

Trustworthiness

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June 16, 2008

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Abstract

Trustworthiness is the basis for maximizing output in economic exchange and in explaining differences in standards of living around the world. A society's willingness to trust and the quality of its institutions have their origins in the trustworthiness of its citizens. We propose a theoretical structure where trustworthiness and trust are important for production, but trustworthiness is primary. We estimate the relationship using a sample of 51 countries. We find that trustworthiness is important for output per capita and that the effect of trust is likely to come from trustworthiness via institutions. Our results are robust to alternative specifications and samples.

*We would like to thank participants of the Economics Workshop at the University of South Carolina for helpful comments.

If members of the group come to expect that others will behave reliably and honestly, then they will come to trust one another.

Fukuyama (1995)

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

Casual observation suggests that a lack of trustworthy behavior is a first-order problem for many developing countries. If people are not trustworthy, a general lack of trust is inevitable. The conceptual distinction between trust and trustworthiness is sharp, but in practice the two occur together. Perhaps this is why they are often treated interchangeably in the literature. It is our view that this is not a useful approach. The purpose of this paper is threefold: to clarify the difference between trust and trustworthiness in terms of their roles in economic exchange and per capita income; to propose a basic theory of the formation of institutions and behavior; and to test our ideas using independent measures of trust and trustworthiness.

Our theoretical framework has two parts, one *static* and one *dynamic*. In the static part, we take the levels of trusting and trustworthy behavior as given. Here, trust is important because people who trust are those who *initiate* transactions. When an individual does not trust – lacks the confidence

that her counterpart will act honestly – she may refuse to transact at all, or at least will engage in costly monitoring and other forms of protection. Trustworthy behavior, on the other hand, is important because any initiated transaction will create maximum output only if the approached party does not cheat. Cheating results in a reduced level of output. In the model we construct, output and output per capita depend on the proportions of agents who are trusting and the proportion of agents who behave in a trustworthy manner.

In the dynamic part of the theory we deal with the *origin* of trusting and trustworthy behavior. In our view, nations begin with an endowment of people who are intrinsically trustworthy. If the number of such people is high enough, they will set up institutions that punish those who cheat.¹ These institutions will elicit trustworthy *behavior* from those who are *not* intrinsically trustworthy. With more trustworthy behavior, people have greater assurance that they will not be cheated in transactions they initiate and thus more people begin to trust. This leads to an expansion of transactions and output. Ultimately, then, a lack of trustworthy behavior can have staggering consequences for the economy – society misses out on potential transactions and the enormous gains that are possible from scale and specialization.

To date, the empirical literature in economics has focused on trust and its effect on economic growth. This literature has found that more trusting

¹In general, it is people who are trustworthy but not necessarily trusting who are more likely to establish institutions.

societies achieve higher rates of growth. Knack and Keefer (1997), Zak and Knack (2001), and Tabellini (2006) use the World Values Survey (2006) for a measure of trust, whereas Temple and Johnson (1998) construct a measure of “social capital” and Hall and Jones (1999) employ a measure of “social infrastructure” – concepts closely related to trust. In this literature, trusting behavior is said to generate cooperation and civic engagement, which can enhance output.²

We believe that trustworthiness has been overlooked but is an integral part of a theory relating trust to economic outcomes. Indeed, the definition of trust provided in Glaeser et al. (2000) as “*the commitment of resources to an activity where the outcome depends upon the cooperative behavior of others*” explicitly recognizes that trust is only one side of a transaction. Others have defined trust similarly. In his book *Trust*, (Fukuyama (1995), p. 26) 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 other 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*”. These definitions of trust point out that the behavior of the party on the other end of the transaction is critical. Without trustworthiness, the level of trust in

²See 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.

society would surely be very low.

Our view is similar to that of Hardin (1992) who states that trust is *learned*. It depends on both predisposition and the many dimensions of individual experience, including upbringing, past exchanges, and institutions, all of which depend on general social trustworthiness. He emphasizes that the literature often confuses trustworthiness with trust, or neglects trustworthiness altogether.

Using data from the World Values Survey (2006), we study the impact of trust and trustworthiness on GDP per capita for a sample of 51 countries for which we are able to compile a complete data set. In the econometric specifications, we control for the impact of institutions on trust and on prompting untrustworthy types to behave trustworthily. We find consistent support for the idea that trustworthiness is a first-order determinant of real output per capita across countries. The inclusion of control variables, including trust, has little impact on the significance of trustworthiness. Our estimates show that a 10% increase in the proportion of the population that is intrinsically trustworthy leads to a 6.5 - 17% increase in GDP per capita, depending on the specification. Our results also provide evidence that the effect of trust on output per capita documented by other researchers is likely to come through trustworthiness.

The paper is organized as follows. The next section constructs a model of output per capita based on the existence of agents who each have two characteristics or dimensions, trust and trustworthiness. This section also

sets out our view of the way that institutions induce trust and encourage otherwise untrustworthy individuals to behave as if they were trustworthy. Section 3 describes the data that we use. Section 4 presents our econometric specifications and results. Finally, Section 5 concludes.

2 Theory

2.1 Production

Individuals are defined along two dimensions: whether or not they *trust* others and whether or not they *can be trusted* to completely fulfill a bargain. There are, accordingly, four distinct types of individual in the economy defined by the absence (0) or presence (1) of the two behaviors. Each person is represented by her type a_{ij} where $i = (0, 1)$ represents trust and $j = (0, 1)$ represents trustworthy behavior. For example, a person of type a_{01} does not trust others but does demonstrate trustworthy behavior; a person of type a_{00} neither trusts nor can be trusted.

We draw a further distinction between a person who is *intrinsically* trustworthy and a person who is not intrinsically trustworthy but *behaves* in a trustworthy manner to avoid legal or cultural penalties. We define *intrinsic trustworthiness* as follows:³

³Our definition contrasts with Glaeser et al. (2000) who view trustworthiness as “behavior that increases the returns to people who trust you”. While this definition has merit, it potentially includes untrustworthy behavior – an untrustworthy individual could also increase the returns to people who trust – whether the people are complicit or not.

Intrinsic trustworthiness is the inherent trait that leads an agent to “do the right thing” – act honestly – out of respect for others, regardless of existing laws and conventions, even at a cost to herself.

Trustworthiness, if intrinsic, is the Golden Rule – “do unto others as you would have them do unto you” – and is common to many of the world’s great religions. 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 allows individuals who are willing to take action that conflicts with self-interest (a type he calls “committed”). Below, we assume that a given fraction of the population is endowed with this trait and will not cheat regardless of the institutional environment.

Whether someone acts honestly because she is intrinsically trustworthy or merely because she seeks to avoid penalties is immaterial for production – both would be classified as type a_{i1} . As we explain later, the mass of intrinsically trustworthy agents does play a role in the formation of institutions, but for production it does not matter. We refer to all agents who can be trusted as “trustworthy” whether they are intrinsically trustworthy or trustworthy by choice.

People interact with one another during discrete periods (“a year”, for example) to produce output. The output that results from any encounter depends on the types of the two individuals. The general rule is this: a

person must trust others to initiate an encounter and generate output.

We conceive of the production process as follows. There are N agents who meet other agents over the course of the year; in the limit, assume each agent encounters every other agent. Under this scheme, there would be $N(N - 1)$ meetings every year. Any two agents meet *twice*, once as the *initiator* and once as the *receiver*. For instance, consider two agents in a large economy: Agent 236 – who is of type a_{01} – and Agent 345 – who is of type a_{11} . Think of Agent 236 as meeting every other agent in the economy. Since Agent 236 does not trust others, he will not initiate any transactions and no output will be produced.⁴ Now consider Agent 345; when she meets others, (including Agent 236) she will initiate a transaction because she is trusting. Output will be produced from *all* of the encounters, but the amount from each will depend upon whether or not the receiver acts honestly.

When a trusting agent (type a_{1j}) meets an individual who is trustworthy (type a_{i1}) the maximum output – which we call y_m – is produced. Moreover, this output is divided equally between the two parties.

When the same trusting agent (type a_{1j}) meets an agent who is *not* trustworthy (type a_{i0}) output is lower, at the value y_l . There is a deadweight loss associated with deception. We express this loss as $y_l = \delta y_m$ where $\frac{1}{2} < \delta < 1$. When cheating occurs, we assume that the cheater gets *all* of the output. Otherwise, people would always initiate transactions since that would be better than refusing to initiate.⁵

⁴By definition all self-encounters lead to zero output.

⁵In our model, agents do not play a game: types are determined prior to the current

Aggregate output in the year depends on the proportions of people who trust and can be trusted. Let v_T be an $N \times 1$ vector whose elements reflect the trust behavior of each person in the economy. That is, every element is either a 0 or a 1. Let v_{TW} be a $1 \times N$ vector whose elements reflect the trustworthiness behavior of each individual. Finally, let V be the $N \times N$ matrix whose elements are:

$$V_{ij} = \begin{cases} y_m & \text{if } v_{Ti} = 1 \text{ and } v_{TWj} = 1 \quad i \neq j \\ y_l & \text{if } v_{Ti} = 1 \text{ and } v_{TWj} = 0 \quad i \neq j \\ 0 & \text{if } v_{Ti} = 0 \text{ or } i = j \end{cases} \quad (1)$$

In other words, the elements of V are the outcomes of the various transactions.

An example might be helpful here. Let

$$\begin{aligned} v_T &= [1, 1, 1, 0, 1] \\ v_{TW} &= [1, 0, 1, 0, 1] \end{aligned} \quad (2)$$

So, for example, Agent 2 trusts others ($v_{T,2} = 1$) but is not trustworthy ($v_{TW,2} = 0$), and Agent 4 neither trusts ($v_{T,4} = 0$) nor can be trusted ($v_{TW,4} =$

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.

0). The others trust and are trustworthy. In this case, the matrix V is:

$$V = \begin{pmatrix} 0 & y_l & y_m & y_l & y_m \\ y_m & 0 & y_m & y_l & y_m \\ y_m & y_l & 0 & y_l & y_m \\ 0 & 0 & 0 & 0 & 0 \\ y_m & y_l & y_m & y_l & 0 \end{pmatrix} \quad (3)$$

The fourth row is full of zeros. This is the case because each row represents the outcomes of the transactions *initiated* by Agent i . Since Agent 4 does not trust others, he initiates no transactions and there is no output created. The entries in Column 4, on the other hand, are those in which Agent 4 participates *passively*. Since he is not trustworthy, all of these transactions generate the low value y_l . The entries in Row 3 show the output that results when Agent 3 interacts with other agents in the economy. Output y_m means Agent 3 has transacted with someone with trustworthy behavior. Output y_l means that Agent 3 has transacted with an individual who behaves untrustworthily. Finally, notice that all diagonal entries are zero: these are self-meetings, which are defined to generate no product.

Aggregate output Y is the sum of all the entries in V . If we had the following values, $y_m = 4$ and $y_l = 2$, then the economy represented by matrix (3) would generate output $Y = 50$, and per capita output would be $y = 10$.

We can derive a formula to relate total output to the proportions of the two kinds of agents. Let p_T be the proportion of people who trust and p_{TW}

be the proportion who behave in a trustworthy manner. Let $M = N(N - 1)$ be the number of meetings between different individuals. Then:

$$Y = p_T p_{TW} M y_m + p_T (1 - p_{TW}) M y_l \quad (4)$$

The formula is derived as follows. The number of meetings initiated by those who trust and directed to someone who is trustworthy is $p_T p_{TW} M$. Each of these meetings results in output of y_m . The other meetings that result in output yield y_l , and there are $p_T (1 - p_{TW}) M$ of these. We add the two to get (4).⁶

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

$$y = \left(1 + \delta \frac{(1 - p_{TW})}{p_{TW}} \right) p_T p_{TW} y_m (N - 1) \quad (5)$$

where $\delta = \frac{y_l}{y_m}$ is the relative shortfall of output when people are not trustworthy. We observe that living standards rise with both the fraction of people who are trusting p_T and the fraction who act honestly p_{TW} . Living standards also rise with δ . A rise in δ means there is a smaller loss in output relative to y_m associated with transactions involving an untrustworthy partner. Finally, living standards rise with scale, N .

⁶Equation (4) is an approximation to the true value of output, except in the case of $p_T = p_{TW} = 1$, in which case it is exact. The error is very small for large N , however; it is on the order of about one one-hundredth of a percent.

2.2 Intrinsic Trustworthiness, Institutions, and Trust

If everyone were *intrinsically* trustworthy by our definition, there would be no need for institutions. No one would ever cheat and agents would soon learn to trust everyone. Output would be at a maximum. Unfortunately, this is never the case. Countries have legal and economic institutions to make people *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 naturally untrustworthy people to behave honestly.⁷

In itself, the rise in trustworthy behavior is good: it increases p_{TW} which raises y by (5). But there is an added benefit: as the mass of trustworthy agents rise,⁸ people *learn* to trust others. The trust that we observe – the p_T in (5) – is due to the existence of trustworthy agents, whether natural or induced by institutions. It is irrational to trust others in an environment of dishonest agents.

What, then, determines the quality of institutions? As noted earlier, we think the endowment of *intrinsic* trustworthiness – part of a general “respect

⁷The 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).

⁸Recall that p_{TW} refers to all people who can be trusted, not just those who are intrinsically trustworthy.

for others” – is the source of good institutions. Let

$$p_{TW} = r_{TW} + v_{TW} < 1 \tag{6}$$

where r_{TW} is the fraction of people in the economy who are intrinsically trustworthy and v_{TW} is the fraction who have been induced to act in a trustworthy way. We hypothesize that the quality of a nation’s institutions depends directly on r_{TW} . Our reasoning has two elements. First, since an agent of this type is genuinely altruistic, his utility function includes the welfare (real income) of others in the economy. The only way to raise aggregate per capita income in our model is to increase the level of trustworthy and trusting behavior. One way to accomplish this is to increase the probability of catching cheaters or to increase the penalty if a cheater is caught, both of which reduce the expected utility from cheating. At the margin, this causes those who are not intrinsically trustworthy to behave honestly. It raises v_{TW} . Changing probabilities or penalties, however, requires institutional reform.⁹

Second, a large share of intrinsically trustworthy agents r_{TW} in the general population is necessary to secure enough votes (or persuade enough influential political leaders) to establish institutions that effectively punish cheaters with high probability. We hypothesize that the greater is r_{TW} , the better

⁹Bohnet et al. (2001) also allow behavior to change over time. One difference between our work and theirs is that in their paper no one is intrinsically trustworthy. Using their notation, a person of type H today – one who would not cheat regardless of monetary reward today – will become a type M tomorrow – and possibly cheat – provided the monetary reward is high enough.

the institutional environment, but the function relating the two may not be smooth. That is, it is possible that a threshold value of r_{TW} is necessary before *any* appreciable improvement in institutions occurs. After that, institutions may increase rapidly with the share r_{TW} , causing v_{TW} to rise as well.

Through birth, migration and cultural evolution, the fraction r_{TW} may not be constant over time, and it is likely that the value of r_{TW} in the past – not the present – is the key to institution formation. We do not have a way of measuring historical values of r_{TW} . In order to make progress, then, we assume that today’s value of r_{TW} for which we do have data, is highly correlated with past values of r_{TW} . This allows us to consider our measure of r_{TW} to be exogenous.

We now turn to a discussion of the data and the structure of the empirical model that we used to test our ideas about trust, trustworthiness, output per capita, and institutions.

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.¹⁰ This question is A165 and is

¹⁰The *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.

available in Waves 1 (1981), 2 (1990), 3 (1995), and 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, but there have been critics. It has been criticized, for example, as reflecting the state of institutions and not a cultural or natural trait (see, for example, Beugelsdijk (2006)). It has also been criticized by Miller and Mitamura (2003) who argue that responses to the trust question may be influenced by a society's level of caution. A low trust society, by this measure, could instead simply be more cautious or more prudent in their dealings. Taken in this light, low trust may be considered a positive, instead of a negative factor for an economy. Last, responses to the trust question measure “generalized trust”. Since the trust question is vague, it is not clear what types of situations people have in mind when they respond.

In spite of these concerns, 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

The *World Values Survey* is downloadable from wvs <http://www.worldvaluessurvey.com/services/index.html>.

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.¹¹ 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. 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.”

¹¹We 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.

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 intrinsically trustworthy. We view respondents who feel it important to teach their children tolerance and respect for others as individuals who themselves possess these basic qualities. An individual cannot have respect for others yet at the same time cheat them. Because survey respondents are asked to select five questions from a list of 10 or more 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.¹²

Unlike responses to Question A165, we assume that our measure of trustworthiness does not include a component that may be induced by institutions. That is, our maintained assumption is that untrustworthy types would not code “tolerance and respect for others” out of fear of penalty or retribution. In other words, we think that Question A035 measures r_{TW} and not p_{TW} . We consider our measure of trustworthiness to be exogenous, unlike our measure of trust, which we assume depends on the environment within which people operate, primarily their perception of the probability of their interacting with someone who behaves in a trustworthy manner.

¹²We are aware of only one other paper that uses this question. Tabellini (2006) includes it in his cultural index.

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. Again, this could be picking up the fact that some people who appear not to trust are really just cautious.

A second consideration in constructing our data set was the choice of waves from the World Values Survey. For our study, we exclude Waves 1 and 2 from the analysis because these waves are heavily weighted with Western European and advanced economies and provide less variation. We combine countries from Waves 3 and 4 but eliminate duplicates; we only use data from Wave 3 if there is no data from Wave 4 for that country.

We combine our data on trust p_T and trustworthiness r_{TW} with data on GDP per capita (y) in purchasing power parity dollars from the Penn World Table (v. 6.2), life expectancy from the *World Development Indicators* of The World Bank (2006), years of schooling in the population aged 25 or older from Barro and Lee (2001), and two indicators of institutions. For institutions, we consider an index measuring the constraint on the executive from the Polity IV database, and an index of security of property rights from the Heritage Foundation. In both cases, a higher value implies better

Table 1: Descriptive Data

Variable	Mean	Std.Dev.	Min	Max
p_T	0.295	0.163	0.028	0.666
r_{TW}	0.714	0.096	0.521	0.921
$\frac{y_j}{y_{US}}$	0.409	0.278	0.031	1.000
$\frac{Years\ Schooling_j}{Years\ Schooling_{US}}$	0.634	0.211	0.200	1.000
$\frac{Life\ Expectancy_j}{Life\ Expectancy_{US}}$	0.933	0.112	0.517	1.052
<i>Constraint on Executive</i>	6.039	1.509	1	7
<i>Property Rights</i>	3.75	1.021	2	5

institutions (we recoded property rights to make it conform to this rule).

The combined data yields a complete set of observations for 51 countries. We have chosen to work with a data set that does not vary depending on the specification.¹³ Country coverage includes developed, developing, and transition economies.¹⁴ Table 1 gives the basic descriptive statistics for some

¹³There is one exception. When we use the property rights measure for institutions, our sample size falls to 48. However, we ran all specifications with this sample and found no substantive differences.

¹⁴The countries in our sample are the following: 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, India, Indonesia, Ireland, Italy, Japan, Jordan, Korea, Rep., Mexico, Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, Uganda, United Kingdom, United States, Uruguay, Venezuela, Zimbabwe

of our data. We present the data for y , *Years Schooling* and *Life Expectancy* relative to the United States. It is interesting that *Life Expectancy* is, on average, close to that of the United States compared to both y and *Years Schooling*. The variable *Constraint on the Executive* is an index that goes from 1 to 7. The average for this variable in our sample is quite high, a bit over 6. *Property Rights* is based on a scale running from 1 to 5.

Our basic hypothesis is that both trust and trustworthiness contribute to greater output per capita. Figures 1 and 2 show the scatter plots of y against p_T and y against r_{TW} for our sample of 51 countries. The scatter plots reveal a clear positive relationship. We investigate these relationships using simple bivariate regressions (standard errors are in parentheses) where all variables are in logarithms:

$$\ln y = 10.14 + 0.642 \ln p_T \quad Adj. R^2 = 0.132 \quad (7)$$

(0.252) (0.163)

$$\ln y = 10.61 + 3.9561 \ln r_{TW} \quad Adj. R^2 = 0.379 \quad (8)$$

(0.267) (0.721)

These equations are repeated as Columns (1) and (2) in Table 2.¹⁵

Whether these relationships remain positive and significant after including control variables will be explored in the next section.

¹⁵We investigated the possibility that Trust and Trustworthiness exert their influence only *between* groups by splitting the sample into OECD and non-OECD (22 and 29 observations, respectively). Of the four regressions, only $\ln p_T$ for non-OECD countries lost significance.

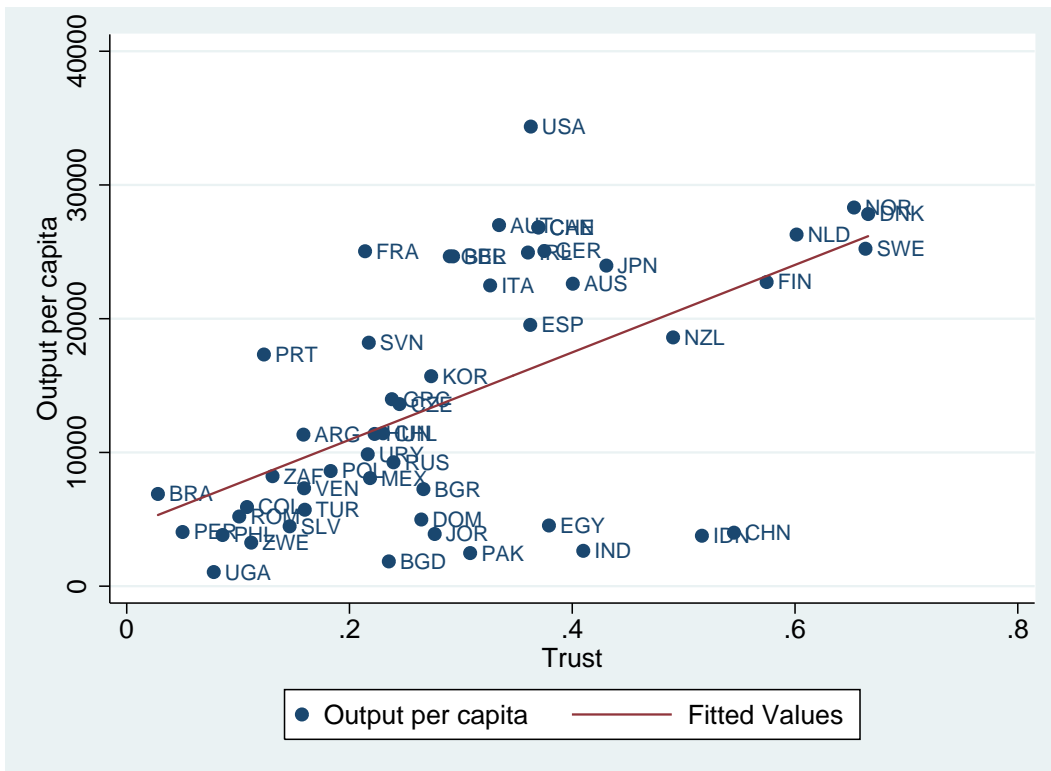


Figure 1: Trust and Output per capita

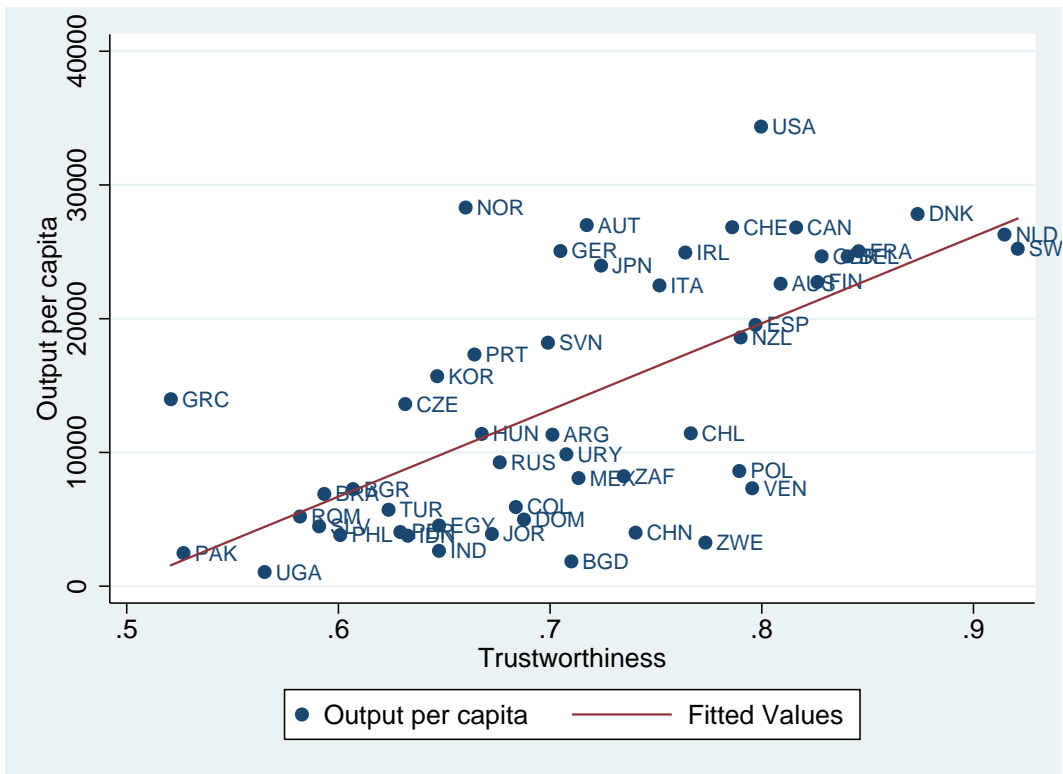


Figure 2: Trustworthiness and Output per capita

4 Empirics

4.1 A Basic Empirical Model

Our econometric model for output per capita is based on (5) and may be specified as:

$$\ln y_j = \alpha_0 + \alpha_1 \ln p_{T,j} + \alpha_2 \ln r_{TW,j} + \alpha_3 I_j + \alpha_4 \ln X_j + \epsilon_j \quad (9)$$

where $p_{T,j}$ measures the proportion of the population of Country j that trusts others and $r_{TW,j}$ measures the proportion of the population of Country j that identifies “tolerance and respect for others” in the World Values Survey to be an important quality to teach their children. We claim that $r_{TW,j}$ is exogenous because it corresponds to a character trait and not a behavior that may depend on institutions. The variable I_j represents contemporaneous institutional variables that prompt otherwise untrustworthy agents to *behave* trustworthily. By including both r_{TW} and I we hope to capture p_{TW} , the fraction of the population that is honest, regardless of whether it is by nature or by choice, since this is what matters for the determination of y .

For I_j our choices include “constraint on the executive” and “property rights”. Constraint on the executive captures the extent to which governments are subject to checks and balances. In our view, a government that is established on the principle of checks and balances will also embrace laws that encourage trustworthy behavior.¹⁶ Property rights measures the extent

¹⁶This variable is used in several papers in this way; see, for example, Acemoglu and

to which property rights of the citizens of a country are protected, which we view as an indicator that the cost of cheating is high.

In (9) X_j stands for a vector of covariates that represents basic human capital variables – life expectancy and schooling – that affect the value of each transaction y_m .

Table 2 presents the results from estimating (9). The first two columns repeat the simple regressions in Equation (7) and Equation (8). In Column (3) we show the results of Equation (9) without either institutional or human capital variables. In Columns (4) and (5) we include one of the two institutional variables – either *Constraint on the Executive* or *Property Rights* – along with our measures of human capital.¹⁷

With the exception of p_T , all of the variables work well in each specification and the adjusted R^2 values are high. The fraction of trustworthy people is highly significant in all of the regressions, and while its magnitude declines considerably when we add controls, it is still economically large. Looking at Column (5), a 10% increase in the fraction of people who are trustworthy – say, from 60% to 66% – raises per capita income by about 16%. This is a powerful effect on living standards.

Trust is insignificant except when it enters alone in Column (1). This raises the possibility that, as we have suggested, trust is induced by the

Johnson (2005). However, Glaeser et al. (2004) present arguments to suggest that this measure is too dependent on recent electoral results to truly reflect deepseated institutions.

¹⁷With property rights, we have only 48 observations. If we run the other specifications with this sample, the results are very similar.

Table 2: Basic OLS
 Dependent Variable: ln per capita Output ($\ln y$)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
$\ln Trust$ ($\ln p_T$)	0.64** [0.00]		0.33 [0.10]	0 [0.99]	0.03 [0.83]	-0.04 [0.73]
$\ln Trustworthiness$ ($\ln r_{TW}$)		3.96** [0.00]	3.18** [0.00]	1.81** [0.00]	1.60** [0.01]	1.61** [0.00]
<i>Constraint on Executive</i>					0.13* [0.03]	
<i>Property Rights</i>						0.28** [0.00]
$\ln Life Expectancy$				2.37** [0.00]	1.91** [0.00]	1.75** [0.01]
$\ln Years Schooling$				0.95** [0.00]	0.74** [0.00]	0.61** [0.00]
<i>Constant</i>	10.14** [0.00]	10.62** [0.00]	10.80** [0.00]	-2.1 [0.41]	-0.57 [0.82]	0 [1.00]
Observations	51	51	51	51	51	48
Adjusted R^2	0.23	0.37	0.4	0.78	0.81	0.82

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

institutional environment of the country. We address this concern as well as the potential endogeneity of X_j and I_j in the following sections.

Finally, we conducted several robustness checks on the results in Table 2. We created different country samples based on region or level of development (limiting our analysis to samples with more than 19 observations). We found that trustworthiness remained significant in nearly all samples, whereas trust was never significant.

4.2 Early Institutions and Induced Trust

The trust variable p_T does a poor job of explaining y in (9). This is somewhat surprising in light of Equation (5), but in our framework p_T is not exogenous: it depends on the proportion of individuals who act honestly, which stems from past values of r_{TW} via the history of institutions. As a small check on this hypothesis, we note that in our data the correlation between p_T and r_{TW} is .51.

Trust is induced, not intrinsic, in our model. In this section we investigate the hypothesis that p_T depends on institutions that are formed *early* in a nation's history. These early institutions – which we call Z_j – are potentially different from the institutions I_j that appear in (9). By using early institutions instead of contemporaneous ones, we hope to minimize the endogeneity between the degree of trust and the state of development as reflected by y . Three variables used elsewhere in the literature seem to be good candidates for Z_j : *latitude*, *legal origin*, and *ethnic fractionalization*. We discuss each of

these in turn.

In the case of latitude, our argument is that when modern nations were being formed, extractive industries were located predominantly in tropical areas. The colonial powers there set up non-representative governments to facilitate the transfer of the gold and silver wealth and had little interest in encouraging competitive commerce. Intrinsically trustworthy migrants, we hypothesize, avoided settling in these areas, since freedom was limited and honest effort was not rewarded. Institutional development was stifled because r_{TW} was low, which contributed to the low levels of induced trustworthiness v_{TW} and trust p_T .

Temperate areas at higher latitudes, on the other hand, attracted intrinsically trustworthy migrants. The colonial powers granted considerable freedom to colonists to form their own institutions as a way of building the population and securing territorial claims. Colonists who went there were highly likely to be intrinsically trustworthy because, given the small size of the settlements, cheating would be easily detected and severely punished. This led to a high fraction r_{TW} . People were tolerant and respectful of others, and shaped the institutions in these nations to promote and protect these values. These institutions induced trustworthiness v_{TW} and trust p_T in those who were not intrinsically trustworthy.¹⁸

¹⁸This general argument is associated with Acemoglu et al. (2001) and Hall and Jones (1999), but only the latter suggest that we focus on latitude as being ultimately responsible for institutions. The former emphasize settler mortality, which is related to climate zone and disease environment.

Many authors have noted that ethnic or linguistic fractionalization may reduce the degree of trust in a society (Easterly and Levine (1997); Alesina et al. (2003)). Although there are advantages to diversity in terms of skill and idea generation (Alesina and Ferrara (2005)), it may be the case that people from different ethnic groups have a more difficult time trusting each other.¹⁹

Legal origin is another variable we think may induce trust. Our measure of legal origin comes from Djankov et al. (2003). It is an index running from 1 to 5 where 1 refers to English common law, 2 – 4 are various forms of civil law, and 5 is Socialist/Communist law. Common law systems have been empirically linked to more well-developed financial markets (Levine (1998) and La Porta et al. (1998)). Our view is that more well-developed financial markets are necessarily ones where trust has been acquired. Therefore, we hypothesize that our legal origin variable should be negatively correlated with trust: civil law systems use a codified set of laws to determine legal outcomes and are not based on precedent as under common law. Since civil law systems leave less to chance rulings, trust is not as important in civil law countries. We surmise, therefore, that civil law countries have lower levels of trust compared to common law countries. However, in this data, Scandinavian countries – where trust is very high – are coded as “socialist/communist law” (code 5), which suggests a positive relationship between trust and the legal origin index. Accordingly, we consider using a quadratic form relating trust to legal

¹⁹See Glaeser et al. (2000) for some evidence from experiments at Harvard.

Table 3: Determinants of Trust

Dependent Variable: *Trust* p_T

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	OLS
<i>Latitude</i>	0.46** [0.00]			0.41** [0.00]	0.24* [0.02]
<i>Fractionalization</i>		-0.23* [0.02]		0 [0.97]	-0.03 [0.72]
<i>Legal Origin</i>			0.05* [0.02]	0.03+ [0.08]	-0.21** [0.00]
<i>Legal Origin Squared</i>					0.05** [0.00]
<i>Constant</i>	0.11* [0.04]	0.37** [0.00]	0.17** [0.00]	0.04 [0.61]	0.38** [0.00]
Observations	51	51	51	51	51
Adjusted R^2	0.26	0.09	0.11	0.29	0.46

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

origin

To investigate the effect on trust, we estimate the following equation:

$$\ln p_{Tj} = \gamma_0 + \gamma_1 Z_j + \gamma_2 r_{TW} + v_j \quad (10)$$

where Z_j stands for some combination of the early institutional variables identified above. Table 3 shows the regression output from different vectors Z_j without including r_{TW} . The first three columns show the result of using one variable at a time. Latitude, fractionalization, and legal origins are all significant at the 5% level at least. Interestingly, the legal origin variable exerts an overall positive influence. It appears that this variable is picking up the influence of Scandinavia more than the actual effect of the legal system.

Table 4: Determinants of Trust 2

	Dependent Variable: <i>Trust p_T</i>				
	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	OLS	OLS	OLS
<i>Trustworthiness</i> ($\ln r_{TW}$)	0.58*	0.78**	0.80**	0.56*	0.41*
	[0.01]	[0.00]	[0.00]	[0.01]	[0.04]
<i>Latitude</i>	0.32*			0.28*	0.17+
	[0.02]			[0.02]	[0.09]
<i>Fractionalization</i>		-0.15		0	-0.02
		[0.12]		[0.98]	[0.78]
<i>Legal Origin</i>			0.04*	0.03+	-0.18**
			[0.03]	[0.07]	[0.00]
<i>Legal Origin Squared</i>					0.04**
					[0.00]
<i>Constant</i>	-0.24+	-0.21	-0.38*	-0.30*	0.09
	[0.10]	[0.18]	[0.02]	[0.03]	[0.60]
Observations	51	51	51	51	51
Adjusted R-squared	0.34	0.27	0.31	0.37	0.5

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

This is confirmed in Column (4) where we put all three together. Now, fractionalization is insignificant and legal origin is significant at only 10%. The R^2 of this relation is just barely above that in Column (1). Latitude appears to be a powerful determinant of trust. Given our earlier discussion, it appears reasonable to allow legal origin to enter in quadratic form. We show this result in Column (5). Except for fractionalization, the variables are significant and the adjusted R^2 rises from 29% to 46%.

In Table 4 we repeat the regressions in Table 3 but include the fraction r_{TW} in each one. We do this because we contend that intrinsic trustworthiness is responsible, ultimately, for both institutions and trust. In all cases, r_{TW}

is significant and often very much so. Moreover, the R^2 values were higher, and the other variables retained their significance.

It is legitimate to put r_{TW} into this equation as a regressor because there is a presumption that r_{TW} causes p_T and not vice versa. A high fraction of people who are trusting should not make people more trustworthy. If anything, it should make them less trustworthy – more willing to cheat – because their counterparts in exchange will be willing to enter transactions without questioning their honesty. On the other hand, a higher fraction of intrinsically trustworthy people – a high value for r_{TW} – will make people more willing to trust.

So far, we have shown that trust has little effect on y and that trust is itself dependent on early institutions and intrinsic trustworthiness.

4.3 Trustworthiness and Living Standards

In light of the results in the last section, we now return to the main estimating equation. Instead of using the measure of trust, however, we use the variables representing early institutions Z_j – *Latitude*, *Ethnic Fractionalization*, and *Legal Origin* – that we think influence current trust. We do this because trust is more likely to be correlated with the error in Equation (9) than are the components of Z_j . For example, it is possible that the level of per capita income y causes trust to be high, just as trust raises y . This kind of simultaneity is nearly eliminated when we use Z_j . For the same reason, we take ten-year lags of *Life Expectancy* and *Years Schooling* and the five-

year lag of *Constraint on the Executive*.²⁰ Recall that the latter is included to capture the effect of institutions on inducing untrustworthy individuals to behave trustworthily. With these changes, our main estimating equation becomes:

$$\ln y_j = \alpha_0 + \alpha_2 \ln r_{TWj} + \alpha_3 I_{j,-5} + \alpha_4 Z_j + \alpha_5 \ln X_{j,-10} + \epsilon_j \quad (11)$$

Table 5 presents the results from various specifications of (11). All columns include the first three variables; they differ by the subset of Z_j that is included. Column (1) presents the results when only latitude is used for Z_j ; Column (2) when only *Ethnic Fractionalization* is used; and Column (3) when only *Legal Origin* and its square are used. In the first two columns, the log of r_{TW} is quite significant and indicates close to an equiproportionate effect on y . On the other hand, the Z variables – latitude and fractionalization – are barely insignificant. *Life Expectancy* (lagged 10 years) and the indicator for institutions *Constraint on the Executive* (lagged 5 years) are quite significant, but *Years Schooling* (lagged 10 years) is not.

In Column (3) we use *Legal Origin* and *Legal Origin Squared* for the Z variables: both are significant and correctly signed. In this specification, r_{TW} maintains significance – at the 10% level – but of the other regressors only *Life Expectancy* is still significant. *Constraint on the Executive* just misses out. In Column (4) we add all of the Z variables together. Trustworthiness,

²⁰We use a five-year lag, instead of a ten-year lag, since we lose an observation when we lag X_{con} by ten years.

Table 5: Trustworthiness and Output per capita

	Dependent Variable: $\ln y$					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
$\ln Trust (\ln p_T)$					0.07 [0.51]	-0.07 [0.50]
$\ln Trustworthiness$ ($\ln r_{TW}$)	1.04** [0.01]	1.12** [0.00]	0.74+ [0.06]	0.76+ [0.06]	1.01** [0.01]	0.80+ [0.05]
<i>Five-year lag of</i> <i>Constraint on</i> <i>Executive</i>	0.09* [0.04]	0.10* [0.02]	0.07 [0.11]	0.07 [0.11]	0.10* [0.02]	0.06 [0.17]
<i>Latitude</i>	0.58+ [0.09]			0.34 [0.34]		0.42 [0.29]
<i>Fractionalization</i>		-0.04 [0.85]		0.12 [0.58]		0.11 [0.61]
<i>Legal Origin</i>			-0.39* [0.02]	-0.32+ [0.07]		-0.39* [0.04]
<i>Legal Origin Sq.</i>			0.08** [0.01]	0.06* [0.04]		0.08* [0.02]
<i>Ten-year lag</i> $\ln Life Expectancy$	4.70** [0.00]	4.86** [0.00]	5.62** [0.00]	5.45** [0.00]	4.76** [0.00]	5.73** [0.00]
<i>Ten-year lag</i> $\ln Years School$	0.16 [0.44]	0.28 [0.16]	0.17 [0.42]	0.12 [0.58]	0.27 [0.16]	0.08 [0.69]
<i>Constant</i>	-11.42** [0.01]	-12.10** [0.01]	-14.70** [0.00]	-14.16** [0.00]	-11.62* [0.01]	-15.25** [0.00]
Observations	51	51	51	51	51	51
Adjusted R^2	0.87	0.87	0.88	0.88	0.87	0.88
Notes: Robust p values in brackets. **significant 1%; * at 5%; + at 10%						

$\ln r_{TW}$, changes little in terms of magnitude and significance and the new additions change almost nothing. In Column (5) we remove all of the Z variables, and replace them with $\ln p_T$. Now, $\ln r_{TW}$ returns to its original magnitude and high significance, but $\ln p_T$ has no influence or significance. Finally, in Column (6) we include all of the variables. Trustworthiness is significant at 10% – and nearly so at 5% – but Trust is actually negative, although not significant. And, continuing the pattern, *Life Expectancy* and the *Legal Origin* variables do much better than *Constraint on the Executive* and *Schooling*.

These results suggest that trustworthiness and the state of health (life expectancy) are the most important determinants of living standards.

4.4 Trustworthiness and Institutions

In this section, we investigate two subsidiary hypotheses. First, we have argued that intrinsic trustworthiness today comes from the pattern of colonial settlement. Colonies in temperate latitudes were given greater freedom to choose their own forms of government, which encouraged the immigration of people who were intrinsically trustworthy. At high latitude, then, we should observe that our measure of intrinsic trustworthiness r_{TW} is also high.

Second, our theory implies that a high proportion of intrinsically trustworthy people should lead to the creation and development of good institutions. That is, high values of r_{TW} should be associated with high values of the contemporaneous institutional variables I .

Table 6: Trustworthiness and Institutions
 Dependent Variable: As Indicated

	(1)	(2)	(3)	(4)	(5)
Dependent Variable →	OLS <i>Trustworthiness</i> (r_{TW})	OLS <i>Constraint on Executive</i>	OLS <i>Constraint on Executive</i>	OLS <i>Property Rights</i>	OLS <i>Property Rights</i>
<i>Trustworthiness</i> (r_{TW})		6.08* [0.01]	3.06 [0.26]	5.21** [0.00]	3.09+ [0.05]
<i>Latitude</i>	0.24** [0.00]		3.30** [0.00]		2.23** [0.00]
<i>Constant</i>	0.62** [0.00]	1.7 [0.35]	2.53 [0.17]	0.04 [0.96]	0.67 [0.48]
Observations	51	51	51	48	48
Adjusted R^2	0.2	0.13	0.25	0.23	0.34

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

Table 6 reports the tests of these hypotheses.

In Column (1) of Table 6 we see that *Latitude* is very significant in explaining r_{TW} in a simple regression. Adding legal origins and its square (not reported) does not add anything to the relationship: the adjusted R^2 is basically unchanged and neither of the new regressors is significant.

In Column (2) we test the second hypothesis by regressing *Constraint on the Executive* on r_{TW} . It is quite significant. However, when we add *Latitude* directly in Column (3), we see that r_{TW} is no longer significant; but *Latitude* is very significant. This is consistent with the idea that trustworthiness is

not randomly distributed around the globe, but concentrated in the higher latitudes.

As a further check, in Columns (4) and (5) of Table 6 we repeat the above specifications, but use *Property Rights* as the dependent variable. The results are much the same but slightly better. Now, r_{TW} retains significance when combined with *Latitude*.

5 Conclusion

In this paper, our focus was on the importance of trustworthiness in generating output per capita. Our view is that intrinsic trustworthiness is instrumental in shaping the key institutions that encourage others to act in a trustworthy manner, which in turn fosters trust. Trust, though important for transactions, is secondary. It must follow the creation of important institutions and the trustworthiness that they encourage.

In our theoretical framework, aggregate output depends on the quality and extent of individual economic exchange. In our model, the amount of output generated in a transaction involving two parties depends on the behavior of the transacting parties – trust extended by the initiating party and the trustworthiness of the responding party. Shared output from transactions involving parties that behave trustworthily is higher than from transactions involving parties that do not behave trustworthily. A lack of trusting behavior reduces aggregate output, too, because opportunities to produce output

are foregone. As a result, output and output per capita depend on the proportions of the population that are trusting and that behave trustworthily. In our model, trustworthy behavior has two sources – an intrinsic component with which some people are endowed – and an induced component, owing to good institutions. Trusting behavior on the other hand is dependent on the quality of institutions and trustworthiness.

In our empirical work, we use data from the World Values Survey to measure trust and trustworthiness. We find that intrinsic trustworthiness is strongly positively associated with per capita income and its significance is little changed with the inclusion of control variables and institutions, or when accounting for potential endogeneity issues. On the other hand, trust is not significant in any specification, except when trustworthiness is excluded from the regression. We also find evidence to support our view that trust is itself influenced by early institutions and intrinsic trustworthiness, and that current institutions depend on intrinsic trustworthiness.

Our model and empirical results suggest that trustworthiness is a more important determinant of standards of living than is trust. In our future work, we will explore more fully the microfoundations of trustworthiness and its implications for macroeconomic outcomes related to standards of living.

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