# Is Trust a Driver of Patience? A Cross – Country Analysis

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**Abstract**
This paper finds that a one standard deviation increase in the variation of Trust leads to an increase of 10 percent of variation in Patience. This result is based on survey responses among 80,000 individuals across a wide range of different countries. Heterogeneity and endogeneity bias initially lead to correlational insignificance and under-estimation. We explain how unbiased estimation of this behavioral effect can be obtained by means of inventive search for controls and instrumental variables, and with appropriate econometric analysis of the collected data. The policy implication of our results is that generating and maintaining a trustful national environment is fundamental to encourage patience and other economy enhancing behavior.

**JEL Classification:** A13, B41, C36, D91, O50

**Keywords**
Trust — Patience — Genetic Distance — Behavioral Economics

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*"Ye who wish to reach the end of your journey, hurry not on; practice my advice, and learn deliberation. The Arab horse makes a few stretches at full speed, and is broken down; while the camel, at its deliberate pace, travels on night and day, and gets to the end of the journey."*

**Sa'di (1258 CE). *The Gullistan*. Chapter 6, part 4.**

## Introduction

Patience and trust are two behavioral variables that are seen as drivers of prosperity and well-being. This paper studies the hypothesis that trust is a fundamental driver for patience, at the individual level as well as at the aggregate national level. The Dutch played a pioneering role in the development of the modern economy. Trust was associated with religion[1], while patience was enforced by the fact that the Dutch supremacy in world trade originates from skills necessary to sail the oceans by only the force of wind. Patience and trust are crucial for economic prosperity. Our empirical research focuses on the mechanism that relates patience to trust, with trust acting as an alternative mechanism that influences choices with intertemporal consequences on time preferences (cf. Cohen et al., 2020).

A modern lucent example of the behavioral role of trust is the local Indian society. The combination of high poverty, distrust in the government, and densely populated cities has transformed personal relationships into a form of currency exchange. According to BBC reporter Nayantara Dutta *'paisa vasool'* or 'value for money' brings local shops and inhabitants together.[2] Shop owners actively forego or delay payment as investment for future loyalty in customer relationships. Customers are willing to pay a higher price for honesty: If the shop owner next door has the sought product, the trusted shop owner will make the customer aware of it. In a *paisa vasool* economy, money is only a minor part of any transaction. If the customer is short of money and is allowed to pay sometime in the near future, the customer is bestowed with trust while the shop-owner patiently awaits the customer to return to the shop regularly.

Patience and trust are associated. But how exactly, and for which reasons is yet an open field of research and discussion. This paper aims to contribute to that discussion through the empirical analysis of global representative data in relation to other country-specific variables. The paper is organized as follows. Second section presents a literature review. Third section introduces the data sources used. Fourth section presents summary statistics and correlations. Fifth section presents the results of the preferred econometric model. In sixth section policy implications are discussed. Seventh section concludes.

## The Relation between Trust and Patience: A Literature Review

This literature review is meant to highlight all relevant variables that have been shown to play a role in the research on

[1] *"God zij met ons"* (In God we trust) was written on the side of the Dutch Florin (guilder).

[2] See http://www.bbc.com/travel/story/20210528-how-the-indian-economy-is-built-on-generosity

patience, trust, and its relationship. All these variables will be used and compared in the empirical analysis below. Time preferences are historically determined by culture and geographical conditions. Maintaining a farm takes time. Bridging the time between harvesting seasons requires patience and trust. The "Columbian" exchange of crops, domestic animals, and peoples between the new and the old world began soon after Columbus discovered the Americas in 1492. Trade has flourished across the Atlantic Ocean ever since. Europe got to know some new staple crops this way, such as the potato. Crops discovered in Africa, for example sugar and coffee, were introduced into the Americas (Nunn & Qian, 2010). Galor and Özak (2016) argue that higher crop yield in the past leads to higher agricultural investment in future generations. They use the Columbian Exchange as a natural experiment to support this claim. A positive experience in agricultural investing encourages learning processes of adaptation, selection, and long-term orientation. According to the authors, individuals who happen to have ancestors from such beneficial geographical regions are characterized by higher patience. In addition, this exchange has positive effects on future investments in crop yield. The findings are robust against controlling for other geographical characteristics such as elevation, island and landlocked indicator variables. Variation in land quality is a key variable to explain long-lasting effects of early agricultural investment on long-term orientation in consecutive generations.

### Patience

Patience is defined as *"the capacity, habit, or fact of being steadfast despite opposition, difficulty, or adversity"*.[3] A patient person can withstand the temptation of direct gratification in favor of a higher payoff at a later point in time. The Money Earlier or Later scheme (MEL, Thaler (1981)) is an important experimental design for approximating patience. Behavioral researchers argue that defining a person's patience measured as a single number may not suffice.[4] Patience does not only depend on one's current mental state. It is also affected by the environmental setting this person happens to be in. Muraven et al. (1998), for example, show that patience is not fixed but depends on the level of fatigue instead. Just like walking and swimming, resilience against temptation appears to be a physical exercise. Countries with more patient populations appear to have higher per capita output and higher steady state capital stock (eg. Falk et al., 2018).

Intertemporal decision making is influenced by the magnitude, timing, and the sign of potential outcomes. The order in which delayed gratification and early consumption are compared has an effect on the revealed outcome (Loewenstein, 1988). When costs of delaying are high, highly impatient people are more likely to procrastinate (Reuben et al., 2015). Individuals fare better 'temptation wise' by abstaining from appealing low self-control options (Toussaert, 2018). Patience is found to be positively related with cognitive ability (Dohmen et al., 2010).

### Trust

Trust is defined as is *"assured reliance on the character, ability, strength, or truth of someone or something"*.[5] Trust is ever-present to almost all economic actions (Arrow, 1974). Brülhart and Usernier (2012) distinguish trust from altruism. The ability to trust is inherited and has a causal effect on economic growth (Algan & Cahuc, 2010).

An example of the importance of trust at the country level is the historical Habsburg affiliation that increases current trust and reduces corruption in courts and police (Becker et al., 2016). In Eastern European countries where the multiethic Hapsburg Empire border crosses current country territories, households within and outside the empire borders have been compared. The Hapsburg dynasty and bureaucracy ceased to exist in 1918, but a thorough econometric analysis shows that living within the former borders of the empire today is still connected with higher trust in the local juridical system.

### Patience and Trust

The relationship between patience and trust has been investigated primarily in psychology. Michaelson et al. (2013) test the effect of social trust on delaying gratification. The study's finding *"[. . . ] provide the first demonstration of a causal role for social trust in willingness to delay gratification, independent of other relevant factors, such as self-control or reward history"* (Michaelson et al., 2013, p. 1).

An exemplary situation from the social sciences where patience and trust going hand in hand is schooling. Patience can be partly taught or enhanced in school and individuals can learn to trust and be trustworthy. Additional years of (voluntary) schooling is correlated with more patience, and higher ability to trust (Oreopoulos & Salvanes, 2011). Spending time learning is costly. Students (and their sponsors) are willing to forego an income now because it is to be expected that the signal of a degree means higher earnings in the future. Hence, going to school depends on patience and on trust related to the value of the certification of a degree. Classroom interventions targeting patience are shown to have a long term positive effect on socioeconomic status (Alan & Ertac, 2018).

## The Global Preference Survey Data and Auxiliary Data Sources

The main data source on patience and trust is the Global Preference Survey (GPS), which is a globally representative dataset on risk and time preferences.[6] The GPS data were collected as a part of the 2012 Gallup World Poll. Countries

[3] "Patience." *Merriam-Webster.com Dictionary*, Merriam-Webster, https://www.merriam-webster.com/dictionary/patience.

[4] This is one of the main results from the Marshmallow Tests: See Mischel & Ebbesen (1970) for the presentation of the test and Mischel et al. (1989) for the longitudinal study results.

[5] "Trust." Merriam-Webster.com Dictionary, Merriam-Webster, https://www.merriam-webster.com/dictionary/trust.

[6] See https://www.gallup.com/analytics/318923/world-poll-public-datasets.aspx

have been selected to maintain a representative global sample. All continents and all (climatic) regions are included, favoring non-neighboring and culturally different countries.[7]

## Measuring Patience

An individual's level of patience results from the following weighting function:

$$\text{"}Patience = 0.7115185 \times Staircase\ patience + 0.2884815 \times Will.\ to\ give\ up\ sth.\ today\text{"}$$

with the weighting of patience measuring elements depending on z-scores per survey item (individual level) resulting from the experimental validation procedure (Falk et al., 2016). Sums of weights are set to equal to one.

*[Staircase patience]* is a quantitative survey element, where the individual is asked to state binary MEL preferences for five consecutive times.

*[Will. to give up sth. today]* is a qualitative survey element, where the individual is asked to state on a 1-10 scale how likely he or she is to postpone a smaller benefit today for a greater benefit in the future.

## Measuring Trust

An individual's level of trust is based on a single qualitative survey item, where the individual is required to state on a 1-10 scale if they agree with the statement that *"I assume that people have only the best intentions"*. No additional weighting is required. At the individual level, raw data has been transformed such that (A) the preference measure has mean zero and (B) standard deviation is equal to one. This way, the variables *Patience* and *Trust*, have been normalized for comparison purposes among countries. The unconditional correlation between *Patience* and *Trust* at the country level is positive, insignificant, and equal to 0.190.[8]

### Auxiliary Data Sources

The literature review highlighted numerous variables, which might have an effect on the relationship between trust and patience. These variables are gathered from a variety of data sources, including CIA World Factbooks, World Population Review and World Bank, as well as data that have been collected earlier by Spolaore and Wacziarg (2018) and Ashraf and Galor (2013).

### The World Factbook by the CIA

Searching for appropriate control variables at the country level, which are related to the associations between patience and trust mentioned above, and show sufficient variation, the World Factbook is a rich source of information. It is produced and maintained by the US Central Intelligence Agency (CIA), and draws from a multitude of reliable sources either part of or linked to the US government.[9] We collected the following data from the World Factbook for our analysis:

- *Literacy rate:* The percentage of people that have reached the age of 15 and are capable of reading;
- *ln(Imports):* National imports data in US dollars. Imports data is defined as the total US dollar amount of produce imports based on exchange rate.
- *Landlocked:* From the list of landlocked countries a dummy variable has been created. A landlocked country is characterized by sharing no borders with a navigable water mass as passageway to another country; 100 percent of the border leads directly into another country.
- *Island:* From the list of island countries a dummy variable has been created. An island, as direct opposite of a landlocked country, shares the entire border with a sea or ocean. It is impossible to travel into another nation by means of transport via land.

### The World Population Review Database (WPR)

The WPR relies on data from the UN and the US census bureau.[10] From this source we collected the following variables.

- *Urban Population:* The percentage of the population living in an urban area. An urban area is defined as an inhabited space with no wide gaps between structures. The majority of the population is not engaged in fishing or agriculture.
- ln(GDP per Capita): The GDP per Capita data in US dollars.
- Density: The number of people per square kilometer;
- Population Growth Rate: The percentage change in population from 2019 to 2020.

## Genetic Distance

Spolaore and Wacziarg (2018) provide a dataset[11] on ancestral distance with direct comparison between countries. Weighted genetic distance is defined as the expected genetic distance between two random individuals of two countries. The key ingredient, different in the updated dataset, is the microsatellite data from Pemberton et al. (2013) on genetic relationship between peoples and different chimpanzees at the population level.

[7] Based on these criteria 76 countries are part of the GPS survey. See Table 1 in Falk et al. (2018) online appendix for detailed descriptions.

[8] See also Table 4 on p1664 in Falk *et al.* (2018).

[9] See https://www.cia.gov/the-world-factbook/about/copyright-and-contributors/ for a full description and listing of sources.

[10] See https://worldpopulationreview.com/about for a full statement on data presentation and accessibility.

[11] See Spolaore and Wacziarg (2009) for the old genetic distance dataset and a detailed analytical framework.

Genetic distance is based on gene form (allele) and is equal to zero if and only if the genetic distributions are identical across populations. The longer two peoples are separated, the more the genes can evolve in different directions, either by means of random drift or natural selection. Genetic *"distances [. . . ] are based on heterozygosity, the probability that two alleles at a given locus selected at random from two populations will be different"* (Spolaore & Wacziarg, 2009, pp. 480-f). All enlisted countries are directly comparable. Nicaragua, the country with the lowest average patience in the Gallup dataset, is the reference state.

**Bio-geographical Variables**

Ashraf and Galor (2013) provide a rich dataset on country-level "bio-geographical" variables. All the quotes from this section can be found in the online appendix from this paper where not noted otherwise.

### Variation in suitable land

*"The standard deviation of [a geospatial index of the suitability of land for agriculture, based on ecological indicators of climate suitability for cultivation, such as growing degree days and the ratio of actual to potential evapotranspiration, as well as on ecological indicators of soil suitability for cultivation, such as soil carbon density and soil pH] across half degree grid cells that are located within a country's national borders."* (p.4)

The United Arab Emirates is characterized by the lowest variation in suitable land (0.003). It is a country that is entirely covered by desert sand. Mexico, meanwhile, is the country with the highest variation (.396). This country consists of desert regions in the north, rainforests in the south, and varies in between.

### Variation in elevation

*"The standard deviation of elevation [of a country, in thousands ok kilometers above sea level, calculated using geospatial data at the 1-degree resolution] across the grid cells (at a 1-degree solution) that are located within a country's national borders."* (p.4) The country with the lowest variation in elevation is Estonia (.031). The one with the highest variation is China (6.176).

### Percentage of arable land

The World Bank definition of arable land is *"Arable land includes land defined by the [Food and Agriculture Organization of the United Nations] (FAO) as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land fallow. Land abandoned as a result of shifting cultivation is excluded"*. Arable land is fit for crop cultivation does not mean the amount of landmass that is possibly cultivatable. The *Percentage of arable land* is *"the fraction of a country's total land area that is arable, as reported for the year 2000 by the World Bank's World Development Indicators online"*. Botswana is the country with the lowest percentage of arable land (0.007%). Bangladesh is the most heavily cultivated country (0.621%).

### Distance to waterways

*"The distance, in thousands of kilometers, from a geospatial grid cell to the nearest ice-free coastline or sea-navigable river, averaged across the grid cells that are located within a country's national borders."* The country with the lowest average travelling distance to a waterway is the Phillipenes, a country consisting of many Islands (0.027). The country with the highest average is Russia (2.386).

### The Old World

The indicator variable is equal to 1 if the country is known to western civilization (Europe, Asia, or Africa) before the discovery of the Americas, dubbed as the new world.

## Summary Statistics and Correlational Analysis

Besides *Trust*, all the other variables mentioned above may be relevant to explain *Patience*. This depends on how their country-level variation associates with *Patience*. Summary statistics of all relevant variables are presented in Table 1. Correlations of all the variables are presented in Table 2. Correlations of variables that are most likely to be endogenous or subject to reversed causality are presented in Table 2A. These variables are directly or indirectly affected or determined entirely by politics. Political power is directly or indirectly distributed by choice. Correlations with variables that are exogenous are presented in Table 2B. The *Landlocked* and *Island* dummies are positively correlated with *Patience* and negatively correlated with Trust. *Distance-to-waterway* is negatively correlated with both *Patience* and *Trust*. Belonging to the *Old World* is positively correlated with both variables. *Population Density* is positively correlated with *Patience* and negatively correlated with *Trust*. The percentage of Arable land within a country is hardly correlated with *Patience* and negatively correlated with *Trust*. Variation in elevation is negatively correlated with both *Patience* and Trust. The relationship between *Variation in land quality* and *Patience* is positive. *Variation in suitable land*, that is land that can be, but is not necessarily transformed into arable land, is negatively correlated with *Trust*. Remarkably, this the only statistically significant correlation.

The finding that *Patience* and *Trust* are not significantly correlated with most auxiliary variables indicates they are not predetermined by natural features and geographic conditions within a country. *Arable land* and *Variation in suitable land* form the elements with direct effect on early agricultural development. Note also the close to zero correlation between *Arable land* and *Patience*. The observed differences in the correlational relationships of suitable and arable land may indicate that higher variation drives "early" specialization, maybe resulting from the necessity for having to think more

**Table 1.** Summary Statistics of All Relevant Variables

| ***Variable*** | **Obs** | **Mean** | **Std. dev.** | **Min** | **Max** |
|---|---|---|---|---|---|
| *Patience* | 76 | - .0034225 | .3696629 | -.61252 | 1.07145 |
| *Trust* | 76 | -.0221458 | .2777946 | -.70644 | .60902 |
| | 76 | .1842105 | .3902316 | 0 | 1 |
| *Landlocked* | | | | | |
| *Island* | 76 | .0394737 | .1960129 | 0 | 1 |
| *Old World* | 76 | .7894737 | .4103913 | 0 | 1 |
| *Population Density* | 76 | 139.1447 | 166.0657 | 3 | 1105 |
| *Variation in Land quality* | 76 | .2148816 | .0870854 | .0033592 | .3957673 |
| *Variation in Elevation* | 76 | .4259937 | .3560829 | .0313992 | 1.738993 |
| *Distance to Waterway* | 76 | .3161919 | .4369561 | .0273757 | 2.38558 |
| | 76 | .1898724 | .1495548 | .0067 | .621 |
| *Arable Land* | | | | | |
| *Ln (Exports)* | 76 | 24.53501 | 1.926012 | 20.47992 | 28.40113 |
| *Ln (Imports)* | 76 | 24.71651 | 1.709676 | 20.98023 | 28.49011 |
| *Genetic Distance* (*) | 72 | .0375525 | .0104895 | .027283 | .0633103 |

(*) Genetic distance from Nicaragua.

**Table 2A.** Pairwise Correlations of Patience, Trust, and the Endogenous Control Variables

| | *Patience* | *Trust* | *Literacy rate* | *Population growth rate* | *Urban population* | *ln (GDP per capita)* | *Health expenditures* | *Education expenditures* |
|---|---|---|---|---|---|---|---|---|
| *Patience* | 1 | | | | | | | |
| *Trust* | 0.1899 | 1 | | | | | | |
| | (.1004) | | | | | | | |
| *Literacy rate* | .3670** | .1707 | 1 | | | | | |
| | (.0011) | (.1404) | | | | | | |
| *Population growth rate* | -.1976 | -.1398 | -.6920** | 1 | | | | |
| | (.0870) | (.2284) | (.0000) | | | | | |
| *Urban population* | .3779** | .2765* | .6129** | -.3970** | 1 | | | |
| | (.0008) | (.0156) | (.0000) | (.0004) | | | | |
| *ln (GDP per capita)* | .6578** | .3059** | .7495** | -.5697** | .7507 | 1 | | |
| | (.0000) | (.0072) | (.0000) | (.0000) | (.0000) | | | |
| *Health expenditures* | .5085** | .0004 | .3247 | -.3070** | .3229** | .493** | 1 | |
| | (.0000) | (.9973) | (.0042) | (.0070) | (.0044) | (.0000) | | |
| *Education expenditures* | .4593** | .1248 | .3983** | -.1922 | .4670** | .3976** | .3821** | 1 |
| | (.0001) | (.3218) | (.0010) | (.1252) | (.0001) | (.0010) | (.0017) | |

Significance levels: * = 5%, ** = 1% . Note: Standard errors in parentheses

**Table 2B.** Pairwise Correlations of Patience, Trust, and the Exogenous Control Variables

| | *Patience* | *Trust* | *Landlocked* | *Island* | *Old World* | *Density* |
|---|---|---|---|---|---|---|
| *Patience* | 1 | | | | | |
| *Trust* | 0.1899** | 1 | | | | |
| | (0.1004) | | | | | |
| *Landlocked (D)* | 0.0034 | -0.1684 | 1 | | | |
| | (0.9770) | (0.1460) | | | | |
| *Island (D)* | 0.0215 | -0.0900 | -0.0963 | 1 | | |
| | (0.8537) | (0.4396) | (0.4078) | | | |
| *Old World (D)* | 0.0461 | 0.0313 | 0.1621 | 0.1047 | 1 | |
| | (0.6927) | (0.7883) | (0.1617) | (0.3681) | | |
| *Density* | 0.1021 | -0.0967 | -0.0494 | 0.2292* | 0.2393* | 1 |
| | (0.3803) | (0.4062) | (0.6718) | (0.0464) | (0.0373) | |
| *Variation in Suitable Land* | 0.1572 | -0.1997 | 0.0188 | -0.1009 | -0.2562* | 0.0135 |
| | (0.1751) | (0.0837) | (0.8721) | (0.3856) | (0.0255) | (0.9080) |
| *Variation in Elevation* | -0.0903 | -0.0082 | -0.0011 | -0.0593 | -0.3699** | -0.1347 |
| | (0.4380) | (0.9440) | (0.9923) | (0.6108) | (0.0010) | (0.2459) |
| *Distance to Waterway* | -0.0744 | -0.0216 | 0.2763* | -0.1311 | 0.0270 | -0.2051 |
| | (0.5232) | (0.8529) | (0.0157) | (0.2588) | (0.8166) | (0.0755) |
| *Arable Land* | 0.0021 | -0.1413 | 0.1288 | -0.0541 | 0.3714** | 0.4739** |
| | (0.9859) | (0.2234) | (0.2676) | (0.6426) | (0.0010) | (0.0000) |
| | *Variation in Suitable Land* | *Variation in Elevation* | *Distance to Waterway* | *Arable Land* | | |
| *Variation in Suitable Land* | 1 | | | | | |
| *Variation in Elevation* | 0.4082** | 1 | | | | |
| | (0.0003) | | | | | |
| *Distance to Waterway* | -0.0284 | 0.1550 | 1 | | | |
| | (0.8076) | (0.1812) | | | | |
| *Arable Land* | 0.0959 | -0.2646* | -0.2548* | 1 | | |
| | (0.4098) | (0.0209) | (0.0264) | | | |

Significance levels: * = 5%, ** = 1% . Note: Standard errors in parentheses

carefully about the best possible way and the most optimal moment to produce and transport goods to make a living.

## Econometric Analysis

When, as in our data, survey questions to measure variables *Patience* and *Trust* are answered by respondents on the basis of information not observable to the researcher, it is likely that Trust is correlated with *Patience* as well as with the error term of the equation. Simple regression results will therefore suffer from omitted variable or endogeneity bias. The endogeneity of *Trust* can be tested using a two stage least square regression model with valid and strong instrumental variables. The econometric model will then be as follows

$$Patience = \beta_0 + \beta_1 * Trust\_IV + \beta_2 * Variation\ in\ suitable\ land + \beta_3 * Variation\ in\ elevation$$

*Trust_IV* is the first stage instrumental variable for *Trust*. Three potential instrumental variables are considered. *Ln(Export)* and *ln(Import)* are used as proxies for international trade.

**Table 2C.** Pairwise Correlations of Patience, Trust, and the Instrumental Variables

| | *Patience* | *Trust* | *ln (Exports)* | *ln (Imports)* | *Genetic distance* |
|---|---|---|---|---|---|
| *Patience* | 1 | | | | |
| *Trust* | 0.1899 | 1 | | | |
| | (.1004) | | | | |
| *ln (Exports)* | 0.5657** | 0.3458** | 1 | | |
| | (.0000) | (.0022) | | | |
| *ln (Imports)* | 0.5573** | 0.3541** | 0.9733** | 1 | |
| | (.0000) | (.0017) | (.0000) | | |
| *Genetic distance* | -.2921* | -.3759** | -.4340** | -.4728** | 1 |
| | (.0128) | (.0011) | (.0001) | (.0000) | |

Significance levels: * = 5%, ** = 1% . Note: Standard errors in parentheses

Trade existed before international law came into existence and (oversee) transport of traded goods started long before the era of global communication. Trust in form of family, common language, or cultural bounds is what ties both ends of a transactional partnership if relying on legal enforcement of a contract in not an option. Renown examples include Genoese and Jewish traders who were able to communicate in a uniform language and settle disputes among themselves. These peoples dispersed over the 'known' world and settled in, or generated, trading hubs in strategic locations (Pomeranz & Topik, 2017).

A third instrumental variable collected for this analysis is *Genetic Distance*. This variable, developed by Spolaore and Wacziarg (2018), is an inverse proxy variable for within country homogeneity – shorter distance implies more homogeneity. It is stronger and more general than the often used *Share of Protestants in a Country* (Le Pargneux and Zeitoun, 2023).

The correlational relationships of the instrumental variables with *Patience* and *Trust* are presented in Table 2C. All correlations are at least significant at the five percent significance level. *Ln(Export)* and *ln(Imports)* are positively correlated with both *Patience* and *Trust*. *Genetic distance* is negatively correlated with *Patience* and *Trust*. The high correlation of 0.973 between *ln(Export)* and *ln(Imports)* is to be expected. The infrastructure necessary for international trade enables importing as well as exporting goods (Francois & Manchin, 2013). Many trade relationships are bilateral with products travelling up and down the same route.[12] One possible caveat is that both international trade indicators have higher correlations with Patience than with Trust. This may jeopardize the validity of trade indicators. From a correlational point of view *Genetic distance* is the more promising instrumental variable.

To control for possible omitted variable and endogeneity bias, the variable Trust is instrumented (*Trust-IV*) by *Genetic distance, ln(Exports),* and *ln(Imports)*. There are only 72 observations for the instrumental variable *Genetic distance*. Nicaragua is the comparison country, and three more values are missing, namely for Bosnia-Herzegovina, Serbia, and Tanzania.

A by-product of using an instrumental variable approach is to get rid of heteroscedasticity in the error terms. Using the instrument of *Genetic Distance* has been successful in resolving the issue of heteroscedastic errors. The Breusch-Pagan / Cook-Weissberg test is no longer significant at the five percent level. The null hypothesis of no endogeneity of the Durbin and Wu-Hausman tests can't be rejected at any significance level either. This is, however, not true for the other two instrumental variables. The Durbin and Wu-Hausman tests of endogeneity of *ln(Exports)* and *ln(Imports)* strongly reject the null of no endogeneity. Of all model specification tests that we have performed we conclude that the model with *Trust* instrumented with *Genetic distance* in the first stage of the 2SLS regression is the best model to describe our data. The estimation of the preferred empirical econometric model then becomes

$$\begin{aligned} Patience = \hat{\beta}_0 \; &+ \hat{\beta}_1 * Trust\_IV \\ &+ \hat{\beta}_2 * Variation\ in\ suitable\ land \\ &+ \hat{\beta}_3 * Variation\ in\ elevation \end{aligned}$$

Table 3 presents the model's estimated coefficients, standard errors, significance levels, and associated test statistics.

## Economic interpretation of the estimation results

The estimated parameter for *Trust_IV* is $\hat{\beta}_1$=0.754 ($s.e.$=.118), and is significantly different from zero at a 5 percent level.

[12] According to ourworldindata.org, 57.76% of the world's country pairs have bilateral trade arrangements, while 25.58% are characterised as non-trading pairs, and only 16.66% have unilateral trade arrangements in the year 2014. See https://ourworldindata.org/grapher/distribution-of-bilateral-and-unilateral-trade-partnerships?country= OWID_WRL

**Table 3.** Pairwise Correlations of Patience, Trust, and the Instrumental Variables

| **Dependent Variable: *Patience*** | |
|---|---|
| | IV Estimates |
| *Trust-IV* | .754** |
| (IV = Genetic Distance from Nicaragua) | (.353) |
| *Variation in Land Quality* | 1.795*** |
| | (.596) |
| *Variation in Elevation* | -.286** |
| | (.131) |
| *Constant* | -.230* |
| | (.118) |
| Wald $\chi^2$ (3) | 10.75 |
| $P > \chi^2$ | .013** |
| Root MSE | .359 |
| $F(n_1, n_2)$ | F (1,68) |
| N | 72 |
| Min(*eigenvalue*) | 15.833 |
| **Breusch-Pagan / Cook-Weisberg Test for Heteroscedasticity** | |
| $\chi^2$ (1) | 3.79 |
| $P > \chi^2$ | .051* |
| **Endogenous test: $H_0$ = exogenous** | |
| Durbin | 2.014 |
| $P > \chi^2$ | .156 |
| Wu-Hausman | 1.928 |
| $P > F$ | .170 |

Significant at 10%, ** significant at 5%, *** significant at 1%. Standard errors in parentheses

This is more than double the size compared with the non-instrumented estimated parameter 0.327 for *Trust*, and four times the size of the unconditional correlation between the two behavioral variables.[13] For the average country, keeping everything else constant, a one standard deviation increase in Trust leads to an increase in Patience of $\hat{\beta}_1 * \Delta(Trust\_IV)$= 0.754*0.134=0.101. Given that Patience is standardized with zero mean and unit standard deviation, this implies an increase of 10 percent. The estimated IV parameter of Variation in suitable land ($\hat{\beta}_2$=1.795 ; *s.e.*=.596) is significantly larger than zero at a 1 percent level.

Countries with high mixtures of possible options for land use are characterized by higher patience as reported by their own citizens. This finding could be explained by location-specific human capital accumulation Michalopoulos (2012) and positive spillover. Protean lay of the land makes individuals learn better to cope with local issues for which patience can be beneficial. In countries with little land variation people deal with similar issues for miles to come. They don't need to learn a lot from their direct neighbors. Conversely, in the case of high land variation, people living in close proximity are dealing with a variety of different problems. Hence, the spill-over effect originates from people with different location-specific human capital with only little travel distance between them that could be obliged to solve a common problem learning from each other in the process.

The parameter of Variation in elevation ($\hat{\beta}_3$=-0.286; *s.e.*= .131) is negative and significant at a 5 percent level. One possible explanation of this finding is when reaching out is more difficult, people living relatively close by have historically communicated less among one another. Traveling the same air-distance in a mountainous environment takes longer than in areas with less elevation. Greater variation in elevation within a certain area leads to more dialects according to Michalopoulos (2012), who claims that local linguistic variation is positively correlated with elevation. This suggests a reduction of communication amongst people when Variation in elevation is large.

Combining the IV estimation results with the averages of *Trust_IV* (=-0.017), *Variation in suitable land* (=0.212), and *Variation in elevation* (=0.430) allows us to compute the country average for Patience as follows

$$\begin{aligned}\widehat{Patience} &= \hat{\beta}_0 + \hat{\beta}_1 * \overline{Trust\_IV} + \hat{\beta}_2 * \overline{Variationinsuitableland} \\ &\quad + \hat{\beta}_3 * \overline{Variationinelevation} \\ &= -0.230 + 0.754 * (-0.017) + 1.795 * (0.212) \\ &\quad - 0.286 * (0.430) \\ &= 0.015\end{aligned}$$

This allows for the possibility to determine countries above and below the mean level of Patience of our sample of countries. This provides a helpful tool for policy analysis.

## Policy implications

Trust is vital for collaboration. Patience is a cornerstone of economic prosperity. Educational programs in developed countries generally focus solely on patience. Society and the functioning of modern democratic government systems, however, rely on trust. Evidence in this paper suggests that lack of trust is detrimental for patience. Individuals that are characterized by high patience and high self-control are more likely to have good careers and live healthier. Considering that these results indicate a positive relationship between patience and trust, it may be important to account for and create an environment of trust when increasing patience is the goal of an intervention. Experiments and surveys with the goal

[13] See Pfann and Pfann (2024) for an unabridged presentation of estimation methods and theoretical formulations.

to investigate time preferences (patience, self-control) might unintentionally report findings that at least in part are driven by trust and trust-worthiness. Policies based on these findings might therefore be misguided and may target symptoms of impatience that are actually driven by distrust. Participants in MEL or marshmal-low test style experiments that choose direct gratification are per se considered (highly) impatient. But they might lack trust in truly acquiring the promised higher (financial) reward and will therefore get hold of what is in front of them rather than take the risk of missing the opportunity to acquire a free lunch, even when this individual is in fact generally a patient person.

## Conclusion

This paper investigates the relationship between trust and patience across countries. The two behavioral variables that are considered to be of relevance for societal development and economic well-being. Being patient only pays off if there is trust in attaining the increased utility from waiting. Distrust is disadvantageous for economic processes. Looking losely at the correlation between trust and patience, a positive, but insignificant relationship is observed. As trust grows, so does the variation in patience. But analysis of the relationship in more depth finds that variation in trust is strongly positively correlated with variation in patience. On average, a one standard deviation increase in the variation of trust leads to an increase of at least 10 percent of variation in patience. From a policy point of view, the implication of this result is that generating and maintaining an environment of trust is essential to encourage patience an economy enhancing behavior.

This paper asserts that trust is a vital driving force of patience. Building bridges is necessary to increase the size of markets. Long-lasting bridges are generally not built on a single day. It takes trust and patience. The main policy implication of our results is that generating and maintaining a trustful national environment is fundamental to encourage patience, a proven economy enhancing behavior.

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