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A COMMENT ON THE COLONIAL ORIGINS OF COMPARATIVE DEVELOPMENT[§]

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Abstract

Robust estimation of the impact of political institutions on economic development requires the identification of valid instruments for institutional quality. Acemoglu *et al.* [2001] introduced the use of colonial settler mortality rates as such an instrument. Our paper develops a more eclectic theory of colonial development, and compares the performance of the settler mortality model to alternatives incorporating instruments reflecting the production structure of colonial economies. *Ceteris paribus*, colonies with a natural comparative advantage in pastoral agriculture were more likely to experience European settlement that led to non-extractive institutions. Some – but not all – of Acemoglu *et al.*'s conclusions are robust to the use of a wider set of instruments.

JEL classification: O17

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I. INTRODUCTION

Economists have recently made substantial progress in tracing the links between the quality of a country's political institutions and its level of economic development. It is by no means surprising that in cross-country datasets there is a positive correlation between institutional quality and *per capita* income.[1] However, it is much more difficult to establish the main direction of causality in this correlation. Observance of the rule of law and the establishment of property rights might well improve economic efficiency by reducing the distortions faced by investors. On the other hand, the legal and political framework required to establish good institutions comes at a cost that may be prohibitively high for low-income countries: lawyers are expensive! Establishing the size of the first of these two effects for the typical developing country – rather than outliers such as North and South Korea – is important in motivating an emphasis on political (rather than purely economic) development in the policy-making community.

The problem lies in the scarcity of obvious instruments for institutional quality. It is necessary to find a measurable, statistically independent country characteristic that is likely to influence economic growth only through its effect on institutions. Acemoglu *et al*. [2001] propose an innovative solution to the problem. Utilising the historical research of Crosby [1986], they propose that a country's current institutional quality is related to the mode of its early colonial settlement. Countries that received relatively large numbers of settlers from the colonial power (such as Canada, the USA, Australia and New Zealand) developed institutions of a relatively high quality. The settlers had the motivation and the political power to ensure that the colonial government replicated the respect for property rights and the rule of law present to some degree in their home country. By contrast, countries with small numbers of settlers developed "extractive" institutions designed to exploit the native population. To the extent that political systems are self-replicating, these institutional differences will persist to the present day.

Acemoglu *et al*. suggest that one main factor explaining the size of a settler population was the risk of disease the settlers faced. Therefore, mortality rates among early settlers can be used as an instrument for current political institutions in a cross country regression equation for *per capita* income. Exploiting this approach, they are able to estimate the impact of institutions on economic development in a model that by and large passes standard tests for statistical robustness.

In this paper, we broaden the institutional theory underlying the empirical model of economic development. The intensity of colonial settlement is likely to have depended not only (perhaps not principally) on the magnitude of costs faced by early settlers, but also (perhaps more importantly) on the size of the expected benefits. Some colonies – typically those acquired relatively early, in the sixteenth or seventeenth centuries – had a comparative advantage in commodities intensive in native or slave labour and/or physical capital. Mineral-rich countries, and also countries with a climate suited to plantation agriculture, producing cash crops such as sugar or bananas, are likely to have fallen in this category. It is unlikely that there was a need for large quantities of settler labour in such countries; as a consequence, they are more likely to have developed totalitarian political institutions designed simply to control an enslaved population. On the other hand, countries with a comparative advantage in pastoral agriculture are likely to have seen more intensive settlement by skilled European labor. The agricultural revolution in eighteenth century northern Europe produced farmers with substantial human capital specific to the raising of livestock, but with a high rate of population growth and a rapidly decreasing land-labour ratio. One solution to the Malthusian dilemma was the export of skilled labour to those colonies with a climate complementary to the human capital. These colonies are likely to have developed stronger political institutions.

In the next section of the paper, we provide more historical detail to support this hypothesis. The theory which emerges motivates the expansion of the instrument set of Acemoglu *et al*. to include indicators of comparative advantage in pastoral agriculture. We then show that with such an expanded set of instruments, we can improve the efficiency and robustness of the empirical model of institutions and economic development.

II. THEORETICAL FRAMEWORK

Historians already recognise the extensive links between colonial comparative advantage and the evolution of social and political institutions. For example, Celso Furtado [1976] suggests a tripartite typology of colonial development. The most fortunate colonies were those with a comparative advantage in temperate agricultural commodities. In these colonies, agricultural production was based on the extensive use of land designed to compete with the domestic production of countries undergoing rapid industrialization and population growth. The production structure in these colonies matched that of northern Europe before industrialization, providing the incentive to import skilled settler labour. The extensive agricultural production necessitated the creation of a widespread transportation network which indirectly led to the rapid unification of the domestic market. These colonies acquired a well developed communication network at an early stage, conducive to the rapid development of civil society. (Often these colonies benefited from a temperate climate and so had a low settler mortality rate. However, the correlation between the two factors was far from perfect.) In addition to the British colonies already noted, this group of countries includes Argentina and Uruguay.

Less fortunate colonies had a comparative advantage in tropical agricultural commodities. There was no pre-existing European human capital specific to the production of these goods. Rather, production was intensive in unskilled slave labor on plantations, with a small number of settlers acting as managers. Traditional transportation networks continued to be used, and the conditions for the establishment of civil society never existed. Examples of this mode of colonization include parts of West and Central Africa, such as Ghana and Cameroon, parts of South East Asia, such as Burma and Vietnam, and much of Central America and the Caribbean.

The fate of mineral-rich colonies was at least as miserable. Production was again intensive in slave labor, which often had to be transferred forcibly to inhospitable mining regions. This dislocation of the population broke up extended family networks, destroying the corresponding social capital. Colonial political institutions developed to exploit not only the slave labor in the mines, but also the rural population providing food for miners. The rural population was often producing at near-subsistence level to begin with, so a great deal of coercive force was required to extract the agricultural surplus. In remote areas, labor discipline was summary and without appeal [Thorp, 1998]. South Africa, Bolivia, Chile, Mexico, Peru and Venezuela are examples of this pattern.

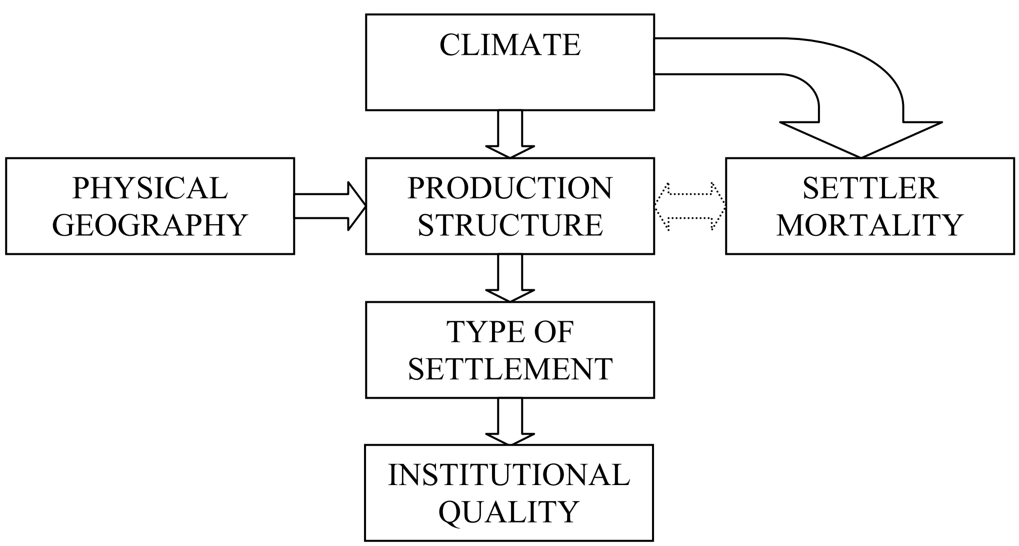
The population dislocation operated at both a national and an international level. The international slave trade required political repression not only at the slaves' destination but also at their point of origin. As noted by Curtin *et al*. [1995], colonies with a comparative advantage in the export of slave labor – mostly in West Africa – also developed weak political institutions.

The timing of the first European settlement in a region is an important element in the political economy of colonization. A large proportion of the mining and plantation colonies were settled relatively early. Spain and Portugal started to occupy West Africa and Latin America in the fifteenth century, long before the European industrial revolution. In the 1480s the Portuguese seized São Tomé in the Gulf of Guinea, setting up plantations to produce sugar for the European market [Curtin *et al*., 1995]. This form of production was extended to Brazil in the sixteenth century and the Caribbean (including early British and French colonies) in the seventeenth. Later, Spain and Portugal introduced more geographical specialization across their territories, using West Africa used largely as a source of slave labor for mines and plantations on the other side of the Atlantic. At this point, population density in Europe was still quite low, and no part of the New World had a marked comparative advantage in pastoral agriculture. The economic motivation for colonization lay entirely in the returns to mining and plantation agriculture. Settler mortality in many of these colonies may have been quite high, but the benefits of revenues from gold and sugar outweighed the costs.

By contrast, pastoral colonies were settled largely in the later eighteenth nineteenth centuries, when the industrial revolution and population growth increased the ratios of both labor and capital to land across northern Europe. *Per capita* agricultural output declined, catastrophically in places such as Ireland, inducing large-scale migration to the temperate colonies which had recently acquired a comparative advantage in pastoral agriculture. This was the period of rapid population expansion in North America, Argentina, Uruguay and Australasia.

Historians also emphasize the complexity of the interactions between comparative advantage, climate and the mode of colonization. Galeano [1973] points out that in some areas the intensive use of forced labor in plantation and mining economies exacerbated the effects on health of a tropical climate that was already associated with a high mortality rate. Low wages, long forced marches and high population densities in mines and on plantations contributed to the high incidence of disease, increasing mortality from smallpox, tetanus, venereal disease, trachoma, typhus, leprosy and yellow fever. This further discouraged European settlers in areas with a high initial settler mortality rate, further entrenching the extractive production structure. Moreover, in areas of high population density the new diseases introduced by the European settlers, to which the indigenous population had no natural resistance, were particularly virulent.[2] High mortality rates among the indigenous population necessitated even more forced movement of labour across long distances, exacerbating the existing problems. Therefore, settler mortality rates in some areas were endogenous to the production structure of the colony, which was initially determined by its natural comparative advantage.

The chart below summarizes the main interactions we have discussed. Institutional quality is a function of the type of settlement a colony experienced, that is, whether or not colonization was either extractive / exploitative. The type of settlement is itself a function of the colony's production structure, which is a consequence of the interaction of physical geography, climate and settler mortality. Climate directly affects both the production structure and settler mortality: tropical climates are less healthy; they also favour exploitative modes of production. It is also *possible* that the production structure and settler mortality rates reinforce each other. This effect is represented by the dashed, double-headed arrow in the chart. The key difference between this typology and that of Acemoglu *et al*. is that the proximate determinant of the type of settlement, and hence in the long run institutional quality, is the production structure of the colony rather than settler mortality.



The chart suggests that we modify the Acemoglu *et al*. model, using an indicator of production structure rather than settler mortality *per se* as the instrument for institutional quality. The key factor in the theory outlined above is the extent to which the area colonized has a comparative advantage in pastoral agriculture. So our instrument will be a measure of internationally tradable pastoral agriculture output. The main measure we will focus on is the beef production *per capita*, described in more detail in the next section. Although some other meat production figures are available, it is not obvious that all types of meat were internationally tradable during the colonial period. For example, unit costs in poultry meat may have been prohibitively high, making poultry production endogenous to past income, since meat is a luxury. If current income depends on past income then total meat production will not be a valid instrument for institutional quality, because it affects current income independently of its impact on institutions. Nevertheless, we are sensitive to the possibility that our measure of pastoral agricultural production is too narrow, so we will also fit a model with total *per capita* meat production as an instrument.[3]

The chart also indicates that our instrument will probably be correlated with the settler mortality instrument. The most important reason for this is probably that tropical climates are both unhealthy and unsuited to European-style pastoral agriculture. It is also possible that there is a Galeano-type loop between mortality rates and modes of production. If this is the case, then the reason for the success of the settler mortality instrument is that it is correlated with production structure, and it will be more appropriate to use an instrument that captures production structure directly. We will test this hypothesis by comparing the results of regression estimates using a settler mortality instrument with an alternative set of estimates using one or other of our production structure instruments.

Finally, we should note one *caveat*. For neither type of instrument does the theory permit us to preclude *a priori* the possibility that some other causal channel is at work other than political institutions. For example, pastoral agriculture might have encouraged investment in a transport infrastructure that had lasting benefits for local productivity. For this reason, we will need to be careful in the application of statistical tests for the validity of our chosen instruments.

III. THE DATASET

Our basic methodology follows that of Acemoglu *et al*.: we construct a cross-country regression equation for log *per capita* GNP conditional on one of a number of measures of institutional quality.[4] This measure is probably endogenous to income, so we need to use an instrument to generate consistent estimates. We consider three different instruments: the settler mortality rate, log beef production *per capita* and log total meat production *per capita*. We also condition on a set of exogenous variables that may influence factor productivity.[5] This set includes measures of ethnolinguistic fractionalization, religious adherence, the identity of the colonial power, the health of the population, and characteristics of climate and physical geography. The Appendix provides details of our data sources. The set of countries from which we extract data overlaps that of Acemoglu *et al*.: with more recent data sources we were able to expand their original sample, but then we had to exclude some countries because beef data were not available. Table I lists all the countries in our dataset, and notes the reasons for the exclusion of some other countries.

Before we begin to discuss the data, a methodological note is in order. Throughout most of the paper, we will apply the econometric methodology that is conventional in the existing growth and development literature. That is, we will address questions about the statistical robustness of the main parameters of interest by fitting several alternative regression equations with alternative sets of auxiliary conditioning variables. The main argument against a general-to-specific approach [Hendry and Krolzig, 2001] is that with fewer than 100 observations in our dataset the chances of spurious results from data-mining are relatively high. Nevertheless, we will end by showing that our key results remain if we adopt a general-to specific modelling approach.

Table II presents some summary statistics for the main variables of interest. These are: PPP-adjusted log *per capita* GNP in 1995 (our dependent variable), our three instruments and five indicators of institutional quality. The means and standard deviations of variables in our dataset are very similar to those in the dataset of Acemoglu *et al*. In both cases there is substantial variation in *per capita* income around the world: the standard deviation of the *log* is approximately equal to one.

The main indicator of institutional quality is a measure of protection of individuals against the risk of state property expropriation, introduced into the economics literature by Knack and Keefer [1995]. We have annual data on this indicator, which rates a country on a 1-10 scale, increasing in the degree of protection. The variable reported in the table is an average of this measure over 1985-95. Of all our institutional indicators, it is conceptually the closest to those characteristics of a polity that are likely to influence economic efficiency. A high value of the index indicates a polity in which property rights and the rule of law are respected. Table II also records a measure of institutional quality for 1990 from the Polity-IV dataset [an updated version of Gurr, 1997]. This is an index of the extent to which the actions of the executive are constrained in law. It is a more general indicator of the rule of law and respect for individual rights than the protection from expropriation risk variable. We do not report the regression equations using this alternative institutional indicator, but the results are broadly similar to those discussed below.

Tables I-II here

Table II records three other institutional quality indicators, also from the Polity-IV database, are historical measures of institutional quality, measuring the extent constraints on the executive in 1900 and in the year of the colony's independence, which is usually later than 1900, and also an overall "democracy" score for 1900. The democracy score is a very broad political indicator, incorporating a weighted average of scores reflecting the accountability of governments, the degree of competition in their election and the freedom with which individuals can form political associations. The three historical indicators will be used to examine the extent to which current institutional quality depends on past institutions.

In addition to the settler mortality instrument, we have two pastoral agriculture variables. They are the *per capita* production of beef and all meat in 1948, towards the end of the colonial period. (Most colonies gained their independence in the late 1950s or 1960s.) This is the first year in which data are available for a very wider range of countries; they were part of an initial data collection exercise by the newly formed United Nations. However, it is unlikely that the extent of comparative advantage in pastoral agriculture changed substantially over the last hundred years of the colonial era (roughly from the 1850s to the 1950s). As a robustness check, we also run regressions with beef and meat production data from 1960 and 1970, and produce very similar results to those based on the 1948 data.

In all cases, those countries in the top quartile of the distribution for beef *per capita* subsequently have, on average, a higher income level and better institutions than those in lower quartiles. They also have, on average, lower settler mortality rates and higher total *per capita* meat production: as expected, there is a strong – but not perfect – correlation between the three alternative instruments. The pattern over the bottom three beef quartiles is less marked: in this range, a higher level of beef production is generally associated with better institutions, but not in all cases. The top quartile contains all of the "Neo-European" colonies (Australia, New Zealand, Canada and the USA) extreme cases in which the European settlers vastly outnumbered the indigenous population.[6] Another robustness check will be to omit these four countries from the regression equations.

In addition to the Table II variables, we employ a wide range of control variables. Some of these reflect physical geography: continental dummy variables, absolute latitude, mean temperature and the proportion of the country within 100km of a maritime coastline. McArthur and Sachs [2001] propose such variables as exogenous determinants of health and therefore productivity (through their correlation with disease-inducing climatic factors). We also look at the impact on our results of conditioning on health variables – life expectancy, infant mortality and the prevalence of malaria – directly; however, these variables may well be endogenous to income, so the results of regressions that include them should be treated with a great deal of caution. The other main group of control variables reflects the colonial origin of each country. We have dummy variables for former British colonies, former French colonies, and countries of French legal origin (that is, legal systems based on the *Code Napoleon*).[7] These could reflect the impact of legal and social culture on productivity [Landes, 1988]. For similar reasons, we also condition on data for (nominal) religious adherence in each country, with data on the fraction of the population that is Protestant / Roman Catholic / Muslim.

IV. RESULTS

Tables III-XI report our regression results. These correspond to Tables III-VIII in Acemoglu *et al*. Most of our results from the regressions using settler mortality as an instrument are not recorded; by and large, coefficient estimates in these regressions are very similar to those reported by Acemoglu *et al*., with some minor variation due to the differences in sample coverage. However, we do report some settler mortality regression results when we get to Table X, which highlights the key differences between the regressions with different instruments.

Tables III-XI here

We begin by exploring the degree of correlation between protection against expropriation risk and our two new instruments (Table III). Panel A reports the results of regressions for protection conditional on (i) log *per capita* meat production and (ii) log *per capita* beef production. These appear in columns 7-10. In each case, we report one equation that conditioned on latitude and one that is not. Panel A also reports results from regressions for protection conditional on the three historical institutional quality variables. These appear in columns 1-6. All of the regression coefficients are significant at the 5% level. To summarize: there is some marked persistence in institutional quality, but institutional quality is also highly correlated with our pastoral agriculture variables, suggesting that there is empirical support for our central hypothesis. There is also a marked correlation of institutional quality and latitude, which is consistent with previous studies that condition economic performance on latitude [Gallup *et al*., 1998; Hall and Jones, 1999]. It remains to be seen how many of these correlations are robust to alternative model specifications.

Panels B and C of Table III explore the extent to which the institutional quality indicators for 1900 are correlated with our two pastoral agriculture instruments. Again, there are strong and statistically significant correlations, even when we condition on latitude. It seems that production structure is associated with institutional quality even before the modern period: the beneficial institutional effects of a large pastoral base date from long before political independence.

All of these stylized facts match those reported for the settler mortality regressions in Acemoglu *et al*. This suggests that pastoral agriculture is a strong competitor against settler mortality as an institutional instrument. How they compare head-to-head will be discussed later.

Tables IV-V report our basic Instrumental Variables regressions for log *per capita* GNP as a function of institutional quality. Table 4 deals with *per capita* meat production as an instrument and Table V deals with beef *per capita*. Again we report versions with and without latitude as a conditioning variable. We also explore the robustness of our base results (columns 1-2) with respect to regional effects. Tables IV-V report three variations of this robustness check: first of all omitting the Neo-European colonies (columns 3-4), then omitting African colonies (columns (5-6), and finally including a whole set of continent dummies (columns 7-8). In all cases the instrument is a significant explanatory variable in the first stage regression for institutional quality (Panel B), and institutions are a significant determinant of *per capita* GNP (Panel A). The Panel A coefficients are similar in size to those reported in Acemoglu *et al*, so changing the instrument does not substantially change the estimated impact of institutions on *per capita* GNP. The IV estimates of the institutional quality effect in Panel A are larger than the corresponding OLS estimates (Panel C): the OLS estimates seem to be biased downwards. The Panel B figures imply that a level of *per capita* total meat production (or of beef *per capita*) that is 1% higher will be associated with an institutional quality index that is higher by about 0.6-0.9% of one point on a 1-10 scale, if we include the Neo-European colonies. The coefficients on the index in Panel A are a little less than one, so the corresponding boost to *per capita* GNP is around 0.5%.

There is, however, some variation in the magnitude of these effects across regression specifications. In particular, exclusion of the Neo-European colonies reduces the estimated impact of the instrument on institutional quality (by about a half) and increases the estimated impact of institutional quality on *per capita* GNP (approximately doubling it). These four observations are marked outliers, and their exclusion does make a substantial difference to the magnitudes of the estimated relationships. However, qualitative effects are robust to their exclusion. Otherwise, the only marked geographical effect is the negative Africa dummy in the *per capita* GNP regression, as in Easterly and Levine [1997]. One other point of interest is that the significance of latitude is not robust to the exclusion of the Neo-European colonies, which are all some distance from the equator.

Tables VI-VII report the results of further robustness checks, adding dummies for British and French colonization, a dummy for French legal origin and measures of religious affiliation (three variables, capturing the percentage of the population that is Roman Catholic, Protestant or Muslim) to the regression specification in various combinations.[8] There is never any substantial change in the estimated effect of the instrument on institutional quality, or of institutional quality on *per capita* GNP. However, the extra control variables are typically statistically significant. Countries colonized by Britain and France can be expected to have better institutions, but – conditional on institutions – lower *per capita* GNP. The two effects are mostly of roughly equal magnitude. In other words, the beneficial productivity effects of better institutions appear only if the high institutional quality is *not* a consequence of colonization by Britain or France. One interpretation of this result is that the protection against expropriation risk variable is a proxy for an underlying measure of social capital. When the protection is "home grown", not imported from Britain or France, then this is a sign of the social capital that promotes economic development.

Tables VIII-IX report the results from regression equations that also contain health control variables: the incidence of malaria, life expectancy and infant mortality. Two versions of this type of equation are reported: one that assumes the exogeneity of the three health variables, and one that instruments them on geographical-climatic factors (in addition to latitude, mean temperature and distance from the coast). Overall, the sizes and significance levels of the coefficients on institutional quality and on the instrument in the first stage equation are not substantially different from those in previous tables.[9] Nor is the estimated effect of institutional quality on income substantially different from that in Acemoglu *et al*.

Table X reports some tests for the validity of our two instruments, in the form of over-identification tests. Our conjecture is that production structure is correlated with modern institutions because it influenced early institutions. Therefore, if our instrument is valid, we will be able to use some measure of early institutional quality as an instrument in place of production structure, and production structure will not be significant as an exogenous conditioning variable. (If it is significant, then production structure influences current income through some channel other than institutional quality, and is not a valid instrument.)

The table reports results for both of our instruments, using in succession four different measures of early institutional quality as an additional instrument: democracy in 1900 and in the first year of independence, and constraints on institutions in 1900 and in the first year of independence. Panel A shows the second stage regression estimates for *per capita* income when one of these measures is used as the only instrument, with the first stage regression coefficients listed in Panel B. Panels D and E show how these regressions change when either one of our production structure variables is added to the second stage regression. *Per capita* beef production is never significant as an additional conditioning variable, which suggests that both are valid instruments. However, *per capita* total meat production is sometimes significant, so we cannot be entirely sure of its validity. This might be because some meat is not internationally tradable, as discussed in Section 2. Panel C confirms these general results by reporting χ^2 tests for over-identification when the production structure variable is omitted from the second stage regression for *per capita* income (but not from the first stage regression). In the case of beef *per capita* none of the χ^2 statistics is significant. This is also true of the statistics for total meat production, but in this case the null is almost rejected at the 10% level for some regression specifications.

Table X corresponds to Table VIII of Acemoglu *et al*., in which the same general results are reported for the settler mortality instrument in the Acemoglu *et al*. dataset. This dataset is slightly different from our own, so it is also of interest to perform the over-identification tests for settler mortality in our dataset. This means contracting our sample size from 68 to 56, because for some of our countries the settler mortality figure is not available. We also omit eight countries from the Acemoglu *et al*. dataset that are not part of our 68: the Bahamas, Gabon, Hong Kong, Malta, Singapore, India, Indonesia and Sri Lanka. It is perhaps worth noting that the first five of these are all relatively high-income but not Neo-European countries; they may not be typical of the dataset as a whole. Panel F of Table X reports regression coefficients for settler mortality as an exogenous conditioning variable: it is almost always significant at the 5% level, suggesting that settler mortality is *not* a valid instrument, because it affects current income through some channel other than institutional quality. The χ^2 statistics for settler mortality in Panel C are all significant at the 5% level, confirming this result. In this regard, it is worth noting that one of the χ^2 statistics in the original Acemoglu *et al*. results is significant at the 10% level, and some of the t-ratios on settler mortality as a conditioning variable are over 1.5: it only takes a small reduction in the standard error – by removing some atypical countries from the dataset – to reverse the conclusion that settler mortality is a valid instrument.[10]

Then, in Table XI, we see what happens when we use a production structure variable as an instrument for institutional quality and settler mortality as an exogenous conditioning variable. There is no substantial change in the size or significance level of the coefficient on institutional quality in the second stage regression, and the production structure instrument is statistically significant in the first stage regression. (The standard error on settler mortality is quite high in the Table XI specification, but, as we will see, this can be reduced by adding extra conditioning variables.) This corresponds to our view of the way in which production structure and settler mortality actually influence the development process. Settler mortality may well be an important as a determinant of current income, but institutional quality is not the only channel through which the effect operates. It may well have affected labor productivity in the colonial period, with lasting effects on capital accumulation. On the other hand, statistical evidence suggests that the relative importance of pastoral agriculture is a valid instrument for institutional quality, at least if we restrict ourselves to production of an internationally tradable meat (beef).[11]

The Table XI regression equations do not contain any additional conditioning variables, other than settler mortality and latitude. Will our basic specification (settler mortality as an exogenous conditioning variable, beef or meat *per* capita as an instrument) survive with more conditioning variables? We are confident that it will. The specification survives the addition of various sets of conditioning variables drawn from Tables IV-X. Moreover, if we apply the *PcGets* general-to-specific model selection methodology [Hendry and Krolzig, 2001] to our dataset, and fit an income equation with beef or meat *per capita* as the instrument with a wide range of conditioning variables in the general model,[12] the specific models selected are the one reported in Table XII. In addition to the (endogenous) institutional quality indicator they contain the Africa dummy, the French legal origin dummy, the proportion of the population that is Roman Catholic and settler mortality. The coefficient on institutional quality is around 0.4 with a t-ratio over 7.5.

V. CONCLUSION

Many factors contributed to the type of colonization different parts of the world experienced in the centuries following the Portuguese discovery of the Americas and West Africa. Early colonization – when the colonial powers were themselves pre-industrial economies – was motivated by the desire to extract mineral wealth and supply Europe with exotic foodstuffs, such as cane sugar, coffee and tobacco. The extractive nature of the colonial state did nothing to enhance civil society or develop political institutions. After the industrial revolution and the expansion of the European population in the eighteenth century, different colonies were founded to provide Europe with new sources of agricultural land. Here the motivation was traditional comparative advantage. These colonies often received a sizeable number of European immigrants with an interest in the local commonwealth. As a result, they tended to evolve less dysfunctional political institutions, the social and economic consequences of which persist to this day.

This process suggests a broadening of scope in empirical studies of colonization, political institutions and economic development. In this paper we add indicators of colonial production structure to the established settler mortality variable in order to instrument institutional quality in a model of *per capita* income. These indicators turn out to be statistically significant, valid instruments that add to our understanding of how current economic conditions depend on past modes of colonization. In fact, our new instruments turn out to be more robust to specification tests than settler mortality. While both settler mortality and production structure have an important part to play in the story, there is some evidence that settler mortality has impacted on current levels of economic development through channels other than institutional quality. For this reason, we propose our production structure variables as the appropriate type of instrument for estimating the impact of institutions on income.

Appendix: Data Sources

Log GNP per capita 1995. Purchasing Power Parity Basis gross national product *per capita*. From World Bank, World Development Indicators, CD-Rom, 2003.

Average Protection Against Expropriation Risk, 1985-1995. Risk of Expropriation of private foreign investment by government from 0 to 10, where a higher score means less risk. Mean value for all years from 1985 to 1995. From Knack and Keefer (1995), 2000 updated version available at www.worldbank.org/research/bios/pkeefer.htm.

Beef per capita in 1948, 1960 and 1970. Beef, buffalo and veal slaughtered within national boundaries regardless of origins, in 1000 metric tonnes. From the FAO website: World Crop and Livestock Statistics 1948-1985, www.fao.org/es/ess/historical.

Meat per capita in 1948, 1960 and 1970. Total meat production comprises horse meat, poultry meat and meat from all other domestic or wild animals such as camels, rabbits, reindeer and game, in 1000 metric tonnes. From the FAO website: World Crop and Livestock Statistics 1948-1985, www.fao.org/es/ess/historical.

Log European Settler Mortality. The natural log of adult mortality rates in the early 19^{th} century, as originally developed by Curtin (1989, 1998). From Acemoglu *et al*. (2001).

Constraint on Executive in 1900, 1990 and First Year of Independence. Seven-category scale from 1 to 7, with a higher score indicating more constraints. Score of 1 indicates unlimited authority; score of 3 indicates slight to moderate limitations; score of 5 indicates substantial limitations; score of 7 indicates executive parity or subordination. Equal to 1 if country was not independent at that date. Date of independence is the first year the country appears in the Polity IV dataset. From the Polity IV dataset, downloaded from the Integrated Network for Social Conflict Research website, www.cidcm.umd.edu/ inscr.

Democracy in 1900 and First Year of Independence. An eleven-category scale, from 0 to 10, with a higher score indicating more democracy. Points from three dimensions: Competitiveness of Political Participation (from 1 to 3); Competitiveness of Executive Recruitment (from 1 to 2, with a bonus of 1 point if there is an election); and Constraints on Chief Executive (from 1 to 4). Equal to 1 if country not independent at that date. From the Polity IV dataset, downloaded from the Integrated Network for Social Conflict Research website, www.cidcm.umd.edu/inscr.

Infant Mortality. Infant mortality rate (deaths per 1,000 live births). From McArthur and Sachs (2001).

Distance from the Coast. Proportion of land area within 100km of the sea coast. From McArthur and Sachs (2001).

Life Expectancy. Life expectancy at birth in 1995. From McArthur and Sachs (2001).

Malaria in 1994. Population living where falciparum malaria is endemic (percentage). From McArthur and Sachs (2001). Dataset available at www.earthinstitute.columbia.edu/about/director.

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Colonial Dummies. Dummy indicating whether country was a British, French, German, Spanish, Italian, Belgian, Dutch or Portuguese colony. From La Porta *el al*. (1999). Dataset available at http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta.

Mean Temperature. 1987 mean annual temperature in degrees Celsius. From McArthur and Sachs (2001).

Latitude. Absolute value of the latitude of the country, from La Porta et al. (1999). Dataset available at http://mba.tuck.dartmouth.edu/pages/faculty/rafael.laporta.

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Table I: Countries Included in the Estimation

Algeria	Ecuador	Madagascar	Sierra Leone
Angola	Egypt	Malawi	South Africa
Argentina	El Salvador	Malaysia	Sudan
Australia	Ethiopia	Mali	Syrian Arab Republic
Bangladesh	Gambia	Mexico	Tanzania
Bolivia	Ghana	Morocco	Thailand
Botswana	Guatemala	Mozambique	Togo
Brazil	Guinea	New Zealand	Trinidad and Tobago
Burkina Faso	Guinea-Bissau	Nicaragua	Tunisia
Cameroon	Guyana	Niger	Uganda
Canada	Haiti	Nigeria	Uruguay
Chile	Honduras	Pakistan	United States
Colombia	Jamaica	Panama	Venezuela
Congo	Jordan	Paraguay	Vietnam
Costa Rica	Kenya	Peru	Democratic Republic of Congo
Cote d'Ivoire	Lebanon	Philippines	Zambia
Dominican Republic	Liberia	Senegal	Zimbabwe

Table II: Variable Sample Means

	Acemoglu Sample	*Base Sample*	*By Quartile of Beef per Capita*			
			(1)	(2)	(3)	(4)
Log GNP per capita (PPP) in 1995	8.05 (1.1)	7.75 (1.00)	7.35	7.35	7.54	8.62
Log Meat per capita in 1948	2.70 (0.99)	2.63 (0.92)	1.84	2.10	2.54	3.77
Log Beef per capita in 1948	1.87 (1.22)	1.80 (1.13)	0.45	1.11	1.88	3.30
Log European Settler Mortality	4.7 (1.1)	4.74 (1.25)	4.84	5.65	4.90	4.03
Average Protection Against Expropriation Risk 1985-1995	6.5 (1.5)	6.29 (1.41)	5.68	5.89	6.05	7.22
Constraint on Executive in 1990	4 (2.3)	3.64 (2.30)	2.67	2.47	3.33	5.75
Constraint on Executive in 1900	2.3 (2.1)	1.96 (1.94)	1.40	1.00	1.75	3.45
Constraint on Executive in First Year of Independence	3.3 (2.4)	3.36 (2.25)	3.33	2.88	3.42	3.70
Democracy in 1900	1.6 (3.0)	1.88 (2.34)	1.00	1.00	1.45	3.75
Number of Observations	64	76	15	17	24	20

Notes: Standard deviations are in parentheses. Quartiles of beef per capita are for our base sample of 76 observations. These are: (1) less than 2.1; (2) greater than or equal to 2.1 and less than 4.5; (3) greater than or equal to 4.5 and less than 10; (4) greater than or equal to 10. The number of observations differs by variable.

Table III: Determinants of Institutions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Dependent Variable is Average Protection Against Expropriation Risk 1985-99										
Constraint on Executive in 1900	0.28	0.22								
	(0.08)	(0.08)								
Democracy in 1900			0.30	0.24						
			(0.06)	(0.06)						
Constraint on Executive in First Year of Independence					0.18	0.14				
					(0.07)	(0.07)				
Log Meat per capita							0.80	0.62		
							(0.16)	(0.18)		
Log Beef per capita									0.57	0.42
									(0.13)	(0.14)
Latitude		3.95		2.95		4.06		2.70		3.28
		(1.20)		(1.21)		(1.23)		(1.29)		(1.26)
R-Squared	0.16	0.28	0.28	0.34	0.14	0.27	0.27	0.32	0.22	0.29
Number of Observations	68	68	68	68	68	68	68	68	68	70

	Panel B: Dependent Variable is Constraint on Executive in 1900				*Panel C: Dependent Variable is Democracy in 1900*			
Log Meat per capita	1.09	1.06			1.45	1.24		
	(0.21)	(0.24)			(0.24)	(0.28)		
Log Beef per capita			0.79	0.72			1.04	0.84
			(0.18)	(0.19)			(0.21)	(0.22)
Latitude		0.39		1.53		3.13		4.46
		(1.78)		(1.75)		(2.03)		(2.00)
R-Squared	0.26	0.27	0.21	0.22	0.32	0.34	0.25	0.30
Number of Observations	76	76	76	76	76	76	76	76

Notes: Standard errors are in parentheses. Regressions with constraint on executive in first year of independence also include years since independence as a regressor. See Appendix for a detailed definition of variables.

Table IV: IV Regressions of log GNP per capita using Meat per capita as Instrument

	Base Sample (1)	Base Sample (2)	Base Sample without neo-Europes (3)	Base Sample without neo-Europes (4)	Base Sample without Africa (5)	Base Sample without Africa (6)	Base Sample with Continent Dummies (7)	Base Sample with Continent Dummies (8)
Panel A: Two Stage Least Squares								
Average Protection Against	0.85	0.84	1.33	1.26	0.56	0.56	0.61	0.65
Expropriation Risk 1985-1995	(0.15)	(0.21)	(0.43)	(0.48)	(0.08)	(0.11)	(0.12)	(0.16)
Latitude		0.09		0.68		-0.003		-0.55
		(1.27)		(1.55)		(0.62)		(0.82)
Asia Dummy							-0.31	-0.31
							(0.18)	(0.18)
Africa Dummy							-0.88	-0.88
							(0.17)	(0.18)
"Other" Continent Dummy							0.001	0.07
							(0.21)	(0.23)
Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95								
Log Meat per capita	0.80	0.62	0.41	0.37	0.89	0.79	0.75	0.63
	(0.16)	(0.18)	(0.18)	(0.19)	(0.19)	(0.20)	(0.18)	(0.20)
Latitude		2.70		1.05		1.66		1.97
		(1.29)		(1.39)		(1.39)		(1.56)
Asia Dummy							0.53	0.45
							(0.58)	(0.58)
Africa Dummy							-0.29	-0.23
							(0.37)	(0.37)
"Other" Continent Dummy							0.53	0.21
							(0.47)	(0.53)
R-Squared	0.27	0.32	0.08	0.08	0.38	0.40	0.32	0.34
Panel C: Ordinary Least Squares								
Average Protection Against	0.51	0.43	0.45	0.42	0.46	0.45	0.37	0.35
Expropriation Risk 1985-1995	(0.06)	(0.06)	(0.07)	(0.08)	(0.03)	(0.05)	(0.05)	(0.05)
Number of observations	68	68	64	64	39	39	68	68

Notes: Standard errors are in parentheses. Panel A reports the two-stage least squares estimates instrumenting for protection against expropriation risk using log meat per capita; Panel B reports the corresponding first stage. Panel C reports the coefficient from an OLS regression of the dependent variable against average protection against expropriation risk. America is omitted in regressions including continent dummies. See Appendix for a detailed definition of variables.

Table V: IV Regressions of log GNP per capita using Beef per capita as Instrument

	Base Sample (1)	Base Sample (2)	Base Sample without neo-Europes (3)	Base Sample without neo-Europes (4)	Base Sample without Africa (5)	Base Sample without Africa (6)	Base Sample with Continent Dummies (7)	Base Sample with Continent Dummies (8)
Panel A: Two Stage Least Squares								
Average Protection Against	0.79	0.75	1.05	0.94	0.56	0.56	0.56	0.58
Expropriation Risk 1985-1995	(0.14)	(0.20)	(0.35)	(0.35)	(0.11)	(0.14)	(0.11)	(0.15)
Latitude		0.51		1.26		0.01		-0.25
		(1.21)		(1.15)		(0.70)		(0.73)
Asia Dummy							-0.32	-0.32
							(0.18)	(0.17)
Africa Dummy							-0.93	-0.93
							(0.16)	(0.16)
“Other” Continent Dummy							0.02	0.05
							(0.19)	(0.20)
Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95								
Log Beef per capita	0.57	0.42	0.31	0.28	0.54	0.45	0.58	0.49
	(0.13)	(0.14)	(0.13)	(0.14)	(0.16)	(0.16)	(0.15)	(0.16)
Latitude		3.28		1.15		2.68		1.99
		(1.26)		(1.37)		(1.45)		(1.58)
Asia Dummy							0.70	0.59
							(0.60)	(0.60)
Africa Dummy							-0.29	-0.24
							(0.37)	(0.37)
“Other” Continent Dummy							0.86	0.48
							(0.49)	(0.57)
R-Squared	0.22	0.29	0.08	0.09	0.23	0.29	0.31	0.33
Panel C: Ordinary Least Squares								
Average Protection Against	0.51	0.43	0.45	0.42	0.46	0.45	0.37	0.35
Expropriation Risk 1985-1995	(0.06)	(0.06)	(0.07)	(0.08)	(0.03)	(0.05)	(0.05)	(0.05)
Number of observations	68	68	64	64	39	39	68	68

Notes: Standard errors are in parentheses. Panel A reports the two-stage least squares estimates instrumenting for protection against expropriation risk using log beef per capita; Panel B reports the corresponding first stage. Panel C reports the coefficient from an OLS regression of the dependent variable against average protection against expropriation risk. America is omitted in regressions including continent dummies. See Appendix for a detailed definition of variables.

Table V1: IV Regressions of log GNP per capita with Additional Controls using Meat per capita as Instrument

	Base Sample (1)	Base Sample (2)	British colonies only (3)	British colonies only (4)	Base Sample (5)	Base Sample (6)	Base Sample (7)	Base Sample (8)	Base Sample (9)
				Panel A: Two Stage Least Squares					
Average Protection Against Expropriation Risk, 1985-1995	0.82	0.74	0.78	0.84	0.85	0.84	0.78	0.64	0.64
	(0.12)	(0.19)	(0.11)	(0.22)	(0.12)	(0.19)	(0.12)	(0.23)	(0.24)
Latitude		0.90		-0.70		0.18		1.33	1.37
		(1.16)		(1.61)		(1.18)		(1.50)	(1.53)
British Colonial Dummy	-0.71	-0.68							
	(0.25)	(0.23)							
French Colonial Dummy	-0.40	-0.44							-0.15
	(0.21)	(0.21)							(0.22)
French legal origin dummy					0.65	0.64			0.18
					(0.24)	(0.26)			(0.33)
p-value for Religion Variables							[0.000]	[0.000]	[0.090]
				Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95					
Log Meat per capita	0.80	0.62	1.07	0.78	0.79	0.62	0.84	0.61	0.59
	(0.16)	(0.18)	(0.22)	(0.27)	(0.15)	(0.17)	(0.18)	(0.22)	(0.22)
Latitude		2.46		3.31		2.60		2.62	2.70
		(1.30)		(1.94)		(1.23)		(1.53)	(1.50)
British Colonial Dummy	0.82	0.73							
	(0.31)	(0.31)							
French Colonial Dummy	0.18	0.01							0.05
	(0.36)	(0.37)							(0.40)
French legal origin dummy					-0.84	-0.82			-0.88
					(0.29)	(0.28)			(0.45)
R-Squared	0.34	0.38	0.50	0.56	0.35	0.40	0.32	0.35	0.40
				Panel C: Ordinary Least Squares					
Average Protection Against Expropriation Risk, 1985-1995	0.54	0.44	0.56	0.44	0.55	0.47	0.52	0.42	0.41
	(0.05)	(0.05)	(0.07)	(0.12)	(0.05)	(0.06)	(0.05)	(0.07)	(0.06)
Number of Observations	68	68	25	25	68	68	68	68	68

Notes: Standard errors are in parentheses and *p*-values for joint significance tests are in brackets. Panel A reports the two-stage least-squares estimates with log GNP per capita in 1995 as dependent variable; Panel B reports the first stage. Panel C reports the OLS coefficient from regressing log GNP per capita on average protection against expropriation risk and the variables indicated in each column. See Appendix for a detailed definition of variables.

Table V11: IV Regressions of log GNP per capita with Additional Controls using Beef per capita as Instrument

	Base Sample (1)	Base Sample (2)	British colonies only (3)	British colonies only (4)	Base Sample (5)	Base Sample (6)	Base Sample (7)	Base Sample (8)	Base Sample (9)
				Panel A: Two Stage Least Squares					
Average Protection Against	0.73	0.60	0.74	0.75	0.79	0.74	0.67	0.41	0.38
Expropriation Risk, 1985-1995	(0.12)	(0.17)	(0.13)	(0.30)	(0.12)	(0.17)	(0.12)	(0.21)	(0.23)
Latitude		1.58		-0.10		0.63		2.55	2.70
		(0.99)		(2.14)		(1.05)		(1.30)	(1.34)
British Colonial Dummy	-0.64	-0.59							
	(0.23)	(0.22)							
French Colonial Dummy	-0.41	-0.49							-0.16
	(0.19)	(0.18)							(0.19)
French legal origin dummy					0.60	0.56			-0.04
					(0.24)	(0.25)			(0.33)
p-value for Religion Variables							[0.000]	[0.000]	[0.015]
				Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95					
Log Beef per capita	0.59	0.44	0.80	0.47	0.57	0.43	0.63	0.42	0.40
	(0.13)	(0.14)	(0.22)	(0.25)	(0.13)	(0.13)	(0.15)	(0.17)	(0.17)
Latitude		2.98		4.55		3.16		3.22	3.35
		(1.27)		(2.02)		(1.19)		(1.46)	(1.44)
British Colonial Dummy	0.88	0.76							
	(0.32)	(0.32)							
French Colonial Dummy	0.29	0.06							0.08
	(0.38)	(0.38)							(0.41)
French legal origin dummy					-0.86	-0.83			-0.86
					(0.30)	(0.28)			(0.46)
R-Squared	0.30	0.36	0.36	0.48	0.31	0.38	0.28	0.34	0.38
				Panel C: Ordinary Least Squares					
Average Protection Against	0.54	0.44	0.56	0.44	0.55	0.47	0.52	0.42	0.41
Expropriation Risk, 1985-1995	(0.05)	(0.05)	(0.07)	(0.12)	(0.05)	(0.06)	(0.05)	(0.07)	(0.06)
Number of Observations	68	68	25	25	68	68	68	68	68

Notes: Standard errors are in parentheses and *p*-values for joint significance tests are in brackets. Panel A reports the two-stage least-squares estimates with log GNP per capita in 1995 as dependent variable; Panel B reports the first stage. Panel C reports the OLS coefficient from regressing log GNP per capita on average protection against expropriation risk and the variables indicated in each column. See Appendix for a detailed definition of variables.

Table V111: Geography and Health Variables Regressions with Meat per capita as Instrument

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Instrumenting only for Average Protection Against Expropriation Risk						Instrumenting for all Right-Hand Side Variables		
	Panel A: Two Stage Least Squares								
Average Protection Against Expropriation Risk, 1985-1995	0.52	0.56	0.63	0.64	0.36	0.29	0.62	0.72	0.26
	(0.11)	(0.14)	(0.20)	(0.20)	(0.12)	(0.15)	(0.23)	(0.30)	(0.26)
Latitude		-0.75		-0.24		0.70			
		(0.76)		(0.90)		(0.56)			
Malaria in 1994	-1.04	-1.11					-0.96		
	(0.21)	(0.19)					(0.23)		
Life Expectancy			0.03	0.03				0.02	
			(0.01)	(0.01)				(0.01)	
Infant Mortality					-0.02	-0.02			-0.01
					(0.003)	(0.003)			(0.004)
	Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95								
Log Meat per capita	0.65	0.57	0.66	0.56	0.51	0.40	0.44	0.42	0.24
	(0.19)	(0.19)	(0.18)	(0.19)	(0.20)	(0.20)	(0.20)	(0.20)	(0.22)
Latitude		2.29		2.30		2.16	-0.29	-0.34	-0.18
		(1.46)		(1.39)		(1.31)	(1.81)	(1.77)	(1.68)
Malaria in 1994	-0.60	-0.30							
	(0.39)	(0.46)							
Life Expectancy			0.02	0.01					
			(0.01)	(0.01)					
Infant Mortality					-0.01	-0.01			
					(0.005)	(0.005)			
Mean Temperature							-0.11	-0.11	-0.10
							(0.05)	(0.05)	(0.05)
Distance from Coast							0.08	0.04	-0.34
							(0.46)	(0.46)	(0.49)
R-Squared	0.29	0.32	0.30	0.32	0.33	0.36	0.38	0.38	0.42
	Panel C: Ordinary Least Squares								
Average Protection Against Expropriation Risk, 1985-1995	0.35	0.35	0.38	0.36	0.27	0.25	0.31	0.31	0.22
	(0.05)	(0.05)	(0.07)	(0.07)	(0.04)	(0.04)	(0.05)	(0.07)	(0.05)
Number of Observations	67	67	67	67	67	67	66	66	66

Notes: Standard errors are in parentheses. Panel A reports the two-stage least-squares estimates with log GNP per capita in 1995 as dependent variable; Panel B reports the first stage. Panel C reports the OLS coefficient from regressing log GNP per capita on average protection against expropriation risk and the other control variables indicated in each column as independent variables. See Appendix for a detailed definition of variables.

Table IX: Geography and Health Variables with Beef per Capita as Instrument

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Instrumenting only for Average Protection Against Expropriation Risk						Instrumenting for all Right-Hand Side Variables		
					Panel A: Two Stage Least Squares				
Average Protection Against Expropriation Risk, 1985-1995	0.44	0.46	0.61	0.62	0.37	0.32	0.49	0.69	0.31
	(0.12)	(0.14)	(0.16)	(0.20)	(0.13)	(0.17)	(0.20)	(0.28)	(0.26)
Latitude		-0.39		-0.18		0.62			
		(0.72)		(0.91)		(0.62)			
Malaria in 1994	-1.15	-1.19					-1.04		
	(0.20)	(0.17)					(0.19)		
Life Expectancy			0.03	0.03				0.02	
			(0.01)	(0.01)				(0.01)	
Infant Mortality					-0.02	-0.02			-0.01
					(0.003)	(0.003)			(0.004)
					Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95				
Log Beef per capita	0.43	0.38	0.46	0.39	0.35	0.29	0.30	0.30	0.19
	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.15)	(0.14)	(0.15)
Latitude		2.63		2.47		2.27	-0.24	-0.39	-0.17
		(1.46)		(1.39)		(1.29)	(1.83)	(1.77)	(1.67)
Malaria in 1994	-0.77	-0.40							
	(0.38)	(0.43)							
Life Expectancy			0.03	0.02					
			(0.01)	(0.01)					
Infant Mortality					-0.01	-0.01			
					(0.004)	(0.004)			
Mean Temperature							-0.12	-0.12	-0.10
							(0.05)	(0.05)	(0.05)
Distance from Coast							0.14	0.07	-0.33
							(0.47)	(0.46)	(0.48)
R-Squared	0.27	0.30	0.28	0.32	0.33	0.36	0.37	0.38	0.42
					Panel C: Ordinary Least Squares				
Average Protection Against Expropriation Risk, 1985-1995	0.35	0.35	0.38	0.36	0.27	0.25	0.31	0.31	0.22
	(0.05)	(0.05)	(0.07)	(0.07)	(0.04)	(0.04)	(0.05)	(0.07)	(0.05)
Number of Observations	67	67	67	67	67	67	66	66	66

Notes: Standard errors are in parentheses. Panel A reports the two-stage least-squares estimates with log GNP per capita in 1995 as dependent variable; Panel B reports the first stage. Panel C reports the OLS coefficient from regressing log GNP per capita on average protection against expropriation risk and the other control variables indicated in each column as independent variables. See Appendix for a detailed definition of variables.

Table X: Overidentification Tests

	Base Sample (1)	Base Sample (2)	Base Sample (3)	Base Sample (4)	Base Sample (5)	Base Sample (6)	Base Sample (7)	Base Sample (8)
				Panel A: Two Stage Least Squares				
Average Protection Against Expropriation Risk, 1985-1995	0.72	0.67	0.66	0.57	0.65	0.62	0.70	0.68
	(0.14)	(0.19)	(0.07)	(0.11)	(0.20)	(0.26)	(0.19)	(0.24)
Latitude		0.89		1.41		0.73		0.46
		(1.17)		(0.87)		(1.47)		(1.30)
				Panel B: First-Stage for Average Protection Against Expropriation Risk				
Constraint on Executive in 1900	0.28	0.22						
	(0.08)	(0.08)						
Democracy in 1900			0.30	0.24				
			(0.06)	(0.06)				
Constraint on executive in first year of independence					0.18	0.14		
					(0.07)	(0.07)		
Democracy in first year of independence							0.14	0.11
							(0.05)	(0.05)
R-Squared	0.16	0.28	0.28	0.34	0.14	0.27	0.17	0.29
				Panel C: Results from Overidentification Test				
p-value: Meat per capita	[0.43]	[0.45]	[0.12]	[0.12]	[0.22]	[0.22]	[0.33]	[0.34]
p-value: Beef per capita	[0.69]	[0.73]	[0.32]	[0.33]	[0.27]	[0.29]	[0.45]	[0.50]
p-value: Settler mortality	[0.03]	[0.02]	[0.02]	[0.02]	[0.03]	[0.02]	[0.02]	[0.01]

Table X: Overidentification Tests (continued)

	Base Sample (1)	Base Sample (2)	Base Sample (3)	Base Sample (4)	Base Sample (5)	Base Sample (6)	Base Sample (7)	Base Sample (8)
	Panel D: Second Stage with log meat per capita as exogenous variable							
Average Protection Against Expropriation Risk, 1985-1995	0.51	0.50	0.44	0.34	0.63	0.63	0.73	0.72
	(0.33)	(0.33)	(0.14)	(0.20)	(0.42)	(0.42)	(0.35)	(0.37)
Log Meat per Capita	0.27	0.21	0.33	0.34	0.03	-0.02	-0.05	-0.08
	(0.27)	(0.21)	(0.13)	(0.16)	(0.35)	(0.27)	(0.31)	(0.26)
Latitude		1.01		1.00		0.73		0.48
		(1.23)		(0.79)		(1.52)		(1.32)
	Panel E: Second Stage with log beef per capita as exogenous variable							
Average Protection Against Expropriation Risk, 1985-1995	0.65	0.62	0.56	0.49	0.71	0.70	0.76	0.74
	(0.26)	(0.29)	(0.11)	(0.14)	(0.36)	(0.39)	(0.29)	(0.32)
Log Beef per Capita	0.08	0.06	0.13	0.10	-0.08	-0.10	-0.11	-0.12
	(0.16)	(0.14)	(0.10)	(0.09)	(0.22)	(0.18)	(0.19)	(0.17)
Latitude		0.95		1.23		0.66		0.51
		(1.25)		(0.81)		(1.61)		(1.31)
	Panel F: Second Stage with log mortality as exogenous variable							
Average Protection Against Expropriation Risk, 1985-1995	0.38	0.35	0.39	0.33	0.11	0.11	0.34	0.33
	(0.20)	(0.24)	(0.10)	(0.15)	(0.45)	(0.41)	(0.21)	(0.22)
Log European Settler Mortality	-0.33	-0.31	-0.33	-0.32	-0.41	-0.34	-0.28	-0.25
	(0.11)	(0.09)	(0.08)	(0.08)	(0.23)	(0.15)	(0.14)	(0.12)
Latitude		0.84		0.90		1.47		0.73
		(1.30)		(0.99)		(1.85)		(1.06)

Table X1: IV Regressions with Settler Mortality as an Exogenous Conditioning Variable

	(1)	(2)	(3)	(4)
	Panel A: Two Stage Least Squares			
Average Protection Against Expropriation Risk 1985-1995	0.67 (0.18)	0.69 (0.23)	0.68 (0.21)	0.72 (0.32)
Latitude		-0.29 (0.94)		-0.40 (1.27)
Log European Settler Mortality	-0.17 (0.13)	-0.17 (0.14)	-0.16 (0.15)	-0.15 (0.16)
	Panel B: First-Stage for Average Protection against Expropriation Risk in 1985-95			
Log Meat per capita	0.58 (0.20)	0.45 (0.22)		
Log Beef per capita			0.36 (0.16)	0.26 (0.16)
Latitude		2.15 (1.47)		2.60 (1.46)
Log European Settler Mortality	-0.37 (0.15)	-0.31 (0.15)	-0.44 (0.15)	-0.35 (0.15)
R^2	0.36	0.38	0.32	0.36

Table X11: Second Stage Regression Equations Resulting from a General-to-Specific Modeling Methodology (54 Observations)

	With Meat *per capita* as an Instrument	With Beef *per capita* as an Instrument
Average Protection Against Expropriation Risk, 1985-1995	0.48 (0.06)	0.55 (0.06)
Africa Dummy	-0.41 (0.18)	
French Legal Origin Dummy	0.38 (0.14)	0.33 (0.17)
Roman Catholic Population		0.47 (0.20)
Log European Settler Mortality	-0.23 (0.07)	-0.26 (0.06)
R^2	0.83	0.79

NOTES

1. Evidence for such a correlation is presented in Knack and Keefer [1995], Mauro [1995] and Rodrik [1999].

2. For example, in Mexico (a mineral-rich colony), the indigenous population is estimated to have shrunk by 90% of its initial level in the first hundred years of colonization.

3. We have to exclude India and Sri Lanka from our dataset when using beef production as an instrument; there is a strong taboo on killing cattle in traditional Hindu society.

4. Using GDP instead of GNP makes no substantial difference to our results.

5. The exogeneity of some of the traditional health indicators, and therefore the consistency of the parameter estimates in some of the regression specifications, is doubtful. This is noted when appropriate in the discussion of our results that follows.

6. In the case of Australia and the USA, this was partly a result of nineteenth century genocides, and even in New Zealand and Canada the early exploitation of indigenous peoples has led to a wide variation in the distribution of income by ethnicity. This represents a very particular mode of colonization.

7. All the countries in the sample have either Napoleonic or British common law legal origins.

8. The religious affiliation variables are added to the *per capita* GDP regressions, but not to the first stage regressions for the instrument. The colonization dummies are added to both.

9. The only case in which the standard errors are high enough to render the key coefficients statistically insignificant is when infant mortality is added as a control.

10. *Per capita* beef production remains a valid instrument if we use the 56-country dataset instead of the 68-country one.

11. The validity of beef production as an instrument suggests that the dashed arrow in the chart in Section 2 is not a major factor. Otherwise, beef would affect current income through its impact on settler mortality rates.

12. The range includes all the conditioning variables in the previous tables, except the three potentially endogenous health variables: dummies for Africa, Asia and others outside the Americas, for British and French colonies, and for French legal origin; latitude, temperature, and distance from coast; fraction of the population that is Protestant, Roman Catholic, and Muslim. There are 54 countries with data for all twelve of these variables.