

SOCIAL TRUST AND DEMOCRACY*

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This paper examines the effect of social trust on democracy and identifies the channels of transmission. The paper uses the World Values Survey to examine the effect of social trust on democracy. To account for potential endogeneity, the paper uses instrumental variables for social trust. The instruments used are the mean elevation and the terrain ruggedness. The estimation results for cross section and panel data show that trust, instrumented by these topographic variables, has a statistically significant positive effect on democracy. The evidence also indicates that trust affects democracy indirectly through enhancing institutional quality which improves democratic governance according to the Hayek-Friedman hypothesis, and through inducing the accumulation of human capital which in turn improves democratic governance according to the modernization theory. The results are robust using alternative techniques and different indicators and datasets.

Keywords: Geography, Trust, Democracy

JEL Classification: O1, P5, Z1

1. INTRODUCTION

This paper examines the effect of social trust on democracy and explores the channels through which trust affects democratic governance. In other words, the paper explores whether a high level of trust is associated with better democratic practices. There is a growing literature that argues that trust is one of the critical determinants of economic performance, the support for welfare state, the demand for government regulations, the extent of central bank independence, and the quality of institutions. This paper contributes to this literature by examining the effect of trust on democracy, while dealing with the issue of potential endogeneity and exploring the channels of

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transmission.

The effect of trust on democracy is becoming a pertinent issue as a Pew Research survey points our attention to the political consequences of the lack of trust of Americans in their political institutions, in their political leaders, and in each other. In the summary of the survey findings, Pew Research states that *in a comment typical of the views expressed by many people of different political leanings, ages and educational backgrounds, one participant in a new Pew Research Center survey said: "Many people no longer think the federal government can actually be a force for good or change in their lives. This kind of apathy and disengagement will lead to an even worse and less representative government."* Another addressed the issue of fading interpersonal trust: *As a democracy founded on the principle of E Pluribus Unum, the fact that we are divided and can't trust sound facts means we have lost our confidence in each other."* This lack of trust in institutions and in each other diminishes confidence in the system of democratic governance. This implies that the effect of social trust on democracy is a pertinent issue that deserves our attention.

Trust can be essential for both the transition to a democratic system, and for an existing democracy to consolidate. A high trust environment allows for antigovernment discourse, sharing grievances, and disclosing the intention to oppose the autocratic state. This can pave the way to a democratic transition. A high trust environment also makes it less risky to participate in political affairs and to increase civic engagement. This allows a democratic system to consolidate.

In this context, we cannot determine the causal effect of trust on democracy since the former is endogenous to the latter. As much as trust can affect the level of democracy, democracy can also affect the level of trust as shown in Ljunge (2014). To identify a causal effect from trust to democracy, we have to find some exogenous source of variation in trust. In other words, when we estimate the effect of trust on democracy we have to use instrumental variables. The instruments used in this paper are the topographic features of the terrain in a country captured by the mean elevation and the terrain ruggedness. Elevation and terrain ruggedness reflect natural barriers that impede communication between societies, obstruct interaction between people, and hinder trade, travel and cultural exchange between communities. Thus, these topographic features may not allow the sentiments of trust to flourish.

The paper uses the generalized trust variable extracted from the World Values Survey that focuses on whether most people can be trusted. The paper conducts instrumental variable estimations where elevation and terrain ruggedness are used as instruments. The results with both cross section and panel data show that trust, instrumented by these topographic variables, explain cross country variations in democracy. The results also show that trust affects democracy indirectly through the channels of schooling and institutional quality. In specific, trust enhances educational attainment and thus the level of economic development, which in turn increases democratic governance according to the modernization theory. Similarly, trust enhances institutional quality, which is associated with political freedoms according to the

Hayek-Friedman hypothesis.

The main contributions of this paper are twofold: it is the first in the literature to investigate the effect of trust on democracy while addressing potential endogeneity by introducing novel instrumental variables for trust. This paper is also the first to identify the channels of transmission from trust to democracy. This is a non-trivial contribution to the field of economic development, given the attention given in the literature to both social trust and democratic governance as factors that determine economic outcomes.

The remainder of the paper is organized as follows: Section 2 includes the literature survey, Section 3 discusses the hypothesis, Section 4 contains a detailed description of the data, Section 5 includes the estimation results and the robustness tests, and Section 6 concludes. References are included thereafter.

2. LITERATURE REVIEW

There are several studies that examine the effect of trust on economic performance, on investment and innovation, on the support for welfare state, on the demand for government regulations, on the extent of central bank independence, and on the quality of institutions.

The first stream of literature argues that trust is one of the critical determinants of economic performance. On one hand, trust facilitates the extension of anonymous exchange in the presence of incomplete contracts and imperfect information. On the other hand, the lack of trust increases the cost of transactions due to the need for enforcement of contracts by third parties. In this context, some studies show that trust is positively associated with economic performance. For instance, Zac and Knack (2001) provide evidence that a low trust environment diminishes investment and economic growth. Knack and Zac (2003) find that policies that increase trust, by increasing schooling and decreasing income inequality, efficiently stimulate economic prosperity. Knack and Keefer (1997) show that trust and civic cooperation are associated with better economic performance. Algan and Cahuc (2010) find that inherited trust explains the economic backwardness of developing countries and the economic differences between developed countries over the twentieth century. Peiro-Palomino et al. (2015) show that higher levels of trust and active associational activities lead to higher economic growth in Europe. Peiro-Palomina and Tortosa-Ausina (2013) find that trust is one of the drivers of economic development, and that the effect of trust on income decreases as an economy becomes wealthier. Horvath (2013) shows that trust exerts a favorable effect on economic growth especially in countries with a weak rule of law. Ahlerup et al. (2009) show that interpersonal trust has the highest growth effect at lower levels of institutional strength. Bjornskov (2012) show that trust promotes schooling and the rule of law directly, thereby indirectly enhancing economic growth. Bjornskov and Meon (2013) show that trust promotes schooling and institutional quality, which in turn spurs economic development.

Another stream of literature argues that trust can influence the accumulation of human capital and physical capital. Workers with high levels of human capital may be better able to cooperate and share information in an environment with higher levels of trust. Thus, trust increases the firm's demand for workers with higher levels of human capital. Similarly, trust would be accompanied by an increase in information dissemination about a larger variety of opportunities of investment in physical capital. In this context, Dearmon and Grier (2009) show that the positive effect of investment on economic development is enhanced in a high-trust environment. Dearmon and Grier (2011) show that trust has a positive effect on human capital and that an increase in trust in a low-trust country has a greater effect on the accumulation of physical capital than a similar increase in a high-trust country.

Some studies argue that there is a positive association between trust and innovation. Innovators need venture capitalists to finance their ideas despite the uncertainty of the outcome. Thus, the risky enterprise benefits if the venture capitalist and the innovator trust one another. In this context, Akcomak and Bas ter Weel (2009) show that social capital fosters innovation proxied by patent applications. Akcomak and Muller-Zick (2018) find that generalized trust and non-egoistic fairness have a robust impact on inventive activities.

Some studies argue that a low level of trust in public officials and private agents increases the demand for government regulations that impose restrictions on their actions. Aghion et al. (2010) provide evidence that the lack of trust generates demand for regulation even when people realize that the government is corrupt and ineffective. Pitlik and Kouba (2015) show that the effect of social trust on attitudes toward government intervention depends on confidence in state actors and in companies. Other studies argue that a high level of trust may increase the support for welfare state, as the former bolsters the belief that others will not use the system inappropriately. In this context, Algan et al. (2016) provide evidence for the support for large welfare states in both low-trust and high-trust countries. Bergh and Bjornskov (2011) show that high levels of trust and trustworthiness are necessary, but not sufficient, conditions for societies to develop successful universal welfare states. Bergh and Bjornskov (2014) conclude that trust facilitates welfare state policies that lower net inequality.

Another stream of literature argues that trust is expected to affect the extent of central-bank independence. In high-trust countries, it is easier and less costly for politicians to trust and delegate power to independent central bankers. In low-trust countries, the need for independence is stronger because the time-inconsistency problem is worse. Some studies, such as Berggren et al. (2014, 2016) find evidence to support this intuition.

Other studies examine the effect of trust on institutions. For instance, Bjornskov (2011) show that efforts of combating corruption are more effective in countries with high levels of social trust. Uslaner (2013) shows that low trust leads to high levels of corruption, which leads to more inequality, which in turn leads to lower trust and more corruption. Zmerli and Newton (2008) show a statistically significant association between social trust and confidence in political institutions and satisfaction with

democracy. Paxton (2002) show that trust and associational activity affect democracy which in turn affects social capital. Knack (2002) show that social trust is a predictor of governmental performance. Bjornskov (2010) finds that the trust-governance association reflects politicians in high-trust democracies being responsive to voters' demands for good governance.

This paper contributes to this literature as it focuses on the effect of social trust on democracy, while dealing with potential endogeneity and identifying the channels of transmission.

3. HYPOTHESIS

Trust can be essential for both the transition to a democratic system, and for an existing democratic system to consolidate. For the transition to a democratic system of governance, an environment with a high level of trust can facilitate antigovernment discourse and sharing grievances within trusting groups. Trusting groups can also be a venue for individuals to indicate their intent to oppose the autocratic state, thus mobilizing the critical mass essential for defiant collective action. This can pave the way to a democratic transition.

For a democratic system to succeed, citizens have to trust in elected officials to act on their behalf, in policy makers to enact policies to their benefit, in politicians and political parties to represent their interests, in institutions to effectively constrain politicians, in media outlets to expose political corruption, in other people's willingness and ability to support policies that are likely to improve their living conditions, and finally to trust in each other to abide by democratically established laws. Trust also makes it easier and less risky to participate in political affairs and to increase civic engagement, which helps create the civil society structures upon which a stable and functioning democracy depends. This allows a democratic system to consolidate. Accordingly, we introduce our first hypothesis:

Hypothesis 1: Trust has a positive association with democracy.

Trust can also enhance the quality of institutions which may be associated with political freedoms through the Hayek-Friedman hypothesis. In a high-trust environment, politicians and public officials are likely to be more trustworthy and less prone to use their positions for personal benefit. This implies that trust can lower the level of corruption. In this context, Bjornskov (2011) show that efforts of combating corruption are more effective in countries with high levels of social trust. Boix and Posner (1998) show that trust facilitates cooperation and compromises between bureaucrats, contributes to solving the principal-agent problem between the government and public agencies, and allows political compromises that include payoffs into the future. This implies that it is easier in this environment to agree on welfare enhancing reforms that

improve institutional quality. From the perspective of the government, high trust implies lower cost of monitoring citizens' adherence to the laws. Therefore, trust facilitates the initiation of contracts and lowers the enforcement costs of those contracts. These factors imply that trust enhances the quality of institutions.

On the other hand, the Hayek- Friedman hypothesis states that societies with high levels of political freedom must also have high levels of economic freedom. This implies that trust that leads to high quality economic institutions (less corruption, reform enactments, and low enforcement costs of contracts) is also associated with improved democratic governance. This allows us to test our second hypothesis:

Hypothesis 2: Trust enhances institutional quality which is associated with better democratic practices according to the Hayek-Friedman hypothesis.

Trust can also enhance the level of human capital which, in turn, makes a democratic transition more likely and allows a democracy to consolidate. Workers with high levels of human capital are more able to cooperate and share information in an environment with higher levels of trust. Thus, trust increases the firm's demand for workers with higher levels of human capital. Schooling, on the other hand, boosts the scope of awareness about public issues, allows people to follow political news, to learn about the constitutional provisions, to comprehend the agendas of political parties and candidates, to understand the nuances of the political process, to know their rights and the responsibilities of their rulers, and to be able to formulate an opinion on how to vote to protect their interests and to promote their beliefs. In addition, there are studies that show that education also enhances political participation. Glaeser et al. (2007) show that schooling increases the incentives for civic engagement and ensures a broader participation in the political process. Campante and Chor (2012) conclude that "more educated citizens display a greater propensity to engage in virtually all forms of political activity, including voting, attending political events, staying informed about politics, working on campaigns, contributing money, and signing petitions." Milligan et al. (2004) also find that educational attainment is related to measures of political interest and participation. Accordingly, higher levels of trust can increase educational attainment, which in turn increases awareness and participation in the political process. These factors cause the democratic system to consolidate. This allows us to test our third hypothesis:

Hypothesis 3: Trust increases educational attainment which has a favorable effect on democratic governance according to the modernization theory.

4. EMPIRICAL ESTIMATION

In the empirical estimation section, we first discuss the data and their sources, then

we discuss the empirical estimation, and finally we discuss the estimation results and the robustness tests.

4.1. Data Description

The sample includes many countries in the cross-section analysis¹, and in the panel data analysis². This sample is limited due to the availability of data in the World Values Survey. The summary statistics of the variables used in the analysis are included in Table 1.

4.1.1. Democracy

We use two indicators for democracy. The first is extracted from the Polity IV Project. The Polity score captures a country's political regime on a 21-point scale ranging from -10 (strongly autocratic) to +10 (strongly democratic). The paper uses the Polity2 variable which is a modified version of the Polity score by applying a simple treatment to convert instances of "standardized authority scores" (-66, -77, -88) to conventional polity scores within the range between -10 to +10. This indicator is denoted "Polity" in the analysis.

We also use the regime categorization following Cheibub et al. (2010) and Bjornskov and Rode (2020). The indicator takes the following values: Parliamentary democracies = 0, Mixed democracies (with weak presidents) = 1, Presidential democracies = 2, Civilian autocracies = 3, Military dictatorships = 4, and Royal dictatorships = 5. This indicator is denoted "Regime" in the analysis.

For the cross section, we use the data for 2014. For the panel data analysis, we use the averages of "Polity" and "Regime" in the years 1995-1999, 2000-2004, 2005-2009, 2010-2014, and 2015-2018.

¹ Armenia, Australia, Azerbaijan, Belarus, Chile, China, Colombia, Cyprus, Ecuador, Egypt, Estonia, Germany, Ghana, Iraq, Japan, Jordan, Kazakhstan, Kuwait, Kyrgyzstan, Lebanon, Malaysia, Mexico, Morocco, Netherlands, Nigeria, Pakistan, Peru, Philip- pines, Poland, Qatar, Romania, Russia, Rwanda, Slovenia, South Korea, Spain, Sweden, Taiwan, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United States of America, Uruguay, Uzbekistan, Yemen, and Zimbabwe.

² Albania, Algeria, Argentina, Armenia, Australia, Azerbaijan, Bangladesh, Belarus, Bosnia Herzegovina, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Cyprus, Czech Rep., Ecuador, Egypt, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Great Britain, Guatemala, Hungary, India, Indonesia, Iran, Iraq, Italy, Japan, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Lithuania, Malaysia, Mexico, Moldova, Montenegro, Morocco, Netherlands, New Zealand, Nigeria, North Macedonia, Norway, Pakistan, Peru, Philippines, Poland, Romania, Russia, Rwanda, Serbia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Tai- wan ROC, Thailand, Trinidad and Tobago, Tunisia, Turkey, Ukraine, United States, Uruguay, Venezuela, Vietnam, and Zimbabwe.

4.1.2. *Trust*

The trust variable is extracted from the World Values Survey. This is derived from the 2010-2014 wave for the cross-section data, and from the waves 1995-1999, 2000-2004, 2005-2009, 2010-2014, and 2017-2020 for the panel data. The survey question 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 percentage of people who responded “Most people can be trusted” is denoted “Trust” in the analysis.

4.1.3. *Instruments*

We use mean elevation and terrain ruggedness as our instrumental variables. The elevation variable measures the mean elevation in meters above sea level. The variable is extracted from the University of Harvard Center for International Development³. This variable is denoted “Elevation” in the analysis. The terrain ruggedness index is introduced in Nunn and Puga (2012). The index was originally devised to quantify topographic heterogeneity in wildlife habitats providing concealment for preys and lookout posts⁴. This variable is denoted “Rugged” in the analysis.

4.1.4. *Controls*

Several control variables are used in the analysis to check the robustness of the results. The first control variable is real Gross Domestic Product per capita derived from the Penn World Tables 8.0. The variable used is the real Gross Domestic Product at constant 2005 national prices. This variable is divided by the population to calculate the real Gross Domestic Product per capita. The logarithm of the real Gross Domestic Product per capita is used in the analysis. For the cross-section analysis, we use the indicator in 2011. For the panel data, we use 5-year averages from 1995-2019. This is included as a control variable since the modernization theory posits that higher income per capita has a positive association with democracy, as argued by Lipset (1959) and Huntington (1991).

The paper also uses an educational attainment indicator derived from the Barro and Lee International Data. The indicator used is the average years of secondary schooling for the population aged 15 and over. This indicator is denoted “Education”. For the cross-section analysis, we use the indicator in 2010. For the panel data, we use the values of 1995, 2000, 2005, 2010, and 2015. There are several studies that show that schooling promotes political participation which is a core component of democratic practices as shown in Glaeser et al. (2007), Campante and Chor (2012) and Milligan et al. (2004).

³ www.cid.harvard.edu/ciddata/geographydata.html.

⁴ The detailed definition of the variable can be found in <http://diegopuga.org/data/rugged/>.

The rule of law is used to reflect the quality of institutions, and is extracted from the World Bank Governance Indicators (WBI). The rule of law 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.” For the panel data, we use 5-year averages from 1995-2020. This indicator is included in light of the Hayek-Friedman hypothesis that posits that societies with high levels of political freedom must also have high levels of economic freedom, or in other words that democracy is associated with better institutional quality. This hypothesis is supported by evidence in Lawson and Clark (2010).

The paper includes 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 C.E. For countries under several colonial powers, the last one is counted provided that it lasted for 10 years or longer. Acemoglu et al. (2001) discuss how some practices by certain colonial powers created extractive institutions that are not consistent with democratic governance. Thus, the identity of the colonial power is expected to have an effect on democracy.

The ethnic and linguistic fractionalization indicators are used as another control variable⁵. Fractionalization measures the probability that two randomly selected individuals from a country are from different ethnic and linguistic groups. Diversity along ethnic and linguistic lines tend to formulate weaker institutions. In highly diverse societies, the group that dominates power tend to expropriate resources from the other groups and restrict the rights of the members of other groups. Therefore, we expect that higher fractionalization to have an adverse effect on democratic governance. We also include oil or gas discovery which is a time-invariant dummy for the presence of at least one petroleum (oil or gas) reserve. This variable is derived from Arbatli et al. (2020). Some scholars argue that the abundance of oil can have an adverse effect on political institutions, such as Tsui (2011) and Bruckner and Arezki (2011).

Finally, the paper uses an indicator for the suitability for irrigation agriculture derived from the Food and Agriculture Organization of the United Nations (FAO). The first indicator extracted is “Land area” which is the country area excluding area under inland waters and coastal waters. The second indicator extracted is the “Land area equipped for irrigation” which is land area equipped with irrigation infrastructure and equipment to provide water to crops, which are in working order. The variable used in the analysis is the “land area equipped for irrigation” divided by the “land area” which measures the proportion of land that is equipped for irrigation. This variable is denoted “Irrigation”. Some studies argue that irrigation allows landed elites in arid areas to monopolize water and arable land, and accordingly political power. Bentzen et al. (2017) show that countries with irrigation agriculture are less democratic than countries with

⁵ The dataset can be found at: http://www.anderson.ucla.edu/faculty_pages/romain.wacziarg/papersum.html

rained agriculture.

Table 1. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
Cross Section Sample					
Polity	47	4.3829	6.3846	-10	10
Regime	47	2	1.5322	0	5
Trust	47	22.6723	15.8172	3.2	66.1
Elevation	47	677.3824	623.5491	9.1667	2988.048
Rugged	47	1.3971	1.1068	0.037	4.287
Income per capita	47	9.2925	0.9944	7.1254	11.6225
Rule of law	47	0.0668	0.9547	-1.507	1.813
Ethnic Fractionalization	47	0.3681	0.2330	0.0019	0.8504
Linguistic Fractionalization	46	0.3109	0.2327	0.0021	0.8503
Irrigation	46	0.0460	0.0537	0.0001	0.2620
Oil or gas discovery	47	0.8372	0.3735	0	1
Education	41	3.6856	1.4322	0.68	6.84
Panel Sample					
Polity	360	5.4183	5.6867	-9	10
Regime	380	1.6992	1.3741	0	5
Trust	259	25.1042	15.4887	2.1	73.7
Income per capita	390	9.4614	0.9876	6.1383	11.3539
Education	340	3.6249	1.4108	0.328	7.915
Rule of law	389	0.1504	0.9967	-2.2500	2.0708

4.2. Ordinary-Least-Squares

This section estimates the effect of trust on democracy in the cross-section sample. The Ordinary Least Squares estimations is as follows:

$$Democracy_i = \alpha + \beta Trust_i + \gamma X_i + \varepsilon_i, \quad (1)$$

where $Democracy_i$ is the democracy indicator in country i . $Trust_i$ captures the level of trust in country i . X_i is a vector of control variables that are identified in the literature as determinants of democracy and are described in the data section. Table 2 includes the Ordinary Least Squares estimation results. Column 1 of table 2 shows the results of these estimations without control variables. The results show that trust has a statistically significant positive association with democracy, which implies that trust significantly explains cross country variations in democracy. The results also show that when we add income per capita in column 2, the coefficient of trust loses its significance while that of income per capita is positive and statistically significant. This continues to be the case when we add other control variables in columns 3, 4, 5 and 6. In column 7, we add the rule of law, and we drop income per capita. The results show that the rule of law has a statistically significant positive effect, while the coefficient of trust loses its significance. In column 8, we add both the rule of law and income per capita. The results show that the rule of law has a statistically significant positive effect, while the coefficients of income per capita and trust are not statistically significant.

We also conduct another estimation of the effect of trust on the rule of law. The estimation results, not included in the table for space considerations, show that trust has a statistically significant positive effect on the rule of law. Combining these results show that trust affects democracy but loses its significance when we add the rule of law. Trust also has a significant direct effect on the rule of law. These results imply that trust affects democracy indirectly through the channel of institutional quality. In this context, trust increases institutional quality which in turn is associated with democratic governance according to the Hayek-Friedman hypothesis.

Table 3 shows the effect of trust on democracy to be statistically significant without control variables in column 1. The results show that when we add income per capita in column 2, the coefficient of trust loses its significance while that of income per capita is positive and statistically significant. This continues to be the case when we add other control variables in columns 3, 4, 5 and 6. In column 7, we add educational attainment, and we drop income per capita. The results show that educational attainment has a statistically significant positive effect, while the coefficient of trust loses its significance. In column 8, we add both educational attainment and income per capita. The results show that only educational attainment has a statistically significant positive effect while the coefficients of both income per capita and trust lose their significance.

We also conduct another estimation of the effect of trust on educational attainment. The estimation results, not included in the table for space considerations, show that trust has a statistically significant positive effect on educational attainment. Combining these results show that trust affects democracy but loses its significance when we add educational attainment. Trust also has a significant direct effect on educational attainment. This provides evidence that trust increases educational attainment which has a favorable effect on democratic governance according to the modernization theory.

Table 2. Effect of Trust on Democracy (Hypothesis 1 and 2) Ordinary-Least-Squares Estimation

Trust	0.1286*** (0.0377)	-0.0272 (0.0631)	-0.0675 (0.0668)	-0.0275 (0.0826)	-0.0270 (0.0830)	0.0399 (0.993)	0.0503 (0.0730)	-0.0109 (0.087)
Income	0.5464*** (0.1742)	0.8974*** (0.216)	0.7348** (0.3072)	0.7270** (0.3048)	0.7220 (0.3787)			0.5229 (0.3310)
Institutions						3.2413** (1.4386)	2.8805* (1.4072)	
Fractionalization	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonial	No	No	No	Yes	Yes	Yes	Yes	Yes
Irrigation	No	No	No	No	Yes	Yes	Yes	Yes
Oil	No	No	No	No	No	Yes	Yes	Yes

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 3. Effect of Trust on Democracy (Hypothesis 1 and 3) Ordinary-Least-Squares Estimation

Trust	0.1412*** (0.0384)	-0.0342 (0.0614)	-0.0923 (0.0647)	-0.0788 (0.077)	-0.0771 (0.074)	-0.0274 (0.0960)	-0.0494 (0.0803)	-0.0600 (0.0888)
Income	0.6382*** (0.1707)	1.088** (0.2164)	1.0534*** (0.241)	0.9735*** (0.242)	1.0153*** (0.360)			0.1800 (0.578)
Education						2.4327*** (0.7632)	2.2239* (1.1006)	
Fractionalization	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonial	No	No	No	Yes	Yes	Yes	Yes	Yes
Irrigation	No	No	No	No	Yes	Yes	Yes	Yes
Oil	No	No	No	No	No	Yes	Yes	Yes

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 4. Effect of Trust on Democracy (Hypothesis 1 and 2) Two-Stage-Least-Squares Estimation

Trust	0.2167*** (0.0591)	-0.3302 (0.2334)	-0.1357 (0.0971)	-0.1845 (0.0943)	-0.1887 (0.0980)	-0.1383 (0.1363)	-0.1194 (0.2222)	-0.0871 (0.1009)
Income	1.2976*** (0.5300)	1.0993*** (0.2672)	1.2589*** (0.2909)	1.2854*** (0.3379)	1.3011*** (0.4493)			0.7308** (0.3098)
Institutions							4.7356** (2.1925)	3.1931** (1.2645)
Fractionalization	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonial	No	No	No	Yes	Yes	Yes	Yes	Yes
Irrigation	No	No	No	No	Yes	Yes	Yes	Yes
Oil	No	No	No	No	No	Yes	Yes	Yes
First Stage (p-value)	(0.0000)	(0.1372)	(0.0004)	(0.0002)	(0.0004)	(0.0081)	(0.4496)	(0.0017)
First Stage (F - statistic)	25.8512							

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 5. Effect of Trust on Democracy (Hypothesis 1 and 3) Two-Stage-Least-Squares Estimation

Trust	0.2282*** (0.0605)	-0.2563 (0.2482)	-0.0826 (0.0989)	-0.1189 (0.0915)	-0.0907 (0.0945)	-0.0097 (0.1380)	-0.0088 (0.1265)	-0.0125 (0.1151)
Income	1.2051* (0.5913)	1.0573*** (0.2931)	1.1970*** (0.2804)	1.0225*** (0.2881)	0.9546** (0.4557)			0.0578 (0.408)
Education							2.1959** (0.8903)	2.1307** (0.9982)
Fractionalization	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Colonial	No	No	No	Yes	Yes	Yes	Yes	Yes
Irrigation	No	No	No	No	Yes	Yes	Yes	Yes
Oil	No	No	No	No	No	Yes	Yes	Yes
First Stage (p-value)	(0.0000)	(0.3157)	(0.0018)	(0.0002)	(0.0001)	(0.0025)	(0.0137)	(0.0032)
First Stage (F - statistic)	27.9353							

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

4.3. Two-Stage-Least-Squares

Trust is, however, endogenous to democracy. This is because the core features of a democratic system include the transparency of the actions of policy makers and their accountability for their actions before the electorate. These features of a democratic system can enhance the sentiments of trust. Transparency allows the citizens to scrutinize the behavior of public officials, while accountability ensures that these officials are aware that they cannot act with impunity. Both can ensure the citizenry that they can trust the system of governance and trust the behavior of their elected officials, compared to other systems of governance. In addition, a democratic environment allows differences in opinion to be tolerated, conflicts of interest to be settled in a peaceful manner, state surveillance and disappearances to be diminished, and a variety of civil liberties to be expanded. These features create a climate that allows social trust to flourish. In this context, Ljunge (2014) provide evidence that democratic political institutions increase trust. Therefore, as much as trust can lead to better democratic practices, democracy can enhance the level of social trust as well.

In this case, a Two-Stage-Least-Squares estimation is conducted to estimate the effect of trust on democracy using instrumental variables. We use mean elevation and terrain ruggedness as instrumental variables for trust. Elevation and terrain ruggedness reflect natural barriers that inhibit communications and interactions between communities, and hinder trade and travel between societies. In specific, the sentiments of trust flourish between communities with continuous interaction and beneficial transactions. These specific topographic features can limit interactions between communities who are separated by these types of terrains. The lack of interaction can enhance the sentiments of suspicion towards others, promote the stereotypes that people believe about others, and cultivate a culture of antagonism towards those you do not know very well. These topographic features also lead to less travel and cultural exchange between communities who are separated by these natural barriers. This diminishes the level of knowledge and awareness about the others' way of life and cultural traits which can, in turn, enhance the sentiments of mistrust. In addition, rugged and irregular terrain can act as an impediment to trade and mobility between communities. This is because this type of landscape is harder to traverse as it may take longer to bypass these terrain obstacles, which makes transportation of products slower and costlier. Thus, it becomes harder to engage in trade across this particular landscape. Thus, these topographic features may not allow trust sentiments to flourish through mutually beneficial economic transactions.

To satisfy the exclusion restriction, these topographic variables cannot be linked to democracy. The argument in this case is that as much as direct democracy requires assembly of a large group of people which is facilitated by a flat terrain without lots of natural obstacles in terms of ruggedness or elevation, a representative democracy can prosper irrespective of the features of the terrain because it only requires the people's representatives to assemble in a specific location. Thus, the topographic features are

argued not to have an association with a representative system of democratic governance.

In this context, the estimation is conducted to address the question of whether trust, instrumented by elevation and terrain ruggedness, has a causal effect on democracy. The estimation is as follows

$$\text{Second Stage: } Democracy_i = \alpha + \beta Trust_i + \gamma X_i + \varepsilon_i, \quad (2)$$

$$\text{First Stage: } Trust_i = \delta Elevation_i + \sigma Rugged_i + \rho X_i + \xi_i. \quad (3)$$

The control variables X_i are a set of included exogenous variables. The error terms in the first and second stage regressions are ε_i and ξ_i , respectively. Mean elevation and terrain ruggedness are considered excluded exogenous variables in that they are used as instrumental variables to extract the exogenous component of trust but are excluded from the second stage regressions.

Column 1 of Table 4 shows the results of the estimation without control variables. The results show that trust has a statistically significant positive association with democracy. This provides evidence for the first hypothesis. The first stage results confirm the validity of the instrumental variables. The results also show that when we add income per capita in column 2, the coefficient of trust loses its significance while that of income per capita is positive and statistically significant. This continues to be the case when we add other control variables in columns 3, 4, 5 and 6. In column 7, we add the rule of law and drop income per capita. The results show that the rule of law has a statistically significant positive effect, while the coefficient of trust loses its significance. In column 8, we add both the rule of law and income per capita. The results show that both the rule of law and income per capita have a statistically significant positive effect, while the trust variable loses its significance. These results imply that trust affects democracy indirectly through the channel of institutional quality. In this context, trust increases institutional quality which in turn is associated with democratic governance according to the Hayek-Friedman hypothesis. This provides evidence for our second hypothesis.

Table 5 shows the effect of trust on democracy to be statistically significant without control variables in column 1. The first stage results confirm the validity of the instrumental variables. The results show that when we add income per capita in column 2, the coefficient of trust loses its significance while that of income per capita is positive and statistically significant. This continues to be the case when we add other control variables in columns 3, 4, 5 and 6. In column 7, we add educational attainment and drop income per capita. The results show that educational attainment has a statistically significant positive effect, while the coefficient of trust loses its significance. In column 8, we add both educational attainment and income per capita. The results show that only educational attainment has a statistically significant positive effect while the coefficients of both income per capita and trust lose their significance. This implies that trust

increases educational attainment which has a favorable effect on democratic governance according to the modernization theory. This provides evidence for our third hypothesis.

To test the robustness of our results, we use an alternative indicator for democratic governance from Cheibub et al. (2010) and Bjornskov and Rode (2020). Table 6 shows that when we include both income per capita and the rule of law, the coefficient of the trust variable loses its significance. This implies that trust affects democracy through the channel of institutional quality.

Table 6. Effect of Trust on Democracy (Hypothesis 1 and 2).
Two-Stage-Least-Squares Estimation

Trust	0.0123 (0.0348)	-0.0515 (0.0844)	-0.0002 (0.0276)
Income	0.0599 (0.1219)		0.2160** (0.0880)
Institutions		-0.0892 (0.8943)	-0.9128*** (0.2236)
Fractionalization	Yes	Yes	Yes
Colonial	Yes	Yes	Yes
Irrigation	Yes	Yes	Yes
Oil	Yes	Yes	Yes
First Stage (p-values)	(0.0081)	(0.4496)	(0.0017)

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 7. Effect of Trust on Democracy (Hypothesis 1 and 3).
Two-Stage-Least-Squares Estimation

Trust	-0.0239 (0.0366)	-0.0485 (0.0444)	-0.0249 (0.0345)
Income	0.1730 (0.1338)		0.3133** (0.1430)
Education		0.2875 (0.3583)	-0.3222 (0.2290)
Fractionalization	Yes	Yes	Yes
Colonial	Yes	Yes	Yes
Irrigation	Yes	Yes	Yes
Oil	Yes	Yes	Yes
First Stage (p-values)	(0.0025)	(0.0137)	(0.0032)

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 7 shows that when we include income per capita and educational attainment, the coefficient of trust loses its significance, while that of income per capita is positive and statistically significant. This implies that trust increases the level of education that is favorable to economic development, which in turn enhances democratic governance. These results confirm our previous findings and show that trust affects democracy indirectly through the channels of schooling and institutional quality.

Thus, the evidence in this paper suggests that schooling and institutional quality can be the channels of transmission from trust to democracy. This is consistent with the findings in Bjornskov (2012) who show that trust affects schooling and the rule of law directly, thereby indirectly enhancing economic growth, and Bjornskov (2009) who shows that trust has led to faster growth of schooling, and Bjornskov and Meon (2013) who show that trust increases education and enhances the quality of institutions, which in turn spurs economic development. Our paper differs from these studies in finding that trust affects democracy through the channels of schooling and institutional quality.

4.4. Panel Data

We also use a panel data and alternative econometric techniques to assess the robustness of our results. First, we estimate the following equation

$$Democracy_{it} = \alpha_i + \beta Trust_{it} + \gamma X_{it} + \delta_i + \mu_t + e_{it}, \quad (4)$$

where X_{it} is a vector of control variables that includes the logarithm of GDP per capita, educational attainment and the rule of law. For the panel data analysis, we use the averages in the years 1995-1999, 2000-2004, 2005-2009, 2010-2014, and 2015-2020 when appropriate. We do not include the time invariant control variables in this case. δ_i is the unobserved time-invariant individual country effect. The μ_t denotes a full set of time effects that capture common shocks to economic growth of all countries. e_{it} is the error term capturing all other omitted factors, such that $E(e_{it}) = 0$ for all i and t .

To test our second hypothesis, the Maximum Likelihood Random Effects estimation results are included in table 8 when Polity score is the dependent variable. The results show that trust has a statistically significant positive effect on democracy with no control variables in column 1. Trust, however, loses its significance when we include income per capita in column 2, while the coefficient of income per capita is statistically significant. Trust loses some of its significance when we include the rule of law in column 3, while the coefficient of the institutional quality is statistically significant.

Table 9 includes the estimation results when Regime is the dependent variable. The estimation results show that trust has a statistically significant positive effect on democracy with no control variables in column 1. Trust, however, loses its significance when we include income per capita in column 2, while the coefficient of income per capita is statistically significant. Trust also loses its significance when we include both income per capita and the rule of law in column 4. These results provide some evidence

that trust affects democracy through the channel of institutional quality as per the Hayek-Friedman hypothesis.

Table 8. Effect of Trust on Polity (Hypothesis 1 and 2).
Maximum Likelihood Random Effects Estimation

<i>Trust_{it}</i>	0.0561*** (0.0221)	-0.0308 (0.0194)	0.0420** (0.0195)	-0.0490*** (0.0191)
<i>Income_{it}</i>		0.7042*** (0.0783)		0.6679*** (0.0698)
<i>Institutions_{it}</i>			3.1217*** (0.7068)	2.6464*** (0.4457)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 9. Effect of Trust on Regime (Hypothesis 1 and 2). Maximum Likelihood
Random Effects Estimation

<i>Trust_{it}</i>	0.0155*** (0.0050)	-0.0025 (0.0050)	0.0200*** (0.0055)	0.0006 (0.0047)
<i>Income_{it}</i>		0.1660*** (0.0205)		0.1813*** (0.0176)
<i>Institutions_{it}</i>			-0.5335*** (0.1508)	-0.7717*** (0.1130)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

To test our third hypothesis, the Maximum Likelihood Random Effects estimation results are included in table 10 when Polity score is the dependent variable. The estimation results show that trust has a statistically significant positive effect on democracy with no control variables in column 1. Trust, however, loses its significance when we include income per capita in column 2, while the coefficient of income per capita is statistically significant. Trust loses its significance when we include educational attainment in column 3, while the coefficient of education is statistically significant. Trust also loses its significance when we include both income per capita and educational attainment in column 4.

Table 11 includes the estimation results when Regime is the dependent variable. Similar patterns are observed as in the previous table. This provides some evidence that

trust affects democracy through the channel of educational attainment as per the modernization theory.

Table 10. Effect of Trust on Plity (Hypothesis 1 and 3). Maximum Likelihood Random Effects Estimation

<i>Trust_{it}</i>	0.0561** (0.0221)	-0.0308 (0.0194)	-0.0002 (0.0184)	-0.0252 (0.0197)
<i>Income_{it}</i>		0.7042*** (0.0783)		0.4475*** (0.1410)
<i>Education_{it}</i>			1.4794*** (0.1665)	0.7160** (0.2907)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 11. Effect of Trust on Regime (Hypothesis 1 and 3). Maximum Likelihood Random Effects Estimation

<i>Trust_{it}</i>	0.0155*** (0.0050)	-0.0025 (0.0050)	0.0110** (0.0046)	-0.0034 (0.0048)
<i>Income_{it}</i>		0.1660*** (0.0205)		0.2662** (0.0358)
<i>Education_{it}</i>			0.1397*** (0.0472)	-0.2626*** (0.0699)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

To address the endogeneity problem, we use the instrumental variable estimation with random effects. Table 12 tests our second hypothesis where we use the ruggedness index as our instrumental variable for trust. The estimation results show that trust has a statistically significant effect on democracy with no control variables in column 1. In column 2, we include income per capita. Trust loses its significance, while the coefficient of income per capita is statistically significant. In column 3, we include the rule of law. Trust also loses its significance, while the coefficient of the rule of law is statistically significant. In column 4, trust also loses its significance when we include both income per capita and the rule of law. This provides evidence that trust affects democracy through the channel of institutional quality as per the Hayek-Friedman hypothesis.

Table 12. Effect of Trust on Democracy (Hypothesis 1 and 2). IV Random Effects Estimation

	Estimation			
<i>Trust_{it}</i>	0.2343*** (0.1174)	0.1128* (0.0664)	0.0935 (0.0815)	0.0642 (0.0816)
<i>Income_{it}</i>		1.8512*** (0.4404)		1.1237*** (0.4681)
<i>Institutions_{it}</i>			2.1123*** (0.7581)	1.5718** (0.8687)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 13. Effect of Trust on Democracy (Hypothesis 1 and 3). IV Random Effects Estimation

	Estimation			
<i>Trust_{it}</i>	0.2343*** (0.1174)	0.1128* (0.0664)	0.1548*** (0.0692)	0.1077 (0.0741)
<i>Income_{it}</i>		1.8512*** (0.4404)		1.6856*** (0.6165)
<i>Education_{it}</i>			0.7515*** (0.3129)	0.2256 (0.3742)
Observations	237	237	237	237

Notes: () includes heteroskedasticity consistent standard errors. * indicates statistical significance at 10%, ** at 5%, *** at 1%.

Table 13 tests our third hypothesis where we use the ruggedness index as our instrumental variable for trust. The estimation results show that trust has a statistically significant effect on democracy with no control variables in column 1. In column 2, we include income per capita. Trust loses its significance, while the coefficient of income per capita is statistically significant. In column 3, we include educational attainment. Trust loses its significance, while the coefficient of education is statistically significant. In column 4, trust also loses its significance when we include both income per capita and educational attainment. This provides evidence that trust affects democracy through the channel of educational attainment and income per capita as per the modernization theory.

5. CONCLUSION

This paper examines the effect of social trust on democracy. To address the issue of potential endogeneity, the paper conducts instrumental variable estimations where mean

elevation and terrain ruggedness are used as instruments to find an exogenous source of variation in trust. The results in cross section and panel data show that trust, instrumented by these topographic variables, explains cross country variations in democratic governance. The findings of this paper also indicate that trust affects democracy indirectly through enhancing institutional quality which is associated with democratic governance according to the Hayek-Friedman hypothesis, and through inducing the accumulation of human capital that is favorable to economic development, which in turn improves democratic governance according to the modernization theory. These results are robust with alternative datasets, various econometric techniques, and different democracy indicators.

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