Trustworthiness and economic performance

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Abstract

Trustworthiness is the foundation for trust, institutions, and per capita output in society. Trustworthiness is primary – a society's willingness to trust and the quality of its institutions have their origins in the trustworthiness of its citizens. Trustworthiness is therefore the basis for maximizing output in economic exchange and in explaining differences in standards of living around the world. We measure trustworthiness with a question from the World Values Survey and estimate its effect using a sample of 60 countries. We find that trustworthiness is important for output per capita and that any effect of trust is likely to come from trustworthiness. Our results are robust to alternative specifications.

(JEL codes: O10, O40, O43, Z1)

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Surprisingly much of the literature on trust hardly mentions trustworthiness, even though much of it is primarily about trustworthiness, not trust.
Hardin (1992).

1 Introduction

Trustworthy behavior is an important determinant of economic outcomes. If people are not trustworthy, a general lack of trust is inevitable, and exchange, specialization, and production suffer. The effect of trust on economic performance has been studied extensively and the results point consistently to a strong, positive correlation between the two. Much less empirical work has been done on trustworthiness. One reason for this may be the perception that there is no real difference between trust and trustworthiness: you cannot have one without the other, this argument goes, so it does not matter which is used as an explanatory variable. Another reason may be the lack of an obvious measure for trustworthiness. We address these issues below and test the primacy of trustworthiness on economic performance.

Our framework, which provides the structure for our empirical tests, contains four elements: (1) the nature of trustworthiness; (2) the endogeneity of trust; (3) the source of good institutions; and (4) the role of trust and trustworthiness in generating output. Trustworthy individuals are one of two types: *intrinsically* trustworthy or *conditionally* trustworthy. Intrinsically trustworthy individuals always behave so, regardless of incentives whereas the conditionally trustworthy behave honestly when it is in their self-interest. We believe intrinsic trustworthiness comes from deep-seated values that are related to culture while conditional trustworthiness comes from institutions. In either case, when there is more trustworthy behavior, individuals have greater reason to *trust*. This is the second element of our framework. Trust is en-

dogenous and can only exist in an environment of trustworthiness. The third element asserts that the proportion of the intrinsically trustworthy is also the source of good *institutions* in a country. Good institutions establish fair and efficient mechanisms to punish cheating and encourage rational individuals to act in a trustworthy manner. The higher the quality of the institutions, the greater the proportion of the *conditionally* trustworthy. Finally, trust and trustworthiness are equally important in generating output. Trust is necessary to initiate transactions and trustworthiness is critical for the realization of production.

To date, the empirical literature in economics has focused on trust and its effect on economic growth. In this literature, trusting behavior is said to generate cooperation, discourage diversion, and encourage civic engagement, which can enhance output. Knack and Keefer (1997), Zak and Knack (2001), Tabellini (2008), Temple and Johnson (1998), and Hall and Jones (1999) are all influential examples of this literature.[1]

Many authors recognize that trustworthiness is important, yet there has been virtually no cross-country empirical work that deals with it in a rigorous way. We address this gap by introducing a measure of intrinsic trustworthiness and testing our ideas. Like the usual measure for trust, our measure of trustworthiness comes from the World Values Survey (2006). The measure is based on a question that elicits from parents their subjective view of the importance of teaching children tolerance and respect for others.

To preview our results, we find that using a sample of 60 countries, trustworthiness consistently performs well in explaining per capita output. The inclusion of control variables changes the magnitude, but not the significance of trustworthiness. More-

[1]See Coleman (1988), Putnam (1993), La Porta et al. (1997), and others who consider the effects of trust in organizations and social groups. Guiso et al. (2005) show that trust is related to culture, and that low trust between countries results in low levels of trade and capital flows.

over, trustworthiness consistently outperforms trust in our regressions. At first, we maintain the hypothesis that trustworthiness is exogenous. Later, we allow it to be endogenous and use four different instruments to control for endogeneity. In almost all of the cases, trustworthiness has a significant, first-order impact on per capita income. We also show that intrinsic trustworthiness is important to the formation of high quality institutions and trust.

The paper is organized as follows. The next section sets out our analytical framework in more detail. This is not a rigorous theoretical model, but rather a guiding structure to help understand the logic of the empirical tests. In Section 3, we describe the data and the sample of countries that we use. Section 4 presents our econometric specifications and results. Section 5 concludes.

2 Framework

2.1 Trustworthiness

We make an important distinction between *intrinsic* trustworthiness and *conditional* trustworthiness. Intrinsic trustworthiness is unconditional; regardless of the costs of behaving trustworthily, an individual who is intrinsically trustworthy, will always act so. The existence of individuals who are intrinsically trustworthy has been assumed in the game-theoretic work of Frank (1987), Harrington (1989), Huang and Wu (1994), and Bohnet et al. (2001) in a similar context. Sen (1977) also assumes there are individuals who are willing to take action that conflicts with self-interest (a type he calls "committed"). In his study of rotating credit institutions in Peru, Karlan (2005) conjectures that some of the respondents may have been innately trustworthy. In contrast, conditional trustworthiness is trustworthy behavior that is conditional on the costs and benefits to behaving trustworthily.

We define the fraction of people who behave trustworthily to be p_{TW}:

$$p_{TW} = r_{TW} + v_{TW} < 1 \tag{1}$$

where r_{TW} is the fraction of people in the economy who are intrinsically trustworthy and v_{TW} is the fraction who are conditionally trustworthy.

In our view, economies are endowed with a level of intrinsic trustworthiness, but conditional trustworthiness is generated by good institutions. Countries with good legal and economic institutions prompt people to *behave* as if they were naturally trustworthy. Institutions elicit honest behavior through threat of punishment or social pressure. Where institutions are good at suppressing cheating, they induce the conditionally trustworthy to behave honestly.[2] We express this relationship as follows:

$$v_{TW} = V(I) \tag{2}$$

where I stands for institutional quality.

2.2 Trust

In his book *Trust*, Fukuyama (1995) states that trust is "*the expectation that arises within a community of regular, honest, and cooperative behavior, based on commonly shared norms, on the part of the members of that community.*" Gambetta (1988) defines trust as "*a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action.*" Fehr (2008) states that trust arises from beliefs about trustworthiness and preferences

[2]The link between institutions and trust has been prominent in the work of Putnam (1993), Coleman (1988), Beugelsdijk (2006), and Huck (1998), among others. There is, on the other hand, a strand of the game-theory literature that examines how cooperative behavior can evolve without the intervention of government institutions. See Axelrod (1984), Ellison (1994), Huang and Wu (1994), and Kandori (1992).

toward risk.

For each of these, trust is equated with an expectation about behavior. More importantly, these definitions point out that the trustworthiness of the party on the other end of the transaction is critical. The trust that we observe is due to the existence of trustworthy agents, whether intrinsic or induced by institutions. It is irrational to trust others in an environment of dishonest agents. We write this relationship as:

$$p_T = T(p_{TW}) \tag{3}$$

where p_T is the proportion of individuals who trust and p_{TW} is defined in (1). In countries with more trustworthy behavior, trust itself is higher. In this environment, trust ultimately depends on the expectation of being cheated, which in turn depends on the fraction of the population that does not cheat.

2.3 Institutions

If everyone were intrinsically trustworthy, there would be no need for institutions. No one would cheat and agents would soon learn to trust everyone. Unfortunately, this is never the case. We assume good institutions come fundamentally from r_{TW}, the fraction of intrinsically trustworthy people in society. Our reasoning has two elements. First, the intrinsically trustworthy fundamentally embrace a respect for others in society. They value the security of property and rule of law as devices to protect not only their own freedom, but that of others, too. Good institutions may be seen as commitment mechanisms designed to ensure individual freedoms and the protection of property rights over time. They increase the probability of catching cheaters and increase the penalty if a cheater is caught. Second, the larger the share of intrinsically trustworthy agents in the general population, the more votes are secured

that establish institutions that effectively punish cheaters with high probability. Thus, we hypothesize that institutional quality depends positively on r_{TW}:

$$I = I(r_{TW}) \tag{4}$$

2.4 Production

We outline a simple story of exchange to illustrate how trust and trustworthiness matter for aggregate output. First, we assume that individuals extend trust to others to produce output. If they do not trust, no output is produced. Counterparties can be two types – intrinsically trustworthy or conditionally trustworthy. Intrinsically trustworthy types participate honestly in the production of output. The conditionally trustworthy may behave dishonestly. When trust is met with trustworthy behavior, maximum output - which we call y_m - is produced. If not, output y_l is produced where $y_l = \delta y_m$ and $0 < \delta < 1$.

There are N individuals who meet others over the course of the year; in the limit, assume each person encounters every other person. Under this scheme, there would be $M = N\,(N-1)$ meetings every year.[3] Aggregate output, Y would then be:

$$Y = p_T p_{TW} M y_m + p_T\,(1 - p_{TW})\,M y_l \tag{5}$$

As (5) shows, aggregate output depends on the proportions of people who trust (p_T) and can be trusted (p_{TW}).

It is useful to write per capita output $y = \frac{Y}{N}$ as follows:

[3]In our model, agents do not play a game: types are determined prior to the current period, but no one knows the type of the person on the other side of the transaction. The payoff matrix, however, is similar to the Trust-Honor variant of the prisoner's dilemma game in Bohnet et al. (2001) and Berg et al. (1995), among many others.

$$y = \left(1 + \delta \frac{(1 - p_{TW})}{p_{TW}}\right) p_T p_{TW}\, y_m\, (N - 1) \tag{6}$$

where $\delta = \frac{y_l}{y_m}$ is the relative shortfall of output when people are not trustworthy. We observe from (6) that living standards rise with both the fraction of people who are trusting p_T and the fraction who act honestly p_{TW}.

The ideas in this section constitute a framework designed to highlight the importance of trust and trustworthy behavior to standards of living. We now turn to a discussion of the data that we use to test the importance of trustworthiness in economic performance.

3 Data and Country Sample

Construction of our sample was guided by several considerations. First, we use the question on trust from the World Values Survey (2006) that has been used frequently in previous research.[4] This question is A165 and is available in Wave 1 (1981), Wave 2 (1990), Wave 3 (1995), and Wave 4 (2000) of the survey. The question reads:

> *"Generally speaking, would you say that most people can be trusted, or that you need to be very careful in dealing with people?"*
>
> 1. *Most people can be trusted*
> 2. *Can't be too careful*

The question has been used by many authors in a wide variety of disciplines.

[4]The *World Values Survey*, initiated in 1981 as a companion of the *European Values Survey* and the *General Social Survey*, contains thousands of questions on topics ranging from "Perceptions of Life" to "Religion and Morale", with useful sociodemographic information. Between 1,000 and 2,000 people are interviewed in each country in each wave. The *World Values Survey* is downloadable from wvs `http://www.worldvaluessurvey.com/services/index.html`.

We measure the fraction of those who trust in a country p_T using affirmative response rates (Answer 1) to the question. An affirmative answer seems to reflect, at least in part, people's confidence in not being cheated. There is no way to tell if people are answering that "most people can be trusted" because they believe in the innate goodness of others (i.e. the respondent views others as intrinsically trustworthy) or because they have faith that institutions will discourage untrustworthy types from cheating them (i.e. institutions have induced the respondent to be trusting).

To measure intrinsic trustworthiness r_{TW} we use responses to question A035 from the World Values Survey.[5] Question A035 is part of a series of questions that asks respondents to select up to five qualities that children can be encouraged to learn at home. In Waves 3 and 4 of the World Values Survey, respondents were given a list of ten qualities. These include good manners, independence, hard work, feelings of responsibility, thrift, determination and perseverance, religious faith, unselfishness, obedience, and tolerance and respect for others. The qualities listed across each wave vary to some degree, but question A035 appears in all four waves.[6] Each question begins with:

> *"Here is a list of qualities that children can be encouraged to learn at home. Which if any do you consider to be especially important? Please choose up to five. CODE FIVE ONLY."*

Each question in the series is then followed by just one "quality", e.g independence, thrift, etc. Those who chose "tolerance and respect for others" we consider to be

[5]We considered several other questions – a question on honesty (A031) and a question on lying (F127) used by Slemrod and Katuscák (2005). A031 was only asked in the 1981 survey and F127 only in the 1990 survey. We also considered questions that Knack and Keefer (1997) used to construct a measure of civic norms (which they mention may be associated with trustworthiness). We did not use these questions because they are situational and there may be a wide range of circumstances that respondents consider when answering.

[6]We are aware of only one other paper that uses this question. Tabellini (2008) includes it in his cultural index.

intrinsically trustworthy. Individuals who value tolerance and respect for others are more likely to be trustworthy. One cannot respect others and at the same time treat them dishonestly. This question, we believe, elicits the true character of the *parent*, not the child. Respondents who feel it important to teach their children tolerance and respect for others, in our view, do so because they themselves possess these basic qualities.

Because survey respondents are asked to select five questions from a list of 10 qualities, there is an opportunity cost to selecting any question. We think that this cost elicits a true response. If, for example, the question were framed as the direct "do you think it is important to teach your children tolerance and respect for a others?" then people might respond "yes" even if they did not really value it. Unlike responses to the trust question, we assume that our measure of trustworthiness does not include a component that may be induced by institutions. Our maintained hypothesis is that conditionally trustworthy types do not code "tolerance and respect for others" based on the legal or social ramifications. In other words, we think that Question A035 measures r_{TW} and not p_{TW}.

For each country, we tabulate the percentage of total respondents who answered "most people can be trusted" to question A165 and those who selected "tolerance and respect for others" to question A035. These percentages correspond to p_T and r_{TW}. There is a fair amount of variation in our data. For example, p_T and r_{TW} are 36% and 80% for the United States, but only 3% and 60% for Brazil. The first two lines of Table 1 show that overall the fraction of people who are trusting is significantly smaller than the number who are intrinsically trustworthy. These differences could be due to differences in the quality of institutions or social preferences.[7]

[7]It is also possible that the *trust* question from the World Values Survey does not measure trust, per se, but rather caution (Miller and Mitamura (2003)) or institutions (Beugelsdijk (2006)).

Table 1: Descriptive Data

Variable	Mean	Std.Dev.	Min	Max
p_T	0.298	0.163	0.028	0.665
r_{TW}	0.708	0.099	0.525	0.923
$\frac{y_j}{y_{US}}$	0.416	0.276	0.031	1.0
$\frac{Years\,Schooling_j}{Years\,Schooling_{US}}$	0.627	0.204	0.20	1.0
Property Rights	3.70	1.021	1	5

In constructing our data set from the World Values Survey, we decided to exclude Waves 1 and 2 from the analysis because these waves are heavily weighted with Western European and advanced economies and provide substantially less variation. Instead, we combined the countries from Waves 3 and 4 but eliminated duplicates; we only used data from Wave 3 if there is no data from Wave 4 for that country.[8]

We also use data on GDP per capita (y) in purchasing power parity dollars from the Penn World Table (v. 6.2); years of schooling in the population aged 25 or older from Barro and Lee (2001) for human capital (H) which will be later used as a control variable in estimating an equation for y; and the index of security of property rights from the Heritage Foundation, as a proxy for institutions (I). A higher value implies better institutions (we recoded property rights to make it conform to this rule).

The combined data yields a base set of observations for 60 countries. Country coverage includes developed, developing, emerging, and transition economies.[9] Table

[8]As a robustness check, we ran all of our main results using the opposite rule: discarding the data for Wave 4 if there were duplicates. The results were virtually unchanged in terms of the significance of the key coefficients.

[9]The countries is our sample are the following: Algeria, Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Denmark, Dominican Republic, Egypt, Arab Rep., El Salvador, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Korea, Rep., Malta, Mex-

1 gives the basic descriptive statistics. We present the data for y, and *Years Schooling* relative to the United States. *Property Rights* is based on a scale running from 1 to 5, with an average of 3.75.

4 Estimation

4.1 A Basic OLS Model

A log-linear model for output per capita that captures the basics of (6) may be specified as:

$$\ln y_j = \alpha_0 + \alpha_1 \ln p_{T,j} + \alpha_2 \ln p_{TW,j} + \alpha_3 \ln H_j + \mu_j \tag{7}$$

where we include human capital H_j as a control variable to proxy for y_m.

We cannot estimate the relationship in (7) however, because we do not have a measure of trustworthy behavior p_{TW}. We noted in (1) that p_{TW} is equal to the sum of the natively trustworthy r_{TW} and the conditionally trustworthy v_{TW}. Using (1) and (2), we can replace p_{TW} in (7) to get our first estimating equation:

$$\ln y_j = \beta_0 + \beta_1 \ln p_{T,j} + \beta_2 \ln r_{TW,j} + \beta_3 I_j + \beta_4 \ln H_j + \epsilon_j \tag{8}$$

Our initial strategy is to estimate Equation (8) with OLS. This is primarily a benchmarking exercise, since it is likely that the regressors – with the possible exception of r_{TW} – are correlated with the error ϵ in our cross section data set.

Table 2 presents the results from estimating variants of (8). The first two columns show the results when the logs of p_T and r_{TW} are included one at a time, with no other regressors. Both are quite significant while trustworthiness has a much larger

ico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Singapore, Slovak Rep., Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan (China), Turkey, Uganda, United Kingdom, United States, Uruguay, Venezuela, Zimbabwe

Table 2: Basic OLS

Dependent variable: $\ln y$

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
$\ln Trust$ ($\ln p_T$)	0.53** [0.00]		0.28 [0.13]	0.16 [0.21]		0.1 [0.46]
$\ln Trustworthiness$ ($\ln r_{TW}$)		3.25** [0.00]	2.74** [0.00]		1.00** [0.01]	0.84* [0.04]
Property Rights Index				0.38** [0.00]	0.36** [0.00]	0.36** [0.00]
ln *Schooling*				0.92** [0.00]	0.87** [0.00]	0.84** [0.00]
Constant	10.00** [0.00]	10.42** [0.00]	10.62** [0.00]	6.26** [0.00]	6.56** [0.00]	6.69** [0.00]
Observations	60	60	60	57	57	57
Adj R^2	0.14	0.27	0.29	0.74	0.75	0.75
Notes: Robust p values in brackets. **significant 1%; * at 5%; + at 10%						

coefficient than trust. The third column shows the results when we put the two together. In this case, only trustworthiness is significant.

The last three columns add *Property Rights* for I and *Years of Schooling* for H, but otherwise repeat the first three columns.[10] Trustworthiness remains significant, although the magnitude of its coefficient falls appreciably. Trust, on the other hand is not significant in any specification. *Property Rights* and *Schooling* are also highly significant and the highest adjusted R^2 is 75%.

In sum, the results of Table 2 show a much stronger correlation between trustworthiness and output per capita than between trust and output per capita.

[10]Our sample size decreases by three when we add *Property Rights*.

4.2 A Reduced-form Model

Our main interest is in exploring the relationship between trustworthiness and output per capita. However, equation (8) and the results in Table 2 may suffer from endogeneity bias. We are concerned that p_T and I may be correlated with the error ϵ. One way around the endogeneity problem is to estimate our system in reduced form. We continue to maintain that r_{TW} is exogenous.

Consider institutions I. As emphasized by Acemoglu et al. (2001), rich countries may prefer better institutions. Or, there may be a bias in the subjective construction of the property rights index, such that evaluators see better institutions in richer economies. Finally, measurement error may be particularly acute in studies like these. Thus, I may be correlated with the error in (8).

Our measure of trust p_T is also likely to be correlated with the error. As argued earlier – see equation (3) – trustworthy behavior p_{TW}, whether intrinsic r_{TW} or conditional v_{TW}, determines trust p_T. It does so because we believe that trust is impossible without the expectation that the other party is likely to be trustworthy. Based on (1), (2), and (3), we see that p_T is correlated with institutions. Therefore, if I is correlated with the error in (8), so will be p_T.

Next, we assume that human capital depends on r_{TW}. Glaeser et al. (2004) argue that human capital H may be more deeply rooted and persistent than some of the measures that are used to represent high quality governmental institutions. Since intrinsically trustworthy types respect the rights and freedoms of others, it is natural to hypothesize that they will also promote and expand educational opportunities. We express this as:

$$H = H(r_{TW}) \tag{9}$$

This is consistent with the ideas of Acemoglu et al. (2005) who hypothesize that

both education and institutions (in their case, democracy) are determined by a third, common variable. For us, that variable is intrinsic trustworthiness.

A reduced-form equation of our initial estimating equation (8) in which y depends only on intrinsic trustworthiness r_{TW} can be obtained by using the four structural relations (2), (3), (4) and (9), along with the identity (1). Accordingly, we estimate the following reduced form:

$$\ln y_j = \gamma_0 + \gamma_1 \ln r_{TWj} + \vartheta_j \tag{10}$$

We estimate this equation using OLS. The results are shown in Table 3.

The first column repeats Column 2 of Table 2. The rest of the table adds regional or income indicator variables to see if we are inadvertently picking up the influence of a some third effect that is correlated with both y and r_{TW}. The second column of Table 3 adds indicator variables for Sub-Saharan Africa ($SBSA$), East Asia and the Pacific, (EAP) and Latin America and Caribbean (LAC). Trustworthiness continues to be significant and the African and Latin American indicators are significantly negative, but there is no explanatory power from the EAP indicator. Column 3 uses indicators from the World Bank for low-income countries (LID) and high-income countries (HID). Trustworthiness retains significance (although the magnitude falls) and both of these indicators are significant with the expected signs. Column 4 repeats the exercise with a single dummy for OECD countries. The results are similar: trustworthiness is significant and so is the indicator. The adjusted R^2 reaches 85% for the third specification.

The last two columns divide the sample into countries with income above the sample median, and those with income below it. In the above-median group, trustworthiness continues to be very significant. In the last column, we see that trustworthiness

Table 3: Reduced-form OLS

Dependent variable: $\ln y$						
	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample	Full Sample	Full Sample	Full Sample	$y \geq y_{med}$	$y < y_{med}$
	OLS	OLS	OLS	OLS	OLS	OLS
$\ln Trustworthiness$ ($\ln r_{TW}$)	3.25** [0.00]	2.91** [0.00]	0.80* [0.02]	1.20+ [0.05]	1.09** [0.00]	0.9 [0.37]
$SBSA$		-1.37** [0.00]				
EAP		-0.58 [0.16]				
LAC		-0.58** [0.00]				
LID			-1.07** [0.00]			
HID			1.17** [0.00]			
$OECD$				1.11** [0.00]		
$Constant$	10.42** [0.00]	10.50** [0.00]	9.09** [0.00]	9.26** [0.00]	10.31** [0.00]	8.91** [0.00]
Observations	60	60	60	60	30	30
Adjusted R^2	0.27	0.42	0.85	0.56	0.3	0.03
Notes: Robust p values in brackets. **significant 1%; * at 5%; + at 10%						

is not significant for the below-median income group. The mean trustworthiness for this group is only 66% as compared to 75% for the higher income group. As we expect, trust is also lower on average (23% compared to 36%).[11]

4.3 Instrumental Variables

To this point we have maintained the hypothesis that our measure of intrinsic trustworthiness r_{TW} is exogenous. Recall that r_{TW} measures the proportion of the population of the country that identifies "tolerance and respect for others" in the World Values Survey to be an important quality to teach their children. We claimed that this proportion corresponds to a deep-seated character trait and does not depend on income or institutions.

There are reasons, however, that some may be concerned about our exogeneity assumption. First, it is possible that we are measuring intrinsic trustworthiness with error. Second, since our measure of intrinsic trustworthiness is based on a survey, it is possible that survey bias has occurred. Third, it may be possible that r_{TW} and y evolve together over time from the influence of common, unobserved variables. A fourth possibility is that r_{TW} is more dependent on current y than we have assumed – it is possible that r_{TW} may be higher because y is higher. If any of these are true, our measure of intrinsic trustworthiness r_{TW} is correlated with the error ϑ in (10), then the coefficient of interest γ_1 is biased.

To correct for any potential endogeneity, we instrument for r_{TW}. We consider four different instruments: two past values of "Constraint on the Executive" (lags of 50 and 100 years) from the Polity IV database, which we label $Constraint\,Exec\,50$ and $Constraint\,Exec\,100$; the variable *Latitude*, which is the absolute value of the

[11] The units for income per capita are International dollars of 2000, as reported in the Penn World Table (Heston et al., 2006).

country's latitude measured as a fraction of 90 degrees; and *Mortality*, which is the measure of potential European settler mortality from Acemoglu et al. (2001). Constraint on the Executive has been used by Acemoglu and Johnson (2005) and others as a measure of the quality of institutions.

We consider the first two to be measures of the quality of early institutions, which we think are highly correlated with early intrinsic trustworthiness. It is likely that the value of r_{TW} in the past – not the present – is the key to institution formation. Since we do not have data on historical values of r_{TW}, we assume that today's value of r_{TW} for which we do have data, is highly correlated with past values of I.

Latitude has been used by Hall and Jones (1999) and Glaeser et al. (2004) among others to instrument for current institutions. Hall and Jones use it as a measure of Western European influence on the set-up and subsequent development of social infrastructure. The idea is that higher latitudes were both sparsely populated and similar in climate to Western Europe itself, both of which encouraged settlement and colonization by Europeans who brought their institutions with them.

We extend the argument to distinguish between types of settlers: we conjecture that more trustworthy Europeans migrated to higher latitudes because the difficult working conditions and the small size of settlements made life unattractive for dishonest agents. Small settlement size, for example, made detection of transgressions easier. The lack of large-scale extractive industries – which were found mainly at low latitudes – made it more difficult to find profitable opportunities to take advantage of native peoples or other settlers.

Settler mortality was introduced by Acemoglu et al. (2001) as an instrument for current institutions. The idea is similar: where settler mortality was low Europeans were more likely to settle and construct good institutions.

We estimate Equation (10) using instruments for $\ln r_{TW}$. This estimation strategy

is valid if all of our instruments work *only* through current intrinsic trustworthiness. We think this is a reasonable working hypothesis and, in any case, there is much precedent for similar strategies in the recent literature.[12] As a check, we also include our instruments one at a time as exogenous regressors (and instruments) in some specifications.

Table 4 presents the main results. The first column uses *Constraint Exec* 50 and *Latitude* as instruments for r_{TW}; the second uses *Constraint Exec* 100 and *Latitude*. The results are broadly similar: the log of r_{TW} is highly significant in explaining y; moreover, the magnitude of the point estimate is quite large. Columns (3) – (6) include the instruments as regressors one at a time. Trustworthiness is significant at 5% or better in three of the four cases (and it is almost significant when *Constraint Exec* 100 is included). The included instruments are never significant. The last column uses *Mortality* as the lone instrument for $\ln r_{TW}$. Again, we see that trustworthiness is both highly significant and has a large impact on y.[13] Living standards as measured by y are strongly related to our measure of trustworthiness, no matter which technique we use.

4.4 Structural Estimation

In this section we test to see if there is support for the structure as described by equations (2), (3), (4), (9), along with (1). These equations show that our measures of institutions, human capital, and trust should all be determined by intrinsic trustworthiness.

The first three columns of Table 5 run OLS regressions for trust, institutions, and

[12] Most of the work on institutions and growth, including Acemoglu et al. (2001); Glaeser et al. (2004); Hall and Jones (1999); Hausmann et al. (2005), employ a similar assumption.

[13] The first stages of the IV equations are reasonable. All are significant with one exception, *Latitude* when the other instrument is *Constraint Exec 100*. The adj-R^2s are not especially high, however, and are all around 16%.

Table 4: Instrumental Variables

Dependent variable: $\ln y$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	IV	IV	IV	IV	IV	IV	IV
Instruments →	*CE50 Lat.*	*CE100 Lat.*	*CE50, Lat.*	*CE100 Lat.*	*CE50 Lat.*	*CE100 Lat.*	*Mort.*
$\ln Trustworthiness$ $\ln r_{TW}$	9.54**	9.09**	11.48*	10.82	7.25*	8.14*	11.31**
	[0.00]	[0.00]	[0.01]	[0.14]	[0.03]	[0.02]	[0.00]
Constraint Exec 50			-0.06				
			[0.55]				
Constraint Exec 100				-0.05			
				[0.78]			
Latitude					0.94	0.48	
					[0.35]	[0.71]	
Constant	12.53**	12.52**	13.48**	13.33**	11.36**	11.99**	13.27**
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Observations	48	36	48	36	48	36	24
$Prob > F$	0.000	0.002	0.007	0.035	0.000	0.004	0.000
Notes: Robust p values in brackets. **significant 1%; * at 5%; + at 10%.							

Table 5: Structural Equations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV
Instruments →				*CE50, Lat.*	*CE50 Lat.*	*CE50, Lat.*	*CE100, Lat*	*CE100, Lat*	*CE100, Lat*
Dependent variable →	$\ln p_T$	*Property Rights*	$\ln School$	$\ln p_T$	*Property Rights*	$\ln School$	$\ln p_T$	*Property Rights*	$\ln School$
$\ln r_{TW}$	1.86** [0.00]	3.27** [0.00]	1.24** [0.00]	4.76** [0.00]	9.88** [0.00]	3.65** [0.00]	5.21* [0.03]	11.81** [0.00]	3.64** [0.00]
Constant	-0.71** [0.00]	4.87** [0.00]	2.42** [0.00]	0.33 [0.53]	7.07** [0.00]	3.25** [0.00]	0.4 [0.59]	7.77** [0.00]	3.27** [0.00]
Observations	60	57	60	48	45	48	36	33	36
Adj R^2	0.16	0.16	0.19						

Notes: Robust p values in brackets. **significant 1%; * at 5%; + at 10%

human capital on $\ln r_{TW}$. In all cases, trustworthiness is significant at the 1% level. Since we cannot be sure that trustworthiness is exogenous, we also estimate each specification using $Constraint50$ – or $Constraint100$ – and *Latitude* as instruments for $\ln r_{TW}$. These results are shown in the last six columns of Table 5. The results in Columns (4) - (9) confirm that trustworthiness is highly correlated with all three structural variables. In each case, moreover, the coefficients rise substantially when we go to IV estimation.

These results support our idea that trust depends on intrinsic trustworthiness. They are also consistent with the idea that institutions and education are, fundamentally, dependent upon the degree of trustworthiness in society.

5 Conclusion

In this paper we drew a distinction between two types of individuals: the intrinsically trustworthy and the conditionally trustworthy. The former always honor contracts; the latter do so only if it is in their self interest. In our view, the proportion of the intrinsically trustworthy is the key to economic development, better institutions, and higher per capita income. The greater the fraction of natively trustworthy people, the greater the output produced and the greater the likelihood that institutions will be established to encourage conditionally trustworthy individuals to behave in a trustworthy manner. As trustworthy behavior grows, so does trust, and output expands further.

To test our hypotheses we used a new question from the World Values Survey to measure intrinsic trustworthiness. This question elicits the respondent's feeling about the importance of a particular quality – "tolerance and respect for others" – out of a list of 10 such qualities. Using this as a proxy for intrinsic trustworthiness,

we found that it was highly significant in explaining per capita income in a wide variety of specifications. In particular, it outperformed trust (measured by the usual question from the World Values Survey) when the two were in the same regression. In addition to treating intrinsic trustworthiness as exogenous, we instrumented for it using lagged values of an institutional variable, latitude, and European settler mortality. In all cases, it remained highly significant and its effect was large. We also tested the structural building blocks of our framework, to see if trust, institutions, and human capital were determined by intrinsic trustworthiness. We found support for this idea too, whether we used ordinary least squares or instrumental variables.

The positive contribution of this paper is to point out the importance of trustworthiness in society. The formation of trust is clearly important, but it is secondary. Trust emerges in an environment where there is trustworthy behavior. Whether trustworthiness is cultivated through institutions that discourage cheating or through the promotion of innate or cultural traits, does not matter. Trustworthy behavior is paramount. We leave as an open question the sources of intrinsic trustworthiness. Institutions and human and physical capital are essential for economic development, but the importance of trustworthiness in production and exchange cannot be overemphasized. We hope to encourage further theoretical and empirical research on this topic.

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