

Endowments, Culture and Economic Development

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Abstract

This paper investigates whether the geographic characteristics of a country can explain cross-country variations in income levels through their ability to explain cross-country variations in cultural traits that enhance economic development. In other words, this paper attempts to determine whether the geographic endowment can serve as an instrument in examining the effect of culture on economic development. The paper conducts two-stage least-squares regressions. The second stage is a regression of the logarithm of real gross domestic product per capita on each of the cultural attributes that are considered in this study. In the first stage, the geographic factors that statistically explain a cultural aspect are used as instrumental variables. The results of the empirical estimation show that the cultural variables, instrumented by the geographic variables, explain cross-country variations in economic development.

1. Introduction

This paper investigates whether the geographic characteristics of a country can explain cross-country variations in income levels through their ability to explain cross-country variations in cultural traits that enhance economic development. In other words, this paper attempts to determine whether the geographic endowment can serve as an instrument in examining the effect of culture on economic development.

The cultural traits that are considered in this study include trust in people from another nationality, trust in people from another religion, trust in most people, in addition to the qualities of responsibility, independence, obedience, thrift, and tolerance and respect for others. There are several studies¹ that argue that these attributes have a significant effect on economic development. According to these studies, trust facilitates the extension of anonymous market exchange, minimizes the need for external enforcement of contractual agreements and thus reduces the cost of transactions. Tolerance and respect for others is essential for economic success as well. If individuals lack respect for other members of their community, public good provision is bound to be inadequate and public administrators are likely to engage in nepotism or corruption practices. The qualities of responsibility, independence and thrift are also essential for economic success in market economies.

The literature, however, cannot determine easily the causal effect of culture on economic development. The key difficulty is that culture is endogenous to economic development. Some studies, such as Inglehart and Baker (2000), argue that the

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modernization theory stresses that economic development has predictable effects on culture and social life. Other studies argue that industrialization produces pervasive social and cultural consequences. Therefore, to identify a causal effect from culture to economic development, we have to find some exogenous source of variation in the cultural attributes considered. In other words, when we estimate the effect of culture on economic development we have to use instrumental variables.

The main contribution of this paper is introducing geography as an instrumental variable in the estimation of the effect of culture on economic development. This paper, thus, argues that the geographic endowment can have an impact on economic development through shaping the cultural traits that promote economic prosperity. This argument is predicated on the observation that people who live in different environments have different habits, customs, traditions and norms. Thus, culture develops in a variety of habitats with different climates, locations and topographic conditions.

In addition to the observations, the relationship between the geographic conditions and the cultural outcomes was studied theoretically by Quamrul and Galor (2011) who develop a model to examine the role of cultural diffusion in the differential patterns of economic development. The authors find that societies that were geographically less exposed to cultural diffusion benefited from lower cultural diversity and accumulation of society-specific human capital. These societies flourished in the technological paradigm that characterized the agricultural stage of development. The lack of cultural diffusion, however, diminished the ability of these societies to adapt to a new technological paradigm, which delayed their industrialization.

In order to examine the effect of culture on economic development, using geography as an instrument, this paper focuses on some geographic characteristics such as the latitude, the elevation, the proximity to the coast, the proximity to waterways, the climatic zone and the terrain topography. A plethora of studies² argued that geography is one of the deep determinants of economic development. This paper extends these studies to argue that one of the channels through which the geographic endowment can have an impact on economic development is through its effect on shaping the cultural aspects that are pertinent to economic performance.

To achieve its objective, the paper examines the relationship between the geographic variables and several cultural attributes that are considered in this paper. The regression results show that the elevation and the terrain ruggedness explain cross-country variations in the cultural attributes of trust in people of another nationality, trust in people of another religion, in addition to the quality of tolerance. The proximity to the coast explains cross-country variations in the quality of independence. The latitude, being in the geographic tropics and the climatic variables explain cross-country variations in trust in most people, besides the qualities of responsibility and obedience. Finally, the latitude explains cross-country variations in the quality of thrift.

The paper also conducts two-stage least-squares (2SLS) regressions. The second stage is a regression of the logarithm of real gross domestic product (GDP) per capita on each of the cultural attributes that are considered in this study. In the first stage, the geographic factors that statistically explain a cultural aspect are used as instrumental variables. The results of the empirical estimation show that the cultural variables, instrumented by the geographic variables, explain cross-country variations in economic development.

The remainder of the paper is organized as follows: section 2 includes the literature survey, section 3 and 4 include the discussion of the data, section 5 includes the empirical estimation and section 6 concludes.

2. Literature

Some studies investigate the effect of culture on economic development. For instance, Granato et al. (1996) examine the hypothesis that cultural attitudes towards achievement and postmaterialism have a significant effect on economic growth. The authors find that the achievement motivation, that emphasizes thrift, saving money, and determination, has a significant positive effect on economic growth. The postmaterialist dimension reflects the shift towards the protection of the environment and the quality of life. The authors find that this cultural attribute has a significant negative effect on economic growth. Berggren and Elinder (2012) investigate how tolerance, measured by attitudes towards different types of neighbors, affects economic growth. The authors find a positive coefficient throughout for tolerance toward people of a different race, and argue that the inclusion of people, irrespective of race, releases innovativeness and productive activities. Gorodnichenko and Roland (2011) explore which dimensions of culture matter for long run economic growth. The cultural aspects that the authors consider include individualism, power distance, masculinity, uncertainty avoidance, autonomy, embeddedness, hierarchy, egalitarianism and harmony. The authors conclude that the individualism dimension is the central cultural value that matters for economic growth.

Other studies attempted to deal with the endogeneity of culture by using an instrumental variable. For instance, Maseland (2013) uses the prevalence rates of the common parasite *Toxoplasma gondii*, which is known to affect individual attitudes and societal values in predictable ways, as instrument for cultural variation. The author finds that the indicators of cultural attitudes are significant determinants of institutional quality, and strong predictors of long run economic performance. Gorodnichenko and Roland (2010) examine the causal effect of individualism versus collectivism on long run economic growth. The authors argue that parental transmission of culture is a fundamental determinant of cultural values of individuals. Thus, measures of genetic distance can be seen as proxy of differences in parental transmission of cultural values. Using genetic distance as an instrument, the authors find strong evidence of a causal effect of individualism on income per worker and total factor productivity. Tabellini (2010) estimate the effect of specific cultural traits on regional economic development in Europe. These cultural attributes include trust, respect for others, and confidence in self determination. The author uses the historical literacy rates and the quality of political institutions as instruments for these cultural traits, and finds that the exogenous component of culture because of these factors is strongly correlated with regional economic development in Europe.

The main contribution of this paper is introducing a new instrument, the geographic endowment, in examining the effect of culture on economic development.

3. Data

There are 47 countries that are included in the analysis. The list of countries is listed in Table 1. This sample is limited owing to the availability of countries in the

Table 1. List of Countries

<i>Countries</i>			
Armenia	Ghana	Nigeria	Sweden
Australia	Iraq	Pakistan	Taiwan
Azerbaijan	Japan	Peru	Trinidad and Tobago
Belarus	Jordan	Philippines	Tunisia
Chile	Kazakhstan	Poland	Turkey
China	Kuwait	Qatar	Ukraine
Colombia	Kyrgyzstan	Romania	USA
Cyprus	Lebanon	Russia	Uruguay
Ecuador	Malaysia	Rwanda	Uzbekistan
Egypt	Mexico	Slovenia	Yemen
Estonia	Morocco	South Korea	Zimbabwe
Germany	Netherlands	Spain	

World Values Survey data³. This sample is, however, diverse as it includes several developed and developing countries. The sample also includes countries from all continents. The summary statistics of all variables used in the analysis are included in Tables 2 and 3.

Income

The measure of development is the real GDP per capita in 2011, which is derived from the Penn World Tables 8.0⁴. The variable used is the real GDP at constant

Table 2. Statistical Summaries of Income and Geography Variables

<i>Variable</i>	<i>Observations</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
<i>GDP per capita</i>	47	9.292	0.994	7.125	11.622
<i>Latitude</i>	47	27.061	24.486	-35.815	62.745
<i>Elevation</i>	47	677.382	623.549	9.166	2988.048
<i>Tropics1</i>	47	0.261	0.430	0	1
<i>Tropics2</i>	47	0.270	0.422	0	1
<i>Coastal1</i>	47	0.455	0.372	0	1
<i>Coastal2</i>	47	0.570	0.375	0	1
<i>Coastal3</i>	47	0.374	0.360	0	1
<i>Coastal4</i>	47	0.476	0.3735	0	1
<i>Ltropics</i>	47	0.157	0.316	0	1
<i>Ptropics</i>	47	0.142	0.310	0	1
<i>LTemperate</i>	47	0.377	0.422	0	1
<i>PTemperate</i>	47	0.443	0.4392	0	1
<i>Rugged1</i>	47	1.397	1.106	0.037	4.287
<i>Rugged2</i>	47	4.059	3.207	0.108	13.105
<i>Rugged3</i>	47	0.392	0.308	0.012	1.246
<i>Rugged4</i>	47	20.493	20.192	0	71.642

Note: *SD* = standard deviation.

Table 3. Statistical Summaries of Cultural Variables

Variable	Observations	Mean	SD	Min	Max
Trust1	47	34.176	16.686	8.8	80.3
Trust2	47	36.210	15.107	9.1	75.3
Trust3	47	22.672	15.817	3.2	66.1
Responsibility	47	71.774	12.337	34.9	90.8
Independence	47	49.453	15.052	28	88
Obedience	47	39.155	19.832	5	73.8
Thrift	47	38.619	12.937	19.1	77
Tolerance	47	68.946	11.612	40.8	87

Note: SD = standard deviation.

2005 national prices (in US dollars). This variable is divided by the population to calculate the real GDP per capita. The logarithm of the real GDP per capita is used in the analysis.

Geography

The first set of geographic data used is extracted from the University of Harvard Center for International Development.⁵ The variables reflect the geographic characteristics of location, topography and climate. The names of the variables used and their definitions are included in Table 4.

The second set of geographic data is compiled by Nunn and Puga (2012). These variables reflect the topographic features of the country. The names of the variables and their definitions are included in Table 5.⁶

Culture

The cultural variables are extracted from wave 6 of the World Values Survey (2010–2014). The first set of survey questions to be considered as an aspect of a nation’s culture is the list of qualities that children can be encouraged to

Table 4. Definition of Geographic Variables from the Center of International Development

Variable	Definition
Latitude	Latitude of the geographical country centroid
Elevation	Mean elevation, or meters above sea level
Coastal1	Percentage of population within 100 kilometers of ice-free coast
Coastal2	Percentage of population within 100 km of ice-free coast or navigable river
Coastal3	Percentage of land area within 100 kilometers of ice-free coast
Coastal4	Percentage of land area within 100 km of ice-free coast or navigable river
Tropics1	Percentage of population in the geographical tropics
Tropics2	Percentage of land area in the geographical tropics
LTropics	Percentage of land area in Koeppen–Geiger tropic zones
PTropics	Percentage of 1995 population in Koeppen–Geiger tropic zones
LTemperate	Percentage of land area in Koeppen–Geiger temperate zones
PTemperate	Percentage of 1995 population in Koeppen–Geiger temperate zones

Table 5. *Definition of Geographic Variables from Nunn and Puga (2012)*

<i>Variable</i>	<i>Definition</i>
<i>Rugged1</i>	The Terrain Ruggedness Index
<i>Rugged2</i>	The average uphill slope of the country's surface area
<i>Rugged3</i>	The average standard deviation of elevation
<i>Rugged4</i>	The percentage of a country's land area that is highly rugged

learn at home. The question wording is stated as follows: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important?" The set of qualities considered include: (1) feeling of responsibility, (2) independence, (3) obedience, (4) thrift, (5) tolerance and respect for other people. The variable used in the analysis is the percentage of people in the given country who answered that this quality is one that children can be encouraged to learn at home. The variables are denoted Responsibility, Independence, Obedience, Thrift, and Tolerance, respectively.

The second set of questions ask how much you trust different groups of people. The survey question wording is stated as follows: "I'd like to ask you how much you trust people from various groups. Could you tell me for each whether you trust people from this group completely, somewhat, not very much or not at all?" The list of groups include: (1) people of another nationality, and (2) people of another religion. The variable used in the analysis is the percentage of people who answered they trust completely, or trust somewhat, the groups considered. The variables are denoted Trust1 and Trust2, respectively.

Another question asks if most people can be trusted. The survey question wording is stated as follows: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" The variable used in the analysis is the percentage of people who answered that most people can be trusted. The variable is denoted Trust3.

4. Controls

Several control variables are used in the analysis to check the robustness of the results. The first is the legal origin indicators that are compiled by La Porta et al. (1999). The list⁷ includes the British common law, the French civil law, the Socialist law, the German civil law and the Scandinavian law. The authors argue that the legal tradition in countries implanted by colonial powers has profoundly shaped national approaches to property rights protection and the degree to which the state intervenes in the economy. Accordingly, the legal origin has a significant influence on economic development.

Another set of control variables is the colonial origin indicator. The data distinguishes between British, French, Portuguese, Spanish and other European (Dutch, Belgian and Italian) colonial origin for countries colonized since 1700. For countries under several colonial powers, the last one is counted provided that it lasted for 10 years or longer. Some studies analyzed the effect of the colonial heritage on current economic development. Colonial heritage is usually proxied by the identity of the colonial ruler, the period of colonization, or the degree of economic penetration by colonial power. These studies, such as Bertocchi and

Canova (2002), Bruhn and Gallego (2012) and Feyrer and Sacerdote (2009), find that colonial origins has a significant effect on current economic development even after decolonization and independence.

The analysis also includes continental dummies. Continent indicators follow the definitions of the United Nations Statistics Division⁸ of 2000. The dummies are for Africa, Asia, Europe, Oceania, North America and South America.

Finally, the fractionalization indicator is used as another control variable.⁹ Fractionalization measures the probability that two randomly selected individuals from a country are from different groups. We consider ethnic, linguistic and religious fractionalization. Some studies, such as Alesina et al. (2003), Alesina et al. (2012) and Montalvo and Reynal-Querol (2005), find that fractionalization can hinder economic development. This is because the level of diversity along ethnic, linguistic and religious lines tends to formulate weaker institutions and inefficient public services. In addition, in highly diverse societies, the group that dominates power tend to expropriate as many resources from the other groups and restrict the rights of members of other groups.

5. Estimation

This section examines the effect of geography on the cultural variables that are considered in this study and the effect of culture on economic development using the geographic variables as instruments.

Endowments and Culture

Ordinary least squares estimations are used to assess the relationship between the geographic endowments and the cultural variables. Each regression is that of one of the cultural variables on each one of the geographic variables, one at a time. Each regression is as follows

$$\text{Cultural Variable} = \alpha + \beta \text{ Geography Variable} + \text{error}$$

Tables 6–8 show the coefficients of each one of these regressions. Figure 1 shows the relationship between some of the geographic variables and the cultural attributes.

The results show that the elevation and the ruggedness measures have a statistically significant negative coefficient with the percentage of people who trust those from another nationality, the percentage of people who trust those from another religion and the percentage of people who encouraged their children to learn the quality of tolerance and respect for others. This implies that the terrain topographic features explain the cultural aspects of trust and tolerance. Figures 1(a) and (b) show the negative relationship between elevation and ruggedness on one hand, and trust in people from another nationality on the other. Figures 1(c) and (d) show the negative relationship between elevation and ruggedness on one hand, and trust in people from another religion on the other. Figures 1(e) and (f) show the negative relationship between elevation and ruggedness, and the quality of tolerance and respect for others.

The intuition behind this is that elevation and terrain ruggedness reflect natural barriers that impede different groups of people from communicating and interacting with each other. These inconsistent landscapes can hinder the feeling of trust and

Table 6. Effect of Geography on Culture

<i>Dependent</i>	<i>Latitude</i>	<i>Coastal1</i>	<i>Coastal2</i>	<i>Coastal3</i>	<i>Coastal4</i>
<i>Trust1</i>	0.128 (0.099)	6.311 (6.604)	10.614 (6.440)	4.238 (6.866)	8.782 (6.528)
<i>Trust2</i>	-0.002 (0.091)	7.571 (5.934)	11.080 (5.772)	4.499 (6.207)	7.232 (5.931)
<i>Trust3</i>	0.259* (0.088)	-0.441 (6.323)	5.837 (6.226)	-2.605 (6.525)	1.481 (6.307)
<i>Responsibility</i>	0.188* (0.069)	1.019 (4.930)	4.319 (4.861)	3.850 (5.066)	8.116 (4.772)
<i>Independence</i>	0.097 (0.090)	11.999* (5.746)	17.459* (5.386)	10.551 (6.018)	12.745* (5.698)
<i>Obedience</i>	-0.367* (0.107)	-6.230 (7.874)	-13.984 (7.601)	-5.557 (8.154)	-10.828 (7.747)
<i>Thrift</i>	0.211* (0.072)	0.176 (5.172)	4.018 (5.106)	6.316 (5.263)	9.738 (4.954)
<i>Tolerance</i>	-0.077 (0.069)	4.464 (4.594)	3.844 (4.579)	4.113 (4.759)	4.265 (4.589)

Notes: Numbers in parentheses denotes standard errors. * Denotes statistical significance. Each regression is that of one of the cultural variables (in the first column) on each geographic variable, one at a time, in each subsequent column.

Table 7. Effect of Geography on Culture

<i>Dependent</i>	<i>Tropics1</i>	<i>Tropics2</i>	<i>LTropics</i>	<i>PTropics</i>	<i>LTemperate</i>	<i>PTemperate</i>
<i>Trust1</i>	-12.178* (5.478)	-10.922 (5.662)	-9.136 (7.732)	-7.640 (7.932)	12.239* (5.601)	13.695* (5.281)
<i>Trust2</i>	-2.162 (5.216)	-0.264 (5.334)	4.258 (7.080)	6.420 (7.192)	6.556 (5.243)	7.715 (4.996)
<i>Trust3</i>	-15.652* (4.948)	-14.986* (5.119)	-22.685* (6.629)	-21.904* (6.858)	12.500* (5.264)	14.055* (4.941)
<i>Responsibility</i>	-13.310* (3.778)	-14.281* (3.801)	-16.230* (5.277)	-19.007* (5.204)	13.872* (3.833)	12.355* (3.759)
<i>Independence</i>	-8.483 (5.050)	-6.883 (5.215)	-4.281 (7.053)	-1.471 (7.225)	7.784 (5.185)	8.576 (4.945)
<i>Obedience</i>	26.111* (5.649)	26.131* (5.819)	26.924* (8.424)	24.685* (8.785)	-21.377* (6.234)	-22.304* (5.851)
<i>Thrift</i>	-4.185 (4.431)	-4.805 (4.511)	-3.463 (6.065)	-2.104 (6.205)	9.157* (4.358)	6.734 (4.274)
<i>Tolerance</i>	2.398 (4.000)	3.123 (4.073)	2.500 (5.451)	1.606 (5.571)	2.911 (4.076)	2.673 (3.920)

Notes: Numbers in parentheses denotes standard errors. * Denotes statistical significance. Each regression is that of one of the cultural variables (in the first column) on each geographic variable, one at a time, in each subsequent column.

possibly exacerbate a sense of alienation and suspicion towards others who are kept at a distance by the uneven topographic features of the terrain. Rugged terrain also hinders trade between communities. This does not allow the members of these

Table 8. Effect of Geography on Culture

<i>Dependent</i>	<i>Elevation</i>	<i>Rugged1</i>	<i>Rugged2</i>	<i>Rugged3</i>	<i>Rugged4</i>
Trust1	-0.008* (0.003)	-5.044* (2.117)	-1.613* (0.737)	-18.250* (7.600)	-0.274* (0.116)
Trust2	-0.008* (0.003)	-4.310* (1.930)	-1.456* (0.667)	-15.693* (6.925)	-0.239* (0.105)
Trust3	-0.001 (0.003)	-2.711 (2.091)	-0.818 (0.725)	-9.779 (7.512)	-0.152 (0.114)
Responsibility	-0.001 (0.002)	0.564 (1.659)	0.290 (0.571)	2.830 (5.954)	0.048 (0.090)
Independence	-0.003 (0.003)	-0.110 (2.027)	0.063 (0.699)	0.884 (7.281)	-0.025 (0.111)
Obedience	-0.001 (0.004)	-4.210 (2.596)	-1.683 (0.887)	-16.080 (9.291)	-0.236 (0.142)
Thrift	-0.001 (0.003)	0.378 (1.741)	0.1836 (0.600)	2.358 (6.249)	0.039 (0.095)
Tolerance	-0.005* (0.0026)	-4.011* (1.445)	-1.388* (0.4985)	-13.813* (5.227)	-0.225* (0.078)

Notes: Numbers in parentheses denotes standard errors. * Denotes statistical significance. Each regression is that of one of the cultural variables (in the first column) on each geographic variable, one at a time, in each subsequent column.

communities an opportunity for interaction and communication that permits trust to flourish. Rugged terrains are also costly to traverse, which does not facilitate mobility and travel from one area to another. This serves as an impediment to communication between different groups of people who are separated from each other by the irregular features of the terrain.

The results also show that the percentage of population and land in the geographic tropics, and the percentage of population and land in the tropic climatic zones have a statistically significant negative coefficient with the percentage of people who answered that most people can be trusted, and the percentage of people who encouraged their children to learn the quality of responsibility. In contrast, the latitude and the percentage of population and land in the temperate climatic zones have a statistically significant positive coefficient with the percentage of people who answered that most people can be trusted, and the percentage of people who encouraged their children to learn the quality of responsibility.

The quality of obedience is considered contradictory to the attributes that are conducive to economic development. The results show that the percentage of population and land in the geographic tropics, and the percentage of population and land in the tropic climatic zones have a statistically significant positive coefficient with the percentage of people who encouraged their children to learn the quality of obedience. In contrast, the latitude and the percentage of population and land in the temperate climatic zones have a statistically significant negative coefficient with the percentage of people who encouraged their children to learn the quality of obedience.

The results also show that the percentage of people and land within 100 kilometers of ice-free coast or navigable river have a statistically significant positive coefficient with the percentage of people who encouraged their children to learn the quality of independence. Finally, the latitude has a statistically significant

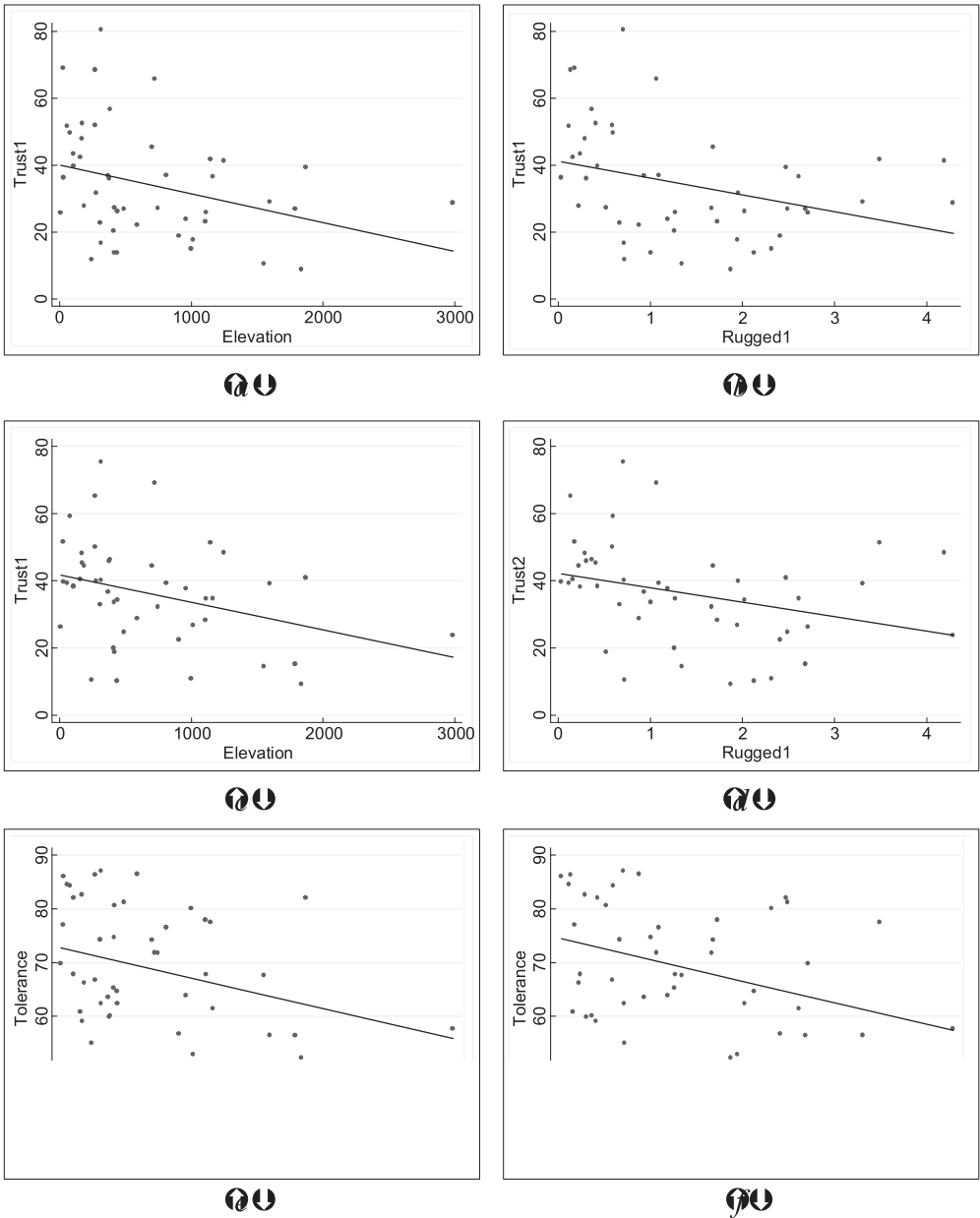


Figure 1. Endowments and Culture

positive coefficient with the percentage of people who encouraged their children to learn the quality of thrift.

Culture and Development

A 2SLS regression is conducted to examine the effect of culture on economic development, using the geographic variables as an instrument. The regression equation is as follows:

Second Stage:

$$\text{Logarithm of real GDP per capita} = \alpha \text{ Cultural Variable} + \sum \beta \text{ Control Variables} + \epsilon$$

First Stage:

$$\text{Cultural Variable} = \delta \text{ Geography Variable} + \sigma.$$

The controls are a set of included exogenous variables. The error terms in the first and second stage regressions are ϵ and σ , respectively. Endowments are considered excluded exogenous variables in that they are used as instrumental variables to extract the exogenous component of the cultural attributes but are excluded in the second stage regressions. The geographic variables that are used as instruments are the ones that were identified as having a statistically significant effect on the cultural attribute under consideration.

Table 9 shows the second stage coefficients of each one of the cultural traits that is considered in the analysis along with the instrumental variables used in every regression. The first column shows the coefficient without the inclusion of control variables. The overidentifying restrictions test p -values are included in column (2) of Table 9. The first stage p -values are included in column (3) of Table 9. Column (1) of Table 10 shows the coefficients after adding the fractionalization variables. Column (2) of Table 10 shows the coefficients after adding the continental dummies. Column (3) of Table 10 shows the coefficients after adding the legal origin indicators. Column (4) of Table 10 shows the coefficients after adding the colonial origin indicators.

The results show that the exogenous component of the cultural aspects significantly explain economic development. In the case without any control variables, all the cultural variables have statistically significant coefficients. When the ethnic, linguistic and religious fractionalization control variables are added, the coefficients of trust in people of another religion, obedience and thrift are not significant. When we add continental dummies, the coefficients of responsibility, thrift and tolerance are not significant. When we add the legal origin or the colonial origin indicators, the coefficient of thrift is not statistically significant.

The test of overidentifying restrictions addresses the following question: do endowments explain economic development beyond the ability of endowments to explain culture? Specifically, the overidentifying restriction test has as its null hypothesis that endowments do not explain the logarithm of real GDP per capita beyond the ability of endowments to explain culture. The p -values of the test are included in column (2) of Table 9. The overidentifying restriction test does not reject the hypothesis that the instruments can be excluded from the second stage regression. This implies that the geographic endowments can not explain cross-country variations in economic development beyond their ability to explain cross-country variations in cultural values that are conducive to economic development.

6. Conclusion

This paper attempts to determine whether the geographic endowment can serve as an instrument in examining the effect of culture on economic development. The

Table 9. Two Stage Least Squares Regression Results

	<i>No controls</i> (<i>SE</i>)	<i>OIR</i> (<i>p-values</i>)	<i>First stage</i> (<i>p-values</i>)	<i>Instruments</i>
<i>Trust1</i>	0.064* (0.016)	(0.300)	(0.022)	Elevation, Tropics1, Ltemperate, Ptemperate, Rugged1, Rugged2, Rugged3, Rugged4
<i>Trust2</i>	0.074* (0.032)	(0.259)	(0.176)	Elevation, Rugged1, Rugged2, Rugged3, Rugged4
<i>Trust3</i>	0.038* (0.010)	(0.114)	(0.000)	Latitude, Tropics1, Tropics2, Ltropics, Ptropics
<i>Responsibility</i>	0.053* (0.013)	(0.130)	(0.010)	Ltemperate, Ptemperate Latitude, Tropics1, Tropics2, Ltropics, Ptropics
<i>Independence</i>	0.060* (0.024)	(0.505)	(0.000)	Ltemperate, Ptemperate Coastal1, Coastal2 Coastal3, Coastal4
<i>Obedience</i>	-0.039* (0.008)	(0.248)	(0.000)	Latitude, Tropics1, Tropics2, Ltropics, Ptropics Ltemperate, Ptemperate
<i>Thrift</i>	0.069* (0.031)	(0.048)	(0.010)	Latitude, Ltemperate
<i>Tolerance</i>	0.050* (0.030)	(0.018)	(0.001)	Elevation, Rugged1, Rugged2, Rugged3, Rugged4

Notes: Each coefficient is that of the regression of real GDP per capita on each cultural variable in the second stage 2SLS regression. Standard errors (*SE*) are heteroskedasticity consistent. *Denotes statistical significance.

cultural traits that are considered in this study include trust in people from another nationality, trust in people from another religion, trust in most people, in addition to the qualities of responsibility, independence, obedience, thrift, and tolerance and respect for others. The geographic variables used in this analysis include the latitude, the elevation, the proximity to the coast, the proximity to waterways, the climatic zone and the terrain topography.

The paper examines the relationship between the geographic variables and several cultural attributes that are considered in this paper. The regression results show that the elevation and the terrain ruggedness explain cross-country variations in the cultural attributes of trust in people of another nationality, trust in people of another religion, in addition to the quality of tolerance. The proximity to the coast explains cross-country variations in the quality of independence. The latitude, being in the geographic tropics and the climatic zones explain cross-country variations in trust in most people, besides the qualities of responsibility and obedience. Finally, the latitude explains cross-country variations in the quality of thrift.

The paper also conducts 2SLS regressions. The second stage is a regression of the logarithm of real GDP per capita on each of the cultural attributes that are considered in this study. In the first stage, the geographic factors that statistically explain a cultural aspect are used as instrumental variables. The results of the

Table 10. Two Stage Least Squares Regression Results

	Fractionalization	Continental	Legal	Colonial
<i>Trust1</i>	0.040* (0.010)	0.056* (0.024)	0.068* (0.016)	0.068* (0.017)
<i>Trust2</i>	0.028 (0.017)	0.086* (0.040)	0.097* (0.038)	0.099* (0.044)
<i>Trust3</i>	0.033* (0.011)	0.031* (0.015)	0.034* (0.015)	0.041* (0.015)
<i>Responsibility</i>	0.044* (0.017)	0.023 (0.022)	0.097* (0.032)	0.092* (0.026)
<i>Independence</i>	0.051* (0.022)	0.056* (0.016)	0.052* (0.019)	0.057* (0.016)
<i>Obedience</i>	-0.024 (0.018)	-0.036* (0.012)	-0.047* (0.017)	-0.053* (0.018)
<i>Thrift</i>	0.042 (0.024)	-0.5661 (1.708)	0.356 (0.462)	0.272 (0.323)
<i>Tolerance</i>	0.042* (0.019)	0.030 (0.029)	0.055* (0.023)	0.090* (0.036)

Notes: Each coefficient is that of the regression of real GDP per capita on each cultural variable in the second stage 2SLS regression equation that includes the control variables on top of each column. Standard errors are included in parentheses. *Denotes statistical significance.

empirical estimation show that the cultural variables, instrumented by the geographic variables, explain cross-country variations in economic development.

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Notes

1. Some of these studies are discussed in detail in the following literature survey section.
2. Examples include Bloom et al. (1998), Gallup et al. (1999), Masters and McMillan (2001), Sachs (2001) and Nunn and Puga (2012).
3. The dataset can be found at: <http://www.worldvaluessurvey.org/wvs.jsp>.
4. The dataset can be found at: <http://cid.econ.ucdavis.edu/pwt.html>.
5. www.cid.harvard.edu/ciddata/geographydata.htm.
6. Detailed data definitions can be found in <http://diegopuga.org/data/rugged/>.
7. The dataset can be found at <http://scholar.harvard.edu/schleifer/publications/quality-government>.
8. The dataset can be found at: <http://unstats.un.org/unsd/default.htm>.
9. The dataset can be found at: http://www.anderson.ucla.edu/faculty_pages/romain.wacziarg/papersum.html.