

Cultural Transmission of Trust

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Abstract

Recently, the importance of trust in economic decision making and its effect on economic variables has been established by a number of influential contributions. However, the mechanisms underlying the transmission of trust have not been well studied. In this paper I try to disentangle the effect of institutions and culture on the transmission of trust using epidemiological approach. I study different immigrant generations and their level of trust in the United States using the General Social Survey from 1978 to 2012. The key contribution of this paper is to analyze the transmission of trust beyond the first two generations and consider the immigrants from different countries separately rather than grouping them based on cultural proximity. I find that there is a lot of persistence in the level of trust for the immigrants. The country of origin trust explains systematic differences among the immigrants even after three generations for the immigrants. While immigrants from the European descent converge to a higher level of trust than the United States after three generations, immigrants from Africa and Puerto Rico do not change their average trust at all even after four generations. I then show that there is heterogeneity in the cultural transmission of trust based on the country of origin initial conditions. For instance, immigrants from weak institution country take fewer generations to lose association with their country of origin trust than the immigrants from country with strong institution. The results give insight into the culture v.s. institutions as the base for formation of beliefs.

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1 Introduction

Trust has been widely studied phenomenon in sociology, management, political science, and recently, economics. Trust has been attributed as one of the key cultural factors responsible for economic growth¹. According to Algan and Cahuc (2010), the income per capita of Africa would be 529 percent higher had they had the same level of trust, after controlling for numerous variable, as the Swedes. This leads to pertinent questions: what are the determinants of trust? Is trust a variable that can be changed quickly or does it take time to change? How can the average trust level of low trust countries can be increased? We would present some facts about how trust evolves from one generation to the other, how culture affects trust, and how culture has heterogeneous effect on the evolution of trust for different group of countries.

Broadly speaking, not only the beliefs and preferences of individuals (or culture), but also the economic environment and institutions in which those individuals reside determines the level of trust. For instance, if Swedes have stronger trust towards generalized population than, say, Africans, this does not necessarily mean that the Swedes culture itself promotes stronger trust as compared to African culture. Instead, it may be that the differences in economic environment and institutions practiced since decades in both regions might be the reason of these observed differences in generalized trust.

In this paper, we are interested in capturing only the *'direct'* effect of culture on trust. In order to take away the effect of the environment and institutions on trust, we employ an approach known as the *'epidemiological approach'* in the literature. This approach helps in distinguishing the impact of environment on outcomes by studying the behavior and preferences of immigrants in a country. The approach exploits the fact that individuals from different cultures (immigrants) are exposed to the same institutions (host country). After controlling for all the relevant economic variables, the systematic difference in their beliefs and preferences remaining in subsequent generations must be due to their cultural differences.

Unlike the existing literature, we do not restrict only to the first two generations² or pool

¹For instance, see Knack and Keefer (1997) and Algan and Cahuc (2010).

²For instance, Guiso et al. (2006); Fernandez and Fogli (2006); Luttmer and Singhal (2011); Alesina et al. (2011). Most of these studies use the second generation immigrants only.

the different generations together³. We analyze the four generations of immigrants in the United States using the General Social Survey (GSS) waves from 1978 to 2012. We explore the differences in the level of trust across the first, second, third and fourth generation immigrants in the United States from 26 different country of origin and 2 regions.

We document the average level of trust among different immigrant groups across generations. We show that, first, that there is huge variation in changes in trust across different countries. That is, immigrants from some countries change their level of trust *‘quickly’*, while other countries retain level of trust close to the average level of trust in their home country. Strikingly, the average level of trust of fourth or higher generation Africans and Puerto Ricans, is comparable to the average level of trust in their home countries. Second, using the *‘epidemiological approach’*, we show that the culture matters in explaining the observed differences in trust among the individuals. The effect of country of origin trust has a lower impact for higher generations, but the impact is still statistically significant even after third generation (for sample of countries without Africa and Puerto Rico), and fourth generation for the whole sample. Third, the paper shows that there is heterogeneity with respect to how the effect of culture evolves for different sub-groups within the sample. By grouping immigrants together from countries with similar level of institutions, the results indicate that there are differences in the effect of culture for different sub-groups.

2 Previous Literature

In the last decade there have been numerous successful attempts to demonstrate the importance of culture in determining economic variables. These contributions have shown how the cultural differences among individuals and groups can account for the differences observed in the economic variables. For instance, Knack and Keefer (1997) showed how the differences in trust among countries can help explain the differences in their economic performance, as measured by the GDP. Fernandez and Fogli (2006) showed that the individual decision to work and fertility decision of the first and second generation female immigrants is correlated to the female labor force participation and the total fertility rates of the country of their origin. Similarly, Alesina and Giuliano (2010) presented evidence how the strength of the family varies across the world

³For instance, Algan and Cahuc (2010); Dinesen (2012).

and how it is correlated the economic performance of the country. Luttmer and Singhal (2011) highlighted the taste for re-distribution among the second generation immigrants in different European countries is correlated to the preference for re-distribution in their country of origin. All these papers successfully show that there exists a relation between culture and economic variables, and that the culture can help explain the differences in the economic variables between different countries.

Before presenting the idea of trust, let us define what is meant by culture. Economists have commonly used two definitions that capture different aspects of culture. One of them refers to social norms and individual beliefs that sustain certain equilibria: *“the ideas and thoughts, common to several individuals, which govern the interactions between them ... and other groups and differ from knowledge in that they are not empirically discovered or analytically proven”* (Grief, 1994). The other definition by Akerlof and Kranton (2000) captures the role of culture through more individual values and preferences. These together capture the effect of culture on economic variables through both beliefs and preferences. Empirically, however, the most commonly used definition is the one put forth by Guiso, Sapienza and Zingales (2006): *“those customary beliefs and values that ethnic, religious, and social groups transmit fairly unchanged from generation to generation”*.

Trust is a dimension of culture. In fact, trust was the idea which opened the analysis to measure differences in culture through other dimensions. Trust is defined as the: *“The subjective probability with which an agent assess that another agent or group of agents will perform a particular action”* (Gambetta, 2000). Differences in trust among different countries and regions has shown to help explain the economic differences among those groups. The seminal contribution of Knack and Keefer (1997) presented a cross-country correlation between *“social capital”*⁴ (as measured by trust) and economic growth. Following their contribution, there has been immense amount of work done to show causal relation between trust and growth. Among these, more influential and recent are contributions by Guiso et al. (2008), Tabellini (2010), and Algan and Cahuc (2010) that convincingly show that trust affects the growth of the country and has sizable economic impact. Algan and Cahuc (2010) measured the *“inherited trust”* and showed that the differences in inherited trust help explain the differences in the GDP.

⁴It is commonly referred to as: *“features of social life - networks, norms and trust - that enables participants to act together more effectively to pursue shared objectives”* Putnam (1990)

The differences in the economic actions of an individual are not only determined by the beliefs and preferences (culture) of the individuals, but also by the economic environment, institutions and the economic structure. In order to take away the effect of this ‘environment’ on trust, we use the ‘*epidemiological approach*’. The approach helps in distinguishing the impact of environment on outcomes by studying the behavior and preferences of immigrants in a country. The approach exploits the fact that individuals from different cultures (immigrants) are exposed to the same institutions (host country). The systematic difference in their beliefs and preferences remaining in subsequent generations must be due to their cultural differences. The approach has been used extensively in the recent work in this literature⁵.

The study of transmission of trust in the immigrant generations has been analyzed by a few papers. Uslander (2008) studying the impact of ethnic heritage, and community in which the immigrants live found that the impact of ethnic heritage is stronger than the community. Guiso et al. (2006) show that the average level of trust for the immigrant group is correlated with the level of trust in the country of origin. The results found indicate that the trust rises in the first generation immigrants from low-trust countries if they have moved to a high trust country and vice versa⁶. However, most of these papers focus on the first and the second generation and abstract from the dynamics across generations. There has not been any contribution yet, to the best of our knowledge, which analyzes the dynamics of a cultural trait beyond the first and second generations. We extend the analysis to the third and fourth generation and see if the results found in the literature still hold. We also demonstrate that there is heterogeneity in the way cultural effect of trust evolves over generations for different subgroup of countries.

The remaining paper is organized as follows: In the next section, we present a brief overview of the different data sets used by the paper, followed by the methodology employed by the paper. Then, the paper presented the results, starting with graphical illustration of how average level of trust changes for different immigrant groups from the first generation to the fourth. Then, the significance of culture is shown in the complete set of countries and also in the reduced set of countries. In the following section, a measure of selection on observables is used to demonstrate that the results are not due to unobservables in the data set. In the next section,

⁵For instance, see Fisman and Miguel (2007); Miguel et al. (2008); and Fernandez and Fogli (2009) etc. Luttmer and Singhal (2011) For an excellent review on the approach, see Fernandez (2011).

⁶Algan and Cahuc (2010) and Dinensen (2011)

the heterogeneity in the effect of culture is demonstrated. The final section concludes and presents some discussion for future work.

3 Data

We use several data sets. The main data set used is the General Social Survey (GSS). GSS is a representative sample of the United States asking the population about social, demographic, behavioral and attitudinal questions. The first wave of the survey was conducted in 1972. Since then there have been 28 waves until 2012. Since the first 6 waves did not ask the question which measures generalized trust, we use the last 22 waves of the data. There are a total of 19,485 individuals among which there are 14,016 from the fourth or higher generation, 1,583 from the third generation, and 2,350 individuals from the second generation.

Since no single international social survey covers the countries in our data set, several data sets are used to compute home-country generalized trust index. The data sets include The World Values Survey (WVS), European Values Survey (EVS), European Social Survey (ESS) and Afro-Barometer. The main data set is WVS which is used to measure the generalized trust in 21 of the 28 regions in the data set. The remaining regions are measured as follows: Denmark, Ireland, Portugal and Belgium using the ESS round 6; Greece using the ESS round 5; Austria using the EVS; and Africa using the Afro-Barometer round 3. The average level of trust in United States is also computed using the WVS.

The list of countries represented in the analysis are: Austria, Belgium, Canada, Denmark, England, Finland, France, Germany, Greece, Hungary, India, Ireland, Italy, Japan, Lithuania, Mexico, Netherlands, Norway, Philippines, Poland, Portugal, Puerto Rico, Romania, Russia, Scotland, Spain, Sweden and Switzerland. Two former countries: Czechoslovakia and Yugoslavia. Two regions: Middle East and Africa. We only consider generations in which there are more than 10 persons⁷⁸.

⁷We lose data for Denmark, Finland, Lithuania (first generation), India, Philippines, Switzerland (third generation), Japan (fourth generation), Romania (third and fourth generation), Belgium (first and third generation), Middle East (second and third generation)

⁸The country of origin and generation pair with less than 41 individuals constitute less than 5% of the data set, while country of origin and generation pair with less than 25 individuals only adds up to less than 2% of the data set

4 Methodology

In order to measure the effect of culture on the level of trust of the immigrant groups,, we use “*Epidemiological Approach*”. The Epidemiological Approach is inspired by the one used in the field of medicine. In medicine, the approach is used to distinguish the genetic contribution to a certain disease (say heart attack) compared to physical contribution by comparing the immigrants and natives in the same location. The approach used in Economics is used to distinguish the cultural factors affecting economic outcomes compared to the economic and institutional factors. By looking at immigrants, and their descendants, from different countries in the same location, the approach “*identifies*” the contribution of culture to the economic decision making.

The basic idea behind the approach is as follows: the economic decision making by individuals may depend not only on the economic or institutional factors but also on the cultural factors. When immigrants from different country of origin are compared in one country, the economic or institutional factors are comparable for all the immigrants. If the decision of the immigrant groups differ among each other significantly, the differences can not be attributed to the economic, institutional or environmental factors. If after controlling for all the relevant economic variables, the immigrants differ from each other based on their country of origin, then this systematic difference in economic decision making among the immigrant groups can be attributed to culture. The immigrant groups may hold on to their cultural beliefs through parents transmitting the cultural beliefs to their children. Thus, the systematic differences among immigrant groups may persist across different generations.

For instance, consider a person who decides to steal or not to steal. His decision is not only influenced by the efficiency of the law enforcement agencies, rule of law, and justice but also by the “*inherent*” utility derived by the individual from stealing or, say, by the “*perceived*” efficiency of the legal system. Comparing the decision making process of different countries does not identify the effect of culture. This is because the countries would differ both in the economic factors and the cultural factors. However, if the immigrants from these countries were compared in one host country, the cultural part of the decision making process can be successfully identified. This is because all the immigrant groups face the same laws and institutions.

The argument above can be summarized in the reduced form in a single equation. Let T_{ic} denote the decision taken by individual i from country of origin c . The decision in this case is to

decide to trust a random person or not to trust. Then, the probability that an individual trusts other or not can be expressed as:

$$T_{ic} = \beta_0 + \beta_1\Gamma_c + \beta_2X_i + \epsilon_i \quad (1)$$

where Γ_c is a proxy for the culture in the country of origin, c . According to Fernandez (2011), using a home country index or proxy is a superior strategy than simply using country of origin dummy⁹. The strategy implicitly assumes that the differences in culture can be proxied by the differences in the average level of country of origin trust levels¹⁰. X_i consists of all the relevant individual level factors, such as gender, age, education, income etc, that can affect the probability of trust.

The generalized trust is measured as an answer to the following question: “*Generally speaking, would you say most people can be trusted or that you need to be very careful in dealing with people?*”. The respondents answer either as 1 (“*most people can be trusted*”), 2 (“*can’t be too careful*”) and 3 (“*depends*”). Most of the responses (99%) are either 1 or 2. Using the response to the question, We construct trust measure as 1 if the respondent answers 1, and 0 otherwise. Thus, trust is a binary variable.

In the other surveys exactly same question is asked and respondents reply with either they trust most people or that they have to be careful. These responses can be used to calculate an average level of trust in each country of origin. That is,

$$\Gamma_c = \frac{1}{N} \sum_{j=1}^N T_{jc} \quad (2)$$

where j denotes the individual surveyed in the home country. The country of origin trust index is a proxy for the level of trust the country has. A higher value of this index means that

⁹Including the country dummy in the equation 1 captures all the factors in which the countries differ amongst each other. On the other hand, the country of origin trust index in equation 1 only captures the variation in the trust of immigrant groups that is explained by the differences in the average level of trust in the country of origin. The approach, as argued by Fernandez (2011), is better than including the country of origin dummy because it directly measures the impact of culture on the individual trust.

¹⁰Even if the average level of trust index in the country of origin is not capturing the entire part of culture, the strategy works fine as long as there are no correlated variables that are omitted. In the case countries differ on more dimensions than just trust, the coefficient on the country of origin trust index is giving a lower bound for the effect of culture.

the immigrants from that country of origin are more trusting, and a lower value means that the immigrants are less trusting. Among the sample, Norway has the highest value for the trust index. In Norway, 69.5% people trust others. On the other hand, in Philippines only 7% people trust others. The average level of trust in the United States is 37.2%.

The data set also asks the individuals question about the ethnicity they belong to, and how many of their parents and grand parents were born in the United States. This set of information can be used to construct for each country of origin, c , the generation to which the individual belongs, g . The generations are decided by the following rule: First generation immigrants are those who immigrated to USA themselves; second generation immigrants are those whose at least one of the parents were born abroad; third generation immigrants are those whose at least two grand parents immigrated to USA and both parents were born in USA; and fourth generation are those whose more than two grandparents born in USA and both parents born in USA. With this definition, fourth generation includes individuals of not only fourth generation, but also higher generations. The data does not give more information to distinguish between fourth and higher generations. Most of the individuals in the data set belong to the fourth or higher generation.

The basic set of controls, X_i , include gender, age, age squared, income category, marital status, employment status, whether the person has children or not and the religion of the individual. There could also be regional disparity in terms of trust. That is, some regions of the United States could be more trusting than other regions. This can be taken into account by controlling for the region from which the individual belongs to. This effect is captured by the term, θ_r . Moreover, the average level of trust in the United States is not constant over time. Thus, the year in which the survey was conducted should be taken into account as additional control. θ_t captures this effect. Hence, the additional set of controls include the region from which the surveyor belongs and the year in which the survey was conducted. This estimation can be summarized as:

$$T_{ic} = \beta_0 + \beta_1 \Gamma_c + \beta_2 X_i + \theta_r + \theta_t + \epsilon_i \quad (3)$$

where θ_r denotes the regional fixed effects which are the same for every individual living in that region and θ_t are the time fixed effects which are the same for every individual interviewed

in the same year.

Allowing for completely different set dynamics for each generation, the Equation 1 is estimated separately for each generation. In the baseline specification, only individual level controls are taken into account. The Equation 1 is re-estimated by controlling for region and time fixed effects. The results of estimation of equation 1 is compared to the unconditional estimates of the country of origin effect as a check if the results we got are driven by the unobservables.

5 Results

5.1 Evolution of Trust

As a first step, the average level of trust in each generation of the immigrant group is computed and plotted against the average level of trust in the country of origin. Figure 1 shows how each generation of each immigrant group compare to the level of trust by individuals living in the country from which they came. The yellow line represents the average level of trust in the United States, while the green line is 45 degrees line. If there is complete convergence to the United States level of trust, the average level of trust in the immigrant groups would lie around the horizontal yellow line. On the other hand, if there is absolutely no convergence, the average level of trust in the immigrant groups would lie around the 45 degrees red line. The brown line represents the slope of best fit line between the average level of trust among the immigrants of each generation versus the average level of trust in the country of origin. If the slope is less than 45 degrees, then this means that the home country level of trust has faded; the lower the slope the more the impact of average trust in the country of origin has eroded. However, if the slope is more than 45 degrees, this means that the home country level of trust has become even stronger over the generations.

As seen from the Figure 1, there is a clear pattern in the evolution of trust. The line of best fit is steeper for the first generation as compared to the second generation, which is in turn steeper than the third and fourth generation. This means that the persistence in the trust is decreasing with generation. In other words, higher generations are less likely to have trust close to the average level of trust in the country from which they originated. Moreover, in the figures on the top the points are scattered all over the place. However, after second generation,

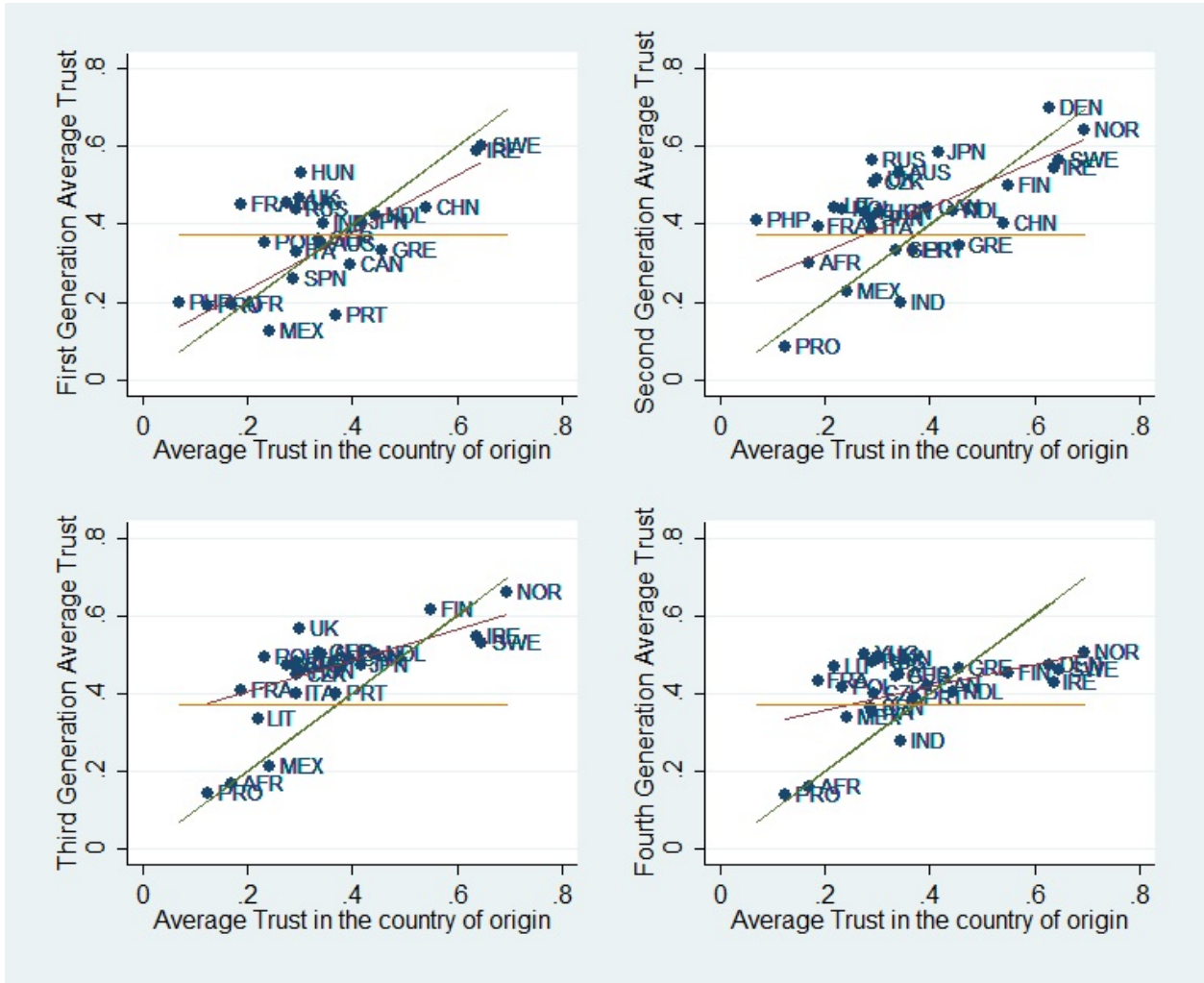


Figure 1: Persistence of Trust

the points seem to lie around the United States level of trust. The descendants of the Nordic countries, Norway, Sweden, Finland and Denmark continue to keep high level of trust. Whereas, descendants of the Puerto Rico and Africa continue to keep low level of trust.

The graph for third and fourth generation shows that the Puerto Rico and Africa are clear outliers. That is, all the countries except Africa and Puerto Rico have assimilated into or around the United States level of trust. However, Africa and Puerto Rico remain to demonstrate low levels of trust. Several factors could be responsible for that. For instance, may be immigrants from Puerto Rico, being an independent dominion of the United States, does not consider themselves to be immigrants. The racial discrimination against the Africans could be responsible for the surprisingly low level of trust they have even after fourth generation. The data does not allow to study in detail the reason behind lesser or more convergence of certain immigrant groups compared to the other.

The results for the first two generations are comparable to the ones in Guiso et al. (2006). Guiso et al. (2006) showed that the correlation between the average obtained by pooling the first and second generation immigrant groups and the country of origin was 0.6. We find that the correlation between the country of origin and the average level of trust of the first generation is 0.666. The correlation drops to 0.622, 0.611 and 0.434 for the country of origin with the average level of trust of the second, third and fourth generation immigrants respectively¹¹.

5.2 Estimating The Effect of Culture

The Table 1 reports the result from estimating Equation 1. The equation is estimated using both simple ordinary least squares (OLS) and Probit estimation. Under the Probit column, marginal effects evaluated at the mean value of the home country trust index and the control variables. The standard errors are reported below the coefficients. Robust standard errors are used to allow for possible heteroskedasticity of the error term. Moreover, the standard errors are clustered at the country of origin to allow for correlation within the individuals from the same country of origin.

¹¹The correlations are fairly unchanged for the first three generation even after dropping Africa and Puerto Rico. The correlations between the country of origin and the average level of trust in the first, second, third and fourth generations are 0.624, 0.562, 0.596 and 0.099 respectively.

Generation	First		Second		Third		Fourth	
	LPM	Probit	LPM	Probit	LPM	Probit	LPM	Probit
Country of Origin Trust	0.477*** (0.109)	0.480*** (0.111)	0.437*** (0.0812)	0.429*** (0.078)	0.302*** (0.090)	0.304*** (0.089)	0.235*** (0.027)	0.238*** (0.027)
R squared	0.105		0.067		0.049		0.040	
N	1,361		2,065		1,438		12,733	

Note: Robust standard errors in parentheses. Probit Marginal Effects are reported under the Probit column. Coefficient of Country of Origin Trust, β_1 in Equation 1, is reported.

Individual level variables are controlled for. The controls include gender, age, squared age, income category, marital status, employment status, whether the person has children or not and the religion of the individual

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

Table 1: Persistence of Trust without controlling for region and time effects

The coefficient on home country trust index is reported in the Table 1. The coefficient estimated from the OLS and the marginal effects from Probit estimation are similar. The results show a clear trend. For the first generation, having 0.1 points higher on the home country trust index, keeping the control variables unchanged, increases the probability of trusting others by 0.0477. The coefficient is statistically significant at even 1% significance level. Similarly, a 0.1 points increase in the home country trust index is associated with an increase in the probability of trusting others by 0.0437, 0.0302 and 0.0235 points for the second, third and fourth generation, keeping individual level controls unchanged. All these coefficients are statistically significant at 1% significance level.

The results show that the home country trust index has an explanatory power in explaining the differences in trust among the immigrant groups. In other words, the initial differences in the trust levels of the different immigrant groups seem to matter for not only the first two generations, but also the third and fourth generation. The effect of the initial difference is diminishing over the generations. The effect has decreased to almost half, from 0.437 to 0.235, after four generations. These initial differences that help in explaining the differences among the immigrant groups are the cultural differences among these groups. Thus, the culture seems to matter in taking economic decisions in this basic specification.

The equation is re-estimated by controlling for the region of the individual and the year in which the individual was interviewed. The results are shown in Table 2. The reported coefficients are lower in magnitude than the ones before. However, the coefficients are not drastically smaller

Generation	First		Second		Third		Fourth	
	LPM	Probit	LPM	Probit	LPM	Probit	LPM	Probit
Country of Origin Trust	0.444*** (0.115)	0.409*** (0.102)	0.366*** (0.083)	0.362*** (0.080)	0.235** (0.092)	0.238*** (0.089)	0.193*** (0.027)	0.196*** (0.027)

Note: Robust standard errors in parentheses. Probit Marginal Effects are reported under the Probit column. Coefficient of Country of Origin Trust, β_1 in Equation 1, is reported. Individual level variables are controlled for. The controls include gender, age, squared age, income category, marital status, employment status, whether the person has children or not and the religion of the individual. In addition, the region of the United States in which the individual lives, and the year in which the individual was interviewed are controlled for. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2: Persistence of Trust after controlling for region and time effects

than the ones got before. This means that the contribution of the region and time effects in explaining the differences among immigrant groups is not large. The results are qualitatively similar. The coefficient decreases from 0.444 from the first generation to 0.193 to the fourth generation. This means that 0.1 points higher on the home country trust index, keeping the control variables unchanged, is associated with an increase in the probability of trusting others by 0.0444 for the first generation, and 0.0193 for the fourth generation. All the coefficient is statistically significant at even 1% significance level.

5.3 Results without Africa and Puerto Rico

Figure 1 clearly pointed out that Africa and Puerto Rico were clear outliers. In this section, the evolution of trust is analyzed without Africa and Puerto Rico. Similar to Figure 1, the Figure 2 shows the scatter plot without Africa and Puerto Rico. As before, the yellow line represents the average level of trust in the United States, while the green line is 45 degrees line and the brown line represents the slope of best fit line between the average level of trust among the immigrants of each generation versus the average level of trust in the country of origin.

It can be seen that the the line of best fit is steeper for the first generation as compared to the second generation, which is in turn steeper than the third and fourth generation. However, the line of best fit is completely horizontal for the fourth generation. This means that the immigrant groups, except immigrants from Africa and Puerto Rico, do not vary systematically based on their country of origin. Interestingly, the line lies above the horizontal line for the United States. This means that the immigrant groups, together, on average are more trusting.

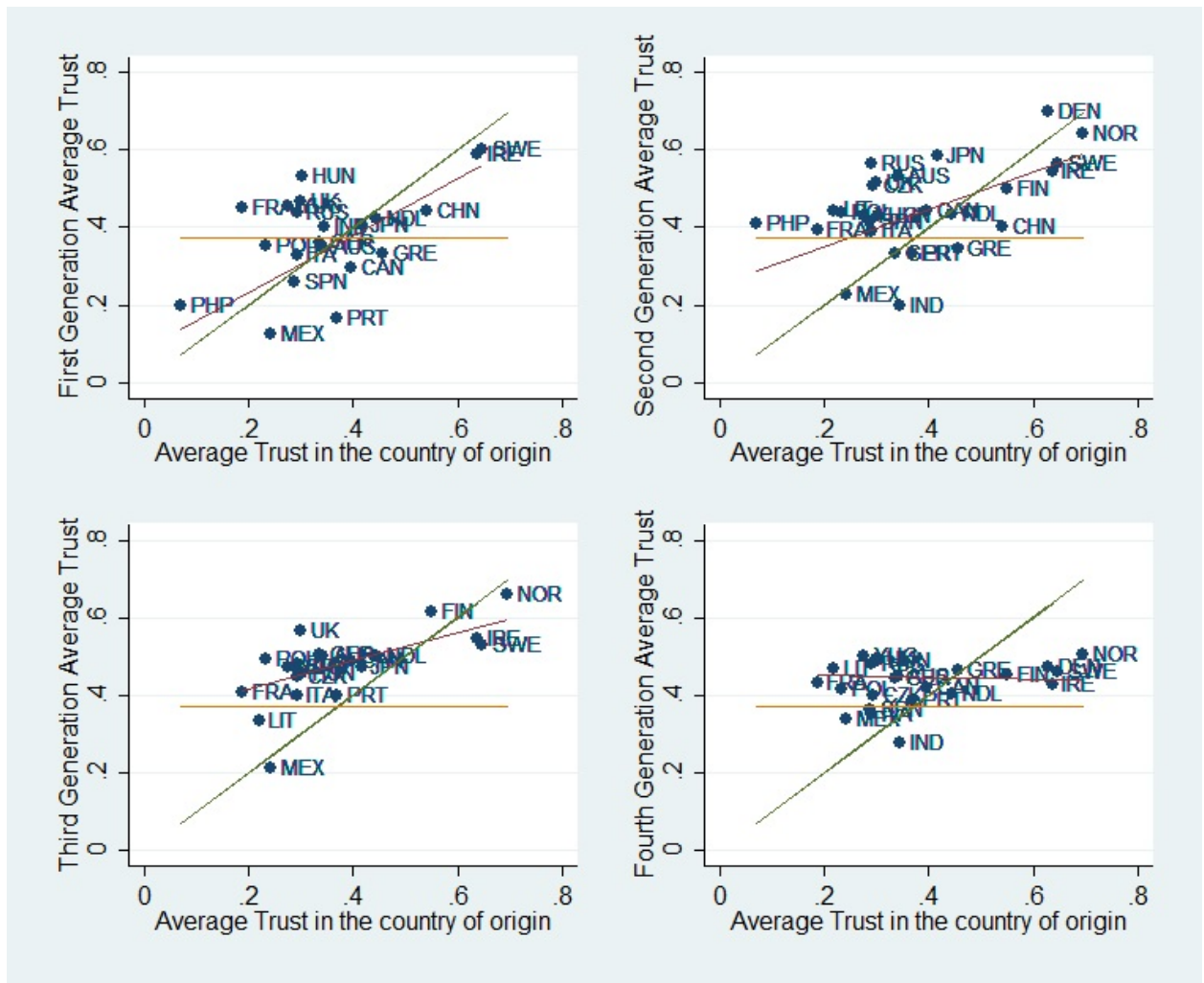


Figure 2: Persistence of Trust without Africa and Puerto Rico

Table 3 reports the estimation of equation 1 without Africa and Puerto Rico. The estimation controls for the region and time effects. The equation is re-estimated by controlling for the region of the individual and the year in which the individual was interviewed. The results are shown in Table 2. The reported coefficients are lower in magnitude than the ones reported in Table 2. The results are qualitatively similar for the first three generations. The coefficient decreases from 0.355 from the first generation to 0.207 to the third generation. This means that 0.1 points higher on the home country trust index, keeping the control variables unchanged, is associated with an increase in the probability of trusting others by 0.0355 for the first generation, and 0.0207 for the third generation. The coefficients for the first three generations are statistically significant. However, the coefficient for the fourth generation is not statistically significant. This means that for the fourth generation, the initial differences in the culture among the immigrant does not seem to matter for taking the decision of trusting other or not.

Generation	Probit - Marginal Effects			
	First	Second	Third	Fourth
Country of Origin Trust	0.355*** (0.117)	0.314*** (0.085)	0.207** (0.091)	0.036 (0.031)

Note: Robust standard errors in parentheses.
Coefficient of Country of Origin Trust is reported.
Individual, regional and time controls have been included
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Persistence of Trust without Africa and Puerto Rico

5.4 Selection on Observables

Estimation of equation 1 implicitly assumed that the countries only differ only along the dimension of trust which is measured by the country of origin trust index. However, the countries can differ not only along different dimensions of culture, but also other observables which might potentially effect the level of trust of individuals. This may cause the results to be biased. Altonji et al. (2005) outlined a nice way to assess the likelihood of the estimates being biased by the unobservables.

Altonji et al. (2005) present a way to evaluate the potential bias from unobservables. The method computes how much stronger selection on unobserveables, relative to selection on observables, must be to explain away the entire estimated effect. The method compares the estimates from the restricted regression, unconditional estimates, to the estimates from the unrestricted regression, the one with the controls included. Let β_1^R denote the estimates of country of origin trust from the restricted estimates and β_1^{UR} denote the estimates from unrestricted estimates. Then, $\beta_1^{UR}/(\beta_1^R - \beta_1^{UR})$ gives a measure of strength of the omitted variable bias. The ratio is higher if the β_1^{UR} is higher, or the difference between the unrestricted and restricted estimates is small. The higher the ratio, the less likely it is that the results are driven by the bias due to omitted variables. The Table 4 shows the results of the measure for both with and without Africa and Puerto Rico.

The Table 4 reports three sets of restricted estimation. In the first and second one, the restricted model does not have any explanatory variables besides the country of origin trust index. While, in the third one, the restricted model is contains basic set of controls. None of the values of the measure are less than 1. The average value of the measure is 3.96. This means

Unrestricted	Restricted	With Africa and Puerto Rico				Without Africa and Puerto Rico			
		First	Second	Third	Fourth	First	Second	Third	Fourth
Basic	None	1.89	3.06	3.19	4.09	1.51	3.48	3.12	8.21
Basic, region and time	None	2.07	1.71	1.45	1.94	2.09	1.99	1.37	4.26
Basic, region and time	Basic	13.45	5.15	3.51	4.60	6.63	6.00	3.24	7.07

Table 4: Selection on Observables

that the selection on unobservables has to be, on average, four times greater than the selection on observables. This situation is highly unlikely. Hence, it is highly unlikely that the results of our estimation are driven entirely by the unobservables.

5.5 Heterogeneous Effect of Culture

The analysis until now is the unobserved heterogeneity between the countries. The analysis works well if the countries only differ along culture, that too along the level of trust. However, the countries differ along numerous dimensions. This difference in dimension is shared by every immigrant from that specific country. This leads to unobserved heterogeneity. Grouping the countries by different levels of institution is one way to see if the evolution of trust from one generation to other varies across different subgroups which differ in their institutional quality. Different sub-group of countries can have different persistence and effect of the country of origin. In this section, the countries are classified in different groups according to their institutional quality. The rationale behind using institutional quality is that the countries differ in both culture and institutional environment. The initial differences in the institutional quality could impact how trust evolves from one generation to another.

The quality of institution data is taken from the Worldwide Governance Indicators (WGI) constructed by Kaufmann et al. (2010). The data set measures and ranks countries from around the world on six broad governance dimensions. The dimensions are voice and accountability; political stability and absence of violence/terrorism; government effectiveness; regulatory control; rule of law; and control of corruption. For our purpose, the rule of law is the dimension of interest. This is because it reflects 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. In the data set, the countries are scored on a scale of -2.5 to 2.5, where higher score reflects better rule of law.

Among the countries in the data set, Russia has the weakest rule of law receiving a score of -0.76, while Finland is the country with the strongest rule of law score of 1.98. The countries are grouped together in four sub-groups depending on the score received on the rule of law data. The countries with the least rule of law include Russia, Yugoslavia, Mexico, China, Philippines, India and Africa. Czechoslovakia, Hungary, Poland, Lithuania, Greece, Italy and Puerto Rico are the countries with medium-low rule of law; and , England, Wales & Scotland, Ireland, Spain, Portugal, France, Germany and Japan are categorized as medium-high rule of law countries. The remaining countries score high on the rule of law index and are characterized as the high rule of law countries. The following is the equation estimated:

$$T_{ic} = \beta_0 + \beta_1\Gamma_c + \beta_2X_i + \beta_{3sg}\Gamma_c * INST_{sg} + \theta_r + \theta_t + \epsilon_i \quad (4)$$

where sg denotes the sub-group country c belongs to. Thus, for each sub-group, the country of origin has two parts: one which is common for every sub-group, β_1 ; and one which is specific to each sub-group, β_{3sg} . As before, the specification is estimated separately for the four generations. Under the specification, the country of origin effect for any country c belonging to subgroup j is given by: $\beta_1 + \beta_{3j}$. The results are summarized in the Table 5.

	First	Second	Third	Fourth
Country of Origin Trust for INST=1	0.294** (0.121)	0.264* (0.161)	0.109 (0.273)	0.032 (0.102)
Country of Origin Trust for INST=2	0.525*** (0.191)	0.354** (0.152)	0.007 (0.168)	-0.029 (0.068)
Country of Origin Trust for INST=3	0.548*** (0.123)	0.386*** (0.099)	0.196** (0.088)	0.071** (0.036)
Country of Origin Trust for INST=4	0.406*** (0.154)	0.413*** (0.088)	0.178 (0.114)	0.036 (0.037)

Table 5: Results with groupings based on Institutions

The table shows the results from the Probit marginal effects estimation of Equation 5. The robust standard errors, clustered at the country of origin are reported. The table reports the

marginal effects, not the coefficients from Probit estimation. The country of origin effect for an individual who belongs to the first generation of immigrant and is from a country with low institutional quality is 0.294. In other words, for an individual who is first generation immigrant and came from a low institutional quality country, if the level of trust in his/her home country increases by 0.1, it is associated with an increase of 0.0294 in his/her level of trust, keeping the individual level controls fixed and controlling for regional and time effects.

Similarly, the marginal effect for the other immigrant sub-groups and generations are positive. The strongest effect is observed for the first generation immigrant group emerging from the medium-high level of institution countries. The results reveal the same pattern we found when the countries were pooled together. For the second generation immigrants, the strongest country of origin effect is also for the immigrants belonging to the medium-high institutional quality countries. On the other hand, for the third and fourth generation immigrant groups, the country of origin effect is not statistically different from zero for all subgroups except for the medium-high institutional quality countries subgroup.

As found earlier, the country of origin effect, for the immigrants from the same institutional quality, decreases from the first generation immigrants to the fourth generation immigrants monotonically, except for the high institutional quality countries¹². For the immigrants not coming from the high institutional quality countries, the country of origin effect is strongest for the first generation, followed by the second generation and the third generation. The effect is weakest for the fourth generation. These results go together with the result obtained by pooling all the countries together.

These results show that there is heterogeneity in the country of origin effect. The country of origin effect for the first generation immigrant from the low institutional quality countries is not the same as the country of origin effect for the same generation immigrants from the high institutional quality countries. The immigrant groups from different institutional quality countries “adjust” to the new institutional environment in different ways.

One possible short coming of the analysis is not to consider other sources of heterogeneity. The analysis assumed that the countries differ along dimension of culture and institutions and

¹²For the fourth generation, the effect only increases slightly from the first generation to the second generation. But, it falls to being statistically not different from zero for the higher generations.

the proxy for trust and institutions in the country of origin is able to capture the unobserved heterogeneity. It might be that the trust and institutions proxy does not fully capture the unobserved heterogeneity and unobserved heterogeneity is unaccounted for.

6 Conclusion & Future Research

Using the epidemiological approach, we measured the effect of culture on probability of trust. Using the General Social Survey, we characterized immigrants according to their country of origin and the immigrant generation to which they belong to. The paper highlighted the dynamics of evolution of trust for different generations; it formally estimated the country of origin effect, controlling for individual, regional and time effects. The previous literature had just concentrated on the first two generations, the paper extends the analysis to the third and fourth or higher generation to demonstrate that the culture still matters for higher generations. The paper then augments the analysis by showing that it is highly unlikely that the results are driven by the unobservables. The heterogeneity in the evolution of trust for different sub-group of immigrants is demonstrated by characterizing the countries according to the different institutional quality.

The culture plays an important role in explaining the differences in the trust among the different immigrant groups. The role of culture is monotonically less important for the higher generations. However, for the fourth or higher generation, except for Africa and Puerto Rico, the culture no longer has explanatory power in explaining the differences in the trust among the immigrant groups. By considering a measure for the selection on observables, we conclude that it is highly unlikely that the results are driven by the unobservables. Finally, we conclude by showing that there is significant heterogeneity in the importance of role of culture for different sub-groups. While the immigrant generations from the high institutional quality country reflect similar monotonic pattern with respect to the importance of culture, the remaining immigrants display a different pattern. The importance is highest for the third generation, while the effect is lowest for the first generation.

The paper sheds light on many interesting results which could be avenue for future research. For instance, we demonstrated that for the fourth and higher generation, the culture does not seem to matter for the immigrant groups from countries other than Africa and Puerto Rico. Explaining why this is the case is out of scope of the paper. One possible analysis could be to

explore why is this the case. Is the initial differences in culture responsible for this result? Or is the initial genetic differences that contribute to this finding? Can the racial discrimination be credited for this outcome?

We only considered the reduced form of the effect of culture and abstracted from the mechanisms responsible for this relationship. Keeping the stylized facts presented in the paper in mind, the future research could take into account the results present in the real data and utilize it to construct a theory explaining the evolution of trust.

Trust, certainly, is not the only cultural variable that matters in explaining the differences in economic variables among countries. The literature has demonstrated that the preference for re-distribution, approval for women working outside the house, the association towards family are among many variables that have been demonstrated to be important. The results present in the literature have considered only the first or the second generation of immigrants. The future research could consider the similar analysis as in the paper, and see if the results hold for higher generations.

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