



Economic Institutions and Comparative Economic Development: A Post-Colonial Perspective

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Summary. — Existing literature suggests that either colonial settlement conditions or the identity of colonizer were influential in shaping the post-colonial institutional environment, which in turn has impacted long-run economic development. These two potential identification strategies have been treated as substitutes. We argue that the two factors should instead be treated as complementary and develop an alternative and unified IV approach that simultaneously accounts for both settlement conditions and colonizer identity to estimate the potential causal impact of a broad cluster of economic institutions on log real GDP per capita for a sample of former colonies. Using population density in 1500 as a proxy for settlement conditions, we find that the impact of settlement conditions on institutional development is much stronger among former British colonies than colonies of the other major European colonizers. Conditioning on several geographic factors and ethno-linguistic fractionalization, our baseline 2SLS estimates suggest that a standard deviation increase in economic institutions is associated with a three-fourth standard deviation increase in economic development. Our results are robust to a number of additional control variables, country subsample exclusions, and alternative measures of institutions, GDP, and colonizer classifications. We also find evidence that geography exerts both an indirect and direct effect on economic development.

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1. INTRODUCTION

The transition from the Malthusian per-capita income stagnation to an era of sustained growth, marked by the onset of the Industrial Revolution, induced a remarkable tenfold increase in world per-capita income during the past two centuries (Ashraf & Galor, 2011). This remarkable growth has not benefited all nations equally as significant disparities in the average living standards exist across countries. Individuals living in the top quartile of countries have real per capita incomes that are, on average, approximately thirty-five times those of individuals living in the bottom quartile. Despite substantial progress in our understanding of the causes behind the unparalleled contemporary growth and the inequality in the average living standards between nations, an overall consensus on the causes still proves elusive. This is evidenced by the emergence of three major theories of economic development in the literature.

There is the neoclassical growth theory and its extensions, which stress the accumulation of physical and human capital and technological changes as the ingredients for economic growth (Galor, 2011; Lucas, 1988; Romer, 1990; Solow, 1956). Next is the geographic determinism theory, which suggests that some regions of the world are developmentally handicapped because of naturally occurring geographic and/or climatic conditions (Diamond, 1997; Gallup, Sachs, & Mellinger, 1999; Landes, 1998). Finally, there is the institutional theory of development, which contends that institutional arrangements determine the incentive structure faced by agents in an economy and are thus directly responsible for economic performance (North, 1981, 1991; North & Thomas, 1973; Olson, 1996).

This study contributes to the institutional theory of comparative development. It is most closely related to two strands of the literature that utilize the European colonization period as a means to identify differences in the development of institutions across former colonies. The first emerges from the seminal contributions of Acemoglu, Johnson, and Robinson (2001) and Acemoglu and Johnson (2005), who argue that settlement conditions determined European settlement strategies in the colonies. Europeans were likely to settle in large numbers and invest in the replication of European institutions to protect private property and constrain the powers of government in colonies with favorable settlement conditions, marked by low mortality rates and/or sparse indigenous populations. In colonies with unfavorable settlement conditions, on the other hand, European colonizers would have sought to establish an extractive state to transfer resources from the colony back home. Because institutions are persistent, early institutional differences set the colonies on divergent development paths that largely explain huge disparities in per-capita income levels among the former colonies, reversing the previous relative levels of prosperity (Acemoglu, Johnson, & Robinson, 2002).

The second line of research follows from the legal origins literature, which argues that a country's legal traditions were largely imparted through the colonization process. According to this view, differences in legal origins explain differences in contemporary laws and regulations that influenced economic outcomes. In particular, countries with English common law origins tend to have better economic performance relative to those with French civil law origins (e.g., La Porta,

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Lopez-de-Silanes, & Shleifer, 2008). Klerman, Mahoney, Spamann, and Weinstein (2011) illustrate the imperfect correlation between legal origin and colonial history in suggesting that the identity of the colonizer is a more important determinant of modern development than legal origins because the former captures more of the diversity in colonial policies that matter for development.

The two views described above, settlement conditions and colonizer identity, both provide a theoretical mechanism for how European colonization impacted long-run economic development via the former's influence on institutional development, and have therefore been used to motivate an identification strategy to estimate the potentially causal impact of institutions on development. However, the literature has treated the two views as competing alternatives. The main contribution of this paper is to give credence to both views, treating them as complementary rather than competing alternatives. We do so by advancing a unifying instrumental variable (IV) approach that simultaneously accounts for the impact of both settlement conditions and heterogeneous home institutions exported by the major European colonizers as a means to better capture variation in the development of early institutions among the colonies than either of the views alone. We do so within a two-stage least squares (2SLS) framework, utilizing as IVs colonial settlement conditions, as measured by population density in 1500 (PD1500), and an interactive term between the identity of the colonizer, as measured by a dummy variable for former British colonies, and PD1500. This provides us with a set of plausibly exogenous instruments that, in our view, better account for historical evidence than previous literature. This approach allows us to estimate more accurately the potential causal impact that institutions exert on modern per-capita income levels. Section 2 provides additional details.

This research also contributes to an emerging strand of the comparative economic development literature that explores the growth effects of a cluster of economic institutions and policies, as measured by the Fraser Institute's Economic Freedom of the World (EFW) index.¹ Previous studies examining the impact of institutions on comparative economic development mainly rely on a unidimensional measure of institutions such as constraints on the executive, risk of expropriation, or the rule of law,² but Acemoglu and Johnson (2005) suggest that there are a broad cluster of institutions that are mutually reinforcing for the development process. The EFW index, further described in Section 3(b), is constructed to provide a comprehensive measure of the degree to which a nation's economic institutions and policies reflect the protection of private property, free trade, market allocation, and minimal policy-induced price distortions. Thus, compared to unidimensional measures, it encompasses a broader spectrum of the variation among countries in the institutional structure that shapes the economic environment for development.³ For robustness, we also utilize several alternative measures of economic institutions such as the Heritage Foundation's index of economic freedom and the social infrastructure index of Hall and Jones (1999).

Further, this study also contributes to the genre of literature that investigates the role of geography in economic development. There has been considerable debate over the impact of geography on development. Some researchers have argued that geographic endowments only influence economic performance indirectly through their influence on institutional development, with the basic premise being that they create a natural environment for the establishment of different types of institutional arrangements (Bennett & Nikolaev, 2016; Easterly,

2007; Sokoloff & Engerman, 2000). Sachs (2001, 2003) contends, however, that the empirical studies purporting to show evidence in support of this view are not robust because they use a single measure of geography, latitude,⁴ which is an imperfect proxy that does not fully account for the various channels through which geography may impact development (e.g., disease ecology, climate, geographic barriers to trade).⁵ Our baseline estimates therefore are conditioned on multiple dimensions of geography, including malaria ecology, distance from major world markets, and access to coastline.

The current research adds to a rapidly expanding body of empirical work that suggests a crucial role for institutions in the development process.⁶ Our baseline estimates suggest that a one-unit (slightly more than a standard deviation) increase in EFW is associated with about a three-fourth standard deviations increase in log real GDP per capita.⁷ The results are robust to a number of additional control factors, including natural resources, human capital, religion, and regional fixed effects. They are also robust to various country subsample restrictions, and alternative measures of economic institutions, GDP, and colonizer classifications. We also find some evidence of both a direct and indirect effect of geography on development.

The remainder of the paper is organized as follows. Section 2 lays out the theoretical foundations for the identification strategy, followed by an overview of the data in Section 3. The main results are presented in Section 4, followed by a series of robustness checks in Section 5. Concluding remarks are offered in Section 6.

2. THEORETICAL FOUNDATIONS FOR IDENTIFICATION STRATEGY

This paper seeks to estimate the impact of economic institutions on per-capita income, but it is plausible that the two evolve simultaneously. Accordingly, an exogenous source of variation in institutions is needed to consistently estimate the potential causal impact of institutions on economic development. Scholars recognize the potential endogeneity of institutions and have identified European colonization as a natural experiment in history that provided an exogenous institutional shock in the colonies that has altered their development trajectory to the present day.

Hall and Jones (1999) recognized that a country's institutions are largely a function of the extent to which it was influenced by Western Europe and used latitude and the share of the population speaking a Western European language (i.e., English, French, German, Portuguese, and Spanish) as instruments for their multi-dimensional institutional index of social infrastructure, finding that institutions exert a positive causal impact on economic development. Acemoglu *et al.* (2001) criticize the instrumentation strategy of Hall and Jones for having weak theoretical foundations and argue that latitude, a measure of geography, may have a direct effect on economic performance.

Acemoglu *et al.* (2001) argued that the impact of European colonization on institutional development, which exerted a lasting impact on economic performance, depended on the colonization strategy of the colonizer. The colonization strategy in turn depended on the feasibility of permanent settlement, as determined by the settlement conditions in the colony. Two broad types of settlement strategies existed. Colonies in which settlers experienced high mortality rates and/or were densely populated by indigenous persons provided unfavorable settlement conditions. When settlement conditions were

poor, the Europeans pursued an extractive strategy that involved mass expropriation of resources from the colony, often through coercion of the native populations, to be shipped home to enrich the kingdom. On the other hand, when settlement conditions were favorable, as indicated by low settler mortality rates and/or sparse indigenous population, the European colonizers were more likely to settle permanently and invest in the establishment of inclusive institutions similar to those existing back in Europe.

Because institutions are persistent and history is path dependent (North, 1981, 1991), the divergent development paths experienced by the former colonies is largely a function of the type of institutions that emerged during the colonization process.⁸ These early institutional differences set the colonies on divergent development paths that largely explain huge contemporary disparities in per-capita income levels among the former colonies, reversing the previous relative levels of prosperity (Acemoglu *et al.*, 2002). Large settlements resulted in the development of growth-promoting institutions protective of property rights and limiting the power of political leaders, and extractive colonies resulted in growth-retarding institutions that protect the power and wealth of the political elite at the peril of the remaining population. Engerman and Sokoloff (2011) provide a similar story about institutional and economic development in the Americas.

A related line of research argues that a nation's colonizer is intrinsically linked to the development of a wide range of institutions. This literature links English common law tradition to the development of institutions protective of financial investors, and hence greater financial development, relative to rules emanating in countries with civil law origins inherited from France and other continental European nations. La Porta *et al.* (2008) indicate that "civil law is associated with a heavier hand of government ownership and regulation than common law" (p. 286), more formalism of judicial procedures and less judicial independence, which are in turn linked to less secure property rights and weaker enforcement of contracts. They also contend that legal origin represents a "style of social control of economic life," and argue that "common law stands for the strategy of social control that seeks to support private market outcomes, whereas civil law seeks to replace such outcomes with state-desired allocations" (La Porta *et al.*, 2008, p. 286).

Because legal systems were transplanted throughout the world through the colonization efforts of a small number of Western European nations, legal tradition has been used as an instrument for institutions by researchers (e.g., Berggren & Jordahl, 2006; Faria & Montesinos, 2009). It is plausibly a valid exogenous instrument for institutions so long as legal tradition only impacts development through institutions and only former colonies that inherited a legal system from their colonizer are included in the sample. There is reason to believe that both of these conditions may be violated. First is the blunt instrument problem described by Bazzi and Clemens (2013), who indicate that legal origin has been used as an instrument for many different variables that impact growth. However, instrument validity requires that legal origin impacts development only through one channel and not through disparate endogenous variables. As Bazzi and Clemens (2013) comment: "If two or more . . . endogenous variables sufficiently affect growth, then instrumentation can be valid in at most one of these studies, and at worst none" (p. 156). Next, Klerman *et al.* (2011) contend that the identity of the colonizer is a better instrument than legal origins despite the high correlation between the two because the colonial powers transplanted not only legal systems, but also differences in

policies related to "education, public health, infrastructure, European immigration, and local governance" (p. 380). A similar view was espoused much earlier by Adam Smith (1981), who wrote in 1776 that colonists carry with them "the habit of subordination, some notion of the regular government which takes place in their own country, of the system of laws which support it, and the regular administration of justice; and they naturally establish something of the same kind in the new settlement" (p. 25).⁹

Studies by Bertocchi and Canova (2002) and Grier (1997, 1999) find that the former British colonies exhibited higher growth rates than French colonies. Klerman *et al.* (2011) provide additional evidence that British colonies experienced greater growth than French and other continental European colonies, but also find evidence that the identity of the colonizer is a "better predictor of post-colonial growth rates than legal origin" (p. 405). Landes (1998) and North, Summerhill, and Weingast (2000) similarly argue that former British colonies prospered relative to the colonies of the other major colonizers because British colonies inherited better economic and political institutions from Britain.¹⁰

As the above discussion reveals, there are two major views on how the colonization process impacted the development of institutions, providing two IVs to estimate the potential causal effect of institutions on long-run economic development. The literature has treated the two views—settlement conditions and colonizer identity—as substitutes. For instance, Acemoglu *et al.* (2001) state that "British colonies are found to perform substantially better in other studies in large part because Britain colonized places where settlement was possible, and this made British colonies inherit better institutions. . . identity of the colonizer is not an important determinant of colonization patterns and subsequent institutional development" (p. 1388). Auer (2013) points to the fact that the British tended to colonize regions located further from home than the other colonizers, perhaps providing better settlement conditions, which would suggest that the settlement conditions may be a proxy for the identity of the colonizer, or vice versa.¹¹ Klerman *et al.* (2011) concede that settlement strategy may explain some of the observed differences in economic performance among the colonizers, but argue that this does not encompass the entire story because colonizers from the various European nations brought with them a diverse set of institutions and policies from home. While sympathetic to both views, we believe that in isolation each is incomplete and attempt to bridge the two into a more comprehensive view that better reflects historical evidence.

Rather than treat the two views as substitutes, the institutional view of comparative post-colonial development advanced here accounts simultaneously for the effects that settlement conditions and the identity of the colonizer exerted on the institutional development in the colonies, which in turn has impacted long-run post-colonial economic development. When settlement conditions were poor, extractive institutions were established, regardless of the identity of the colonizer. In this respect, our hypothesis is consistent with the settlement conditions interpretation of colonial events.

When settlement conditions were favorable for large-scale settlement, however, our unifying view of the historical process diverges from the settlement conditions conjecture advanced by Acemoglu *et al.* (2001). We agree that good settlement conditions would have enticed large-scale settlement by colonizers, who would have sought to establish institutions similar to those that had developed in the mother country up to and throughout the colonial era; however, heterogeneous home institutions existed among the major colonizers.

Although Britain was mercantilist in the early modern period (i.e., 17th and 18th centuries), it was less mercantilist than the other major European colonizers (i.e., France, Portugal, and Spain), exhibiting economic institutions that were more supportive of market allocation and free enterprise, legal institutions based on common law, and political institutions that constrained the powers of the monarch (e.g., [Acemoglu & Robinson, 2012](#)). Meanwhile the other major European colonizers exhibited highly centralized economic institutions characterized by a large degree of state allocation and regulation, and less constrained executives whose power was reinforced by a civil law system in which the judges were subject to the discretion of the central administration (e.g., [Heckscher, 1955](#); [La Porta et al., 2008](#); [Landes, 1998](#); [North et al., 2000](#)). Additionally, Britain was the first colonial power to embrace “classically liberal” policies such as acceptance of free trade, the struggle to eliminate slave trade, and establishment of the Gold Standard, the latter of which contributed to fiscal discipline and price stability.

Given the vastly different institutional arrangements between the English and continental colonizers, it should not be expected that large-scale colonial settlements resulted in the development of similar institutions irrespective of the colonizer. Instead, we would expect more liberal economic, legal, and political institutions to arise in colonies with large-scale settlement by the British, relative to large-scale settlement by the other major colonizers. Initial constraints on the executive measures among the colonies of the major colonizers provide some evidence of this, as the average initial constraint on the executive score among former British colonies is 5.4, while that of French, Spanish, and Portuguese colonies is 2.3, 2.1, and 2.0, respectively.¹²

3. DATA AND METHODOLOGY

We utilize a two-stage least squares (2SLS) framework to estimate the potential causal impact of a broad cluster of economic institutions on the level of contemporary economic development. [Table 1](#) provides a description, the source, and summary statistics for the variables used in this study.

(a) *Economic development*

We use the log of real GDP per capita in 2010 (GDP) values from the Penn World Tables (PWT) version 7.1 as the primary measure of economic development ([Heston, Summers, & Aten, 2012](#)). This choice is motivated by the fact that the PWT dataset provides slightly greater country coverage than the PWT 8.1 and World Bank World Development Indicators datasets, which we also used for a robustness check.

(b) *Economic institutions*

The Economic Freedom of the World (EFW) data is published annually by the Canadian Fraser Institute and a network of “think tanks” around the world. The EFW index is designed to measure the degree to which a country’s institutions and policies are consistent with personal choice, voluntary exchange, open markets, and protection of persons and their property from aggressors. The index incorporates 42 separate components derived from publically available sources such as the World Bank, International Monetary Fund, and the Global Competitiveness Report. The original data are transformed to a zero to 10 scale, with higher values reflecting more economic freedom. The components are used to derive

both a summary rating for each country and ratings in five areas: size of government; legal system and property rights; sound money; freedom to trade internationally; and regulation of credit, labor, and business.¹³ The methodology of the index is highly transparent and the component and area data for each country, as well as the summary ratings, are publicly available ([Gwartney, Lawson, & Hall, 2012](#)).

The EFW data provide a broad measure of economic institutions and the policy environment for more than 100 countries back to 1980, with the latest report containing data for more than 150 countries. The comprehensiveness of EFW captures a “broad cluster of institutions” that are mutually reinforcing in the development process, a desirable feature for measures of institutions ([Acemoglu & Johnson, 2005](#)). In order to achieve a high EFW rating, a country must provide secure protection of privately owned property, evenhanded enforcement of contracts, and a stable monetary environment. It also must keep taxes low, refrain from creating barriers that restrict exchange (both domestic and international), and rely primarily on markets rather than the political process to allocate goods and resources. In many respects, the EFW rating is a measure of how closely the institutions and policies of a country compare with the idealized structure implied by standard textbook analysis of microeconomics.

(c) *Instrumental variables*

As described in [Section 2](#), we employ an identification strategy where the IVs simultaneously account for the settlement conditions and colonizer identity postulates. Using the colonizer identity classifications of [Klerman et al. \(2011\)](#), former colonies are coded as 1 if colonized by the British and zero otherwise.¹⁴

[Acemoglu et al. \(2001\)](#) and subsequent studies have utilized the log of settler mortality rate as their preferred instrument. We contend however that indigenous population density is a better proxy for settlement conditions. [Olson \(1996\)](#) suggests that the presence of large native populations would have limited the ability of the colonizers to adopt institutions and policies resembling those in their home country if the natives comprised a significant proportion of the total population and had previously established their own set of institutions and policies. In such circumstance, the colonizers would represent a weak minority, limiting their ability to implement radical institutional change peacefully. This would have been the case even in regions in which colonizers experienced low mortality rates. Furthermore, [Easterly and Levine \(2016\)](#) provide empirical evidence that population density in 1500 is a robust determinant of European settlement, suggesting that regions with high indigenous populations could supply resistance to European settlement. These theoretical and empirical considerations, combined with controversy surrounding the settler mortality rate data (c.f., [Acemoglu, Johnson, & Robinson, 2012](#); [Albouy, 2012](#)), motivate our use of the population density in 1500 (PD1500) as a proxy for settlement conditions.¹⁵

One of the criticisms of the settler mortality rate data used by [Acemoglu et al. \(2001\)](#), who used a log transformation of the variable, is that outliers were driving the result that institutions are a strong and robust causal determinant of economic performance. Even though we make use of the PD1500 data as our proxy for colonial settlement conditions, the variable does nonetheless have a large standard deviation due to the presence of several right-skewed observations. In an effort to mitigate the potential effect of outliers, along with a reasonable theoretical conjecture, we adopt a transformation metric that rescales PD1500 to the unit interval and is decreasing in

Table 1. Variable descriptions & summary statistics

Variable	Mean	Std. Dev	Min	Max	N	Description	Source
EFW	5.93	0.88	4.33	8.26	60	Economic freedom of the World composite index. Comprised of 5 area scores: size of government, legal system & property rights, sound money, freedom to trade internationally, regulation of business, credit & labor. Average of chain-linked score over period 1985–2005.	Fraser Institute. Gwartney et al. (2012) . < www.freetheworld.com >
IEW	5.90	0.87	4.26	8.09	60	Index of Economic Freedom composite index. Comprised of 4 main categories: rule of law, limited government, regulatory efficiency, open markets. Average over period 1995–2010.	Heritage Foundation. Miller and Kim (2014) .< www.heritage.org/index/about > Hall and Jones (1999)
SocInf	0.39	0.19	0.12	0.97	59	Social infrastructure index, computed as the average of two separate indices: (1) A government anti-diversion policy index and (2) An index of openness.	
GDP	8.32	1.15	6.16	10.69	60	Natural log of real GDP per capita in 2010.	Penn World Tables version 7.1. Heston et al. (2012) . Acemoglu et al. (2001)
PD1500	0.65	0.35	0.00	1.00	60	Population density in 1500, adjusted to take values on unit interval using formula $x'_j = 1 - \left(\frac{x_j}{x_{max}} \right),$ where $x_{max} = \bar{x} + 0.25 \times \sigma_x$	
UK	0.37	0.49	0.00	1.00	60	Dummy variable equal to 1 if former British colony, zero otherwise.	Klerman et al. (2011)
PD1500*UK	0.24	0.39	0.00	1.00	60	PD1500 interacted with UK	See above
Coast	0.35	0.35	0.00	1.00	60	Land area within 100 km of ice-free coast.	Gallup et al. (1999)
Malaria	5.34	7.81	0.00	30.10	60	Malaria ecology index, based on temperature, mosquito species type, abundance, and vector type. Measured at subnational level and averaged for national measure.	Sachs (2003)
MarketDist	5.10	2.12	0.14	9.28	60	Distance by air to closest of three major world markets (New York, Rotterdam or Tokyo)	Gallup et al. (1999)
EthnLingFrac	0.41	0.31	0.00	0.89	60	Average value of 5 different indices of national ethnic and linguistic fractionalization. Approximate the probability that 2 people chosen at random have the same ethnicity or language.	La Porta et al. (1999)
CogSkill	3.80	0.80	2.45	5.09	30	Average standardized international test score in math, science, and reading, primary through end of secondary school. Scaled to PISA scale and divided by 100.	Hanushek and Woessmann (2012b)
Education	2.54	2.47	0.13	9.96	56	Average years of schooling for population above the age 25. Average over period 1960–2010.	Barro and Lee (2010)
Religion							
Catho80	32.22	38.37	0.00	96.90	48	Share of the population that was Catholic in 1980.	La Porta et al. (1999)
Muslim80	24.05	36.52	0.00	99.40	48	Share of the population that was Muslim in 1980.	La Porta et al. (1999)
Prot80	12.43	23.14	0.00	97.80	48	Share of the population that was Protestant in 1980.	La Porta et al. (1999)
Natural Resources							
Gold	1.35	6.95	0.00	47.00	48	Share of world gold reserves.	Acemoglu et al. (2001)
Iron	0.83	2.74	0.00	16.00	48	Share of world iron reserves.	Acemoglu et al. (2001)
Silv	0.88	2.97	0.00	13.00	48	Share of world silver reserves.	Acemoglu et al. (2001)
Zinc	1.27	3.44	0.00	15.00	48	Share of world zinc reserves.	Acemoglu et al. (2001)
Oilres	0.13	0.51	0.00	3.00	48	Share of world oil reserves.	Acemoglu et al. (2001)

Soil quality variables include dummies for steppe (low latitude), steppe (middle latitude), desert (middle latitude), dry steppe wasteland, desert dry winter, and highland. Temperature variables include average temperature, minimum monthly temperature, maximum monthly high, minimum monthly low, and maximum monthly low, all in centigrade. Humidity variables include morning minimum, morning maximum, afternoon minimum, and afternoon maximum, all in percent. Soil quality, temperature, and humidity variables provided in [Acemoglu et al. \(2001\)](#).

population density using the formula $x'_j = 1 - (x_j/x_{max})$, where x'_j and x_j are the adjusted and nominal population densities in 1500 for colony j , respectively, and $x_{max} = \bar{x} + 0.25\sigma_x$.¹⁶ This transformation rescales the variable in a relative sense such that sparsely populated regions have values approaching one, while the most densely populated areas receive a value approaching zero. This has the benefit of simplifying both our unified view of the settlement conditions and colonizer identity hypotheses and the interpretation of point estimates. A one-unit increase in PD1500 is equivalent to the difference between a relatively uninhabited and the most densely populated region. The rescaled metric also assumes that the negative effect of indigenous population density on institutional development fails to exert a differential impact beyond a certain density level. In other words, the marginal effect of indigenous population density on institutional development is zero above x_{max} .

We anticipate a positive relationship between the rescaled PD1500 variable and contemporary institutional variables, and the effect to be greater among colonies settled by the British. Figure 1 illustrates this hypothesized relationship by plotting institutions against PD1500. Regardless of the identity of the colonizer, it is postulated that the colonizers would have attempted to establish highly extractive institutions in regions with the highest indigenous population densities. As settlement

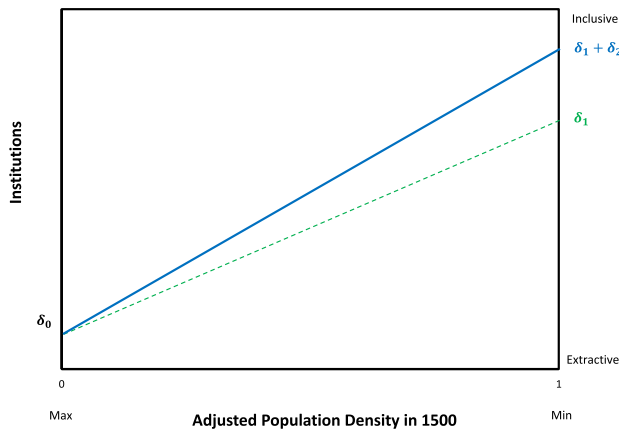


Figure 1. Institutions vs. settlement conditions.

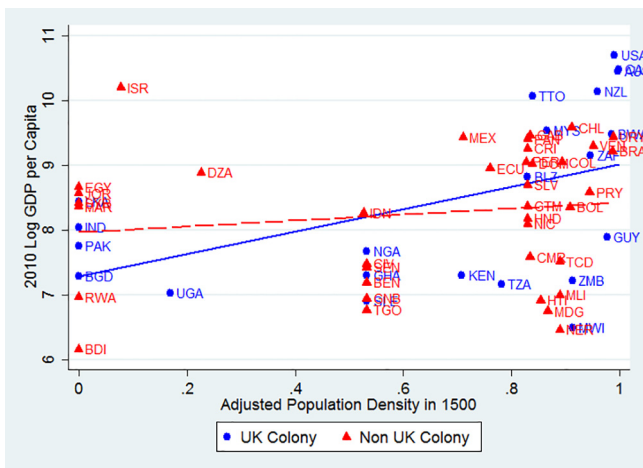


Figure 2. GDP vs. PD1500.

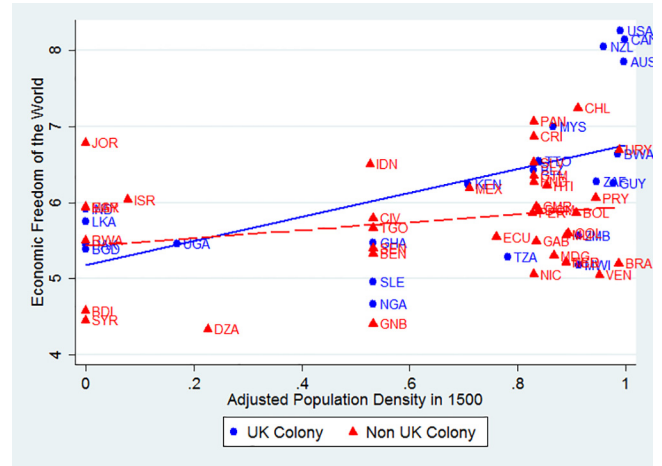


Figure 3. EFW vs. PD1500.

conditions improved (i.e., population density decreased), the opportunity to establish permanent institutions resembling those back home increased. In less populated regions, early institutions and policies are predicted to be less extractive among British than other European colonies, represented by the larger slope of the continuous line relative to the dashed one.

Figures 2 and 3 plot adjusted PD1500 against GDP and EFW, respectively, for the sample of countries used in the main empirical results presented in Section 4 below. Former UK colonies are indicated by circles, and non UK colonies by triangles. Both figures depict a positive relationship between PD1500 and the respective variables, with a greater slope for the sample of former UK colonies. The slope of the best fit line in Figure 2 for non-UK colonies (the dashed line) is relatively flat, suggesting a very weak correlation between PD1500 and GDP for this sample of countries. The relationship between EFW and PD1500 roughly corresponds to the relationship hypothesized in Figure 1 above.

(d) Geography

There is disagreement in the comparative economic development literature over the role of geography in the development process, with some scholars arguing that geography only affects development through its influence on institutional choice (e.g., Acemoglu et al., 2001; Easterly & Levine, 2003; Hall & Jones, 1999; La Porta et al., 1999; Rodrik et al., 2004). Others argue, however, that geography exerts a direct effect on development, even after accounting for its influence through the institutional channel (e.g., Alsan, 2015; Auer, 2013; Dell et al., 2014; McMillan, 2016). Given the amount of evidence documenting a direct effect of geography on development, as well as the possibility that multiple aspects of geography may be important for economic development, we control for three measures of geography in our baseline model.

First, countries with climate and topography more prone to life-threatening infectious diseases such as malaria are likely to exhibit a less productive labor force. Additionally, individuals may also have shorter life expectancy such that they are less likely to make long-term investments in human and physical capital. As such, a country's growth prospects may be hampered by a high prevalence of disease. Following Sachs (2003) and Carstensen and Gundlach (2006), we control for malaria ecology (Malaria).¹⁷

Table 2. *Reduced form OLS results (GDP is dependent variable)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PD1500	0.982** (0.403)		0.977** (0.403)	0.460 (0.544)	0.967*** (0.324)	0.931*** (0.340)	0.552 (0.343)
UK		0.162 (0.332)	0.143 (0.308)	-0.677 (0.531)			
PD1500*UK				1.264 (0.792)	0.419 (0.345)	0.488 (0.358)	-0.006 (0.318)
Coast					0.246 (0.374)	0.217 (0.380)	-0.051 (0.331)
Malaria					-0.077*** (0.011)	-0.068*** (0.013)	-0.052*** (0.013)
MarketDist					-0.109* (0.060)	-0.102 (0.064)	-0.083* (0.048)
EthnLingFrac						-0.349 (0.520)	-0.165 (0.446)
EFW							0.596*** (0.142)
<i>N</i>	60	60	60	60	60	60	60
<i>F</i>	5.93	0.24	3.04	3.44	15.06	13.81	19.83
<i>R</i> ² adj.	0.07		0.06	0.08	0.43	0.42	0.54

OLS reduced-form regressions. Robust standard errors in parentheses. GDP is 2010 log GDP per capita data from Penn World Tables version 7.1. EFW is average Fraser Institute Economic Freedom of the World Index over period 1985–2010. PD1500 is population density in 1500, transformed to 0–1 inverse scale. UK is a dummy variable equal to 1 if a former UK colony, according to Klerman et al. (2011). See Table 1 for additional variable details. Constant term omitted for space. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Next, landlocked countries and those with limited coastal access face higher transportation costs to engage in international trade, restraining their potential to develop a comparative advantage. Additionally, nations remotely located from major world markets may face higher trade costs, limiting the extent of the market for their goods and services and the potential to benefit from economies of scale. Given these possibilities, we follow Gallup et al. (1999) in conditioning our estimates on the proportion of land located within 100 km of ice-free coast (Coast) and the closest distance to one of the three major world markets (MarketDist).

4. EMPIRICAL RESULTS

(a) *Reduced form results*

Table 2 presents reduced-form OLS regressions with GDP as the dependent variable. Models 1 and 2 are simple regressions of GDP on PD1500 and UK. Both variables have a positive sign, but only PD1500 is statistically significant (at the 5% level). Model 3 simultaneously includes both PD1500 and UK. The results for each main effect term are nearly identical as the simple regressions from models 1 and 2, with PD1500 positive and statistically significant at the 5% level, but UK insignificant statistically. Model 4 adds the interaction between PD1500 and UK. PD1500 and PD1500 × UK are both positive, suggesting that the effect of better settlement conditions on economic development is greater for UK colonies. Meanwhile, the main effect UK terms enters negatively. None of the three variables are statistically significant at conventionally accepted levels in this specification.

Model 5 in Table 2 drops UK and adds the three geographic conditioning variables: Malaria, Coast, and MarketDistance. In addition to the geographic controls, model 6 also conditions on ethno-linguistic fractionalization (EthnLingFrac). In models 5 and 6, both PD1500 and PD1500 × UK are positive, but only the former is statistically significant (at the 1% level).

Model 7 introduces EFW, our measure of economic institutions. EFW enters positively and statistically significant at the 1% level. PD1500 remains positive in the specification, but it is no longer statistically significant and the magnitude of the coefficient declines considerably from 0.931 to 0.552. The coefficient on PD1500 × UK turns negative, but is not statistically significant. These results are suggestive that the effects of our proposed instruments, PD1500 and PD1500 × UK, on economic development are via the institutional channel.

(b) *Main 2SLS results*

Table 3 presents our main 2SLS results. Panels A and B present the second- and first-stage estimates with GDP and EFW as the dependent variables, respectively. Models 1–4 are for comparative purposes and do not include any conditioning variables.

Models 1 and 2 instrument EFW with PD1500 and UK, respectively. The excluded instruments are positive and statistically significant at 10% or better in both specifications, with PD1500 significant at the 1% level in model 1. Model 3 includes both PD1500 and UK as excluded instruments. Both enter positively and are statistically significant at the 10% level or better in the first-stage estimates.

The first-stage estimates in models 1–3 suggest that better settlement conditions and English colonization are both associated with the development of better economic institutions, but the theory and historical evidence outlined in Section 2 predicts that the positive impact of settlement conditions on institutional formation would be greater for British colonies relative to the continental colonizers due to the fact that England had more liberal home institutions during the colonial era. Furthermore, it suggests that even the British colonies would have adopted poor institutions when faced with adverse settlement conditions. As such, the first-stage estimates of PD1500 underestimate (overestimate) the impact of settlement conditions on institutional formation for British (continental)

Table 3. *Main 2 SLS results*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Panel A: 2nd Stage Estimates (Log GDP is dependent variable)</i>							
EFW	1.017*** (0.335)	0.357 (0.575)	0.825*** (0.288)	0.889*** (0.205)	0.857*** (0.226)	0.918*** (0.203)	0.925*** (0.197)
Coast						-0.117 (0.331)	-0.143 (0.345)
Malaria						-0.042*** (0.015)	-0.037** (0.015)
MarketDist						-0.073 (0.045)	-0.069 (0.046)
EthnLingFrac							-0.202 (0.420)
<i>Panel B: 1st Stage Estimates (EFW is dependent variable)</i>							
PD1500	0.966*** (0.307)		0.950*** (0.294)	0.519 (0.387)	0.637** (0.285)	0.668** (0.256)	0.636** (0.264)
UK		0.455* (0.255)	0.436* (0.226)	-0.247 (0.384)			
PD1500*UK				1.052* (0.577)	0.760** (0.323)	0.767*** (0.284)	0.829*** (0.294)
Coast						0.475 (0.311)	0.450 (0.318)
Malaria						-0.035*** (0.012)	-0.027** (0.013)
MarketDist						-0.037 (0.062)	-0.031 (0.063)
EthnLingFrac							-0.310 (0.401)
Observations	60	60	60	60	60	60	60
Partial R ²	0.15	0.06	0.15	0.25	0.24	0.30	0.31
p(OID)			0.20	0.28	0.44	0.22	0.25
p(UID)	0.00	0.08	0.01	0.01	0.01	0.02	0.02
p(CLR)			0.03	0.02	0.01	0.00	0.00
p(AR)	0.01	0.62	0.04	0.01	0.04	0.00	0.00
p(LM)			0.04	0.06	0.01	0.00	0.00
F(Effective)	9.9	3.2	7.0	6.0	8.1	10.4	10.6
crit(tau5)	37.4	37.4	19.5	22.7	16.4	17.4	16.4
crit(tau10)	23.1	23.1	12.6	14.0	10.7	11.4	10.8
crit(tau20)	15.1	15.1	8.6	9.1	7.5	7.9	7.5
crit(tau30)	12.0	12.0	7.1	7.3	6.2	6.5	6.3

Robust standard errors in parentheses. Partial R² is the first-stage partial R-square of the endogenous regression (i.e., EFW). p(OID) denotes the p-value of Hansen J-statistic of over-identification. p(UID) denotes the p-value of Kleibergen–Papp LM statistic of under-identification. p(CLR), p(AR), and p(LM) are the p-values for the conditional likelihood ratio, Anderson–Rubin, and Kleibergen–Moreira Lagrange multiplier robust weak instrument tests, respectively, estimated using the rivtest command in Stata (Finlay & Magnusson, 2009). F(Effective) is the robust F-statistic that should be compared to the critical values, estimated using the weakivtest command in Stata (Montiel Olea & Pflueger, 2013; Pflueger & Wang, 2015). See Table 1 for variable details. Constant term omitted for space. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

colonizers, while the first-stage estimate of UK overestimates (underestimates) the impact of British colonization on institutional formation in regions with dense (sparse) indigenous populations. The biased first-stage estimates also likely bias the second-stage estimates of the impact of EFW on GDP.¹⁸

We report the results of the robust test for weak instruments (Montiel Olea & Pflueger, 2013), where F(Effective) is the robust F-statistic and Crit(τ) are the critical values. The null hypothesis is that the estimator approximate asymptotic (aka Nagar) bias exceeds a fraction τ of a “worst-case” benchmark. The test rejects the null at the 5% level when F(Effective) > Crit(τ) for the desired threshold τ .¹⁹ We fail to reject the null at even a $\tau = 30\%$ threshold in models 1–3, suggesting that both PD1500 and UK are by themselves, as well as in tandem, weak as instruments for EFW. We also report the results of Anderson–Rubin (A–R), Moreira conditional likelihood ratio (CLR), and Kleibergen–Moreira Lagrange

multiplier (LM) tests of the endogenous variable coefficient, which yield inferences robust to weak instruments. The p-values of the A–R tests are 0.01 and 0.62 in models 1 and 2, suggesting that EFW exerts a statistically significant effect on GDP in model 1, but not model 2.²⁰ Accordingly, EFW is positive in both models 1 and 2, but is only significant statistically (at the 1% level) in the former. The A–R, CLR, and LM inferential tests all suggest that EFW is positively and significantly statistically (at the 5% level or better) associated with GDP in model 3.

Model 4 adds the PD1500 \times UK interactive term as an instrument. It enters positively and is significant at the 10% level in the first-stage. The main effect PD1500 term is also positive, but it is not significant statistically. Meanwhile, the UK main effect term not only loses statistical significance, it also turns negative. The results from the weak instrument test again are suggestive of weak instruments, but the A–R, CLR,

and LM inferential tests once more suggest the EFW is significantly correlated with GDP.

The theory outlined in Section 2 suggests that the identity of the colonizer will fail to exert an independent effect on institutional development when faced with the worst possible settlement conditions, because all colonizers will have an incentive to pursue an extractive rather than inclusive settlement strategy. As such, model 5 in Table 3 drops the UK main effect term and includes PD1500 and PD1500 \times UK as instruments for EFW.²¹ In this parsimonious model, both the main and interactive effect terms are positive and statistically significant at 5% or better in the first-stage. The estimates suggest that a one-unit increase in PD1500 (change from the worst to the best settlement conditions) is associated with a 0.64-point (nearly three-fourths a standard deviation) improvement in EFW for non-English colonies, but a 1.40-point (1.6 standard deviations) increase in EFW for English colonies.²² $F(\text{Effective}) = 8.1$ and falls between the critical values for the τ thresholds of 10 and 20%. The A–R, CLR, and LM inferential tests all suggest that EFW exerts a statistically significant and positive effect on GDP, even if one imposes a lower τ threshold such that they fail to reject the null of the robust weak instrument test.

Model 6 in Table 3 controls for three geographic variables that potentially impact economic development: Malaria, Coast, and MarketDist (see Section 3(d) or Table 1 for details). Consistent with expectations, Malaria and MarketDist enter both stages with a negative sign. Malaria is statistically significant at 5% or better in both stages, suggesting that, consistent with Sachs (2003) and Carstensen and Gundlach (2006), the disease environment exerts both direct and indirect effects on economic development. MarketDist is not statistically significant in either stage. Meanwhile, Coast is positive in the first-stage estimate, but negative in the second; however, it is not statistically significant in either stage. More importantly, both instruments remain positive and are statistically significant at 5% or better in the first-stage after controlling for geography, and the coefficient estimates suggest that the partial effect of settlement conditions (for both British and non-British colonies) is similar to the estimates from model 5. EFW also remains highly significant in the second-stage.

Model 7 in Table 3 serves as the baseline estimate, conditioning on three geographic variables and EthnLingFrac, which enters negatively in both stages but is not statistically significant in either. The geographic variables maintain similar qualitative and quantitative effects in both stages. The two excluded instruments remain statistically significant at 5% or better, and the coefficient estimates suggest that an increase from the worst to the best settlement conditions faced by the colonizer is associated with a 1.47-point increase in EFW in former British colonies, but only a 0.64-point increase in non-British colonies. $F(\text{Effective}) = 10.6$ and is only modestly less than the $\tau = 10\%$ critical value. We easily reject the null hypothesis for the A–R, CLR, and LM inferential tests, suggesting that EFW exerts a statistically significant and positive effect on GDP that is robust to weak instruments.

The second-stage point estimates in model 7 suggest that a point increase in EFW (slightly more than a standard deviation) is associated with a 0.925 increase (0.8 standard deviations) in log of real 2010 GDP per capita. As an illustration, consider Costa Rica and Guatemala, two Central American nations. Neither was colonized by the British and settlement conditions were very similar in the two countries. Both nations have considerable coastal access, but Guatemala has greater risk of malaria and its population is more fractionalized. As such, the model predicts Costa Rica to have better economic

institutions than Guatemala. All else equal, the first-stage estimates predict a 0.25-point EFW difference between the two countries, but the actual difference is 0.52 points (6.87 vs. 6.35). The second-stage estimates predict that, ceteris paribus, the actual difference in EFW between the two countries will yield a 0.48-log-point difference in the level of real GDP per capita between the two nations, suggesting that GDP per capita is around 60% greater in Costa Rica ($e^{0.52} - 1 = 0.62$). The actual difference is 0.89 log-points, indicating that GDP per capita is 140% higher in Costa Rica ($e^{0.89} - 1 = 1.4$). These results suggest differences in economic institutions between Costa Rica and Guatemala account for more than 50% of the difference in the observed level of economic development between these two nations.

We also report the p-values from the Kleibergen–Papp test for under-identification as $p(\text{UID})$ in Table 3, as well as the p-values from the Hansen J-statistic of over-identification as $p(\text{OID})$. We reject the null hypothesis that the model is under-identified at the 1% level in all but model 2, which has $p(\text{UID}) = 0.08$. The over-identification test can be applied because we have one endogenous regressor with multiple excluded instruments. We easily fail to reject the null hypothesis in models 3–7. In particular, the results of this test for models 6 and 7 support the notion that our instruments are conditionally exogenous.²³

5. ROBUSTNESS ANALYSIS

Table 4 provides a series of robustness tests to additional control variables that potentially impact economic development. Model 1 is the baseline estimate from Table 3 and is reproduced here for ease of comparison. All specifications allow for the control variables included in our baseline model, but are omitted for space.

Models 2–4 in Table 4 further test the geographic determinism theory of economic development by incrementally introducing a number of additional geography and/or climate variables. Countries with more natural resources may achieve higher levels of per capita income, although there is a body of evidence suggestive that natural resources are a curse and detrimental for institutional development and/or economic growth (e.g., Van der Ploeg, 2011). Model 2 controls for a set of natural resource variables, including: world shares of gold, iron, and zinc reserves; number of minerals present in the country; and thousands of barrels of oil reserves per capita. The results of the individual natural resource variables are omitted for space, but the p-value from a test of their joint significance is reported as $p(\text{NatRes})$ and suggests that the natural resource variables are jointly significant in both stages at the 1% level.²⁴ Model 3 adds a set of temperature and humidity variables to the previous specification. The individual results of these variables are omitted for space but the p-value from tests of their joint significance are reported as $p(\text{Temp})$ and $p(\text{Humid})$. In this specification, the sets of natural resource, temperature, and humidity variables are all statistically significant at 10% or better in both stages. Model 4 adds a set of soil type dummy variables and the p-value of their test of joint significance is reported as $p(\text{Soil})$.²⁵ The natural resource, temperature, and humidity variables are jointly significant at 10% or better in both stages, while the soil variables are jointly significant in the first stage. After robustly controlling for additional geographic factors, EFW remains positive and highly significant statistically as a predictor of economic development, and the coefficient estimates are relatively stable throughout these specifications.

Table 4. *Robustness to additional controls*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: 2nd Stage Estimates (Log GDP is dependent variable)</i>								
EFW	0.925*** (0.197)	0.996*** (0.202)	0.949*** (0.185)	1.014*** (0.205)	0.889*** (0.268) −0.010 (0.288)	0.537 (0.697)	1.165*** (0.229)	0.927** (0.465)
CogSkill								
Education						0.153 (0.185)		
p(NatRes)		0.00	0.00	0.00				
p(Temp)			0.06	0.10				
p(Humid)			0.00	0.00				
p(Soil)				0.36				
p(Religion)							0.48	
p(Region)								0.05
<i>Panel B: 1st Stage Estimates (EFW is dependent variable)</i>								
PD1500	0.636** (0.264)	0.724** (0.317)	0.882*** (0.261)	0.823*** (0.266)	0.339 (0.317)	0.361 (0.278)	0.733** (0.343)	0.779* (0.427)
PD1500*UK	0.829*** (0.294)	0.893** (0.362)	0.581 (0.453)	0.587 (0.551)	1.090*** (0.289)	0.236 (0.264)	0.904*** (0.312)	0.413** (0.200)
CogSkill					0.339** (0.155)			
Education						0.198*** (0.052)		
p(NatRes)		0.00	0.00	0.03				
p(Temp)			0.02	0.07				
p(Humid)			0.00	0.00				
p(Soil)				0.05				
p(Religion)							0.22	
p(Region)								0.00
Observations	60	48	48	48	30	56	48	60
Partial R ²	0.31	0.38	0.45	0.44	0.47	0.07	0.31	0.19
p(OID)	0.25	0.69	0.69		0.35	0.04	0.47	0.66
p(UID)	0.02	0.03	0.00	0.01	0.01	0.37	0.05	0.04
p(CLR)	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.03
p(AR)	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.07
p(LM)	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.02
F(Effective)	10.6	8.6	7.8	5.4	13.7	1.6	8.5	6.5
crit(tau5)	16.4	17.6	22.4	26.0	15.5	16.0	10.8	17.2
crit(tau10)	10.8	11.5	14.3	16.4	10.1	10.5	7.5	11.2
crit(tau20)	7.5	8.0	9.7	11.0	7.1	7.3	5.5	7.8
crit(tau30)	6.3	6.6	7.9	8.9	5.9	6.1	4.8	6.5

All specifications include same conditioning variables used in the baseline model 6 of Table 3. Robust standard errors in parentheses. p(NatRes) is p-value from test of joint significant of stocks of gold, iron, silver, zinc, and oil reserves. p(Temp) and p(Humid) are p-values from tests of joint significance of sets of temperature and humidity variables. p(Soil) is p-value from test of joint significant of set of soil variables. p(Religion) is p-value from test of joint significance of shares of the population Catholic, Muslim, and Protestant in 1980. P(Region) is p-value from test of joint significance of regional fixed effects. Partial R² is the first-stage partial R-square of the endogenous regression (i.e., EFW). p(OID) denotes the p-value of Hansen J-statistic of over-identification. p(UID) denote the p-value of Kleibergen–Papp LM statistic of under-identification. p(CLR), p(AR), and p(LM) are the p-values for the conditional likelihood ratio, Anderson–Rubin, and Kleibergen–Moreira Lagrange multiplier robust weak instrument robust, respectively, estimated using the rivtest command in Stata (Finlay & Magnusson, 2009). F(Effective) is the robust F-statistic that should be compared to the critical values, estimated using the weakivtest command in Stata (Montiel Olea & Pflueger, 2013; Pflueger & Wang, 2015). See Table 1 for variable details. Constant term omitted for space. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The factor accumulation theory of development stresses the importance of human and physical capital as determinants of development. Because one of the main channels through which institutions are believed to impact growth is physical capital investment (Daude & Stein, 2007; Dawson, 1998; Gwartney, Holcombe, & Lawson, 2006; Hall, Sobel, & Crowley, 2010), we do not control for physical capital; however, there is a body of literature suggestive that human capital exerts a direct causal impact on economic development (Gennaioli, La Porta, Lopez-de-Silanes, & Shleifer, 2013; Glaeser *et al.*, 2004; Hanushek & Woessmann, 2012a, 2012b).²⁶

Following Hanushek and Woessmann (2012a, 2012b), model 5 controls for human capital using cognitive skills (CogSkill), which captures variations in knowledge and ability attributable to all sources of human capital development—including schooling, family structure, and natural ability. Criticizing school attainment as a measure of human capital, Hanushek and Woessmann (2012b) state that a “year of schooling in Peru is assumed to create the same increase in productive human capital as a year of schooling in Japan” (p. 269).²⁷ CogSkill is therefore a better measure of human capital than educational attainment, which is the conventional measure of human capital used in the literature. CogSkill is

Table 5. Sensitivity analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
<i>Panel A: 2nd Stage Estimates (Log GDP is dependent variable)</i>													
EFW	0.925*** (0.197)	0.798*** (0.157)	1.517** (0.765)	1.024*** (0.146)	1.112*** (0.225)	1.172*** (0.232)			0.945*** (0.194)	0.943*** (0.192)	0.934*** (0.196)	0.952*** (0.203)	0.969*** (0.208)
IEW							1.046*** (0.186)						
SocInf								5.378*** (1.248)					
<i>Panel B: 1st Stage Estimates (EFW IEW SocInf is dependent variable)</i>													
PD1500	0.636** (0.264)	0.400 (0.342)	0.456* (0.237)	1.341*** (0.401)	0.663** (0.258)	0.663** (0.258)	0.691** (0.285)	0.109** (0.054)	0.653** (0.267)	0.632** (0.260)	0.641** (0.263)	0.652** (0.281)	0.636** (0.289)
PD1500*UK	0.829*** (0.294)	1.355*** (0.333)	0.133 (0.236)	0.580 (0.392)	0.703** (0.310)	0.703** (0.310)	0.651** (0.294)	0.152* (0.079)	0.822*** (0.295)	0.875*** (0.288)	0.830*** (0.294)	0.785*** (0.286)	0.762*** (0.282)
Observations	60	37	56	40	59	59	60	59	59	60	60	60	60
Partial R ²	0.31	0.47	0.08	0.49	0.27	0.27	0.27	0.22	0.31	0.27	0.31	0.29	0.27
p(OID)	0.25	0.91	0.45	0.86	0.40	0.31	0.36	0.25	0.14	0.31	0.27	0.16	0.12
p(UID)	0.02	0.03	0.12	0.02	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.02	0.02
p(CLR)	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p(AR)	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p(LM)	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F(Effective)	10.6	12.3	2.7	18.7	8.4	8.4	8.3	5.5	10.6	11.4	10.6	9.4	8.6
crit(tau5)	16.4	14.8	11.5	7.1	16.4	16.4	13.5	21.3	16.4	16.5	16.5	16.1	15.8
crit(tau10)	10.8	9.8	7.8	5.3	10.7	10.7	9.1	13.6	10.7	10.8	10.8	10.6	10.4
crit(tau20)	7.5	6.9	5.7	4.3	7.5	7.5	6.5	9.3	7.5	7.5	7.5	7.4	7.3
crit(tau30)	6.3	5.8	4.9	3.9	6.3	6.2	5.5	7.6	6.3	6.3	6.3	6.2	6.1
Sample	Baseline	w/o Sub-Saharan Africa	w/o Neo-UK	w/o Latin America	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline
Colonizer Classifications	1	1	1	1	1	1	1	1	2	3	4	1	1
PD1500 Adjustment	1	1	1	1	1	1	1	1	1	1	1	2	3

All specifications include same conditioning variables used in the baseline model 6 of Table 3. Robust standard errors in parentheses. Models 2 and 4 exclude the countries of Sub-Saharan Africa and Latin America, and model 3 excludes the U.S., Australia, Canada, and New Zealand. Models 5 and 6 use PWT 8.1 and World Bank WDI measures of log real GDP per capita as 2nd stage dependent variable. Models 7 and 8 use the Heritage Foundation Index of Economic Freedom (IEF) and Hall and Jones Social Infrastructure Index (SocInf) as the measures of economic institutions. Alternative colonizer classifications: (1) Klerman et al. (2011); (2) French research center CEPII; (3) Acemoglu et al. (2001); and (4) La Porta et al. (1999). Alternative adjustments of raw PD1500 data (see Section 3 (c) for additional information) as follows: $x'_j = 1 - \left(\frac{x_j}{x_{\max}}\right)$, where $x_{\max} = \bar{x} + (y \times \sigma_x)$, where $y = (1) 0.25; (2) 0.5; (3) 0.75$. See Table 1 for variable detail and Table 3 or 4 for notes on statistical tests. Constant term omitted for space. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

positive and statistically significant in the first-stage (at the 5% level), but is insignificant in the second-stage. This finding is consistent with the view that human capital impacts economic development indirectly by promoting better institutions (Galor, 2011; Galor *et al.*, 2009). More importantly, and consistent with the results of Faria *et al.* (2016), EFW remains positive and highly statistically significant as a predictor of economic development, and the coefficient changes only modestly relative to the baseline. The two instruments remain positive in the first-stage, and although only the interactive term is statistically significant at conventionally acceptable levels, $F(WID) = 13.7$, which lays between the critical values for the τ thresholds of 5 and 10%. The A–R, CLR, and LM inferential tests reinforce the finding that EFW is a significant determinant of GDP.

Although CogSkill is our preferred measure of human capital, we also control for average educational attainment (Education) over the period 1960–2010 in model 6 of Table 4. Similar to CogSkill, Education is positive and statistically significant in the first-stage, but not statistically significant in the second-stage. In this specification, $F(\text{Effective}) = 1.6$, suggesting that the instruments are weak; however, results from the A–R and CLR inferential tests, which are robust to weak instruments, suggest that EFW is a positive and significant determinant of economic development. Both instruments retain a positive sign in the first-stage, but neither is statistically significant at conventionally accepted levels. Several qualifications are in order here. First, EFW and Education are highly correlated ($\rho = 0.64$). Next, the correlations between PD1500 and EFW and Education are nearly identical ($\rho = 0.39$).²⁸ The variation in EFW explained by settlement conditions is likely being picked up by educational attainment. As such, and in conjunction with the above discussion concerning measurement of human capital, lead us to place greater emphasis on the results controlling for cognitive skill than those using educational attainment. It should also be noted that models 5 and 6 are based on significantly different country samples due to data availability, which potentially explains the difference in the first-stage partial R^2 between these two specifications.

Following a body of literature which suggests that religion is important for economic growth (Grier, 1997; McCleary & Barro, 2006; Weber, 1930), model 7 of Table 4 controls for three religious variables: the shares of the population identifying as Catholic, Muslim, and Protestant in 1980. The p-value from a test of their joint significance is reported as $p(\text{Religion})$ and suggests that the three religious variables are jointly insignificant in both stages. Both instruments enter positively and are statistically significant in the first-stage, and EFW remains a positive and highly significant predictor of economic development.

Olsson (2004) argues that there are different waves of colonization, which roughly correspond to the colonization of different regions of the world, suggesting that European colonization strategy likely differed by continent. Model 8 in Table 4 accounts for this possibility by controlling for a set of regional fixed effects.²⁹ The regional fixed effects are jointly significant at 5% or better in both stages of the model, reported as $p(\text{Region})$. The instruments, PD1500 and $PD1500 \times UK$ both remain statistically significant at the 10% level or better. $F(\text{Effective}) = 6.5$, suggesting that the instruments are fairly weak in this specification; however, results from the A–R, CLR, and LM inferential tests, which are robust to weak instruments, suggest that EFW is a positive and statistically significant predictor of GDP, even after controlling for regional fixed effects.

Table 5 provides a battery of sensitivity tests. Model 1 again reproduces the baseline estimate from Table 3 for ease of comparison. Models 2–4 exclude strategic subsamples of countries that may be driving the results. Model 2 excludes the countries of Sub-Saharan Africa, most of which have poor institutions and are fairly undeveloped. Model 3 excludes Australia, Canada, New Zealand, and the United States (collectively, Neo UKs), four former British colonies that are among the most economically developed in the world today. Model 4 excludes the countries of Latin America, which Olsson (2004) argues were colonized during the mercantilist era when no European nation exhibited sound economic or political institutions. Across these subsamples, the instruments maintain qualitatively similar results in the first-stage, although only the main effect term is statistically significant in models 3 and 4, while only the interactive term is statistically significant in model 2. The robust weak instrument test suggests that the instruments are weak in model 2.³⁰ Meanwhile, $F(\text{Effective}) = 12.3$ in model 3 and falls between the critical values for the τ thresholds of 5% and 10%, while the $F(\text{Effective}) = 18.7$ is greater than the critical value for $\tau = 5\%$. Nonetheless, the robust to weak instrument A–R, CLR, and LM inferential tests indicate that EFW is a positive and statistically significant predictor of economic development in all three models. The point estimates for EFW across models 2–4 range from 0.798 to 1.517.

Ram and Ural (2014) show that the results of cross-country empirical growth studies can be sensitive to the choice of GDP measure. Models 5 and 6 of Table 5 use the PWT 8.1 and World Bank World Development Indicator real GDP per capita measures in lieu of the PWT 7.1 measures. The results are nearly identical to the baseline, although the estimated impact of EFW on GDP is moderately higher in these two specifications. Ram (2014) suggests that empirical results may be sensitive to the measure of economic freedom. Models 7 and 8 use the Heritage Foundation Index of Economic Freedom (IEF) and the Social Infrastructure Index (SocInf) developed by Hall and Jones (1999), respectively, in lieu of the EFW measure. The results are qualitatively similar to the baseline.

Models 9–11 of Table 5 use alternative classifications of colonizers. Model 9 uses the classifications of French research center CEPII, model 10 the classifications employed by Acemoglu *et al.* (2001), and model 11 the legal origin classifications of La Porta *et al.* (1999). The results across these three specifications are relatively unchanged compared to the baseline. Finally, models 12 and 13 utilize alternative transformations of the raw population density in 1500 data, showing that the results are not sensitive to the choice of transformation.

The results from Tables 4 and 5 collectively show that the baseline 2SLS estimate of the potential causal impact of economic institutions on economic development, which conditions on several geographic factors and ethnolinguistic fractionalization, are robust to a number of additional control variables that potentially impact development and are insensitive to various sample restrictions, alternative measures of economic institutions, GDP colonizer classifications, and transformations of the raw indigenous population density data. The point estimate of the potential causal impact of economic institutions on economic development remains relatively stable and is highly significant throughout all of the specifications across Tables 4 and 5, bolstered by the A–R, CLR, and LM inferential test results that are robust to weak instruments, suggesting that the positive effect of EFW on real GDP per capita is a robust finding.

6. CONCLUDING REMARKS

Prior research has provided evidence that institutions are an important factor in the economic development process. But debate continues about the nature and structure of the institutions that matter and whether the impact of institutions on development is endogenous. In an effort to address the endogeneity problem, scholars have advanced two main IV identification strategies. One is the settlement condition view commonly associated with [Acemoglu et al. \(2001\)](#), which stresses that the colonizers imported inclusive growth-promoting economic and political institutions when conditions were favorable for large-scale settlement, but established extractive growth-retarding institutions when conditions were unfavorable. The other is the colonizer identity view that points to the superiority of pre-colonial British institutions relative to the other major colonizers as the key driving force influencing post-colonial institutional formation and subsequent economic development ([Klerman et al., 2011](#); [La Porta et al., 1999](#); [Landes, 1998](#); [North et al., 2000](#)).

This paper offers an innovative IV approach that simultaneously accounts for the potential impact of both views. While previous literature has largely treated these two views as substitutes, we instead treat them as complementary. We provide a hypothesis that unifies the settlement conditions and colonizer identity views as an improved description of the colonial process of institutional transplantation. Specifically, we use as IVs population density in 1500 (PD1500), as a proxy for settlement conditions, and PD1500 interacted with a dummy variable equal to one if the colonizer was the UK to allow for a differential impact of settlement conditions on institutional development in former British colonies. These IVs, we argue, provide us with a source of conditionally exogenous variation in contemporary economic institutions in order to estimate their potential causal impact on modern levels of economic development.

[Acemoglu and Johnson \(2005\)](#) suggest that there are likely a broad cluster of institutions that are mutually reinforcing for the development process, but most previous studies have uti-

lized either a singular measure of institutions such as executive constraints or risk of expropriation. We adopt the Fraser Institute's Economic Freedom of the World Index (EFW), which is comprised of five broad and mutually reinforcing institutional areas that are constructed in accordance with a consistent theoretical definition, as our primary measure of economic institutions. Conditioning on three geographic factors and ethnolinguistic fractionalization, our baseline 2SLS estimate suggests that a one-point increase in EFW (slightly more than a full standard deviation) is associated with about a 0.92-log-point increase in real GDP per capita (0.75 standard deviations). This point estimate is relatively stable after controlling for additional variables such as natural resources, climate, soil quality, human capital, religion, and regional fixed effects. The results are also robust to alternative measures of economic institutions, GDP, and colonizer classifications, as well as various country sample restrictions and alternative transformations of the raw settlement conditions data.

Our analysis also contributes to the debate on the role of geography in the development process. Previous empirical studies, which have relied primarily on latitude as the sole measure of geography ([Acemoglu et al., 2001](#); [Easterly & Levine, 2003](#); [Rodrik et al., 2004](#)), have neglected or underestimated the role that geography plays in shaping economic outcomes, in spite of substantial evidence documenting a direct effect of geography on development ([McMillan, 2016](#)). This has potentially resulted in an upward bias in the impact of institutions on growth because of measurement error and/or omitted variable bias ([Auer, 2013](#)). We therefore condition on multiple dimensions of geography such as malaria ecology, distance to major markets, and access to coastline. Contrary to previous studies, which have found that geography only impacts economic development indirectly, our results are consistent with the findings of [Sachs \(2003\)](#) and [Carstensen and Gundlach \(2006\)](#), who find that malaria ecology exerts a negative effect on development directly, as well as indirectly via the institutional channel.

NOTES

1. EFW has been found to be a robust correlate of economic growth ([De Haan, Lundström, & Sturm, 2006](#); [Hall & Lawson, 2014](#)), but there is little empirical evidence that EFW is a causal determinant of long-term economic performance, with the exceptions of studies by [Faria and Montesinos \(2009\)](#), which suffers from the blunt instrument problem ([Bazzi & Clemens 2013](#)), and a recent study by [Faria, Montesinos, Morales, and Navarro \(2016\)](#).

2. See for example, studies by [Acemoglu et al. \(2001\)](#), [Acemoglu, Gallego, and Robinson \(2014\)](#), [Glaeser, La Porta, Lopez-de-Silanes, and Shleifer \(2004\)](#), [Rodrik, Subramanian, and Trebbi \(2004\)](#).

3. Market allocation refers to economic resources being allocated through the market rather than the political process.

4. See for example, studies by [Acemoglu et al. \(2001\)](#), [Easterly and Levine \(2003\)](#), [Hall and Jones \(1999\)](#), [La Porta, Lopez-de-Silanes, Shleifer, and Vishny \(1999\)](#), [Rodrik et al. \(2004\)](#).

5. [McMillan \(2016\)](#) suggests that the debate over the impact of geography on development has led some scholars, mostly in the institutional research strand, to neglect or underestimate the role that

geography plays on economic outcomes, in spite of substantial evidence documenting a direct effect of geography on development. For example, [Sachs \(2003\)](#), [Carstensen and Gundlach \(2006\)](#), [Auer \(2013\)](#), [Dell, Jones, and Olken \(2014\)](#), and [Alsan \(2015\)](#) provide evidence that geography exerts a direct impact on economic development beyond its effect on institutions.

6. Some examples of recently published papers include: [Acemoglu, Reed, and Robinson \(2014\)](#), who show that regions in Sierra Leone with more constrained chiefs are associated with better development outcomes; [Ang \(2013\)](#), who finds that the exogenous variation of institutions, which can be traced back to deep growth determinants, exerts a significant effect on current output; [Ashraf, Glaeser, and Ponzetto \(2016\)](#), who show the importance of institutions and incentives in solving a so-called last-mile problem of bringing clean water to poor final users; [Egert \(2016\)](#), who documents that quality of institutions is an important driver of multifactor productivity at the firm-level; [Michalopoulos and Papaioannou \(2013\)](#), who find a strong correlation between pre-colonial ethnic political complexity, at the regional level in Africa, and contemporary development, measured by satellite images of light density at night; and [Michalopoulos and Papaioannou \(2014\)](#), who uncover an average non-effect of national institutions on ethnic development; however, this non-

effect hides considerable heterogeneity. Once they account for distance from the capital, the effect of national institutions increases with proximity to the capital.

7. As indicated in Table 1, the standard deviation of ln real GDP per capita is 1.15, so three-quarters of a standard deviation is 0.87 ln points. This represents a nearly 240% difference in real GDP per capita, or approximately the difference between Canada and Chile or Uruguay and Paraguay.

8. For evidence on persistence of institutions see, for example, Acemoglu *et al.* (2001), Roland (2004), Guiso, Sapienza, and Zingales (2016), Alesina and Giuliano (2015) and Becker, Boeckh, Hainz, and Woessmann (2016). Although institutional persistence suggests that institutions are difficult to change, it does not mean that they are immutable. For example, Hong Kong experienced a radical economic reform in the 1960s, adopting pro-market institutions and policies. Chile has had substantial changes in the aftermath of Allende's administration in the 1970s, initiated under the dictatorship of Pinochet and continued during the democratic years. Peru, as we speak, is also improving the quality of its institutions, meanwhile Venezuela's institutional quality has been deteriorating. Some of the countries transitioning from the former Soviet Union (e.g., Estonia, Georgia, Poland) have also witnessed a profound institutional transformation.

9. Glaeser *et al.* (2004), who challenge the institutional view of development and particularly the findings of Acemoglu *et al.* (2001) in providing evidence that human capital is a more robust growth determinant than institutions, argue that "it is far from clear that what the Europeans brought with them when they settled is limited government. It seems at least as plausible that what they brought with them is themselves, and therefore their know-how and human capital" (p. 289) Acemoglu, Gallego, and Robinson (2014) respond: "The historical evidence suggests that the exact opposite of this claim may be true: The conquistadors who colonized South America were more educated than the British and other Europeans who colonized North America" (pp. 883–884). The ensuing paragraphs provide detailed information on the human capital levels of conquistadors versus early English settlers.

10. The above arguments suggest that identity of the colonizer better captures the notion of a colonial British institutional advantage than legal origin, given that identity of the colonizer may have influenced development through channels other than just the legal system. Additionally, the British may have done a number of other things differently than the other colonizers that are not reflected in institutions but encouraged growth, such as drain swamps, teach people English, build railroads, and encourage Protestant missionaries who taught literacy and temperance. To control for such effects, we include measures of human capital and geography as conditioning variables in our main empirical specifications.

11. Auer (2013) argues that by failing to account for the influence that geographic endowments may have exerted on colonization strategy, Acemoglu *et al.* (2001) overestimate the influence of institutions on economic growth, while La Porta *et al.* (1999) underestimate the importance of colonial-transplanted legal origins on the development of institutions.

12. Executive constraints are part of the Center for Systemic Peace's Polity IV dataset. Countries receive a categorical score between 1 and 7 that increases as the political executive's decision-making capacity is constrained by the political system's checks and balances. Initial constraint is the average score over the first 10 years for which data are available for a given country, which serves as a proxy for the first decade of independence.

13. Because EFW is comprised of measures of both economic institutions and policies, it invites a criticism of Glaeser *et al.* (2004), namely that policies, which are susceptible to short-term manipulation by policymakers, may be better viewed as outcome variables than deep roots of development. While this suggests the possibility of reverse causality between EFW and economic development, motivating the need for valid IVs, it is also consistent with a salient recommendation by Glaeser *et al.*, who argue that "our results suggest that the current measurement strategies have conceptual flaws, and that researchers would do better focusing on actual laws, rules, and compliance procedures that could be manipulated by a policy maker to assess what works. . . More generally, it might be less profitable to look for "deep" factors explaining economic development for policies favoring human and physical capital accumulation" (p. 298). Moreover, institutions and policies are to some degree inherently intertwined and difficult to distinguish because both impose restrictions on behavior, and the EFW index is designed to capture institutions and policies consistent with the protection of private property, or rules that constrain government and elite expropriation, as well as those that regulate transactions between the state and citizens. Institutions of this nature have been shown by Acemoglu and Johnson (2005) to be more important for development than contractual institutions—rules that support private contracting such as legal formalism and procedural complexity, which mainly govern relations between citizens. EFW can therefore be construed as a cluster of property rights institutions and policies, also known as vertical institutions.

14. For robustness, we also use three alternative colonizer classification datasets: (i) those of French research center CEPII; (ii) classifications employed by Acemoglu *et al.* (2001); and (iii) the legal origin classifications of La Porta *et al.* (1999). These results are included in Table 5.

15. In a series of unpublished papers, Albouy and Acemoglu *et al.*, debate some of the criticisms that Albouy raised concerning the settler mortality rate data used by Acemoglu *et al.* (2001). The most notable criticisms included: (1) more than half of the countries in their sample are assigned mortality rates from other countries based on conjectures by the authors of which countries had similar disease environments; (2) the mortality rates do not reflect actual European settlers but are instead based on incomparable populations of laborers, bishops, and soldiers, depending on data availability and circumstances; and (3) the relationship between mortality rates and institutions is driven by outliers. See, for example, Acemoglu, Johnson, and Robinson (2011) for a summary of the back and forth between the authors. It is worth noting that Albouy (2012) appears to have retreated from the outlier criticism in the final published version of his comments, particularly after Acemoglu *et al.* (2011) showed that after imposing an upper bound on the settler mortality rate data to limit the effect of outliers, their results were strengthened. To the best of our knowledge, the 1500 population density data have not been subject to such poignant criticisms. The adjustment of the population density that we apply imposes an upper bound on it to limit the effect of outliers.

16. Using alternative transformations that set x_{max} equal to 0.5 or 0.75 standard deviations above the mean does not change the results, as indicated in Table 5.

17. As pointed out by Carstensen and Gundlach (2006), temperature, rainfall, and latitude are climatic factors relevant for the prevalence of malaria. Given that the likely impact of these climatic factors on economic development is via their influence on the disease environment, conditioning on Malaria should adequately control for any such effects.

18. Results not reported for space, but in regressions of GDP on EFW and the analogous instruments, EFW has a coefficient ranging from 0.854 to 0.913 for models 1–4. The 2SLS estimates of EFW in models 1 and 2 are

1.017 and 0.357, which are noticeably larger and smaller, respectively than the corresponding OLS estimates. Theoretically, OLS estimates are larger than IV estimates in the presence of reverse causality bias. The opposite is typical in the economic growth literature. [Acemoglu et al. \(2014\)](#) suggest that this may be attributable to measurement error of institutions, which induces the OLS estimator attenuation bias. Moreover, they suggest that institutions are typically measured with greater error than human capital and as such, OLS models are mis-specified.

19. The robust test for weak instruments extends the Stock and Yogo weak instrument test by allowing for errors that are not conditionally homoscedastic and serially correlated in the case of a single endogenous regressor.

20. The CLR and LM tests are only valid with multiple instruments ([Finlay & Magnusson, 2009](#)). As such, results not available for models 1 and 2.

21. [Brambor, Clark, and Golder \(2005\)](#) indicate that correctly specified interaction models include both main effect terms individually (UK and PD1500 in our case) as well as the interaction term (PD1500×UK). They describe two justifications for omitting one of the main effect terms. First, if there is no strong theoretical expectation that the omitted variable (UK) has no effect on the dependent variable (EFW) in the absence of the other interactive term (PD1500). We rescale the raw population density data as a continuous unit interval, with zero and one representing the worst and best settlement conditions possible. When conditions were highly unfavorable for settlement (PD1500 = 0), highly extractive institutions were established regardless of the colonizer. No discernible differential impact of English colonization relative to other colonizers is predicted when PD 1500 = 0. Second, a main effect term can be omitted if the “fully specified model” is estimated and the partial effect of the omitted term (UK) is found to be zero. UK is not statistically significant in the first-stage in model 4 of [Table 3](#), nor is it significant statistically (p-value of 0.934) when added as an instrument to the baseline model (model 7 of [Table 3](#)). Meanwhile, the other main effect term (PD1500) and the interaction term (PD1500 × UK) have p-values of 0.114 and 0.087, respectively, and are jointly significant at the 1% level. These results are omitted for space but available upon request. As such, both criteria specified by [Brambor et al.](#), for omitting a main effect term (UK) are satisfied here.

22. The first-stage partial effect with respect to PD1500 in this parsimonious specification is $0.64 + 0.76 \times \text{UK}$. This implies that the effect is 0.64 when UK = 0 and 1.40 when UK = 1.

23. Validity of IV(s) requires both relevancy and exogeneity. Relevancy relates to correlation between the endogenous variable and the IV(s). For our baseline sample, the correlations between EFW and PD1500 and PD1500×UK are 0.39 and 0.44, respectively. Exogeneity implies that IV(s) impacts the dependent variable (i.e., economic development) only through the endogenous variable (i.e., EFW). Exogeneity, also known as the exclusion restriction, requires orthogonality between the IVs and the

second-stage error term. Omission of a variable that is correlated with the IVs that may also impact the dependent variable violates the exclusion restriction. In our case, geography potentially influences both our IVs and development such that failing to control for geography would potentially introduce a correlation between the IVs and the second-stage error term, violating the exclusion restriction. Because we are controlling for other potential channels of influence of the IVs on development (i.e., geography), PD1500 and PD1500×UK are conditionally exogenous. There is, however, a very weak correlation between the three baseline geography variables (lcl100km, malecol, dmm) and the IVs, as the absolute value of the bivariate correlations are all less than 0.175.

24. For the interested reader, gold share is statistically significant at the 1% level in both stages of the model, entering negatively in the first-stage and positively in the second. Iron is positive and statistically significant at the 1% level in the first stage and oil reserves negative and statistically significant at the 1% level in the second stage. The remaining point estimates for the natural resource variables are insignificant statistically.

25. The temperature variables are: average, minimum, and monthly high and low temperatures. The humidity variables are morning and afternoon minimum and maximum humidity. The soil variables are steppe (low latitude), desert (low latitude), steppe (middle latitude), desert (middle latitude), dry steppe, wasteland, desert dry winter, and highland.

26. There is also reason to believe that human capital is not an ultimate cause of growth. [North and Thomas \(1973\)](#) argue that the typical macroeconomic factors of production—education, TFP, and physical capital—are not causes of growth; they are the growth. [Galor \(2011\)](#) and [Galor, Moav, and Vollrath \(2009\)](#) show that human capital impacts economic development indirectly by promoting better institutions. [Acemoglu et al. \(2014\)](#) find that after allowing for historical differences determining human capital and institutions, the latter exerts a robust first order impact on development whereas, human capital estimates are either not significant or of a small magnitude. [Faria et al. \(2016\)](#) find similar results in a horse race between human capital and EFW.

27. In growth regressions that use both school attainment (years of education) and school achievement (cog skills), (the latter from international standardized tests on math, language, and science), years of education loses significance as a predictor of growth in specifications that allow for cognitive skills.

28. For comparison, CogSkills is also fairly well correlated with EFW ($\rho = 0.61$), but there is virtually no correlation between it and PD1500 ($\rho = 0.01$).

29. The set of regional fixed effects includes dummy variables for the East Asia and Pacific, Latin America, Sub-Saharan Africa, South Asia, and Middle East and North Africa regions, as defined by the World Bank.

30. F(Effective) is less than the critical value for the τ threshold of 30%.

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