a difference of roughly 1.6% in income per capita, while a 0.01 standard deviation difference in natural disease environment is associated with a difference of 0.3% in income per capita.

In line with the main finding of this study, two policy conclusions arise. First, only the installment of institutions geared towards aligning social and private incentives can achieve substantial convergence of the world distribution of income. For example the results of this study suggest that if Nigeria were to improve the score for the rule of law to the level prevalent in Algeria, it would be about 2.5 times as rich as it is today.

Second, I also find that economic endowments have a large impact on prosperity. For example, the results imply that if it were possible reduce the level of disease prevailing in Nigeria to the one prevailing in Algeria, Nigeria would be 62% percent richer than it is today.

Thus, while the results of this paper put forward institutions as the dominant force of development, they also highlight the high economic burden of disease and the big gains that poor nations might realize if the current development efforts to eradicate the world's major diseases succeed.

References

[1] **Acemoglu, Daron; Johnson, Simon and Robinson, James A.** "The Colonial Origins of Comparative Development: An Empirical Investigation" The American Economic Review, December 2001, 91(5), pp. 1369-1401.

[2] **Acemoglu, Daron; Johnson, Simon and Robinson, James A.** "Reversal of fortune: Geography and institutions in the making of the modern world income distribution" The Quarterly Journal of Economics, November 2002, 117 (4), pp. 1231-1294

[3] **Acemoglu, Daron; Johnson, Simon and Robinson, James A.** "A response to Albouy's "A Reexamination Based on Improved Settler Mortality Data"" MIT Department of Economics Working Paper, March 2005.

[4] **Albouy, David.** "The Colonial Origins of Comparative Development: An Investigation of the Settler Mortality Data," February 2008, University of Michigan, Ann Arbour.

[5] **Alesina, Alberto; Devleeschauwer, Arnaud; Easterly, William; Kurlat, Sergio and Wacziarg, Romain.** "Fractionalization," Journal of Economic Growth, June 2003, 8 (2), pp. 155-94.

[6] **Barro, Robert J. and Jong-Wha Lee**, "International Data on Educational Attainment: Updates and Implications," manuscript, Harvard University, February 2000

[7] **Bloom, David E. and Sachs, Jeffrey D.** "Geography, Demography, and Economic Growth in Africa." Brookings Papers on Economic Activity, 1998, (2), pp. 207-73.

[8] **Curtin, Philipp D.** *Disease and Empire The Health of European Troops in the conquest of Africa.* New York: Cambridge University Press, 1998.

[9] **Diamond, Jared M.** *Guns, germs and steel: The fate of human societies.* New York: W.W. Norton & Co., 1997.

[10] **Djankov, Simeon; Glaeser, Ed ; La Porta, Rafael ; Lopez-de-Silanes, Florencio and Shleifer, Andrei** "The New Comparative Economics," Journal of Comparative Economics, December, 2003.

[11] **Dollar, David, and Aart, Kraay.** "Institutions, Trade and Growth: Revisiting the Evidence," The World Bank, Working Paper, January 2003.

[12] **Easterly, William and Levine, Ross.** "Tropics, germs, and crops: how endowments influence economic development," January 2003, Journal of Monetary Economics, 50(1), pp. 3-39.

[13] **Engerman, Stanley L. and Sokoloff, Kenneth L**. "Factor Endowments, Institutions, and Differential Paths of Growth among New World Economies" in Stephen Haber, ed., *How Latin America fell behind*. Stanford, CA: Stanford University Press, 1997, pp. 260-304.

[14] **Feyrer, Bruce and James Sacerdote**. "Colonialism and Modern Income – Islands as Natural Experiments" The Review of Economics and Statistics, forthcoming

[15] **Gallego, Francisco**. "Historical Origins of Schooling: The Role of Political Decentralization" Mimeo, MIT, 2003

[16] **Gallup, John L.; Mellinger, Andrew D. and Sachs, Jeffrey D.** "Geography and Economic Development," National Bureau of Economic Research, Working Paper No. 6849, 1998.

[17] **Glaeser, Ed ; La Porta, Rafael ; Lopez-de-Silanes, Florencio and Shleifer, Andrei** "Do Institutions Cause Growth?", Journal of Economic Growth, September 2004, 9 (3) , pp. 271 -304

[18] **Hall, Robert E. and Jones, Charles I.** "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" The Quarterly Journal of Economics, February 1999, Vol. 114 (1), pp. 83-116.

[19] **Kaufmann, Daniel; Kraay, Art and Mastruzzi, Massimo.** "Governance Matters IV: Governance Indicators for 1996-2004" World Bank Policy Research Working Paper Series, May 2005, No. 3630

[20] **Kiszewski, Anthony; Mellinger, Andrew; Spielman, Andrew; Malaney, Pia; Ehrlich Sachs, Sonia and Sachs, Jeffrey D.** "A Global Index of the Stability of Malaria Transmission," American Journal of Tropical Medicine and Hygiene, May 2004, 70(5), pp. 486-498.

[21] **Knack, Stephen and Keefer, Philip** "Institutions and Economic Performance: Cross-Country Tests Using Alternative Measures." Economics and Politics, November 1995, 7(3), pp. 207-27.

[22] **La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W.** "Law and Finance," The Journal of Political Economy, December 1998, 106(6), pp. 1113-1155.

[23] **La Porta, Rafael; Lopez-de-Silanes, Florencio; Shleifer, Andrei and Vishny, Robert W.** "The Quality of Government," Journal of Law, Economics and Organization, December 1998, 15(1),pp. 222-279.

[24] **Mauro, Paolo.** "Corruption and Growth," The Quarterly Journal of Economics, August 1995, 110(3), pp. 681-712.

[25] **Mellinger, Andrew; Gallup, John Sachs, Jeffrey** "Climate, Coastal Proximity, and Development," in *Oxford Handbook of Economic Geography*, edited by Gordon L. Clark, Maryann P. Feldman, and Meric S. Gertler, Oxford University Press, 2000.

[26] **North, Douglass C.** *Structure and change in economic history.* New York: W.W. Norton & Co., 1981.

[27] **Nunn, Nathan and Puga, Diego** "Ruggedness: The Blessing of Bad Geography in Africa" Working Paper, Harvard University, March 2007

[28] **Parker, Philip M.** *National cultures of the world: A statistical reference*, *Cross Cultural Statistical Encyclopedia of the World, Vol. 4* Westport, CT: Greenwood Press, 1997.

[29] **Rodrik, Dani**. "Where did All the Growth Go?" Journal of Economic Growth, December 1999, 4(4), pp. 385-412.

[30] **Rodrik, Dani**. "Getting Institutions Right", April 2004, Kennedy School of Government, Harvard University.

[31] **Rodrik, Dani; Subramanian, Arvind and Trebbi, Francesco.** "Institutions rule: The primacy of institutions over geography and integration in economic development", Journal of Economic Growth, June 2004, 9 (2), pp. 131-165.

[32] **Smith, Adam** *An Inquiry into the Nature and Causes of the Wealth of Nations*, W. Strahan and T. Cadell, London, 1776.

[33] **Weil, David N.** "Accounting for The Effect of Health on Economic Growth" The Quarterly Journal of Economics, August 2007, 122 (3), pp. 1265-1306.

Table 1 - Pairwise Correlations Between Instruments for Institutions and Measures of Endowments

	Latitude	Malaria Ecology	Maximum of Monthly Rain	Average Temperature
Ethnic Fractionalization from Alesina et al. (2004)	[-0.51]**	[0.51]**	[0.30]**	[0.35]**
French Legal Origin Dummy from La Porta et al. (1998)	[-0.37]**	[0.19]*	[0.04]	[0.43]**
Log Settler Mortality from Acemoglu et al. (2001)	[-0.48]**	[0.72]**	[0.42]**	[0.52]**
Log Population Density in 1500 from Acemoglu et al. (2002)	[-0.26]*	[0.14]	[0.17]	[0.41]**

Notes: Table 1 displays the pairwise correlations between measures of geographic endowments and instrumental variables for institutional outcomes. The four instrumental variables are Ethnic Fractionalization, the Logarithm of European Settler Mortality, a dummy for countries with French Legal Origin, and the Logarithm of the population density in 1500. Latitude, Maximimum Monthly Rainfall, and Average Temperature are from Parker (1997). Malaria Ecology is from Kiszewski et al. (2004); * significant at 5%; **significant at 1%

Table 2 - The Differential Effect of Geographic Endowments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Average Temperature		Average Rainfall		Average Elevation		Temp. at max. Humidity		Malaria Ecology	
	Former Colonies	*Not Colonized*	*Former Colonies*	*Not Colonized*	*Former Colonies*	*Not Colonized*	*Former Colonies*	*Not Colonized*	*Former Colonies*	*Not Colonized*
Dependent Variable is the 1996-2004 Average Score for "Rule of Law" from Kauffman et al. (2005)										
Average Temp.	-0.55	0.02								
(std.)	[0.14]**	[0.13]								
Avg. Rainfall			0.03	0.59						
(std.)			[0.10]	[0.23]*						
Avg. Elevation					-0.08	-0.54				
(std.)					[0.05]	[0.16]**				
Temp. at Max.							-0.76	0.11		
Humidity (std)							[0.14]**	[0.14]		
Malaria									-0.27	-0.18
Ecology (std.)									[0.06]**	[0.18]
Observations	95	56	95	56	95	56	95	56	93	54
R-squared	0.164	0	0.002	0.091	0.012	0.114	0.249	0.007	0.13	0.001
Mean	0.549	-0.931	0.175	-0.296	0.095	-0.161	0.578	-0.980	-0.547	0.318
Std. Dev.	0.622	0.814	1.162	0.528	1.154	0.641	0.558	0.801	0.126	1.140
Min	-1.835	-2.833	-1.284	-1.203	-0.652	-0.652	-2.074	-2.900	-0.567	-0.567
Max	1.532	1.282	4.312	0.969	3.954	1.899	1.480	1.149	0.363	4.090

Notes: Table 2 presents the relation between geographic variables and the 1996 to 2004 average score of the "Rule of Law" from Kaufmann et al. (2005). Average annual temperature, average elevation, and humidity at maximum temperature are from Parker (1997). Average rainfall equals the standardized sum of minimum monthly rainfall and maximum monthly rainfall from Parker (1997). Malaria Ecology is taken from Kiszewski et al. (2004). All regressors are standardized. The four bottom rows report mean, standard deviation, and minimum and maximum value of each variable and for the respective group. For the sample criterion see main text. Robust Standard Errors in parentheses; * significant at 5%; ** significant at 1%

Table 3 - Estimating the Partial Effects of Selected Endowments and Institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fm. Colonies Temperature OLS	*Not Colonized Temperature OLS*	*Full Sample Temperature IV*	*Full Sample Avg. Rainfall IV*	*Full Sample Temp./Humidity IV*	*Full Sample Elevation IV*	*Full Sample Malaria Ecology IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003							
Rule of Law			1.92	1.54	1.64	2.26	-1.19
			[0.41]**	[0.34]**	[0.25]**	[0.60]**	[5.95]
Temperature (Std.)	-0.99	0.11	0.07				
	[0.22]**	[0.22]	[0.16]				
Avg. Rain (Std)				0			
				[0.07]			
Temp. /max. Humidity (Std.)					0.02		
					[0.14]		
Avg. Elevation (Std)						-0.03	
						[0.12]	
Malaria Ecology (Std.)							-1.01
							[1.54]
Colony y/n			-0.1	-0.24	-0.2	0.24	-1.29
			[0.26]	[0.29]	[0.20]	[0.42]	[3.14]
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"							
Temperature (Std.)	-0.55	0.02	0.02				
	[0.14]**	[0.13]	[0.13]				
Temp * Colony y/n			-0.57				
			[0.19]**				
Avg. Rain (Std)				0.59			
				[0.23]*			
Avg. Rain * Colony y/n				-0.55			
				[0.26]*			
Temp. /max. Humidity (Std.)					0.11		
					[0.14]		
Temp. /max. Humidity * Colony y/n					-0.86		
					[0.20]**		
Avg. Elevation (Std)						-0.54	
						[0.16]**	
Elevation * Colony y/n						0.46	
						[0.16]**	
Malaria Ecology (Std.)							-0.18
							[0.18]
Malaria Ecology * Colony y/n							-0.08
							[0.19]
Colony y/n			-0.36	-0.83	-0.32	-0.56	-0.51
			[0.19]	[0.18]**	[0.20]	[0.15]**	[0.11]**
Panel C: Reduced Form Estimation - Dependent is the Ln of GDP per Capita in 2003							
Coefficient of Examined			0.11	0.9	0.2	-1.25	-0.79
Geographic Variable			[0.22]	[0.34]**	[0.27]	[0.18]**	[0.26]**
Observations	95	56	151	151	151	151	147
R-sq (first stage)	0.164	0	0.185	0.145	0.229	0.159	0.18

Notes: Table 3 displays the relation between geography and institutional quality (Panel A) and the relation between instrumented institutional quality and income (Panel B). Panel C presents a reduced-form estimation of GDP per head on the geographic variable, the colony dummy and the interaction of the two. In Columns 1 to 3, the independent variable is the average annual temperature. In Column 1, the sample consists of 95 former colonies, in Column 2 it consists of 56 countries that have not been colonized. In all other estimations the sample includes all 151 countries and each regression also adds the interaction of the measure of geography with the colony dummy. Average annual temperature, average elevation, and temperature at maximum humidity are from Parker (1997) and standardized. Average rainfall equals the standardized sum of minimum monthly rainfall and maximum monthly rainfall from Parker (1997). Malaria Ecology is taken from Kiszewski et al. (2004) and standardized. Heteroscedasticity Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 4 - The Colonial and Geographic Origins of Comparative Development

	(1) *OLS Full Sample*	(2) *IV Full Sample*	(3) *IV Excl. Africa*	(4) *IV Excl. AUS CAN, NZL, USA*	(5) *IV Excl. Warsaw Pact*	(6) *IV w. Continent Dummies*	(7) *IV adding 2nd order Geography*	(8) IV Restricted Sample
Panel B: Second Stage Estimation - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law 1996 to 2004		1.92 [0.26]**	1.78 [0.30]**	2.17 [0.36]**	2.58 [0.50]**	1.69 [0.26]**	1.47 [0.14]**	1.68 [0.19]**
Avg. Temperature (std.)	-0.71 [0.18]**	0.03 [0.16]	0.07 [0.16]	-0.04 [0.17]	0.57 [0.34]	0.03 [0.14]	1.14 [0.31]**	-0.07 [0.11]
Avg. Rainfall (std.)	0.03 [0.15]	-0.05 [0.08]	-0.19 [0.10]	-0.04 [0.10]	-0.04 [0.13]	-0.05 [0.07]	-0.08 [0.19]	-0.06 [0.13]
Avg. Elevation (std.)	-0.54 [0.11]**	-0.08 [0.11]	0.01 [0.11]	-0.1 [0.11]	0.14 [0.19]	-0.16 [0.08]*	-0.32 [0.23]	-0.12 [0.16]
Panel A: First Stage Estimation - Dep. Var is the 1996 to 2004 Average of the Rule of Law from Kaufmann et al. (2005)								
Avg. Temperature (std.)		0.1 [0.16]	0.1 [0.16]	0.1 [0.16]	-0.35 [0.13]**	0.24 [0.15]	-0.13 [0.45]	0.14 [0.17]
Avg. Rainfall (std.)		0.48 [0.28]	0.48 [0.28]	0.48 [0.28]	0.03 [0.28]	0.25 [0.29]	0.26 [0.33]	0.56 [0.28]*
Avg. Elevation (std.)		-0.42 [0.18]*	-0.42 [0.18]*	-0.42 [0.18]*	-0.57 [0.16]**	-0.16 [0.19]	-0.56 [0.20]**	-0.52 [0.15]**
Avg. Temperature (Std.) * Colony y/n		-0.98 [0.20]**	-0.88 [0.21]**	-0.74 [0.21]**	-0.53 [0.18]**	-0.99 [0.19]**	-1.1 [0.22]**	-1.08 [0.21]**
Avg. Rainfall * Colony y/n		-0.45 [0.30]	-0.3 [0.31]	-0.47 [0.30]	-0.01 [0.30]	-0.27 [0.30]	-0.66 [0.31]*	-0.61 [0.31]*
Avg. Elevation (Std.) * Colony y/n		0.09 [0.19]	0.06 [0.20]	0.18 [0.19]	0.24 [0.17]	-0.09 [0.20]	0.04 [0.19]	0.2 [0.19]
Model Information and Hypothesis Tests								
Colony Dummy	y	y	y	y	y	y	y	y
Continent Dummies						y		
Square Terms of Endowments							y	
Joint Wald test of the included geographic variables on LN GDP per Capita in 2003 (combining first and second stage effect)								
P Value	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Anderson Canonical Correlation LR Statistic (identification/IV relevance test all instrument)								
P Value	-	<0.001	0.002	<0.001	0.03	<0.001	<0.001	<0.001
Hansen J Test of Overidentication (all Instruments)								
P Value	-	0.415	0.121	0.168	0.973	0.331	0.400	0.5122
Observations	151	151	104	147	131	151	151	124
R^2 First Stage	-	0.323	0.272	0.276	0.437	0.399	0.345	0.372

Notes: Table 4 presents the relation between the rule of law, geography, and income. In Panel B, the dependent variable is logarithm of 2003 per capita GDP. In Panel A, the dependent variable is the 1996 to 2004 average of the score for the rule of law. Average Rainfall is the standardized sum of Maximum Monthly Rainfall and Minimum Monthly Rainfall from Parker (1997). Average Temperature and Average Elevation are standardized and from Parker (1997). Column 1 presents the OLS relation between income and geography. From Column 2 onwards, the instrumented score for the rule of law is added. Column 7 adds second order coefficients of the three measures of geography. For example, "Temperature Square" equals (Temperature+2.83)^2 where -2.83 is the minimum observed value of average temperature. Column 8 omits all observations with values for any of the independent variables outside the intersection of the support in the group of former colonies and non-colonized nations. The bottom rows of Table 4 reportp-values corresponding to the hypothesis that all interaction coefficients equal 0 and to the hypothesis that all main effects of geography (including first and second stage coefficients) equal 0; * significant at 5%; ** significant at 1%

Table 5 - Alternative Measures of Institutional Quality and the Effect of Human Capital

	(1)	(2)	(3)	(4)	(5)	(6)
Endogenous Variables	*Control of Corruption*	*Government Effectiveness*	*adding % w. Highschool*	*Rule of Law*	*adding % w. Highschool*	*adding % w. Primary Ed.*
Instruments (interacted):	***Temperature, Rainfall, and Elevation***			***adding Var. of Rain and High Temp/ max. Humidity***		
Panel B: Second Stage Estimation - Dependent Variable is the Ln of GDP per Capita in 2003						
Control of Corruption 96-04	2.03 [0.28]**					
Government Effectiveness 96-04		1.99 [0.22]**				
Rule of Law 96-04			1.39 [0.48]**	1.64 [0.25]**	1.26 [0.32]**	1.53 [0.22]**
% of total Pop.with some highschool in 95			0.03 [0.03]		0.04 [0.02]	
% of total Pop. With some Prim. school in 95						0.01 [0.01]
Avg. Temperature (std.)	0.14 [0.16]	0.12 [0.14]	0.07 [0.25]	-0.09 [0.17]	-0.03 [0.15]	-0.19 [0.16]
Avg. Rainfall (std.)	-0.17 [0.09]	-0.16 [0.10]	-0.06 [0.07]	0.05 [0.13]	0.05 [0.11]	0 [0.12]
Avg. Elevation (std.)	-0.08 [0.13]	-0.06 [0.11]	0 [0.16]	-0.03 [0.11]	-0.06 [0.10]	-0.13 [0.11]
High Temperature at max. Humidity (std.)				0.09 [0.22]	0.12 [0.19]	0.07 [0.23]
Variation of Rainfall (std.)				-0.22 [0.11]*	-0.19 [0.11]	-0.12 [0.12]
Panel A: Summary of First Stage Estimation(s)						
Shea's Partial R2: Instituions	0.1461	0.1308	0.0427	0.1196	0.102	0.1062
P value Institutions	<0.001	<0.001	0.0265	<0.001	<0.001	<0.001
Shea's Partial R2: Education	-	-	0.2155	-	0.2576	0.1734
P value Education	-	-	<0.001	-	<0.001	<0.001
Anderson Canonical Correlation LR Statistic (identification/IV relevance test all instrument)						
P Value	<0.001	<0.001	0.1354	0.0317	0.0368	0.048
Observations	151	151	96	96	96	96

Notes: In Panel B of Table 5, the dependent variable is the 2003 logarithm of GDP per capita. Panel A summarizes the first stage regression(s) and presents Shea's (1997) partial R2 measure and the p value corresponding to the power of the instruments for the endogenous variable in question. Columns 1 and 2 use the 1996 to 2004 average of "Control of Corruption" and the "Quality of Government" from Kaufmann et al. (2005) as measures of institutional outcomes. From Column 3 onwards, the measure of institutional outcomes is the 1996 to 2004 average of the "Rule of Law." Columns 1 to 3 use the three interactions of Table 4 as instruments and Columns 4 to 6 add the interaction of "variation of rainfall" and "high humidity at maximum temperature" with a colony dummy. Variation of rainfall equals the (standardized) square of maximum minus minimum monthly rainfall. Columns 3, 5, 6, and 7 add a second endogenous variable. Column 3 and 5 add "Percentage of "higher school attained" in the total population in 1995" and Column 6 adds "Percentage of "primary school attained" in the total population in 1995." Both variables are from Barro and Lee (2000) and are measured from 1 to 100; * significant at 5%; ** significant at 1%

Table 6 - The Geographic Determinants of Mortality Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Rainfall & Temperature	*Large Georg. Model*	*adding KGTEMP*	*adding Latitude*	*Large Model & Population*	*Rainfall & Temperature*	*Large Model & Population*
	Dependent Variable is the Standardized Ln of Mortality from: Acemoglu et al. (2001)					**from: Albouy (2006)**	
Avg. Temperature	0.63	0.64	0.58	0.61	0.49	0.58	0.57
(std.)	[0.17]**	[0.33]	[0.35]	[0.34]	[0.31]	[0.21]**	[0.34]
Min. of Monthly Rainfall	-0.32	-0.32	-0.36	-0.33	-0.19	-0.23	-0.18
(std.)	[0.06]**	[0.05]**	[0.10]**	[0.05]**	[0.07]**	[0.07]**	[0.08]*
Max. of Monthly Rainfall	0.22	0.16	0.17	0.15	0.14	0.26	0.21
(std.)	[0.09]*	[0.08]	[0.10]	[0.08]	[0.09]	[0.14]	[0.17]
Temp. at max Humidity		-0.68	-0.64	-0.71	-0.51		-0.39
(std.)		[0.28]*	[0.37]	[0.29]*	[0.29]		[0.38]
Savanna y/n		0.6	0.53	0.55	0.51		0.39
(std.)		[0.19]**	[0.21]*	[0.22]*	[0.21]*		[0.25]
Temperate Vegetation y/n		-0.7	-0.51	-0.6	-0.61		-0.25
		[0.25]**	[0.26]	[0.31]	[0.19]**		[0.36]
Mediteranean Climate y/n		-1.08	-1.11	-1.05	-0.95		-0.8
		[0.31]**	[0.35]**	[0.32]**	[0.30]**		[0.38]*
Mountains y/n		-0.49	-0.55	-0.51	-0.62		-0.5
		[0.26]	[0.28]	[0.26]	[0.28]*		[0.28]
KGPTEMP			-0.13				
			[0.66]				
Latitude				-0.13			
(std.)				[0.18]			
Campaign Rate y/n					0.71		0.42
					[0.28]*		[0.31]
Forced Laborer Rate y/n					0.56		-0.25
					[0.26]*		[0.26]
Bishop Rate y/n					-0.01		0.11
					[0.24]		[0.30]
P-value: geography	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P-value: pop. dummies	na	na	na	na	0.026	na	0.003
P-value: whole model	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Observations	62	62	60	62	62	60	60
Clusters	35	35	35	35	35	35	35
R-squared	0.48	0.66	0.65	0.67	0.72	0.42	0.55

Notes: Table 6 presents the relation between geography and the settler mortality estimates taken from historical sources. In Columns 1 to 5, the dependent variable is the standardized annual mortality rate from Acemoglu et al. (2001). All dependent variables except dummies and KGPTEMP are standardized. For example, in Column 1, the interpretation of the coefficient of Avg. Temperature is that a one standard deviation warmer climate is associated with a 0.63 standard deviation higher logarithm of the settler mortality rate. KGPTEMP takes values between 0 and 1 and is equal to population living in temperate areas. In Columns 7 and 8, the dependent variable is the annualized and standardized mortality rate from Albouy (2006), Revision 2. The population dummies used in Columns 5 and 7 (for Bishops, Soldiers in Campaigns, and Forced Laborers) are from Albouy (2006). Heteroscedasticity robust and clustered standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 7 - Data Summary and Pairwise Correlation Diagram

Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
Ln Mortality Acemoglu et al. 2001 (Std.)	62	0.00	1.00	-2.03	2.65
EDE (Pop. Adjusted; from Col. 5)	151	0.00	1.00	-2.71	2.61
EDE not Adjusted (from Col. 2)	151	0.00	1.00	-2.52	2.60
EDE Short not Adjusted (from Col. 1)	151	0.00	1.00	-2.01	2.68
Ln Mortality Albouy (2006) (Rev. 2; Std.)	60	0.00	1.00	-2.07	2.49
EDE Albouy (from Col. 7)	151	0.00	1.00	-2.49	3.17
Ln GDP per Capita	151	7.52	1.63	4.44	10.56
Rule of Law 1996-2004	151	-0.02	0.97	-1.84	2.14

Pairwise Correlation Diagram

	I.	II.	III.	V.	VI.	VII.
I. Ln Mortality Acemoglu et al. 2001	1.000					
II. EDE (Pop. Adjusted; Col. 5)	0.801	1.000				
III. EDE not Adjusted (Col. 2)	0.815	0.989	1.000			
IV. EDE Short not Adjusted (Col. 1)	0.695	0.772	0.788	1.000		
V. Ln Mortality Albouy (2006) (Rev. 2)	0.860	0.699	0.701	0.643	1.000	
VI. EDE Albouy (Col. 7)	0.778	0.979	0.965	0.854	0.708	1.000

Notes: Table 7 presents summary statistics and a pair wise correlation diagram for the mortality series of Acemoglu et al. (2001) and Albouy (2006), the constructed measures of Early Disease Environment, the 1996-2004 average of the score for Rule of Law from Kauffman et al. (2004), and income per capita. The measures of Early Disease Environment are predicted using the models of Table 6. If appropriate, the sampling population has been partialed out when predicting the measure of disease environment. For the sample criterion see main text.

Table 8 - Settler Mortality Rates, Early Disease Environment, and Institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sample of former colonies from Acemoglu et al. (2001)				*Additional Colonies*	*All former Colonies ((4) + (5))*	*All Not Colonized Countries*	*Full Sample*
	OLS	*IV*	*IV*	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*
Panel B: OLS and Second Stage - Dep. Var. is the 1996 to 2004 Avg. Score for "Rule of Law" from Kauffman et al. (2005)								
Mortality rate (from Acemoglu et al., std.)	-0.587 [0.127]**	-0.74 [0.135]**	-0.693 [0.140]**					
EDE				-0.609 [0.112]**	-0.471 [0.128]**	-0.566 [0.090]**	-0.022 [0.158]	-0.022 [0.157]
EDE * Colony y/n								-0.543 [0.181]**
Colony y/n								-0.397 [0.185]*
R-sq	0.435	na	na	0.389	0.212	0.332	0	0.266
No. Observations	62	62	62	62	33	95	56	151
No. Clusters	35	35	35	62	33	95	56	151
Panel A: First Stage - Dependent variable is the mortality rate from Acemoglu et al. (2001)								
EDE		*1st stage see Column 2 of Table 6*	0.879 (0.121)**					
Testing for weak identification								
Cragg-Donald (1993) F statistic		13.11	107.03					
Stock-Yogo (2005) 10% crit. value		11.39	16.38					
R-sq first stage	na	0.66	0.389	na	na	na	na	na

Notes: Table 8 presents the relation between settler mortality rates, mortality, and institutional quality. In the upper Panel B, the relation between disease and institutional quality is presented, while Panel A (if applicable) presents the relationship between Early Disease Environment and mortality rates. In Panel B, the dependent variable is 1996-2004 Average of the score for "Rule of Law" from Kauffman et al. In Columns 1 to 4, the sample is equal to that of Acemoglu et al. (2001), but Bahamas and Malta are excluded since their Population is less than 500,000. Column 5 presents the results for the 33 additional former colonies, while Column 7 presents the results for 52 independent nations. In Columns 2 to 8, the measure of early disease environment (EDE) is predicted from Table 6, Column 5. The variable "EDE * Colony y/n" is the interaction of the colony dummy and EDE. Heteroscedasticity robust standard errors reported in brackets; where applicable the standard errors are clustered; * significant at 5%; ** significant at 1%

Table 9 - Estimating the Partial Effect of Disease, Institutions, and Geography

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sample of former colonies from Acemoglu et al. (2001)		*All former Colonies*	*Not Colonized Nations*	*Full Sample*	*Full Sample*	*Full Sample*	*Full Sample*
	IV	*IV*	*IV*	*IV*	*OLS*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law	1.709	1.916	2.077	13.033			1.624	1.191
	[0.241]**	[0.250]**	[0.233]**	[80.414]			[0.265]**	[0.377]**
EDE					-0.943	-0.878	-0.256	0.081
					[0.121]**	[0.140]**	[0.100]*	[0.259]
EDE Square								-0.098
								[0.072]
Colony y/n						-0.245	0.108	0.024
						[0.278]	[0.180]	[0.149]
R-Sq	-	-	-	-	0.335	0.339	-	-
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"								
Mortality rate (from Acemoglu et al.; std.)	-0.587							
	[0.127]**							
EDE		-0.609	-0.566	-0.022			-0.022	-0.145
		[0.112]**	[0.090]**	[0.158]			[0.157]	[0.322]
EDE * Colony y/n							-0.543	-0.627
							[0.181]**	[0.256]*
EDE Square								0.035
								[0.073]
Colony y/n							-0.397	-0.429
							[0.185]*	[0.181]*
Observations	62	62	95	56	151	151	151	151
Clusters	35	62	95	56	151	151	151	151
R-sq first stage	0.435	0.389	0.332	0	-	-	0.266	0.267

Notes: Table 9 presents the first stage relation between early disease environment and institutional quality (Panel A) and the second stage relation between instrumented institutional quality and income (Panel B). EDE is predicted from Table 6, Column 5. In Columns 1 and 2 of Table 9, the sample is equal to that of Acemoglu et al. (2001) except that Bahamas and Malta are excluded since their population is less than 500,000. For the sample criterion in the other Columns of Table 9 see main text. The variable "EDE * Colony y/n" is the interaction of the colony dummy and the demeaned EDE. Because the interaction coefficient is demeaned in this way, the colony dummy itself captures the total impact of colonization for a country with average disease environment. "EDE Square" equals (EDE+2.72)^2, where -2.72 is the minimum value of EDE in the sample. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 10 - Basic Robustness Tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Excluding African Countries		*Excluding "Neoeuropes" (AUS, CAN, NZL, USA)*		*Excluding Members of the Warsaw Pact*		*Adding Continent Dummies*	
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law	1.12	1.08	1.89	1.96	1.54	1.59	1.21	1.16
	[0.28]**	[0.37]**	[0.44]**	[0.51]**	[0.22]**	[0.25]**	[0.20]**	[0.26]**
EDE	-0.27	-0.24	-0.25	-0.31	-0.3	-0.38	-0.2	-0.19
	[0.10]*	[0.09]**	[0.12]*	[0.11]**	[0.09]**	[0.09]**	[0.07]**	[0.07]**
Colony y/n	0.19	0.31	0.34	0.05	0.21	0	0.09	0.16
	[0.14]	[0.33]	[0.29]	[0.29]	[0.22]	[0.24]	[0.25]	[0.35]
Latitude (Std.)		0.11		-0.25		-0.24		0.07
		[0.25]		[0.29]		[0.23]		[0.17]
Africa y/n							-0.82	-0.83
							[0.43]	[0.44]
Americas y/n							0.22	0.23
							[0.35]	[0.35]
Asia y/n							-0.27	-0.26
							[0.25]	[0.25]
Oceania y/n							-0.46	-0.43
							[0.30]	[0.29]
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"								
EDE	-0.02	0.11	-0.02	0.08	0.12	0.32	0.21	0.24
	[0.16]	[0.15]	[0.16]	[0.15]	[0.17]	[0.15]*	[0.16]	[0.16]
EDE* Colony y/n	-0.64	-0.51	-0.4	-0.36	-0.69	-0.6	-0.73	-0.59
	[0.23]**	[0.23]*	[0.18]*	[0.18]*	[0.19]**	[0.16]**	[0.19]**	[0.20]**
Colony y/n	-0.35	0.31	-0.52	0.02	-0.9	-0.27	0.25	0.53
	[0.20]	[0.27]	[0.18]**	[0.23]	[0.21]**	[0.21]	[0.24]	[0.27]*
Latitude (Std.)		0.51		0.42		0.61		0.31
		[0.17]**		[0.14]**		[0.14]**		[0.14]*
Africa y/n							-1.29	-1.11
							[0.31]**	[0.33]**
Americas y/n							-1.37	-1.09
							[0.33]**	[0.38]**
Asia y/n							-0.99	-0.76
							[0.25]**	[0.27]**
Oceania y/n							-0.65	-0.4
							[0.55]	[0.53]
Observations	104	104	147	147	131	131	151	151
R-sq first stage	0.131	0.218	0.236	0.292	0.392	0.507	0.378	0.403

Notes: Table 10 presents basic robustness tests, each without (odd numbered columns) and with controlling for latitude (even numbered columns). Panel A displays the first stage relation between the instruments and the 1996 to 2004 average score for the rule of law. Panel B displays the second stage relationship between institutions, disease, and income. In Columns 1 and 2, 47 African countries are excluded from the regression. In Columns 3 and 4, the four Neo-Europes Australia, Canada, New Zealand, and the USA are excluded. In Columns 5 and 6, all former members of the Warsaw Pact are excluded. This excludes 14 former members of the Soviet Union (Turkmenistan does not have a 2003 World Bank GDP estimate), Bulgaria, Hungary, Poland, the Check and Slovak Republics, and Romania. Columns 7 and 8 include continent dummies, whith Europe being the omitted group. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 11 - Estimating the Effect of Selected Geographic Variables I

	(1)	(2)	(3)	(4)	(5)	(6)
		Latitude			*Landlocked Dummy*	
		Full Sample			*Full Sample*	
	OLS	*IV*	*IV*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003						
Rule of Law		1.7	1.68		1.46	1.44
		[0.33]**	[0.32]**		[0.27]**	[0.25]**
EDE		-0.31	-0.31		-0.31	-0.32
		[0.09]**	[0.08]**		[0.10]**	[0.09]**
Colony y/n	0.5	-0.13	-0.12	-1.24	0.06	0.06
	[0.36]	[0.27]	[0.28]	[0.24]**	[0.16]	[0.16]
Latitude (Std.)	1.09	-0.22	-0.2			
	[0.17]**	[0.24]	[0.24]			
Landlocked y/n				-1.28	-0.66	-0.67
				[0.27]**	[0.20]**	[0.19]**
R-sq	0.315			0.231		
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"						
EDE		0.1	0.13		-0.05	-0.07
		[0.15]	[0.16]		[0.15]	[0.15]
EDE* Colony y/n		-0.45	-0.52		-0.5	-0.49
		[0.18]*	[0.20]*		[0.17]**	[0.17]**
Colony y/n		0.18	0.26		-0.39	-0.43
		[0.23]	[0.26]		[0.18]*	[0.19]*
Latitude (Std.)		0.47	0.6			
		[0.14]**	[0.22]**			
Latitude * Colony y/n			-0.21			
			[0.28]			
Landlocked y/n					-0.34	-0.52
					[0.17]*	[0.38]
Landlocked y/n * Colony y/n						0.29
						[0.41]
Observations	151	151	151	151	151	151
R-sq first stage		0.336	0.34		0.285	0.288

Notes: Table 11 examines the effect of distance from equator (Latitude) and a "Landlocked" dummy on income conditional on colonial history and early disease environment. The Landlocked dummy is from Parker (1997). In Columns 1 and 4, the respective measure is simply added to the basic instrumental variable specification. In Columns 2 and 5, EDE and the interaction of EDE with the colony dummy is added in the first stage. Columns 3 and 6 also add the interaction of the respective geographic variable with the colony dummy to test whether the variable in question had a different effect on development in former colonies and other countries. Heteroscedasticity robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 12 - Estimating the Effect of Selected Geographic Variables II

	(1)	(2)	(3)	(4)	(5)	(6)
		Full Sample			*Full Sample*	
	OLS	*IV*	*IV*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003						
Rule of Law		1.49	1.32		1.72	1.86
		[0.30]**	[0.28]**		[0.33]**	[0.35]**
EDE		-0.29	-0.35		-0.31	-0.3
		[0.12]*	[0.11]**		[0.09]**	[0.10]**
Colony y/n	-1.38	0.04	-0.01	-0.04	0.03	0.02
	[0.26]**	[0.18]	[0.17]	[0.29]	[0.20]	[0.21]
Oil rich y/n	1.2	0.66	0.72			
	[0.31]**	[0.22]**	[0.21]**			
KGPTEMP				2.38	-0.35	-0.52
				[0.32]**	[0.47]	[0.50]
R-sq	0.229			0.418		
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"						
EDE		-0.08	-0.1		0.23	0.25
		[0.18]	[0.18]		[0.17]	[0.18]
EDE* Colony y/n		-0.46	-0.45		-0.47	-0.53
		[0.20]*	[0.20]*		[0.17]**	[0.20]**
Colony y/n		-0.44	-0.39		-0.09	0
		[0.20]*	[0.23]		[0.18]	[0.24]
Oil rich y/n		0.27	0.43			
(>50,000 brl / cap)		[0.19]	[0.43]			
Oil rich y/n*			-0.23			
Colony y/n			[0.47]			
KGPTEMP					1.22	1.32
					[0.24]**	[0.34]**
KGPTEMP *						-0.27
Colony y/n						[0.46]
Observations	151	144	144	144	144	144
R-sq first stage		0.293	0.295		0.407	0.408

Notes: Table 12 examines the effect of KGPTEMP and a dummy for oil rich countries. KGPTEMP is constructed by Mellinger et al. (2000), takes values between 0 and 1, and measures the fraction of the population living in temperate areas. The dummy for oil rich countries equals 1 if Parker (1997) lists the country to have more than 50,000 barrels of oil per capita in 1994. In Columns 1 and 4, the respective measure is simply added to the basic instrumental variable specification. In Columns 2 and 5, EDE and the interaction of EDE with the colony dummy is added in the first stage. Columns 3 and 6 also add the interaction of the respective geographic variable with the colony dummy to test whether the variable in question had a different effect on development in former colonies and other countries. Heteroscedasticity robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 13 - Estimating the Effect of Selected Geographic Variables III

	(1)	(2)	(3)	(4)	(5)	(6)
		Full Sample			*Full Sample*	
	OLS	*IV*	*IV*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003						
Rule of Law		1.7	1.69		1.62	1.64
		[0.28]**	[0.27]**		[0.31]**	[0.31]**
EDE		-0.33	-0.33		-0.26	-0.25
		[0.11]**	[0.11]**		[0.10]*	[0.10]*
Colony y/n	-0.59	-0.09	-0.09	-0.88	0.11	0.11
	[0.38]	[0.21]	[0.21]	[0.28]**	[0.18]	[0.18]
Avg. Temperature (std.)	-0.44	0.22	0.22			
	[0.19]*	[0.12]	[0.12]			
Max. Monthly Rainfall (std.)				-0.45	0	0
				[0.12]**	[0.08]	[0.08]
R-sq	0.171	-	-	0.199	-	-
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"						
EDE		-0.03	-0.03		-0.02	-0.02
		[0.17]	[0.17]		[0.16]	[0.16]
EDE * Colony y/n		-0.55	-0.53		-0.5	-0.5
		[0.18]**	[0.21]*		[0.19]**	[0.19]**
Colony y/n		-0.41	-0.41		-0.35	-0.33
		[0.20]*	[0.20]*		[0.19]	[0.20]
Avg. Temperature (std.)		0.01	0.03			
		[0.11]	[0.14]			
Avg. Temp. * Colony y/n			-0.04			
			[0.23]			
Max. Monthly Rainfall (std.)					-0.09	-0.11
					[0.07]	[0.28]
Max Mon. Rain * Colony y/n						0.03
						[0.29]
Observations	151	151	151	151	151	151
R-sq first stage	-	0.266	0.266	-	0.271	0.272

Notes: Table 13 examines the effect of (standardized) average temperature and a maximum monthly rainfall (also standardized) on income conditional on colonial history and early disease environment. All data is from Parker (1997). In Columns 1 and 4, the respective measure is simply added to the basic instrumental variable specification. In Columns 2 and 5, EDE and the interaction of EDE with the colony dummy is added in the first stage. Columns 3 and 6 also add the interaction of the respective geographic variable with the colony dummy to test whether the variable in question had a different effect on development in former colonies and other countries. Heteroscedasticity robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 14 - Estimating the Effect of Selected Geographic Variables IV

	(1)	(2)	(3)	(4)	(5)	(6)
	Malaria Ecology missing BHR, PRI, SYR, and WBG			*Tropical Climate Full Sample*		
	OLS	*IV*	*IV*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003						
Rule of Law		1.31	1.31		1.66	1.66
		[0.26]**	[0.26]**		[0.28]**	[0.28]**
EDE		-0.23	-0.23		-0.26	-0.26
		[0.09]*	[0.10]*		[0.10]*	[0.10]**
Colony y/n	-0.74	0.03	0.03	-0.83	0.06	0.06
	[0.27]**	[0.15]	[0.15]	[0.31]**	[0.19]	[0.19]
ME (std.)	-0.7	-0.23	-0.23			
	[0.09]**	[0.08]**	[0.08]**			
Tropics y/n				-0.77	0.15	0.15
				[0.30]*	[0.20]	[0.20]
R-sq	0.308	-	-	0.172	-	-
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"						
EDE		0	0.01		-0.01	-0.02
		[0.16]	[0.17]		[0.16]	[0.17]
EDE* Colony y/n		-0.61	-0.62		-0.52	-0.51
		[0.21]**	[0.22]**		[0.18]**	[0.19]**
Colony y/n		-0.48	-0.35		-0.31	-0.3
		[0.19]*	[0.12]**		[0.19]	[0.21]
ME (std.)		0.05	-0.2			
		[0.08]	[0.30]			
ME * Colony y/n			0.25			
			[0.32]			
Tropics y/n					-0.21	-0.06
					[0.15]	[0.26]
Tropics y/n * Colony y/n						-0.15
						[0.31]
Observations	147	147	147	151	151	151
R-sq first stage	-	0.28	0.281	-	0.273	0.273

Notes: Table 14 examines the effect of Malaria Ecology (ME) and a "Tropics" dummy on income. Malaria Ecology is a measure of the geographic potential for malaria and is taken from Kiszewski et al. (2004). ME is standardized. The Tropics dummy equals one if Parker (1997) lists the country to have either "Tropical Wet" or "Tropical Wet/Dry" climate. In Columns 1 and 4, the respective measure is simply added to the basic instrumental variable specification. In Columns 2 and 5, EDE and the interaction of EDE with the colony dummy is added in the first stage. Columns 3 and 6 also add the interaction of the respective geographic variable with the colony dummy to test whether the variable in question had a different effect on development in former colonies and other countries. Heteroscedasticity robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 15 - Different Models of Early Disease Environment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Small model of Early Disease Environment		*Small model of EDE Adjusted for Sampling Pop.*		*Large Model of EDE Not Adjusted for Pop.*		*Large Model of EDE & Latitude*	
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law	1.93	1.87	1.91	1.88	1.61	1.65	1.63	1.71
	[0.39]**	[0.30]**	[0.35]**	[0.31]**	[0.29]**	[0.34]**	[0.27]**	[0.34]**
EDE Small	0.07	-0.02						
	[0.20]	[0.15]						
EDE Small & Adjusted			0.07	-0.03				
			[0.18]	[0.16]				
EDE Large Not Adjusted					-0.24	-0.29		
					[0.12]*	[0.10]**		
EDE Latitude							-0.25	-0.31
							[0.10]*	[0.09]**
Latitude (Std.)		-0.13		-0.15		-0.17		-0.22
		[0.22]		[0.24]		[0.23]		[0.24]
Colony y/n	-0.09	-0.2	-0.09	-0.2	0.07	-0.12	0.11	-0.13
	[0.20]	[0.26]	[0.22]	[0.26]	[0.17]	[0.27]	[0.18]	[0.27]
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"								
EDE Small	-0.15	0.23						
	[0.15]	[0.17]						
EDE Small * Colony y/n	-0.54	-0.68						
	[0.18]**	[0.17]**						
EDE Small & Adjusted			-0.07	0.35				
			[0.14]	[0.16]*				
EDE Small & Adjusted * Colony y/n			-0.63	-0.7				
			[0.18]**	[0.16]**				
EDE Large Not Adjusted					-0.09	0.04		
					[0.16]	[0.16]		
EDE Large Not Adjusted * Colony y/n					-0.49	-0.43		
					[0.19]**	[0.18]*		
EDE Latitude							-0.03	0.09
							[0.16]	[0.15]
EDE Latitude * Colony y/n							-0.54	-0.45
							[0.18]**	[0.18]*
Latitude (Std.)		0.57		0.63		0.45		0.47
		[0.14]**		[0.15]**		[0.13]**		[0.14]**
Colony y/n	-0.19	0.29	-0.21	0.23	-0.36	0.2	-0.39	0.18
	[0.18]	[0.20]	[0.19]	[0.19]	[0.18]	[0.22]	[0.19]*	[0.23]
Observations	151	151	151	151	151	151	151	151
R-sq first stage	0.283	0.368	0.258	0.352	0.284	0.35	0.267	0.336

Notes: Table 15 presents the basic IV specification using alternative geographic models of Early Disease Environment (EDE). Panel A presents the first stage relation between the instruments and rule of law and Panel B the second stage relationship. The respective alternative measures of EDE are predicted using the models of Table 6. Columns 1 and 2 present the results when using the short model of Column 1 of Table 6. Columns 3 and 4 present the results when using the short model adjusted for population (not reported in Table 6). Columns 5 and 6 present the results when using the large model disease environment, but unadjusted for sampling population (Column 2 of Table 6). Columns (7) and (8) present the results when using the main model of disease but also including latitude to predict EDE (from Column 4 of Table 6). Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 16 - Main Results and Basic Robustness Using a Wide Definition of Former Colonies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full sample		*Excluding African Countries*		*Excluding "Neoeuropes" (AUS, CAN, NZL, USA)*		*Excluding Members of the Warsaw Pact*		*Adding Continent Dummies*	
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003										
Rule of Law	1.58	1.66	1.11	1.06	1.81	1.91	1.46	1.5	1.17	1.1
	[0.25]**	[0.34]**	[0.28]**	[0.38]**	[0.39]**	[0.52]**	[0.19]**	[0.22]**	[0.21]**	[0.28]**
EDE	-0.28	-0.32	-0.28	-0.26	-0.28	-0.32	-0.35	-0.4	-0.22	-0.2
	[0.10]**	[0.09]**	[0.11]**	[0.10]**	[0.11]*	[0.10]**	[0.09]**	[0.09]**	[0.08]**	[0.08]**
Colony y/n	0.13	-0.05	0.19	0.32	0.34	0.11	0.25	0.12	0.2	0.31
	[0.17]	[0.28]	[0.14]	[0.33]	[0.27]	[0.28]	[0.21]	[0.23]	[0.27]	[0.38]
Latitude (Std.)		-0.17		0.11		-0.21		-0.16		0.11
		[0.24]		[0.25]		[0.29]		[0.20]		[0.17]
Africa y/n									-0.94	-0.96
									[0.46]*	[0.48]*
Americas y/n									0.1	0.11
									[0.39]	[0.39]
Asia y/n									-0.36	-0.36
									[0.29]	[0.30]
Oceania y/n									-0.56	-0.52
									[0.31]	[0.30]
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"										
EDE	0	0.09	0	0.1	0	0.08	0.27	0.43	0.18	0.2
	[0.17]	[0.16]	[0.17]	[0.17]	[0.17]	[0.16]	[0.19]	[0.15]**	[0.17]	[0.17]
EDE * Colony y/n	-0.57	-0.44	-0.65	-0.51	-0.44	-0.35	-0.84	-0.73	-0.7	-0.56
	[0.19]**	[0.19]*	[0.24]**	[0.24]*	[0.19]*	[0.19]	[0.21]**	[0.17]**	[0.20]**	[0.21]**
Colony y/n	-0.42	0.18	-0.36	0.28	-0.53	0.03	-1.14	-0.53	0.34	0.58
	[0.21]	[0.25]	[0.22]	[0.28]	[0.21]*	[0.25]	[0.26]**	[0.23]*	[0.25]	[0.28]*
Latitude (Std.)		0.47		0.49		0.42		0.57		0.31
		[0.13]**		[0.16]**		[0.14]**		[0.13]**		[0.14]*
Africa y/n									-1.36	-1.14
									[0.31]**	[0.33]**
Americas y/n									-1.44	-1.12
									[0.32]**	[0.38]**
Asia y/n									-1.04	-0.83
									[0.26]**	[0.27]**
Oceania y/n									-0.71	-0.43
									[0.55]	[0.54]
Observations	151	151	104	104	147	147	131	131	151	151
R-sq first stage	0.264	0.336	0.129	0.216	0.231	0.292	0.415	0.522	0.38	0.405

Notes: Table 16 reproduces the main result and some robustness tests using a wider definition of former colonies. The colony dummy used in this table equals 1 if a country was either officially colonized, ever had the official status of "protectorate," ever was under the control of an empire-affiliated organization, ever lost the sovereignty over its foreign policy to a non-adjacent empire, or was under a League of Nations mandate after World War I. Using this definition, there are 100 former colonies and 51 independent nations. Panel A presents the first stage relation between the instruments and rule of law and Panel B the second stage relationship. Column 1 includes only the measure of early disease environment, its interaction with the colony dummy, and the colony dummy itself. Column 2 and every even numbered specification also controls for latitude. Columns 3 and 4 exclude African countries, Columns 5 and 6 the four Neo-Europes and Columns 7 and 8 add continent dummies. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 17 - Main Results and Basic Robustness Using a Narrow Definition of Former Colonies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Full sample		*Excluding African Countries*		*Excluding "Neoeuropes" (AUS, CAN, NZL, USA)*		*Excluding Members of the Warsaw Pact*		*Adding Continent Dummies*	
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003										
Rule of Law	1.66	1.74	1.21	1.19	1.95	2	1.59	1.64	1.25	1.23
	[0.26]**	[0.31]**	[0.26]**	[0.32]**	[0.45]**	[0.49]**	[0.22]**	[0.24]**	[0.19]**	[0.24]**
EDE	-0.24	-0.3	-0.24	-0.23	-0.24	-0.31	-0.28	-0.38	-0.19	-0.18
	[0.10]*	[0.09]**	[0.10]*	[0.09]**	[0.12]	[0.11]**	[0.09]**	[0.09]**	[0.07]**	[0.07]*
Colony y/n	0.11	-0.14	0.19	0.23	0.37	0.06	0.22	-0.01	0.02	0.05
	[0.19]	[0.25]	[0.14]	[0.29]	[0.32]	[0.28]	[0.23]	[0.24]	[0.24]	[0.32]
Latitude (Std.)		-0.23		0.03		-0.26		-0.28		0.03
		[0.22]		[0.22]		[0.27]		[0.22]		[0.16]
Africa y/n									-0.72	-0.72
									[0.41]	[0.42]
Americas y/n									0.31	0.32
									[0.34]	[0.33]
Asia y/n									-0.22	-0.21
									[0.24]	[0.24]
Oceania y/n									-0.41	-0.39
									[0.30]	[0.30]
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"										
EDE	-0.01	0.12	-0.01	0.12	-0.01	0.1	0.12	0.33	0.22	0.25
	[0.15]	[0.15]	[0.16]	[0.15]	[0.15]	[0.15]	[0.16]	[0.15]*	[0.16]	[0.16]
EDE * Colony y/n	-0.56	-0.48	-0.68	-0.57	-0.41	-0.38	-0.69	-0.63	-0.76	-0.63
	[0.18]**	[0.17]**	[0.23]**	[0.22]*	[0.18]*	[0.17]*	[0.19]**	[0.16]**	[0.19]**	[0.20]**
Colony y/n	-0.41	0.12	-0.37	0.23	-0.54	-0.05	-0.88	-0.29	0.19	0.44
	[0.18]*	[0.22]	[0.20]	[0.25]	[0.18]**	[0.22]	[0.20]**	[0.20]	[0.24]	[0.27]
Latitude (Std.)		0.45		0.48		0.39		0.61		0.29
		[0.13]**		[0.16]**		[0.14]**		[0.14]**		[0.14]*
Africa y/n									-1.25	-1.07
									[0.31]**	[0.33]**
Americas y/n									-1.34	-1.07
									[0.33]**	[0.38]**
Asia y/n									-0.96	-0.74
									[0.24]**	[0.26]**
Oceania y/n									-0.62	-0.39
									[0.55]	[0.54]
Observations	151	151	104	104	147	147	131	131	151	151
R-sq first stage	0.27	0.34	0.14	0.22	0.24	0.29	0.4	0.51	0.38	0.4

Notes: Table 17 reproduces the main result and some robustness tests using a narrow definition of former colonies. The colony dummy used in this table equals 1 if a country was either officially colonized, ever had the official status of "protectorate," or ever was under the control of an empire-affiliated organization. Using this definition, there are 91 former colonies and 60 independent nations. Panel A presents the first stage relation between the instruments and rule of law and Panel B the second stage relationship. Column 1 includes only the measure of early disease environment, its interaction with the colony dummy, and the colony dummy itself. Column 2 and every even numbered specification also controls for latitude. Columns 3 and 4 exclude African countries, Columns 5 and 6 the four Neo-Europes and Columns 7 and 8 add continent dummies. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 18 - Repeating the Basic Analysis with the Mortality Data of Albouy (2006)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sample of former colonies from Albouy (2006)		*All former Colonies*	*Not Colonized Countries*	*Full Sample*	*Full Sample*	*Full Sample*	*Full Sample*
	IV	*IV*	*IV*	*IV*	*OLS*	*OLS*	*IV*	*IV*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law	1.628	1.893	2.032	5.989			1.808	1.814
	[0.258]**	[0.250]**	[0.220]**	[14.345]			[0.347]**	[0.429]**
EDE Albouy					-0.945	-0.908	-0.157	-0.162
					[0.115]**	[0.139]**	[0.146]	[0.242]
EDE Albouy Square								0.001
								[0.055]
Colony y/n						-0.129	0.131	0.133
						[0.289]	[0.201]	[0.213]
R-Sq	-	-	-	-	0.337	0.338	-	-
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"								
Mortality rate (from Albouy (2006); std.)	-0.464							
	[0.126]**							
EDE Albouy		-0.572	-0.574	-0.053			-0.075	-0.112
		[0.119]**	[0.096]**	[0.168]			[0.159]	[0.330]
EDE Albouy * Colony y/n							-0.493	-0.51
							[0.178]**	[0.195]**
EDE Albouy Sq.								0.009
								[0.057]
Colony y/n							-0.352	-0.356
							[0.190]	[0.185]
Observations	60	60	95	56	151	151	151	151
Clusters	60	60	95	56	151	151	151	151
R-sq first stage	0.267	0.351	0.332	0.001	0.731	0.731	0.267	0.267

Notes: Table 18 presents the first stage relation between early disease environment and institutional quality (Panel A) and the second stage relation between instrumented institutional quality and income (Panel B). The measure of early disease environment (EDE Albouy) is predicted from Column 7 in Table 6, partialling out the sampling population. In Columns 1 and 2 of Table 18, the sample is equal to that of Albouy (2006) except that Bahamas and Malta are excluded since their Population is less than 500,000. For the sample criterion in the other Columns of Table 18 see main text. The variable "EDE Albouy * Colony y/n" is the interaction of the colony dummy and EDE. The measure "EDE Albouy Square" equals (EDE Albouy +2.49)^2, where -2.49 is the minimum observed value of EDE Albouy. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 19 - Robustness Tests for the Data of Albouy (2006)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Excluding African Countries		*Excluding "Neoeuropes" (AUS, CAN, NZL, USA)*		*Excluding Members of the Warsaw Pact*		*Adding Continent Dummies*	
	Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003							
Rule of Law	1.19	1.19	1.91	1.87	1.61	1.62	1.23	1.21
	[0.29]**	[0.32]**	[0.50]**	[0.45]**	[0.27]**	[0.26]**	[0.19]**	[0.22]**
EDE	-0.26	-0.25	-0.22	-0.32	-0.24	-0.35	-0.17	-0.15
	[0.12]*	[0.10]*	[0.16]	[0.11]**	[0.12]*	[0.10]**	[0.09]*	[0.08]
Colony y/n	0.23	0.25	0.33	0.06	0.21	-0.01	0.08	0.14
	[0.15]	[0.30]	[0.29]	[0.27]	[0.24]	[0.24]	[0.24]	[0.32]
Latitude (Std.)		0.02		-0.23		-0.25		0.06
		[0.23]		[0.25]		[0.23]		[0.16]
Africa y/n							-0.82	-0.81
							[0.40]*	[0.40]*
Americas y/n							0.26	0.28
							[0.33]	[0.32]
Asia y/n							-0.25	-0.23
							[0.24]	[0.24]
Oceania y/n							-0.43	-0.41
							[0.30]	[0.30]
	Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"							
EDE	-0.05	0.18	-0.05	0.14	0.03	0.31	0.3	0.38
	[0.17]	[0.17]	[0.17]	[0.17]	[0.19]	[0.17]	[0.17]	[0.17]*
EDE* Colony y/n	-0.61	-0.56	-0.38	-0.41	-0.6	-0.6	-0.82	-0.72
	[0.24]*	[0.22]*	[0.19]*	[0.18]*	[0.21]**	[0.17]**	[0.20]**	[0.20]**
Colony y/n	-0.27	0.34	-0.48	0.02	-0.8	-0.22	0.26	0.54
	[0.20]	[0.25]	[0.19]*	[0.22]	[0.21]**	[0.21]	[0.25]	[0.26]*
Latitude (Std.)		0.55		0.44		0.63		0.35
		[0.18]**		[0.15]**		[0.15]**		[0.14]*
Africa y/n							-1.43	-1.24
							[0.32]**	[0.33]**
Americas y/n							-1.47	-1.18
							[0.34]**	[0.38]**
Asia y/n							-1.07	-0.86
							[0.25]**	[0.27]**
Oceania y/n							-0.72	-0.49
							[0.56]	[0.53]
Observations	104	104	147	147	131	131	151	151
R-sq first stage	0.128	0.221	0.237	0.295	0.389	0.503	0.386	0.417

Notes: Table 19 reproduces the basic robustness tests of Table 7 using EDE Albouy. EDE Albouy is predicted from Column 7 of Table 6, partialing out the sampling population dummies. Each specification is estimated without (odd numbered columns) and with controlling for latitude (even numbered column). In Columns 1 and 2, 47 African countries (all colonies) are excluded from the estimation. In Columns 3 and 4, the four Neoeuropes Australia, Canada, New Zealand, and the USA are excluded. In Columns 5 and 6, all former members of the Warsaw Pact are excluded. This excludes 14 former members of the Soviet Union (Turkmenistan does not have a 2003 World Bank GDP estimate) and Bulgaria, Hungary, Poland, the Check and Slovak Republic, and Romania. Columns 7 and 8 add continent dummies, where European countries are the omitted group. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 20 - Sociologic and Historical Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Measures of Fractionalisation			*Warsaw Pact*	*Legal Origin*	*Legal Origin*
	Ethnic	*Religion*	*Linguistic*	*All three*	*Dummy*	*Dummies*	*& Warsaw P.*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003							
Rule of Law	1.71	1.56	1.35	1.45	1.56	1.9	1.61
	[0.40]**	[0.25]**	[0.31]**	[0.34]**	[0.22]**	[0.46]**	[0.24]**
EDE	-0.24	-0.29	-0.26	-0.26	-0.29	-0.17	-0.32
	[0.10]*	[0.10]**	[0.09]**	[0.09]**	[0.09]**	[0.18]	[0.10]**
Colony y/n	0.08	0.13	0.06	-0.01	0.22	0.3	0.21
	[0.19]	[0.17]	[0.15]	[0.16]	[0.22]	[0.34]	[0.25]
Frac. Ethnic	0.23			0.83			
	[0.58]			[0.66]			
Frac. Rel		-0.45		-0.18			
		[0.33]		[0.41]			
Frac. Linguist			-0.79	-1.12			
			[0.34]*	[0.45]*			
Warsaw Pact y/n					0.31		0.52
					[0.25]		[0.28]
Legor UK y/n						-0.55	-0.04
						[0.47]	[0.22]
Legor FRA y/n						0.08	0.47
						[0.28]	[0.18]**
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"							
EDE	0	0	-0.02	0.04	0.11	-0.14	0.12
	[0.14]	[0.16]	[0.15]	[0.15]	[0.16]	[0.17]	[0.17]
EDE * Colony y/n	-0.39	-0.56	-0.45	-0.4	-0.68	-0.39	-0.64
	[0.18]*	[0.19]**	[0.18]*	[0.18]*	[0.18]**	[0.19]*	[0.19]**
Colony y/n	-0.27	-0.43	-0.32	-0.25	-0.89	-0.7	-0.95
	[0.18]	[0.19]*	[0.18]	[0.18]	[0.21]**	[0.19]**	[0.22]**
Frac. Ethnic	-1.14			-1.47			
	[0.32]**			[0.35]**			
Frac. Rel		0.28		0.59			
		[0.28]		[0.29]*			
Frac. Linguist			-0.57	0.02			
			[0.25]*	[0.27]			
Warsaw Pact y/n					-1.12		-1.17
					[0.22]**		[0.29]**
Legor UK y/n						0.81	0.2
						[0.23]**	[0.28]
Legor FRA y/n						0.43	-0.16
						[0.21]*	[0.26]
Observations	148	151	148	145	151	150	150
R-sq first stage	0.331	0.27	0.288	0.366	0.376	0.324	0.404

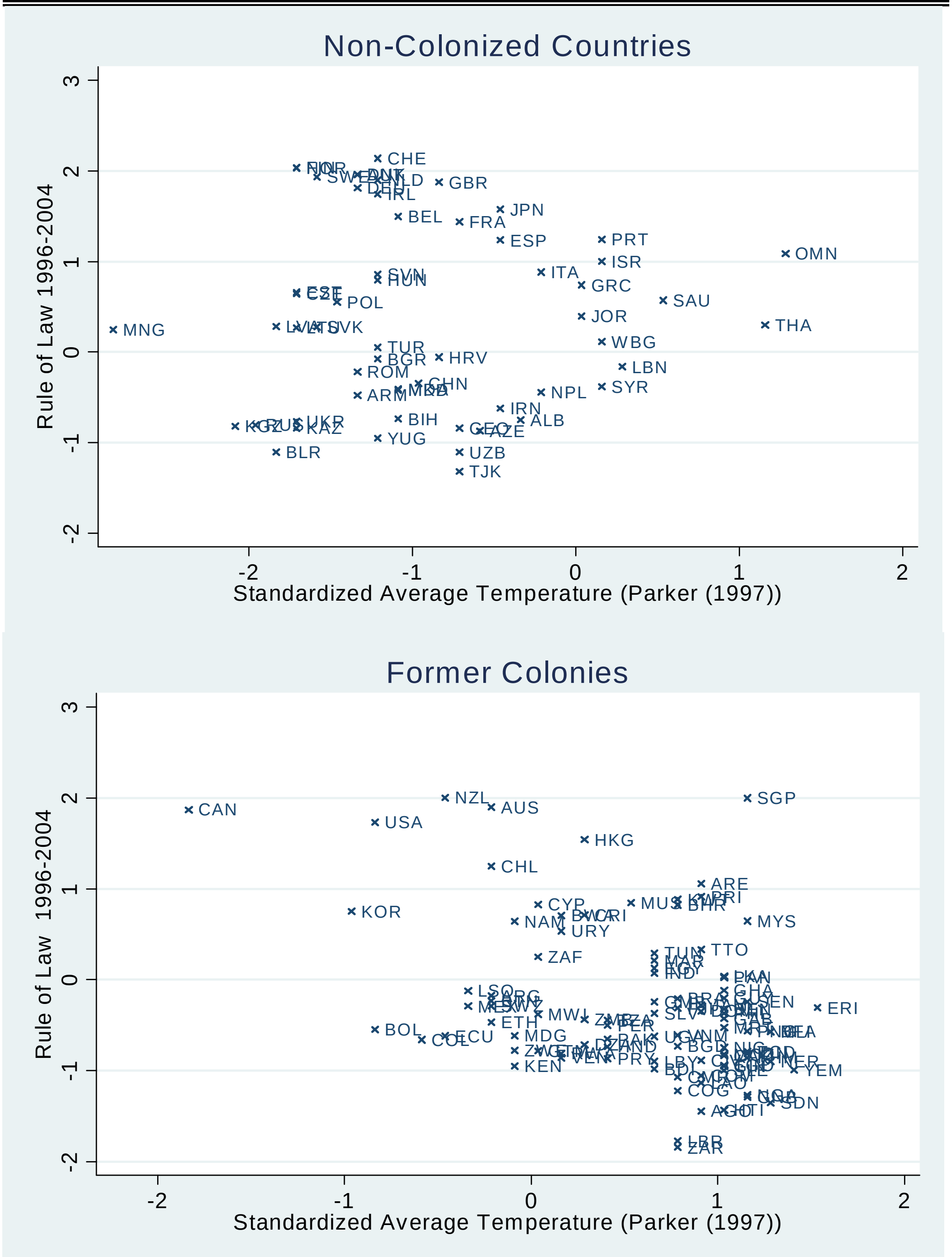
Notes: Table 20 tests for the effect of natural oil abundance, measures of fractionalization, and legal origins conditional on colonial history and early disease environment. Columns 1 to 3 respectively add measures of ethnic, religious, and linguistic fractionalization and Column 4 adds all three measures. These measures are from Alesina et al. (2004), take values from 0 and 1 and are the higher the more heterogeneous a country is (Ethnic is missing for PRI, WBG, YEM while Language is missing for HTI, RWA, and SLV). In Column 5, a dummy that equals 1 for the 20 former Warsaw Pact members of the sample is added. In Column 6, two dummies for countries with French or British legal origins (from La Porta et al. (1999), missing WBG) are included. Column 7 includes both the legal origins dummies and the Warsaw Pact dummy. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Table 21 - Additional Instruments for Institutions and Overidentification Tests

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	First Polity Score		*First XCONST Score*		*Ethnic*	*Warsaw Pact*	*Legal Org.*	*Colonizer*
	before 1911	*before 1961*	*before 1911*	*before 1961*	*Fract.*	*Dummy*	*Dummies*	*& Soviet*
Panel B: Second Stage Results - Dependent Variable is the Ln of GDP per Capita in 2003								
Rule of Law	1.07	1.36	1.07	1.31	1.57	1.39	1.22	1.27
	[0.13]**	[0.19]**	[0.14]**	[0.16]**	[0.17]**	[0.15]**	[0.20]**	[0.14]**
EDE	-0.33	-0.34	-0.32	-0.37	-0.27	-0.35	-0.41	-0.39
	[0.17]	[0.12]**	[0.17]	[0.10]**	[0.08]**	[0.09]**	[0.10]**	[0.09]**
Colony y/n	0.02	0.02	0.03	-0.02	0.06	0.06	0.02	0.03
	[0.18]	[0.19]	[0.22]	[0.19]	[0.17]	[0.15]	[0.15]	[0.14]
Panel C: Overidentification Test (P value of a Hansen C statistic for the orthogonality of EDE * Colony y/n)								
P Value	0.727	0.122	0.754	0.111	0.665	0.192	0.076	0.115
Panel A: First Stage Results - Dependent Variable is the 96-04 Avg. of "Rule of Law"								
EDE	-0.87	-0.41	-0.83	-0.44	-0.39	-0.68	-0.39	-0.58
	[0.24]**	[0.21]	[0.23]**	[0.18]*	[0.18]*	[0.18]**	[0.19]*	[0.19]**
EDE * Colony y/n	0.16	-0.09	0.21	-0.03	0	0.11	-0.14	0.05
	[0.22]	[0.19]	[0.16]	[0.16]	[0.14]	[0.16]	[0.17]	[0.16]
Colony y/n	-1.49	-0.79	-1.36	-0.76	-0.27	-0.89	-0.7	-0.99
	[0.27]**	[0.18]**	[0.24]**	[0.17]**	[0.18]	[0.21]**	[0.19]**	[0.21]**
Early Polity Score	0.09	0.04						
	[0.02]**	[0.01]**						
Early constraints on executive			0.26	0.15				
			[0.04]**	[0.03]**				
Frac Ethnic					-1.14			
					[0.32]**			
Warsaw Pact y/n						-1.12		-1.04
						[0.22]**		[0.23]**
Legor UK y/n							0.81	
							[0.23]**	
Legor FRA y/n							0.43	
							[0.21]*	
Colony UK y/n								0.47
								[0.15]**
Colony FRA y/n								0.05
								[0.17]
Observations	52	102	52	102	148	151	150	151
R-sq first stage	0.643	0.528	0.685	0.569	0.331	0.376	0.324	0.413

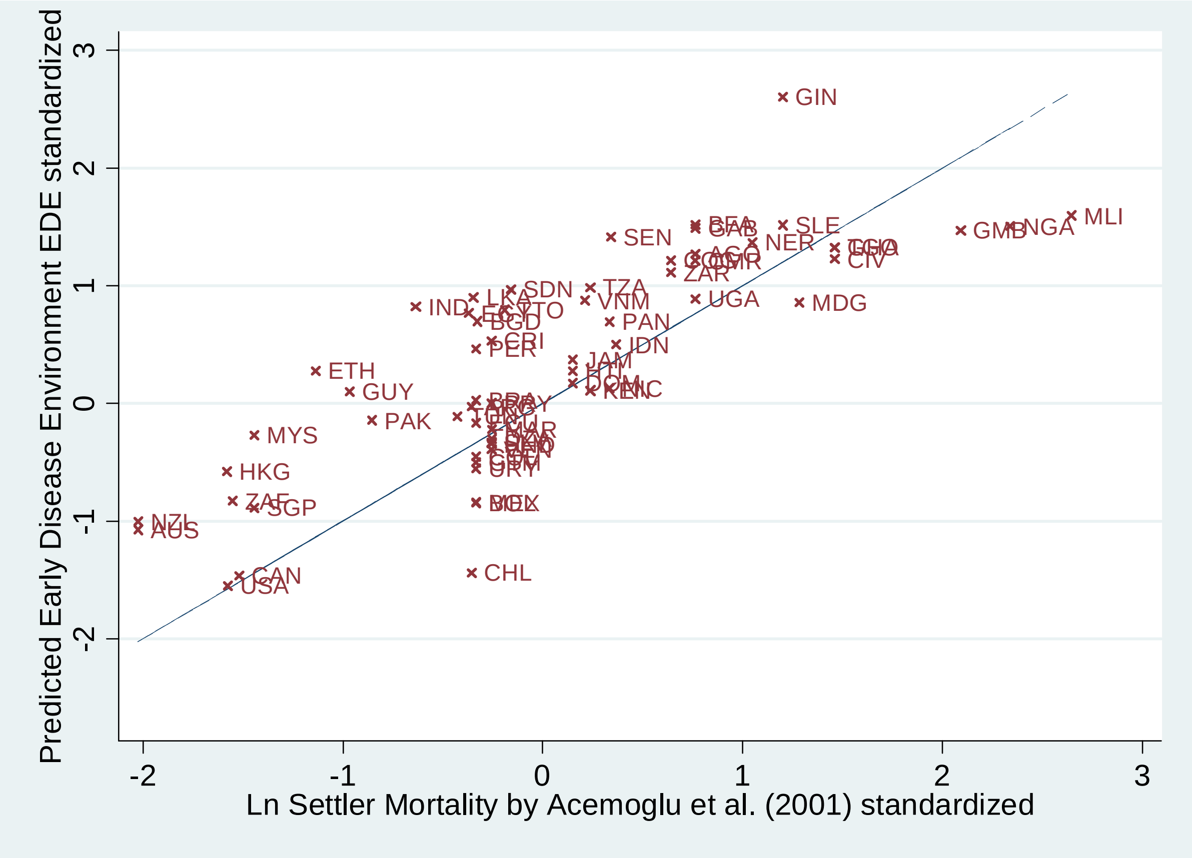
Notes: Table 21 presents additional instruments for institutions and the associated overidentification tests. Panel A presents the first stage relation between the instruments and the rule of law, Panel B the second stage relationship, and Panel C the heteroscedasticity robust Hansen C statistic. The p value corresponding to the orthogonality of "EDE * colony dummy" is reported. Columns 1 to 4 include early institutional quality from the Polity IV database. Early institutional score is the earliest available score from 1900-1911 in Columns 1 and 3 or the earliest available score in the interval 1900 to 1961 in Columns 2 and 4. Columns 1 and 2 present the results for the POLITY measure, which lies between -10 and 10, while Columns 3 and 4 present the results for XCONST, which can take values of 1 to 7. For both measures, a higher score is associated with better institutions. Column 5 uses ethnic fractionalization, which is from Alesina et al. (2004), takes values from 0 and 1, and is higher in more heterogeneous countries. Column 6 adds the Warsaw Pact dummy, Column 7 adds French and British legal origin dummies from La Porta et al. (1999) and Column 8 adds both the Warsaw Pact dummy and the two legal origins dummies. Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

Figure 1 - Temperature and Institutions in Former Colonies and Not Colonized Countries



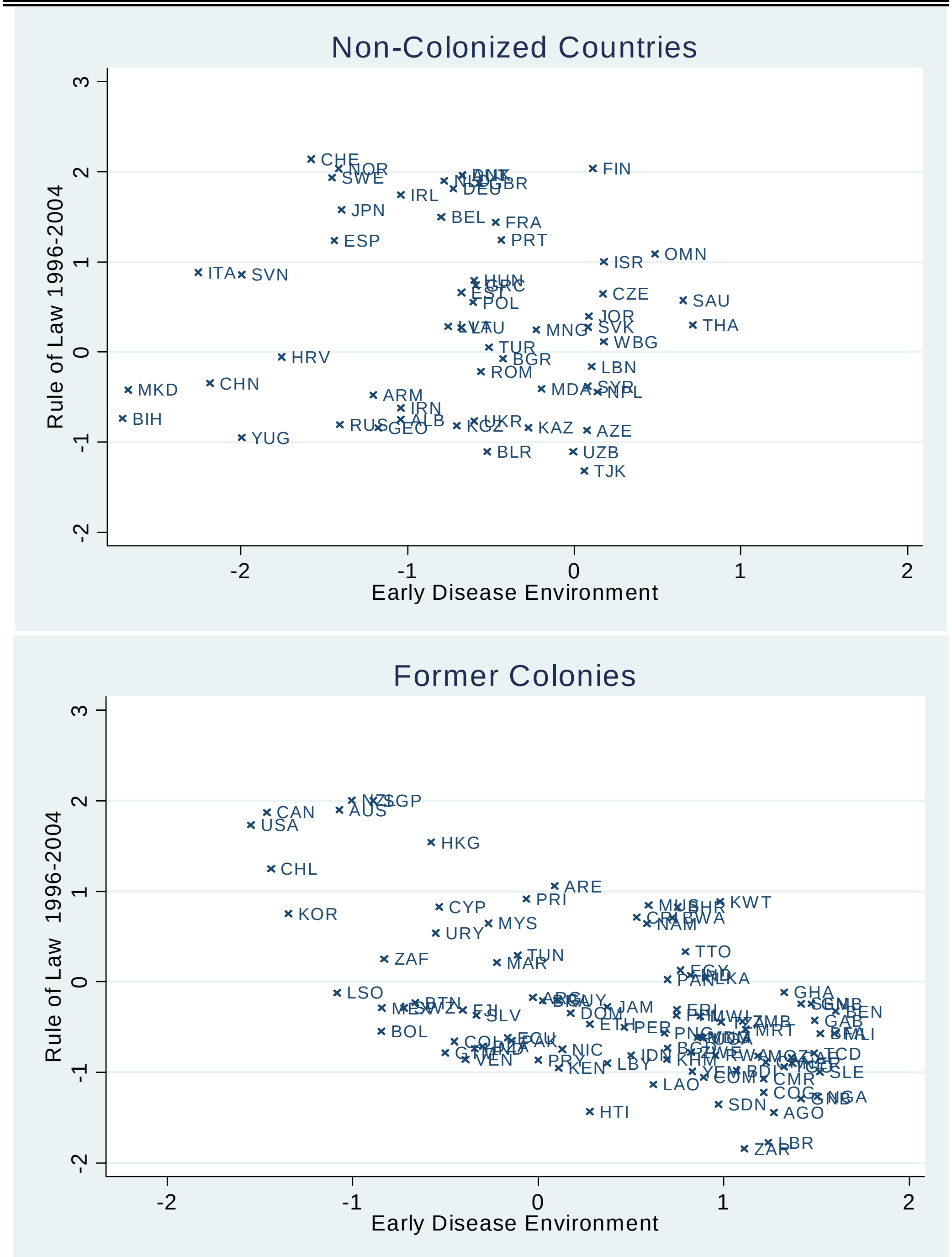
Notes: The upper plot of Figure 1 presents the relation between average temperature and property rights institutions for countries that have not been colonized. The lower plot of Figure 1 presents the same relation for former colonies. Average temperature is from Parker (1997) and standardized. The measure of institutional quality is the 1996 to 2004 average score of the rule of law from Kaufman (1995). Countries are denoted by Worldbank country codes.

Figure 2 - Settler Mortality and Early Disease Environment



Notes: Figure 2 presents the relation between the standardized natural logarithm of the annual settler mortality rate from Acemoglu et al. (2001) and the predicted value of Early Disease Environment. The measure "EDE" is displayed, which is predicted from Column 5 of Table 6 partialing out the sampling population dummies. The dashed line is the 45 degree line.

Figure 3 - Disease and Institutions in Former Colonies and Non-Colonized Nations

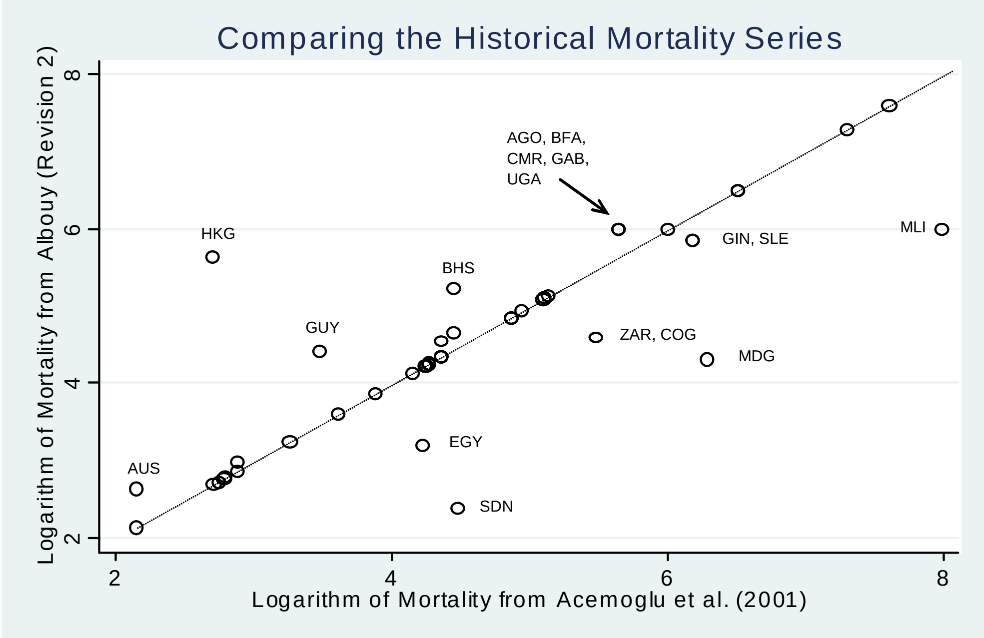


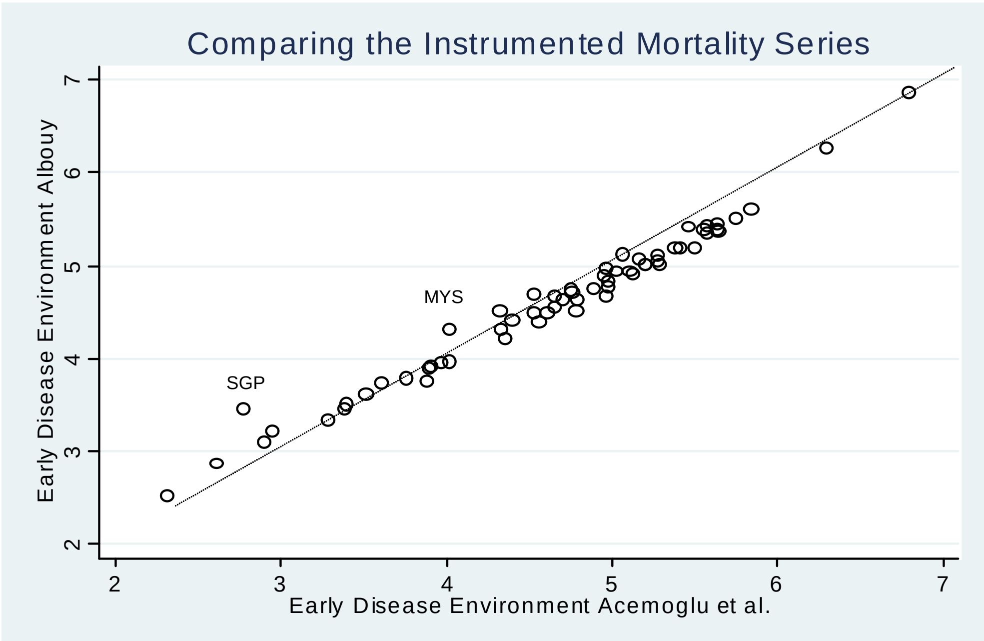
Notes: The upper plot of Figure 3 presents the relation between early disease environment (EDE) and property rights institutions for countries that have not been colonized. The lower plot of Figure 3 presents the same relation for former colonies. Countries are denoted by Worldbank country codes. EDE is predicted from Column 5 of Table 6 partialing out the sampling population dummies. In the lower plot, Guinea (Worldbank code GIN, EDE 2.61, and Rule of Law -0.95) is truncated.

Figure 4 - Disease and Income in Former Colonies and Non-Colonized Nations

Notes: The upper plot of Figure 4 presents the relation between early disease environment (EDE) and per capita GDP for countries that have not been colonized. The lower plot of Figure 4 presents the same relation for former colonies. Countries are denoted by Worldbank country codes. EDE is predicted from Column 5 of Table 6 partialing out the sampling population dummies. In the lower plot, Guinea (Worldbank code GIN, EDE 2.61, and Ln 2003 GDP per Capita 5.94) is truncated.

Figure 5 - Discrepancies Between Historical Mortality Estimates and Geographic Projections





Notes: The upper part of Figure 3 presents a scatter plot of the mortality rates from Acemoglu et al. (2001) versus the revised rates from Albouy (2006) (Revision 2). In this figure, since the mortality rates collected from historical sources are in some cases extrapolated to neighboring nations, one circle can represent multiple countries. The lower part of Figure presents a scatter plot of EDE and EDE Albouy. EDE is predicted from Column 2 of Table 6, while EDE Albouy is predicted from Column 6 of Table 6. Both measures are *not* standardized. In both plots, the 45 degree line is displayed. Also, in both plots, World Bank country codes are displayed if the respective mortality rates or levels of disease environment differ by more than 0.3 log points (35%). The two countries where EDE exceeds 6 are Sierra Leone and Guinea.

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