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Historical Prevalence of Infectious Diseases, Cultural Values, and the Origins of Economic Institutions

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Abstract

It is widely believed that economic institutions such as competitive markets, the banking system, and the structure of property rights are essential for economic development. But why economic institutions vary across countries and what are their deep origins is still a question that is widely debated in the developmental economics literature. In this study, we provide an empirical test for the provocative hypothesis that the prevalence of infectious diseases influenced the formation of personality traits, cultural values, and even morality at the regional level (the so called Parasite-Stress Theory of Values and Sociality), which then shaped economic institutions across countries. Using the prevalence of pathogens as an instrument for cultural traits such as individualism, we show in a two-stage least squares analysis that various economic institutions, measured by different areas of the index of Economic Freedom by the Heritage Foundation, have their deep origins in the historical prevalence of infectious diseases across countries. Our causal identification strategy suggests that cultural values affect economic institutions even after controlling for a number of confounding variables, geographic controls, and for different sub-samples of countries. We further show that the results are robust to four alternative measures of economic and political institutions.

Keywords: Economic Freedom, Institutions, Pathogens, Parasite-Stress.

JEL Classification Numbers: I0, J24, I21, I31.

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1 Introduction

What makes some countries rich and others poor? In 1776, Adam Smith (1776), widely considered the father of modern economic thought, asked this question in his celebrated book “An Inquiry into the Nature and Causes of the Wealth of Nations.” More than two hundred years later, this question still remains one of the central topics in the developmental economics literature.

Smith’s theory of growth inspired much of the earlier neoclassical growth models, which explained cross-country differences in economic performance in terms of different paths of factor accumulations (Solow, 1956), preferences (Cass, 1965; Koopmans, 1965), externalities associated with physical and human capital accumulation (Romer, 1986; Lucas, 1988), or investment in new technologies (Romer, 1990). Yet, many of these determinants of economic growth such as innovation, education, or capital accumulation are what most economists describe as economic growth on the first place (Acemoglu et al., 2005). Thus, more recent papers have emphasized the importance of institutions as a fundamental explanation for economic progress (Baumol, 1996; Acemoglu et al., 2005; Dort et al., 2014; Gwartney et al., 2006)

Institutions, as North (1990) defines them, are “the rules of the game in a society, or, more formally, ... the humanly devised constraints that shape human interaction.” In that sense, they “structure incentives in human exchange, whether political, social, or economic.” Economic institutions such as competitive markets, the banking system, or the structure of property rights are especially important for economic progress because they determine the relative rewards from different productive and non-productive economic activities. In this way, they fundamentally influence how society invests in physical and human capital as well as technology, and organizes its production.¹

Despite the growing body of empirical research that shows that institutions have a strong influence on economic development, it is by now also clear that high quality institutions are as much a result of economic development as they are the cause of it, i.e., they are

¹Baumol (1996), for example, suggests that the allocation of entrepreneurial talent — e.g., to productive activities such as technological innovation or unproductive ones such as rent seeking — is largely determined by the relative rewards defined by economic institutions.

endogenous. Better institutions can explain why some countries are richer than others, but richer countries are also the type of places where citizens have the resources and voice to demand better institutions and influence the distribution of political and economic power (Rodrik, 2004; Acemoglu et al., 2005). But how economic institutions evolved on the first place and why they vary across countries is still hotly debated in the field of economic growth and development. Previous theories have explained the variation in economic institutions with differences in ideology (Piketty, 1999), geography (Levine, 2005), settler mortality (Acemoglu et al., 2001, 2005), ethnic fractionalization (Easterly and Levine, 1997), legal origins (La Porta et al., 2000), and social conflict (North, 1981).

In this paper, we offer another possible explanation for the deep origins of economic institutions – the historical prevalence of infectious diseases. Specifically, we contribute to the literature by empirically testing the provocative hypothesis that regional variation in infectious diseases influenced cultural traits such as xenophobia, openness, and ethnocentrism, which led to the formation of social values associated with collectivism-individualism (Fincher et al., 2008), which, in the next stage, shaped economic institutions at the regional level. In that sense, our theory relies on a causal mechanism that is rooted in evolutionary theory and is based on a rich literature in psychology and biology that has identified the instrument a priori (Thornhill and Fincher, 2014).

Our analysis suggests that individualistic values are strongly and positively correlated with economic freedom. In our 2SLS analysis, we further show that parasitic stress is strongly and negatively correlated with individualistic values, which, in the next stage, are a strong determinant of economic freedom and its various sub-areas. These results hold even when we control for a number of confounding factors such as the current health of nations, geographic dummies, other cultural values, and for different sub-samples of countries. We also show that the findings are robust to four alternative measures of institutional and political institutions including the rule of law, expropriation risk, executive constraints, and a democracy index.

Thus, this paper contributes to the literature on the determinants of economic institutions in three ways. First, while previous studies use settler mortality as an instrument for economic institutions, to the best of our knowledge, we are the first to test if the historical

prevalence of infectious diseases, which influenced mortality rates, shaped the formation of economic institutions through the channel of collective cultural values. In this way, our story enriches previous theories and provides a deeper understanding of the processes that lead to the formation of different types of economic institutions. Second, we provide evidence for a number of economic institutions – from the structure of property rights and corruption to financial and labour freedoms. Finally, we advance the literature methodologically by suggesting a potential new instrument that can be used to examine the effect of a wide range of cultural values (e.g., social trust, religiosity, ethnolinguistic fractionalization) on numerous economic, social, and political outcomes. This is important since many recent studies document a strong correlation between institutions and cultural values such as social trust ([Berggren and Nilsson, 2013](#)), morality ([James, 2015](#)) or attitudes toward fertility and childbearing ([Basso, 2015](#)), to mention a few.

2 The Parasite-Stress Theory of Values

Parasitic (infectious=pathogenic) stress is the most important cause of evolutionary change, accounting for more evolutionary action across the human genome than any other environmental factor including climate, geography, diet or subsistence strategies ([Fumagalli et al., 2011](#)). In human evolutionary history, infectious diseases were a major source of morbidity and thus of natural selection ([Volk and Atkinson, 2013](#); [Wolfe et al., 2007](#)). There are two ways in which humans adapted to pathogenic stress. The first one is the physiological immune system at the cellular level. The second one is the adaptation of the behavioral immune system, which consisted of changes in psychology and behavior that helped humans avoid infectious diseases and manage their contagion ([Schaller and Duncan, 2007](#); [Fincher and Thornhill, 2008](#)).² Examples of adaptation in the behavioral immune system include adaptive feelings (e.g., disgust), cognition (e.g., worry about contagion), and values about the behavior towards out-group and in-group members (e.g., prejudice against people who are perceived unfamiliar, unhealthy, or unclean) ([Thornhill and Fincher, 2014](#)).

²A growing body of empirical evidence suggests that selection pressures by pathogens have had an influence on the psychology and social behavior of many species, including primates and humans ([Møller et al., 1993](#); [Loehle, 1995](#)).

Xenophobia, ethnocentrism, and other specific form of interpersonal prejudice, for instance, appear to be at least to some extent a result from these pathogen-avoidance strategies. One line of evidence comes from lab experiments and suggests that individuals who perceive themselves to be more exposed to infectious diseases are more likely to develop traits that are associated with avoidance of outsiders. For example, [Faulkner et al. \(2004\)](#) provide experimental evidence from a random sample of undergraduate students at the University of British Columbia and document that participants who are shown slideshows “that conveyed the ease with which bacteria and germs are transmitted in everyday life” tend to respond more negatively to questions regarding potential outsiders such as immigrants. In a number of experiments, [Navarrete and Fessler \(2006\)](#) furthermore suggest that ethnocentric attitudes increase as a function of perceived disease vulnerability. In another experiment, they show that in-group attraction increases as a function of disgust sensitivity, both when measured as an individual difference variable and when experimentally primed. Experiments by [Park et al. \(2007\)](#) even suggest that people who are chronically concerned about pathogen transmission have more negative attitudes toward obese people, with this effect especially pronounced following a visual exposure to obese individuals.

There is by now convincing evidence that host-parasite arm races were geographically localized ([Fincher et al., 2008](#)). One implication of this phenomenon is that host defense works most effectively against local parasite genotypes and less so against those evolving in out-group hosts. Thus, particular forms of social behavior that serve as pathogen-avoidance strategies, and the psychological mechanisms underlying these behaviors, are likely to characterize not just individual differences, but also cultural populations that have been exposed historically to greater prevalence of infectious diseases. Prior research, for example, suggest that cross-country differences in pathogen prevalence successfully predict specific kinds of cultural differences such as parenting practices ([Quinlan, 2007](#)), food preparation ([Sherman and Billing, 1999](#)), marriage structures [Low \(1990\)](#), and mate preferences ([Gangestad et al., 2006](#)).

In this paper, we focus on the multi-faceted value system of individualism and collectivism (I-C) for two reasons. First, previous studies suggest that the I-C dimension is the most significant driver of cultural differences across societies ([Heine and Ruby, 2010](#); [Oy-](#)

serman et al., 2002; Markus and Kitayama, 1991). It is also most commonly used in the the social sciences to describe cross-country cultural differences (Oyserman et al., 2002; Hofstede and Hofstede, 2001). Second, emerging research in business and economics suggests that, among a variety of cultural dimensions, the individualism-collectivism dimension, based on Hofstede and Hofstede (2001) data, is the most important cultural dimension that has the strongest and most robust and significant effect of culture on long-run economic growth and innovation (Gorodnichenko and Roland, 2011). Furthermore, the authors argue that other cultural dimensions , such as power distance, that have significant effect are generally strongly correlated with individualism and convey similar information. Zheng et al. (2013) provide further empirical evidence that the I-C cleavage, among others, is the most strongly correlated cultural dimension with corruption. Studies in cross-cultural psychology support this observation and suggest that collectivism and conformity mediate the relationship between pathogens and economic outcomes such as innovation (Murray, 2014).

Although research in this area is still in its infancy, there is intitial evidence that the historical prevalence of infectious diseases predict cross-sectional differences in individualism-collectivism. The so called parasite-stress theory of values (PSTV), which was first introduced by Thornhill and Fincher (2014), suggests that regions with high prevalence of infectious diseases (parasitic stress) are more likely to favor the natural selection of personality traits such as xenophobia, ethnocentrism, and, more generally, values that disregard the rights, liberties, and well-being of out-group members, including those at the lower end of the socio-economic ladder.³ Societies with high prevalence of infectious diseases would then be more likely to develop cultural values and ideologies associated with collectivist values (Fincher et al., 2008) that view negatively ideas that threaten the established social norms and legitimize authoritarian social outcomes (Thornhill et al., 2009). From an evolutionary standpoint, this strategy played an important role to prevent the spread of infectious diseases.

On the other hand, low parasite stress promotes the development of a value system associated with tolerance, validity, and trust of out-groups (Fincher et al., 2008). Societies

³Xenophobia, for example, reduces economic transactions between groups and across-regions, and neophobia rewards conformity and obedience of traditional values and discourages new ideas. As a consequence, corruption, in-group favoritism, and authoritarianism are more likely social outcomes (Thornhill et al., 2009)

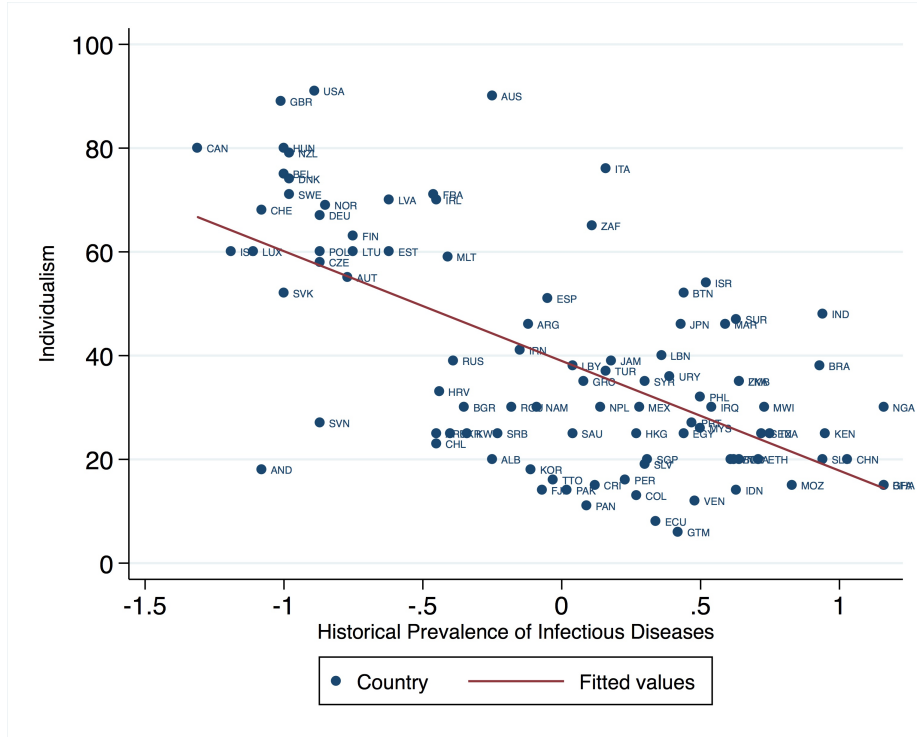


Figure 1: Individualism and Historical Prevalence of Infectious Diseases

with low parasite stress develop values that favor inclusiveness and emphasize the rights and freedoms not only of the ruling majority, but also of those with differences in social class, religion, or ethnicity. This ideology is associated with openness to new ideas, even if the ideas come from out-groups. In evolutionary history, this strategy was successful because it provided benefits by encouraging the free exchange of goods and services, promoting specialization of labor, and increasing the formation of social alliances for cooperation with out-groups that promoted the diffusion of new knowledge. Figure 1 shows the strong correlation between the historical prevalence of infectious diseases and individualistic values ($r = -.63$; $p = 0.000$).

As [Fincher et al. \(2008\)](#) argue, there are at least two defining features of collectivism (versus individualism) that provide logical basis for the PSTV hypothesis. First, collectivist values make a sharp distinction between in-groups and out-groups while the in- and out-group distinction is much weaker in individualistic cultures ([Fincher et al., 2008](#); [Gelfand et al., 2004](#)). One consequence is that collectivist are more cautious and anxious when interacting with out-group members such as foreigners or minorities ([Sagiv and Schwartz,](#)

1995). Such xenophobic attitudes can help in-group members avoid exposure to novel pathogens. Second, and equally important, is the distinction these two values systems place on achievement, conformity, and tolerance for deviance. Collectivism encourages conformity and discourages individuals from standing out from the group. Variety of restrictive social norms undermine individual achievement in favor of solidarity, the status quo, and traditional order (Oishi et al., 1998; Sagiv and Schwartz, 1995). Many of these specific social norms such as non-tolerance for deviance serve as a pathogen-avoidance strategy. On the other hand, more individualism values such as non-conformity and deviance from the status quo may pose contagion risk to self and others. Overall, collectivist values may serve as a successful strategy to contain the spread of diseases and prevent from the risks posed by pathogens.

Previous studies, for example, have successfully linked the prevalence of infectious diseases to individualistic-collectivistic values. Cashdan and Steele (2013), using pathogen and ethnographic data for 186 cultures, show that societies in areas with rampant levels of infectious diseases are more likely to socialize children toward collectivist values. van Leeuwen et al. (2012) show that, using global data, the historical prevalence of infectious diseases robustly predicts cultural practices that belong to collectivist (in-group) foundation even after controlling for the level of economic development and political regimes. Similarly, Fincher et al. (2008) show that the regional prevalence of pathogens has a strong positive correlation with collectivism and negative correlation with individualism. Murray et al. (2011) present four empirical tests in which they find that the origins of cultural conformity reflect historical variability in the prevalence of disease-causing pathogens. In a separate paper, Murray et al. (2013) provide further evidence that parasite prevalence predicts authoritarianism. An indirect evidence for the hypothesis that the prevalence of infectious diseases is linked to the cultural dimension of individualism-collectivism comes from the observation that equatorial regions, where infectious diseases tend to be more prevalent (Guernier et al., 2004), also tend to have more collectivist values than societies at higher latitudes (Hofstede and Hofstede, 2001).

Our hypothesis, then, is that high parasite stress will be conducive to the development of cultural values that favor economic institutions that are inconsistent with the principles of

economic freedom [e.g., personal choice, voluntary exchange, freedom to enter markets and compete, and security of privately owned property (Gwartney et al., 2014)]. Low parasite stress societies, on the other hand, will be more likely to promote the natural selection of personality traits that favor more inclusive institutions that are characterized by respect for the rights, liberties, and well-being of all members of society. We demonstrate this mechanism with a simple schematic below:

- (1) High Parasitic (= infectious = pathogenic) stress \Rightarrow
- (2) Cultural Values (e.g., xenophobia, ethnocentrism, collectivism) \Rightarrow
- (3) Economic Institutions (protection of private property, free markets)

To test our hypothesis, we use a two stage least squares (2SLS) model in which the prevalence of infectious diseases is used as a source of regional exogenous variation for cultural values, which then predict differences in economic institutions across countries. We proxy cultural values by a multifaceted value system of individualism-collectivism. Collectivism is characterized by strong values placed on tradition and conformity while individualism is defined by greater tolerance for deviations from the status quo (Oishi et al., 1998). As a measure of economic institutions we use the index of Economic Freedom (EF) published by the Heritage Foundation and its various sub-areas such as rule of law and regulatory efficiency. Since the index of EF is a complex composite indicator that has ten sub-areas, we further investigate how different economic institutions are affected by the historical prevalence of pathogenic stress.

3 Data

In this section, we provide a brief description of the main variables used in this study and discuss our main data sources. Table 1 provides descriptions, sources, and summary statistics for the main variables used in this study.

3.1 Economic Freedom

The dependent variable of interest is the degree to which a country's institutions and policies are consistent with the concept of economic freedom, which is based on the principles of personal choice, voluntary exchange, freedom to enter markets and compete, and security of privately owned property. We use the 2014 Index of Economic Freedom (EF) published by the Wall Street Journal and the Heritage Foundation. EF is measured using 10 quantitative and qualitative factors, which are grouped into four broader categories, or pillars, of economic freedom: (1) Rule of Law (property rights, freedom from corruption), (2) Limited Government (fiscal freedom, government spending), (3) Regulatory Efficiency (business freedom, labor freedom, monetary freedom), and (4) Open Markets (trade freedom, investment freedom, financial freedom). Overall, the index of EF measures these 10 different freedoms in 186 countries. Each one of these areas is rated on a scale of 0-100 that reflects the distribution of the underlying data. A country's level of economic freedom is then calculated by averaging these ten economic freedoms, with equal weight given to each freedom. The data and complete methodology are freely available online at <http://www.heritage.org/index/>

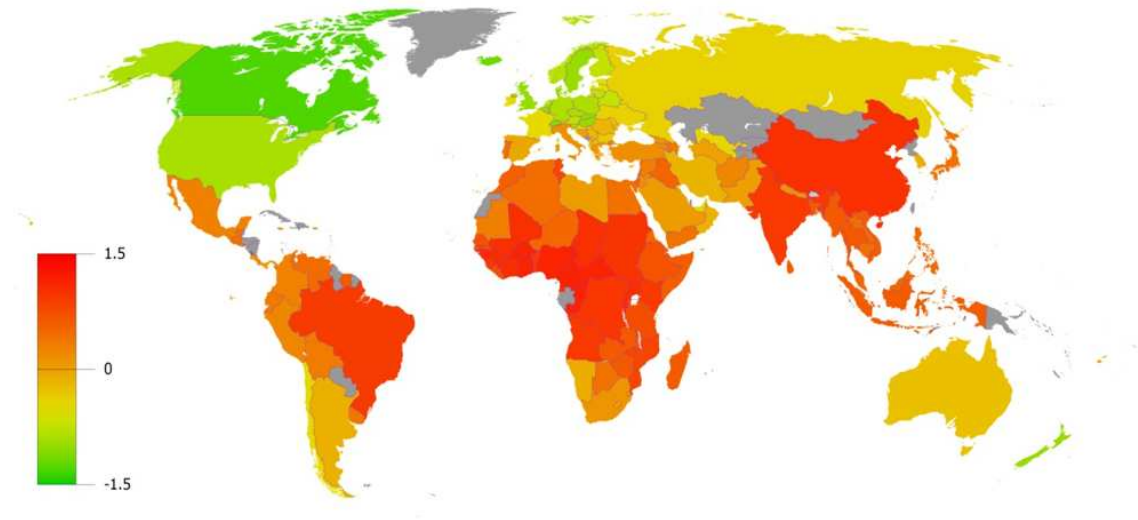


Figure 2: Historical Prevalence of Infectious Diseases

3.2 Historical Prevalence of Infectious Diseases

Our main independent variable is the historical prevalence of infectious diseases from [Murray and Schaller \(2010\)](#). In their work, the authors create an index that assesses the intensity of the historical prevalence of disease-causing pathogens for more than 155 countries. The index is based on the prevalence of nine diseases that are destructive to the human reproductive health: leishmanias, trypanosomes, leprosy, schistosomes, filariae, tuberculosis, malaria, dengue, and typhus. In estimating their historical pathogen prevalence index, the authors use epidemiological maps of infectious diseases before the introduction of modern medicine that are presented in [Simmons et al. \(1944\)](#). Therefore, [Murray and Schaller \(2010\)](#) dataset provides robust deep-rooted measures of the historical prevalence of infectious diseases. Previous studies on the relationship between cultural values and economic growth have used this index as an instrument for the I-C cleavage ([Gorodnichenko and Roland, 2016](#)). A number of studies in biology and evolutionary and cross-cultural psychology have also used this variable successfully [for a review, please see [Thornhill and Fincher \(2014\)](#)].

The pathogen scores for each one of these diseases are then standardized by converting them to z scores. The composite pathogen prevalence index is estimated as the average of the individual disease z-scores included in the index. Thus, positive values for each country indicate above average disease prevalence while negative values denote that pathogen prevalence is below the mean. The authors show that their index is strongly correlated with a similar index of disease prevalence by [Gangestad and Buss \(1993\)](#). Although the index by [Gangestad and Buss \(1993\)](#) is estimated for only 29 countries, the correlation with the [Murray and Schaller \(2010\)](#) index is 0.87. Fig. 2 shows a heat map of the historical prevalence of infectious diseases for 155 countries.

3.3 Individualism-Collectivism

Contemporary research on the economic and political consequences of individualism-collectivism stems largely from [Hofstede \(1980\)](#) who carried out one of the most comprehensive studies of how values in the workplace are shaped by culture. In this and follow up

work (Hofstede and Hofstede, 2001), Hofstede conducted surveys with more than 100,000 IBM employees worldwide. Based on responses for 14 “work goal” questions, he estimated national Individualism-Collectivism (IC) scores for approximately 50 nations. He defined individualistic societies as those “in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family.” Contrary, collectivism is attributed to “societies in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people’s lifetime continue to protect them in exchange for unquestioning loyalty” (Hofstede et al., 1991, p.51).

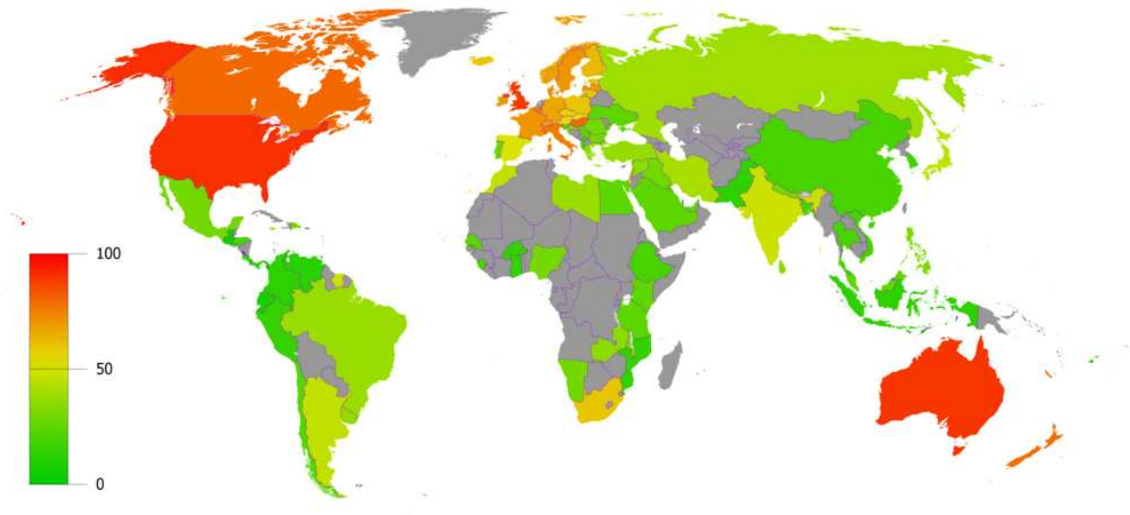


Figure 3: Individualism-Collectivism Values

The related literature has successfully linked individualism/collectivism with social capital (Allik and Realo, 2004), economic development (Ball, 2001) and antecedents of long run economic growth (Gorodnichenko and Roland, 2011). In this study, we rely on the most recently updated dataset of IC scores for more than 100 countries from Hofstede et al. (1991). The IC scores are standardized and rescaled from 0 (most collectivistic) and 100 (most individualistic). Figure 3 shows a heat map for IC scores around the world.

3.4 Other Controls

To address potential omitted variable bias we add a vector of control variables that have previously been found to be correlated with economic freedom. These additional controls

include GDP per capita, legal origins, and various geographical controls (Rodrik, 2004; Acemoglu et al., 2005; Piketty, 1999; Levine, 2005; La Porta et al., 2000; Easterly, 2007; Johnson, 1998; Ashby and Sobel, 2008; Nattinger and Hall, 2012). Descriptive statistics are presented in Table 1.

[Table 1 around here]

4 Empirical Results

In this section we report our empirical estimates. First, we present some descriptive evidence using ordinary least squares (OLS) models in which we estimate the relationship between economic institutions and cultural values. Next, we repeat our analysis using a two stage least squares analysis (2SLS) in which we use pathogens as an instrument for cultural values of individualism-collectivism at the country level.

4.1 Cultural Values and Economic Institutions: OLS Estimates

We start our analysis by estimating reduced form cross-country OLS equations of the following form:

$$EF_c = \mu + \alpha Individualism_c + Controls_c + \epsilon_c \quad (1)$$

where EF_c represents the index of EF, $Individualism_c$ represents our main variable of interest, which captures cultural values associated with greater tolerance for deviation from the status quo and loose family ties where everyone is expected to look after herself or himself, and ϵ_c is a random error term. The coefficient of interest in this section is α , the effect of individualism on economic freedom.

[Table 2 around here]

The results from this exercise are reported in Table 2. Column (1) presents a parsimonious model in which we use individualism as the only regressor for economic freedom and find a strong positive correlation between the two—more individualistic societies are

more likely to have institutions consistent with the principles of economic freedom. Figure 4 shows this relationship for our base sample of 95 countries. The R-squared in the regression of column 1 suggests that individualism alone explains approximately 22 percent of the variation in economic freedom. If causal, the estimated coefficient on individualism suggests that one standard deviation increase in the individualism index is associated with close to one half standard deviation increase in the index of EF. The results remain unchanged qualitatively when we add additional controls for legal origins (column 2) latitude (column 3), log of GDP per capita (column 4), and ethnolinguistic fractionalization (column 5). It is important to note that while the variable on individualism does not change qualitatively, it drops more than a half when we control for logged GDP per capita. This decrease can also be observed in our 2SLS analysis later. This quantitative change of the coefficients in the text show the importance of GDP in explaining the variation in economic institutions. Since GDP is highly endogenous itself, it can serve as a catch-all variable.

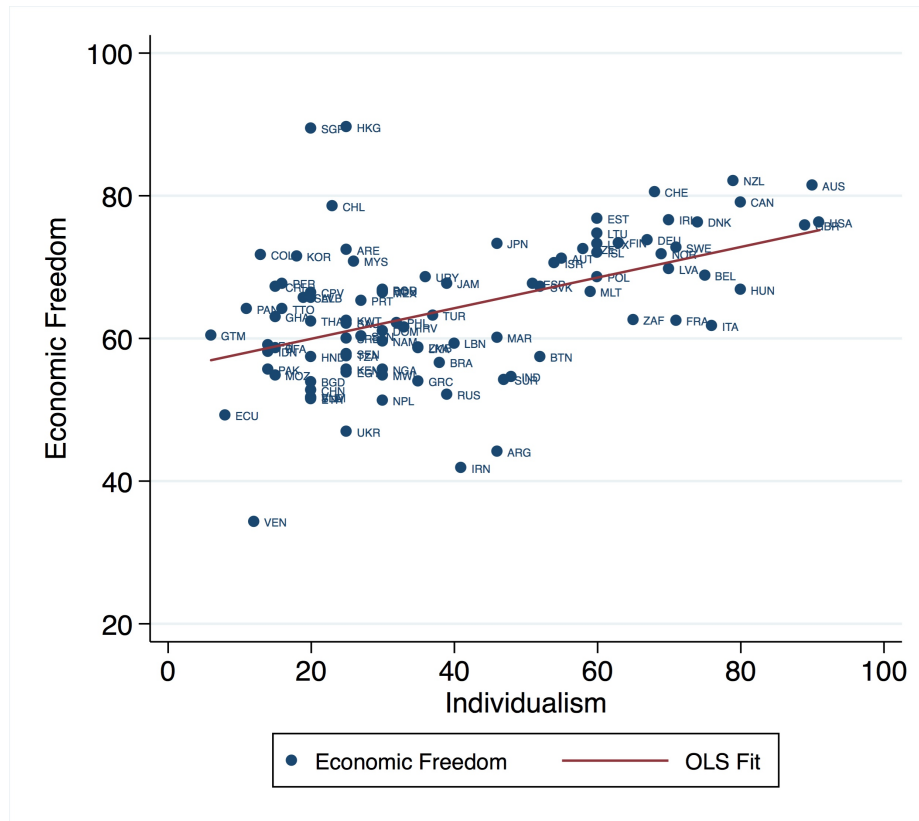


Figure 4: Economic Freedom and Individualism

Overall, the results in Table 2 show a strong correlation between cultural values of individualism and economic institutions. However, these results should not be interpreted as casual for variety of important reasons. For example, countries with higher level of economic freedom naturally promote economic and social institutions that emphasize more individualistic values. In such societies people also have more opportunities to succeed on their own and it might be more natural for individualistic values to develop. More importantly, however, there could be many important omitted variables that are correlated with both individualism and economic freedom. Thus, the analysis introduces a positive bias which can be solved if we had an instrument for individualism. Such an instrument should be a strong determinant of cultural values but have no direct effect on economic institutions.

4.2 Two Stage Least Squares Regressions

In this section, we use the historical prevalence of infectious diseases as an instrument for cultural values of individualism, which then predict economic freedom in the second stage. Section 2 provides an overview of the Parasite-Stress Theory of Values, which suggests that the historical prevalence of infectious diseases can influence economic institutions but through the channel of cultural values. It is also highly unlikely that the level of economic freedom today will have an effect on the prevalence of infectious diseases in the past. The exclusion restriction implied by our instrumental variable estimation is that, conditional on other controls in our model, the historical prevalence of infectious disease has no effect on economic institutions today other than its effect through the individualism-collectivism dimension of cultural values. There are two major concerns here. First, it is possible that pathogens could be correlated with the current level of health of nations which can have a direct effect on economic institutions. It is also likely that pathogens may affect other cultural values which can also influence the development of economic institutions. As we show later in our analysis, however, even when we control for the current level of the health of nations and five additional cultural dimensions, individualism is still significantly and positively correlated with economic institutions. This seems to support the findings of a number of previous studies described in section 2.

Equations (2) and (3) describe the first and second-stages of our model, where $Controls_c$ is a set of control variables such as legal origins, geography, and log GDP per capita that potentially impact economic institutions, \widehat{Values}_c is the predicted value for the individualism index from the first stage estimates.

$$Values_c = \beta Pathogens_c + Controls_c + \epsilon_c \quad (2)$$

$$\sum EFW_c = \alpha \widehat{Values}_c + Controls_c + \nu_c \quad (3)$$

The 2SLS results are reported in Table 3. In these regressions, individualism is treated as an endogenous correlate of economic freedom and instrumented with the historical prevalence of infectious diseases, which provide exogenous variation for cultural values. Panel A of Table 3 shows the second stage regression estimates while Panel B provides the first stage results. In all models we find evidence that supports our hypothesis: pathogens are significantly and negatively correlated with individualistic values in the first stage, which then are a strong and significant determinant of economic freedom in the second stage.

[Table 3 around here]

Column (1) shows the results for a bivariate regression where only the instrumented individualism index is included on the right hand side. As before, individualism is statistically significantly and positively correlated with economic freedom. If causal, the results suggest that one standard deviation increase in the individualism index increases overall economic freedom by close to one standard deviation. Similar to the OLS results in Table 2, we next add dummy variables for legal origins in column 2. The estimates for the instrumented individualism index do not change, while majority of the legal origins dummy variables are statistically insignificant. Columns (3) and (4) further include two important antecedents of economic institutions to the vector of control variables: latitude and the log of GDP per capita. The IC index remains statistically significant as well as the pathogens index in the first stage, which is a strong predictor of individualistic values. Finally, in column (5) we control for ethnolinguistic fractionalization and find that our results remain unchanged

qualitatively.

At the bottom of Table 3, we report the IV F-test statistic for the relevance of the instruments. In the case of a single instrument and a single endogenous regressor, the t-value of the instrument should be greater than 3.2, i.e., the rule of thumb is that the F-statistic of a joint test whether all excluded instruments are significant should be greater than 10. This is the case in all five models, which provides confidence for the choice of instrument in our study.

4.3 Decomposing the Index of Economic Freedom

Since the index of Economic Freedom is a complex composite indicator, in this section we re-estimated our main model from Table 3 (column 4) to examine the effect of individualism on the main sub-components of the index: property rights, freedom from corruption, fiscal freedom, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom. We report these results in Table 4. In most instances, individualism is strongly and positively correlated with the various economic freedom sub-areas. The only notable exception is the coefficient on individualism in column 3, which is negatively correlated with fiscal freedom. This is a puzzling result since more individualistic societies should, in theory, prefer smaller government. We furthermore find that individualism has the strongest impact on property rights and corruption, which are two institutions that change slowly over time. Overall, our results are consistent with our findings in the previous section.

[Table 4 around here]

4.4 Robustness with Additional Controls

Next, in Table 5 we test the robustness of our results by re-estimating our main model (Table 3) by including a number of additional and alternative variables in a stepwise fashion. First, we re-estimate our baseline model from Table 3 by using GDP growth as a proxy for successful implementation of economic policies instead of the level of GDP (column 1). Next, we add an additional control for trade openness, which measures the sum of exports

and imports of goods and services measured as a share of gross domestic product (column 2). Since recent studies document the interrelationship between democracy, economic institutions, and growth ([Peev and Mueller, 2012](#)), in column 3, we add an additional control for democracy, which is a simple average of civil rights and political freedoms. In column 4, we add continental/regional dummies for Asia, Europe, Oceania, and North and South America. In the final column 5, we include all variables from the previous regressions. In all regressions, individualism remains strongly correlated with the index of economic freedom and pathogens is negatively and significantly correlated with individualism in the first stage.

[Table 5 around here]

In a similar fashion in Table 6 we add additional controls for life expectancy, share of the population living in tropics, the prevalence of malaria, and early settler mortality. All of these variables have previously been found to be correlated with institutions. For example, [Acemoglu et al. \(2001\)](#) argue that Europeans adopted very different colonization strategies in different colonies based on differences in settler mortality rates. In places where Europeans faced high mortality rates, they were more likely to set up extractive institutions. The two major sources of mortality facing potential settlers were malaria and yellow fever, which accounted for more than 80 percent of European deaths in the tropics ([Curtin, 1989](#)). The results in Table 6 are consistent with our previous findings. Even after controlling for early settler mortality and objective health today proxied by life expectancy, individualism is still positively and strongly correlated with economic freedom. Once we control for all of these additional controls in the same regression (column 6), however, the coefficient on individualism loses its significance, but so do the rest of the variables in our model. Here it is important to note that our sample loses close to two-thirds of its observations. In addition, as could be expected, early settler mortality is highly correlated with pathogens (0.72, $p=0.000$).

[Table 6 around here]

4.5 Robustness with Sub-samples

As another robustness test, we re-estimate our main model (Table 3) for different sub-samples of countries and excluding influential observations. In columns (1) and (2) of Table 7, we drop 3 countries with the highest and lowest levels of EF. Column (3) reports the results when we exclude countries with a population of less than 3 million citizens. In column (4) we remove the countries that are “lying outside” the typical relationship between individualism and economic freedom: Singapore and Luxembourg. We then re-estimate our main model by excluding African (column 5), Asian (column 6) and European (column 7) countries. Again, the results are very similar to our baseline estimates.

[Table 7 around here]

4.6 The Effect of Other Cultural Dimensions

It is likely that the historical prevalence of infectious diseases affected other cultural values, which then influenced the development of economic institutions. In this case, our IV variable, pathogens, will be correlated with the error term in the second stage of our structural model and the estimated coefficients will not reflect the true causal effect of individualism. For example, societies with high level of infectious diseases may be more likely to develop higher power distance relationships, which could be negatively correlated with economic institutions.

Therefore, in Table 8, we first use five additional cultural dimensions from [Hofstede et al. \(1991\)](#)—Power Distance, Masculinity, Uncertainty Avoidance, Long Term Orientation, and Indulgence—as alternative instruments in our model. The footnote in this table describes how these variables are measures and what they mean. The results, which are presented in Table 8, suggest that only the cultural dimension of power distance, which represents the extent to which less powerful members of society accept and expect power to be distributed unequally, is significantly and negatively correlated with economic freedom in addition to individualism. In our sample of countries, however, individualism and power distance are strongly correlated with each other (-0.79 , $p=0.000$), which suggests that they may be capturing similar cultural values. For example, in societies with low power distance, people

demand justification for inequalities of power. Similarly, individualistic societies reward personal achievement with higher social status, but such achievements should be earned. On the other hand, collectivism encourages conformity and discourages individuals from standing out from the group through variety of restrictive social norms that undermine individual achievement in favor of group solidarity, the status quo, and traditional order (Hofstede et al., 1991). In that sense, more collectivist societies embrace more hierarchical structure in which unequal distribution of power may be justified. This finding is similar to Gorodnichenko and Roland (2011) who find that the I-C dimension has the strongest and most robust impact on economic growth while other dimensions such as the power distance one are likely to be strongly correlated and capture similar values.

Once we control for all five cultural values in the same regression (column 7) and close these other cultural channels through which pathogens can possibly affect economic institutions, we still find that individualism is positively and statistically significantly correlated with economic freedom at conventional levels. It is possible, of course, that pathogens may work through other cultural dimensions which are omitted from the analysis and thus our IV violates the exclusion restriction. We believe, however, as most previous studies in cross-cultural psychology do, that the most important cultural dimension in the context of the PSTV is the I-C one. Future studies are likely to provide further empirical tests for the validity of our choice of instrument.

[Table 8 around here]

4.7 Alternative Measures of Economic Institutions

As a final robustness check, we use four alternative measures of economic and political institutions: (1) rule of law index, (2) executive constraints, (3) expropriation risk, and (4) democracy index. The rule of law index comes from the World Bank Worldwide Governance Indicators and captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The index ranges from -2.5 (weak) to 2.5 (strong) governance. The executive constraints variable is

a measure of the extent of institutionalized constraints on the decision makings powers of chief executives and takes values from 1 to 7, with higher values indicating greater extent of institutionalized constraints. This variable was collected from the Polity IV Project. The expropriation risk index measures the risk of "outright confiscation and forced nationalization" of property. This variable ranges from 0 to 7 with higher numbers indicating higher probability of expropriation. Finally, the democracy index ranges from 0 to 6, with higher values indicating a higher degree of institutionalized democracy. The index was created by the Fraser Institute and the data reflects values for 2013.

In all of our estimations, we find that pathogens are strongly correlated with individualistic values, which then predict in an expected way these various measures of economic and political institutions. For example, higher level of individualism is associated with stronger legal system and better protection of private property rights, higher levels of executive constraint, lower risk of expropriation, and higher degree of democracy. These results are consistent with those in Table 2 and provide further confidence in our findings.

[Table 9 around here]

5 Concluding Remarks

It is by now widely accepted that high quality institutions have a strong and positive impact on economic development and can explain the large differences in income per capita across countries. But how economic institutions evolved on the first place and why they vary across countries is still debated in the developmental economics literature. Previous studies explain the variation in economic institutions with differences in ideology (Piketty, 1999), geography (Levine, 2005), settler mortality (Acemoglu et al., 2001, 2005), ethnic fractionalization (Easterly and Levine, 1997), legal origins (La Porta et al., 2000), and social conflict (North, 1981).

In this paper, we contribute to the literature by empirically testing another possible hypothesis for the deep origins of economic institutions, namely, that the historical prevalence of infectious diseases influenced cultural traits such as xenophobia, openness, and ethnocentrism, which then shaped cultural values associated with collectivism (Fincher et al.,

2008), which, in turn, led to the development of economic institutions that are inconsistent with the principles of economic freedom—protection of privately owned property, voluntary exchange, free trade, etc. Our theory relies on a causal mechanism that is rooted in evolutionary theory and is based on a rich literature in psychology and biology that has identified the instrument a priori (Thornhill and Fincher, 2014).

Our findings provide suggestive evidence that parasitic stress is strongly correlated with economic institutions through the channel of cultural values. Specifically, using a 2SLS analysis we show that the historical prevalence of infectious diseases is strongly and significantly correlated with collectivist values, which, in the next stage, are a strong determinant of economic freedom and its various sub-areas. These results hold even when we control for a number of confounding factors such as the current health of nations, numerous geographical controls, other cultural values, and for different sub-samples of countries. They are also robust to four alternative measures of economic and political institutions including the rule of law, expropriation risk, executive constraint, and democracy.

These findings enrich previous theories and provide a deeper understanding of the processes that lead to the formation of different types of economic institutions and advance the literature methodologically by suggesting a potential new instrument that can be used to examine the effect of a wide range of cultural values (e.g., social trust, religiosity, ethnolinguistic fractionalization) on numerous economic, social, and political outcomes.

It is important to note that our findings do not imply that institutions today are predetermined by the historical prevalence of infectious diseases alone. Rather, our results suggest that the prevalence of pathogens is only one of the many factors that could have shaped the cross-country differences in institutional quality today. Many other studies treat institutions as a “black box,” i.e., institutions lead to faster economic growth, but how to improve institutions is not often discussed in the literature. Our study suggests one possible channel—societies with lower level of pathogenic stress are more likely to promote the natural selection of personal traits that favor more inclusive institutions that are characterized by respect for the rights, liberties and well-being of all members of society.

6 Bibliography

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7 Appendix

Table 1: Summary Statistics

Variable	Description	Source / Year	Mean	Std. Dev.	Min	Max
Economic freedom	Index of economic freedom evaluates countries on broad dimensions of economic environment over which governments typically exercise policy control. Values range from 0 (least free) to 100 (most free).	Heritage Foundation / 2014	60.70	10.34	29.6	89.6
Property rights	Sub index of economic freedom which measures the degree to which a country's laws protect private property rights and the extent to which those laws are respected.	Heritage Foundation / 2014	42.23	24.87	5	95
Freedom from corruption	Sub index of economic freedom which measures the extent to which corruption prevails in a country.	Heritage Foundation / 2014	42.02	19.64	6.7	91
Fiscal freedom	The fiscal freedom component is a composite measure of the burden of taxes that reflects both marginal tax rates and the overall level of taxation, including direct and indirect taxes imposed by all levels of government	Heritage Foundation / 2014	77.81	12.03	39.6	99.9
Business freedom	Sub index of economic freedom which measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses.	Heritage Foundation / 2014	64.25	15.98	18.2	100
Labor freedom	Sub index of economic freedom that takes into account various aspects of the legal and regulatory framework of a country's labor market.	Heritage Foundation / 2014	61.64	16.41	20	98.5
Monetary freedom	Sub index of economic freedom that measures sound monetary policy and price stability.	Heritage Foundation / 2014	75.38	7.37	42.8	89.5
Trade freedom	Trade freedom is a sub index of economic freedom that measures of the extent of tariff and non-tariff barriers that have impact on bilateral trade.	Heritage Foundation / 2014	75.75	10.79	41.4	90
Investment freedom	Sub index of economic freedom that evaluates a variety of regulatory restrictions that typically are imposed on investment.	Heritage Foundation / 2014	55.00	23.94	0	95
Financial freedom	Sub index of economic freedom that measures banking system efficiency.	Heritage Foundation / 2014	48.66	19.06	10	90
Individualism	Index that measures the degree to which a society accepts and reinforces individualist or collectivist values. The index ranges from 0 (most collectivistic) and 100 (most individualistic)	Hofstede et al. (2010) / 2010	39.17	22.07	6	91

Pathogens	Index measuring the historical prevalence of infectious diseases in a particular country. When available the pathogen index is derived from epidemiological maps of infectious diseases before the introduction of modern medicine. Therefore, Murray and Schaller's (2010) dataset provides a robust deep-rooted measure of the historical prevalence of infectious diseases. These epidemiological maps and summaries presented in Simmons et al. (1944) .	Murray and Schaller (2010)	0.15	0.66	-1.31	1.17
Legal origins dummies	Legal origins dummies for UK, France, Socialist, German, and Scandinavian = 1 if legal origin; 0 otherwise	La Porta et al. (2000)	-	-	0	1
Latitude	Value of the latitude of a country's approximate geodesic centroid	La Porta et al. (2000)	19.06	24.22	-41.81	74.73
GDP per capita (log)	GDP per capita, PPP	World Bank / 2013	9.19	1.22	6.34	11.81
Ethnic fractionalization	Index that captures the probability that two individuals, selected at random from a country's population, will belong to different ethnic groups	Alesina et al. (2003)	0.44	0.26	0	0.93
Economic growth rate, %	Growth rate of GDP, %	World Bank / 2000-2012	4.06	2.75	-10.05	15.30
Democracy index	Index that is measured as average of civil rights and political liberties.	Fraser Institute / 2013	3.67	1.97	0	6
Continental dummies	Continental dummies for Africa, Asia, Europe, Oceania, North and South America = 1 if continent; 0 otherwise.	Ashraf & Galor (2013)	-	-	0	1
Rule of Law	Index that captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence	World Bank Worldwide Governance Indicators/ 2015	0	0.99	-2.39	2.12
Executive constraints	Index that captures the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities.	Polity IV Project / 2015	5.22	1.94	1	7
Expropriation index	Index that captures the risks of expropriation, breach of contract by the government, a possible negative change of attitude towards foreign investors, and also risks related to the functioning of the judiciary system. Countries are classified into seven categories: from 1 (low risk) to 7 (high risk)	Credendo Group / 2015	3.57	1.94	1	7

Table 2: OLS Estimates

Variables	Dependent Variable: Index of Economic Freedom				
	(1)	(2)	(3)	(4)	(5)
Individualism	0.215*** (0.036)	0.179*** (0.038)	0.179*** (0.046)	0.092** (0.045)	0.090** (0.045)
Legal origins: Socialist		-8.869*** (2.156)	-8.870*** (2.196)	-4.827** (1.983)	-4.463* (2.252)
Legal origins: French		-10.181*** (2.090)	-10.176*** (2.086)	-7.232*** (1.894)	-6.653*** (2.090)
Legal origins: UK		-6.637*** (2.191)	-6.630** (2.755)	-3.579 (2.214)	-2.665 (2.705)
Legal origins: Scandinavian		-3.789** (1.646)	-3.792** (1.772)	-1.214 (1.697)	-1.428 (1.880)
Latitude			0.000 (0.057)	-0.085** (0.037)	-0.088** (0.035)
Log GDP				5.388*** (1.047)	5.073*** (1.010)
Ethno					-4.067 (3.806)
Constant	55.660*** (1.908)	64.974*** (2.366)	64.968*** (2.631)	15.770* (9.245)	20.027** (9.173)
Observations	95	95	95	94	94
Adj. R-squared	0.222	0.255	0.247	0.480	0.481

Note: All models are estimated with OLS with robust standard errors (reported in parentheses). See Table 1 for description and sources of variables. "Legal Origins: German" is used as a reference group.

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Two Stage Least Squares (2SLS) Estimates

	(1)	(2)	(3)	(4)	(5)
Panel A: 2SLS Results					
Dependent Variable: Index of Economic Freedom 2014					
Individualism	0.364*** (0.067)	0.364*** (0.074)	0.407*** (0.088)	0.219** (0.097)	0.230** (0.095)
Legal origins: Socialist		-7.189 (4.707)	-6.559 (4.872)	-4.368 (3.680)	-4.078 (3.710)
Legal origins: French		-7.055 (4.586)	-8.512* (4.758)	-7.227** (3.580)	-6.741* (3.641)
Legal origins: UK		-4.624 (4.486)	-6.688 (4.780)	-4.427 (3.719)	-3.851 (3.845)
Legal origins: Scandinavian		-6.855 (5.919)	-6.101 (6.082)	-2.63 (4.656)	-2.931 (4.672)
Latitude			-0.0787 (0.056)	-0.118*** (0.046)	-0.123*** (0.045)
Log GDP				4.450*** (1.157)	4.096*** (1.171)
Ethno					-3.031 (3.885)
Observations	92	92	92	91	91
IV F-stat	68.88	56.31	42.88	19.92	21.05
Panel B: First Stage					
Dependent Variable: Individualism Index					
Pathogens	-22.41*** (2.700)	-23.66*** (3.153)	-21.67*** (3.309)	-19.13*** (4.286)	-19.82*** (4.320)
Legal origins: Socialist		-7.758 (8.419)	-8.338 (8.322)	-6.957 (8.574)	-6.223 (8.581)
Legal origins: French		-1.817 (8.219)	1.184 (8.292)	1.422 (8.335)	3.127 (8.450)
Legal origins: UK		5.167 (8.256)	8.769 (8.402)	9.776 (8.477)	12.09 (8.699)
Legal origins: Scandinavian		5.481 (10.570)	3.544 (10.500)	4.338 (10.620)	3.473 (10.620)
Latitude			0.154* (0.087)	0.167* (0.092)	0.156* (0.093)
Log GDP				1.845 (2.410)	0.707 (2.602)
Ethno					-10.32 (8.988)
Observations	92	92	92	91	91
R-squared	0.434	0.479	0.498	0.506	0.513

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. See Table 1 for description and sources of variables. "Legal Origins: German" is used as a reference group.

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Decomposing the Index of Economic Freedom

	Dependent Variables (Sub-area of the Index of Economic Freedom)								
	Prop Rights	Corruption	Fiscal	Business	Labor	Monetary	Trade	Investment	Financial
Panel A: 2SLS Results									
Individualism	0.698*** (0.202)	0.559*** (0.156)	-0.257** (0.122)	0.327** (0.140)	-0.00902 (0.160)	0.140 (0.0923)	0.227** (0.103)	0.647** (0.281)	0.475** (0.199)
Legal origins: Socialist	-25.70*** (7.712)	-15.07** (5.984)	15.03*** (4.670)	-6.270 (5.369)	-0.479 (6.140)	-2.668 (3.534)	6.079 (3.927)	-7.398 (10.73)	-3.815 (7.593)
Legal origins: French	-23.44*** (7.482)	-16.90*** (5.793)	6.614 (4.531)	-10.39** (5.198)	-10.92* (5.944)	-5.375 (3.421)	0.112 (3.810)	-9.228 (10.41)	-7.223 (7.368)
Legal origins: UK	-19.75** (7.794)	-14.09** (6.044)	13.57*** (4.720)	-4.241 (5.423)	5.013 (6.202)	-8.062** (3.570)	-4.408 (3.969)	-16.00 (10.85)	-7.948 (7.675)
Legal origins: Scandinavian	-2.893 (9.756)	8.317 (7.571)	-5.934 (5.908)	4.031 (6.793)	-3.880 (7.769)	-1.885 (4.472)	1.315 (4.968)	-6.064 (13.57)	-3.187 (9.606)
Latitude	-0.184* (0.0955)	-0.202*** (0.0736)	0.0129 (0.0578)	-0.0770 (0.0660)	-0.172** (0.0755)	-0.0821* (0.0435)	-0.0721 (0.0486)	-0.163 (0.133)	-0.170* (0.0940)
Log GDP	9.061*** (2.424)	7.025*** (1.879)	1.171 (1.468)	5.506*** (1.686)	7.253*** (1.928)	1.831* (1.110)	3.618*** (1.234)	4.356 (3.373)	5.751** (2.387)
Observations	92	93	92	93	93	93	92	92	92
IV F-stat	20.18	20.59	20.18	20.59	20.59	20.59	20.18	20.18	20.18
Panel B: First Stage									
	Dependent Variable: Individualism Index								
Pathogens	-19.13*** (4.258)	-19.10*** (4.210)	-19.13*** (4.258)	-19.10*** (4.210)	-19.10*** (4.210)	-19.10*** (4.210)	-19.13*** (4.258)	-19.13*** (4.258)	-19.13*** (4.258)
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	92	93	92	93	93	93	92	92	92
R-squared	0.506	0.507	0.506	0.507	0.507	0.507	0.506	0.506	0.506

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. See Table 1 for description of variables. "Legal Origins: German" is used as a reference group.

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Robustness, Additional Controls

	(1)	(2)	(3)	(4)	(5)
Panel A: 2SLS Results	Dependent Variable: Index of Economic Freedom 2014				
Individualism	0.453*** (0.132)	0.289*** (0.0892)	0.254** (0.107)	0.407*** (0.145)	0.190* (0.100)
Legal origins: Socialist	-7.344 (5.176)	-9.090** (3.800)	-8.540** (3.620)	-7.647 (5.351)	-7.128* (3.639)
Legal origins: French	-8.714* (4.959)	-9.412*** (3.632)	-8.309** (3.476)	-9.983** (4.554)	-8.698*** (3.268)
Legal origins: UK	-7.651 (5.217)	-8.434** (3.830)	-6.953* (3.910)	-9.140* (4.901)	-7.467** (3.649)
Legal origins: Scandinavian	-6.714 (6.452)	-3.944 (4.699)	-3.923 (4.486)	-4.022 (5.809)	-1.986 (4.034)
Latitude	-0.0821 (0.0593)	-0.0854** (0.0435)	-0.0661 (0.0465)	-0.187** (0.0894)	-0.00611 (0.0714)
Growth	0.541 (0.864)	-0.214 (0.608)	0.254 (0.541)	0.611 (0.793)	0.302 (0.530)
Dummy: Asia				8.363** (3.480)	2.883 (2.428)
Dummy: European				8.504 (5.796)	-2.428 (4.371)
Dummy: Oceania				-0.0423 (7.952)	8.243 (5.514)
Dummy: N America				14.10*** (4.513)	6.882* (3.568)
Dummy: S America				0.772 (4.470)	2.851 (3.126)
Trade		0.0718*** (0.0116)	0.0620*** (0.0133)		0.0665*** (0.0127)
Democracy			1.385* (0.817)		2.117** (0.859)
Observations	92	91	90	92	90
IV F-stat	21.20	25.89	18.01	14.90	17.77
Panel B: First Stage	Dependent Variable: Individualism				
Pathogens	-17.99*** (3.908)	-20.20*** (3.969)	-17.03*** (4.012)	-16.89*** (4.376)	-17.88*** (4.242)
Controls	✓	✓	✓	✓	✓
Observations	92	91	90	92	90
R-squared	0.515	0.545	0.596	0.570	0.662

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. All first stage regressions include the controls from the second stage, but are not reported to save space. See Table 1 for description of variables. "Legal Origins: German" is used as a reference group.

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness, More Controls

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: 2SLS Results	Dependent Variable: Index of Economic Freedom 2014					
Individualism	0.294*** (0.111)	0.623*** (0.213)	0.337*** (0.125)	0.398*** (0.154)	0.534** (0.260)	1.256 (1.238)
Legal origins: Socialist	-5.769 (4.176)	-6.996 (5.861)	-8.710* (4.681)	-5.745 (4.574)	-9.401 (13.56)	-1.868 (23.62)
Legal origins: French	-7.933** (3.990)	-9.963* (5.627)	-9.297** (4.517)	-8.513* (4.352)		
Legal origins: UK	-3.684 (4.294)	-10.73* (6.323)	-6.311 (4.719)	-5.557 (4.901)	-2.085 (6.499)	16.93 (23.79)
Legal origins: Scandinavian	-3.680 (5.229)	-9.715 (7.677)	-5.191 (6.185)	-5.537 (6.176)		
Latitude	-0.0874* (0.0477)	-0.0689 (0.0655)	-0.0675 (0.0512)	-0.0717 (0.0485)	0.0005 (0.0934)	0.0055 (0.134)
Economic Growth	0.827 (0.700)	0.897 (1.068)	0.806 (0.919)	1.263 (0.927)	1.485 (2.112)	2.277 (4.133)
Life expectancy	0.572*** (0.142)			0.634*** (0.208)		0.0431 (0.877)
Share of population in tropics		0.106* (0.0576)		0.0761* (0.0425)		30.43 (33.22)
Malaria Prevalence			-7.553** (3.654)	0.878 (4.945)		-0.364 (14.54)
Early settlers mortality					-0.00483 (0.00701)	-0.00342 (0.0124)
Observations	92	92	86	86	40	37
IV F-stat	19.08	11.45	19.68	12.93	8.166	0.769
Panel B: First Stage	Dependent variable: Individualism					
Pathogens	-18.36*** (4.204)	-13.57*** (4.012)	-19.43*** (4.379)	-15.84*** (4.403)	-18.41*** (6.442)	-6.958 (7.936)
Controls	✓	✓	✓	✓	✓	✓
Observations	92	92	86	86	40	37
R-squared	0.515	0.562	0.558	0.602	0.517	0.660

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. All first stage regressions include the controls from the second stage, but are not reported to save space. See Table 1 for description of variables. "Legal Origins: German" used as a reference group.

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Robustness, Sub-Samples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: 2SLS Results		Dependent Variable: Index of Economic Freedom 2014					
Individualism	0.525*** (0.139)	0.493*** (0.162)	0.449*** (0.151)	0.423*** (0.123)	0.431*** (0.136)	0.441*** (0.106)	0.606** (0.286)
Legal origins: Socialist	-7.087 (5.160)	-6.659 (4.805)	-9.834* (5.625)	-7.030 (4.767)	-7.799 (5.302)	-3.260 (5.537)	-16.85 (13.99)
Legal origins: French	-7.202 (4.962)	-8.820* (4.576)	-8.708* (5.217)	-8.653* (4.607)	-10.10** (5.090)	-4.528 (5.518)	-11.59 (9.745)
Legal origins: UK	-9.222* (5.252)	-9.742** (4.893)	-8.352 (5.602)	-8.050* (4.810)	-6.841 (5.379)	-6.882 (5.674)	-13.13 (10.47)
Legal origins: Scandinavian	-6.855 (6.439)	-6.734 (5.966)	-7.157 (7.152)	-6.425 (5.956)	-5.544 (6.525)	-2.945 (6.175)	
Latitude	-0.136** (0.0641)	-0.117 (0.0817)	-0.0708 (0.0586)	-0.0733 (0.0544)	-0.123* (0.0669)	-0.0676 (0.0548)	-0.0371 (0.0783)
Growth	0.788 (0.883)	0.443 (0.811)	0.913 (1.207)	0.268 (0.798)	0.706 (0.977)	0.703 (0.806)	0.637 (1.435)
Observations	89	88	78	90	77	69	59
IV F-stat	18.54	13.65	19.54	20.30	18.33	25.03	6.735
Panel B: First Stage		Dependent Variable: Individualism					
Pathogens	-17.24*** (4.003)	-14.35*** (3.885)	-17.46*** (3.949)	-18.33*** (4.068)	-19.35*** (4.520)	-22.24*** (4.445)	-13.51** (5.205)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	89	88	78	90	77	69	59
R-squared	0.516	0.545	0.603	0.511	0.505	0.606	0.306
Excluded Countries	Lowest Economic Freedom	Highest Economic Freedom	Population below 3 million	Outliers: Singapore &Luxemburg	No Africa	No Asia	No Europe

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. See Table 1 for description of variables. "Legal Origins: German" is used as a reference group. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Robustness, the Effect of Other Cultural Dimensions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Second Stage		Dependent Variable: Index of Economic Freedom 2014					
Individualism	0.230** (0.0946)						0.319* (0.185)
Power Distance		-0.291** (0.119)					0.114 (0.150)
Masculinity			3.961 (14.07)				-0.128 (0.0842)
Uncertainty				2.671 (7.212)			-0.0680 (0.0564)
Long Term					-1.151 (1.404)		-0.0144 (0.0734)
Indulgence						0.602 (0.493)	-0.0413 (0.0586)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	91	91	91	91	76	72	72
IV F-stat	21.05	12.74	0.0729	0.133	0.747	2.118	8.962
Panel B: First Stage		Dependent Variable: Individualism					
individualism	-19.82*** (4.320)	15.67*** (4.389)	-1.152 (4.264)	-1.708 (4.675)	3.857 (4.462)	-7.921 (5.444)	-14.19*** (4.738)
Controls	✓	✓	✓	✓	✓	✓	✓
Observations	91	91	91	91	76	72	72
R-squared	0.513	0.441	0.308	0.417	0.561	0.439	0.707

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. See Table 1 for description of variables. “Legal Origins: German” is used as a reference group. All models include the controls from our main specification in Table 3. All cultural variables came from Hofstede (2001). The Power Distance index measures the extent to which the less powerful members of organizations and institutions (in society and the family) accept and expect that power is distributed unequally, with higher values reflecting higher acceptance of inequality in the distribution of power by those below. The Masculinity index reflects dominance of men over women and to the dominance of “male” values such as assertiveness and competitiveness versus norms of caring and modesty. The Uncertainty Avoidance index refers to society's tolerance for uncertainty and the extent to which members of society feel either uncomfortable or comfortable in situations that are novel, unknown, surprising, different from usual. The Long Term Orientation index measures the extent to which societies maintain links with their own past while dealing with the challenges of the present and future. Societies who score low on this index prefer to maintain time-honored traditions and norms while viewing societal changes with suspicion. Finally, the Indulgence index measures the degree to which societies allow free gratification of basic and natural human drives related to enjoying life and having fun, with higher values of this index reflecting more indulgent societies with less restrictive social norms. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Robustness, Alternative Measures of Institutions

	(1) Rule of law	(2) Executive Constraints	(3) Expropriation Risk	(4) Democracy Index
Panel A: 2SLS results				
Individualism	0.0303*** (0.00744)	0.0541*** (0.0190)	-0.0450** (0.0175)	0.0744*** (0.0204)
Legal origins: Socialist	-0.764*** (0.293)	-0.312 (0.708)	-0.181 (0.711)	-0.543 (0.759)
Legal origins: French	-0.916*** (0.287)	-0.831 (0.699)	0.887 (0.705)	-1.005 (0.744)
Legal origins: UK	-0.683** (0.303)	-1.524** (0.753)	0.942 (0.736)	-1.868** (0.808)
Legal origins: Scandinavian	-0.110 (0.369)	-0.528 (0.951)	0.594 (0.892)	-0.616 (0.958)
Latitude	-0.00816** (0.00356)	-0.0120 (0.00868)	0.0177** (0.00838)	-0.0234** (0.00934)
GDP per capita (log)	0.293*** (0.0926)	-0.264 (0.234)	-0.615*** (0.225)	-0.120 (0.251)
Ethno	-0.568* (0.301)	0.331 (0.770)	1.559** (0.735)	-0.340 (0.800)
Observations	93	89	87	92
IV F-stat	21.73	19.07	23	19.66
Panel B: First Stage				
Pathogens	-19.80*** (4.248)	-19.06*** (4.364)	-20.66*** (4.307)	-18.95*** (4.273)
Controls	✓	✓	✓	✓
Observations	93	89	87	92
R-squared	0.514	0.519	0.520	0.523

Note: Panel A reports the two-stage least squares estimates with the index of Economic Freedom in 2014. Panel B reports the corresponding first stage. All first stage regressions include the controls from the second stage, but are not reported to save space. See Table 1 for description of variables. "Legal Origins: German" is used as a reference group. The rule of law index comes from the World Bank Worldwide Governance Indicators and captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The index ranges from -2.5 (weak) to 2.5 (strong) governance. The executive constraints variable is a measure of the extent of institutionalized constraints on the decision making powers of chief executives and takes values from 1 to 7, with higher values indicating greater extent of institutionalized constraints. The expropriation risk index measures the risk of "outright confiscation and forced nationalization" of property. This variable ranges from 0 to 7 with higher numbers indicating higher probability of expropriation. Finally, the democracy index ranges from 0 to 6, with higher values indicating a higher degree of institutionalized democracy.

*** p<0.01, ** p<0.05, * p<0.1