Is trust the missing root of institutions, education, and development?

Christian Bjørnskov and Pierre-Guillaume Méon

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Abstract: In the paper, we report evidence that trust is the missing root relating education, institutions, and economic development. We observe that more trust both increases education and improves legal and bureaucratic institutions, which in turn spurs economic development. We substantiate this intuition with a series of regressions that provide evidence that trust determines both education and the quality of institutions, and that education and institutions in turn affect GDP per capita.

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1. Introduction

The notion that the quality of a country's institutional framework is a key determinant of development has reached the status of a consensus, if not that of a "buzzword", as Dixit (2009) calls it. Although Demsetz (1967) already outlined how the proper definition, protection and transferability of private property rights causes an efficient allocation of resources, as well as efficient reallocation in case the distribution of productivity or endowments shifts, the "institutional view" really became influential following the work of Douglass North (North and Weingast 1989; North 1990). The popularity of the institutional view has benefitted from the support of a series of empirical studies. Early support was provided by the contributions of Knack and Keefer (1995) and Mauro (1995), who reported a strong correlation between measures of institutional quality and economic growth. They were later complemented by results emphasizing the primacy of institutions over other explanations of development, like Rodrik et al. (2004), and establishing a causal link from institutions to development, like Hall and Jones (1999) or Acemoglu, Johnson and Robinson (2001). A red thread of that strand of literature is that institutions are a deep factor that evolves slowly and finds its roots in the country's distant past. Accordingly, Sokoloff and Engerman (2000) and Acemoglu, Johnson and Robinson (2001) trace the origins of institutions to the colonization of countries. Nunn (2008) finds that the intensity of slave trade centuries back is reflected in the current economic performance of African nations.

The role of education is, however, difficult to integrate into the narrative that views institutions as the fundamental determinant of development.[1] Levine and Renelt (1992), Mankiw et al. (1992),

[1] It bears mentioning that the direct link between education and development is not undisputed. Pritchett (2001), for example, notes several problems relating to measuring average impacts and achieving the 'right' mix between primary, secondary and tertiary education. Berggren et al. (2008) and Beugelsdijk et al. (2004), in extreme bounds analysis, also find only weak support for education as an important growth factor.

Barro and Lee (1994, 2010), Bassanini and Scarpetta (2002), and Hanushek and Woessman (2008) all report evidence of direct positive effects of education on long-run economic performance, typically measured as either the average number of years of schooling completed by a nation's population or as the share of the population with a secondary education. Dearmon and Grier (2009, 2011) instead find that education affects investment activity, which feeds back into increases in the demand for education.

More to the point, Boix (2003) argues that a minimally educated population is a prerequisite for the appearance of democratic institutions, as Lipset (1960) contended, subsequently leading to secure property rights. Glaeser et al. (2004) even make the point that the empirical support for the "institutional view" vanishes once education, measured as the average number of years of schooling, is taken into account. They observe that education is a better predictor of subsequent growth than institutions. Moreover, they argue that standard instruments used to establish causality are more likely to capture the impact of colonial origins on the transmission and accumulation of human capital than on the colonized countries' institutions. Accordingly, they report a stronger correlation between settlers' mortality rates, the instrument used by Acemoglu et al. (2001), and past and present education than with past and present institutions. The implication of the results of Glaeser et al. (2004) is that poor countries rise out of poverty thanks to policies favoring the accumulation of human capital, which incidentally leads to better institutions. This is the essence of the "development view". A complement is provided by the "grand transition" view, which holds that income also causally affects institutional development in the very long run, as Paldam (2002) and Paldam and Gundlach (2008) argue.

Strikingly, both the development and the institutional view overlook the role of culture, although culture may provide the missing link between the two views. Yet, recent studies document the importance of a specific element of culture – social trust, defined, for instance, by Guiso et

al. (2008) as the propensity of a population to trust other people whom they do not know personally. As Paldam (2000) argues, trust is one of the key concepts of social capital. This cultural feature could supply a missing link because of the growing evidence that social trust affects both institutions and education. First, trust has been found to be related to the quality of institutions at the regional level within countries, by Putnam (1993) and Knack (2002), at the cross-country level, by Uslaner (2002) and Bjørnskov (2010), or both, by Tabellini (2008). Second, trust has also been found to affect education; supportive evidence is provided by Papagapitos and Riley (2009) and Bjørnskov (2009). Taken together, those findings suggest that a deeper factor, social trust, may affect both education and institutional quality simultaneously. High trust countries may grow out of poverty by investing in education and developing well-functioning institutions, with a potential positive interaction between them. Both the development and the institutional view may thus hold at the same time. Moreover, different levels of trust may explain why some countries with otherwise similar institutions and endowments implement different education policies and realize returns to investments (private and public) in that sector as well as in institutions, which is arguably a blind spot of the development view. Trust may thus, along with other known factors such as openness, determine what Djankov et al. (2003) refer to as the institutional possibility frontier. In other words, instead of constituting a production factor on its own, as Paldam and Svendsen (2000) argue, trust may be a deeper factor affecting fundamental transaction costs. To our knowledge, that view has not yet been tested formally.

The aim of the present paper is precisely to test whether social trust links institutions, education, and economic development. To do so, we must provide evidence indicating the existence of several causal relations. The first two are that trust affects education on the one hand, and institutions on the other. We do so by running two-stage least-squares regressions with predetermined instruments to assess the impact of exogenous variations in trust. Second, we must check whether trust affects per capita income, which is the outcome of long-term growth. Using two-stage least-squares estimations

again, we here start by testing the overall impact of exogenous variations in trust on per capita income. We then control for education and institutions, and interpret the coefficient of trust as measuring the direct effect of trust on income. In a third step, we complement previous results by running full-fledged three-stage least-squares regressions, where both education and institutions are regressed on trust, and GDP is subsequently regressed on education and institutions. The structure of those three-stage least-squares regressions maps the notion that trust is a more fundamental factor that affects income at least partly through institutions and education. That strategy allows us to assess the extent to which indirect effects may explain long-run income differences, as opposed to more direct economic effects. Disentangling the channels through which trust affects economic performance is the main contribution of the present paper, because existing studies have so far almost always limited their scope to one channel. Here, we not only study jointly two important channels of transmission, but gauge their relative impacts and compare them to the size of the direct impact of trust on economic performance. In doing so, we also complement the literature by investigating the effect of trust on development in the very long-run, measured by the level of national output. The existing literature, following Knack and Zak (1997), has indeed focused on growth over periods of several decades. By following Acemoglu et al. (2001) and using the level of GDP as dependent variable, we study the impact of trust on growth since countries' origins. Studying the very long-run impact of trust on GDP is our second salient contribution to the literature.

The rest of the paper is organized as follows. The next section outlines a set of theoretical mechanisms potentially connecting trust to overall economic performance. Section 3 describes our data and empirical strategy. Section 4 reports our findings. Section 5 concludes.

2. How would education and institutions mediate trust effects?

If social trust determines education and institutional quality, both of which cause cross-country differences in long-run economic development, it may be viewed as a key root of economic

development. At the individual level, Bohnet (2008) defines trust as the willingness to make oneself vulnerable to another person's actions, based on beliefs about that person's trustworthiness. *Social* trust thus relates to a positive belief in the trustworthiness of most people. Guiso et al. (2008) accordingly define social trust as the propensity of a population to trust other people whom they do not know personally. In Williamson's (2000) terms, social trust is a determinant of development operating at a deep level of social analysis. Specifically, trust belongs to the first level of social analysis, the social embeddedness level, where norms, traditions, and culturally stable basic beliefs are located (Guiso et al. 2008). In this section, we briefly survey the literature on the impact of trust on institutions and education.

2.1. Institutions

In their early contribution, Knack and Keefer (1997) argued that the influence of social trust on economic growth was channeled through the quality of legal and bureaucratic institutions. As they had shown in a previous paper that the quality of institutions led to economic growth (Knack and Keefer 1995) a channel of transmission from trust to growth was suggested.

The theoretical reasons why trust may affect the quality of institutions are numerous. The most direct is that, in a more trustworthy society, politicians and government officials are likely to be more trustworthy, and will be less prone to take advantage of their positions for personal benefit. This argument can, for instance, be found in the early work of Knack and Keefer (1997) or Knack (2002). Boix and Posner (1998) elaborate on this mechanism by distinguishing two effects of trust on the quality of the bureaucracy. The first effect of trust is to facilitate cooperation and compromises between government bureaucrats. Its second effect on the bureaucracy is that it contributes to solving the principal-agent problem inherent in the relationship between the government and public agencies.

Another mechanism through which trust may affect the quality of institutions is that with trust comes a greater interest and participation in politics, as Boix and Posner (1998) or Knack (2002) argue. In the words of Boix and Posner (1998), trust breeds "sophisticated consumers of politics" better able and willing to monitor public officials, as trusting citizens apply higher standards of behavior to all members of society, including politicians. This may account for Putnam's (1993) finding that public services are better provided by local governments in the more trusting regions of Italy. In line with that argument, la Porta et al. (1997) observe a positive impact of trust on voter turnout.

A final impact of trust on institutions runs through institutional reforms and compromises. Bois and Posner (1998) argue along these lines that social capital can help in striking deals, especially in polarized societies facing a crisis, as trust allows political compromises that include payoffs realized further into the future. Similarly, Knack (2002) and Heinemann and Tanz (2008) argue that trust facilitates the adoption of institutional reforms.

Empirical evidence based on various levels of data aggregation support the theoretical contention that trust leads to better institutions. Within countries, the impact of social trust on institutions was key to Putnam's (1993) study of regional governance in Italy. Knack (2002) likewise reports that social trust is a determinant of the quality of state institutions across US states. Similar results are reported in cross-country studies, where higher levels of trust are found to be associated with less corruption, for instance by Putnam (2001) and Uslaner (2002), and better legal quality and bureaucratic efficiency. Bjørnskov (2012) and Boulila et al. (2008) focus specifically on estimating the transmission mechanisms through which trust affects economic growth. Both identify institutional quality as an important link. Bjørnskov (2009), therefore, suggests that the main mechanism through which trust generates economic growth is by improving the quality of formal economic-judicial institutions, because he finds that trust affects long-run economic growth above and beyond its direct

influence on education and investments. However, to the extent that trust works by changing voters' demands, one would expect larger effects of trust on institutional quality in more democratic and richer countries. Reflecting this difference, Bjørnskov (2010) finds that social trust affects the quality of legal institutions only in democratic countries, but affects corruption in all countries regardless of their political institutions. Méon and Bjørnskov (2010) similarly observe that the relation between trust and total factor productivity is driven by economic-judicial institutions.

We focus here on economic-judicial institutions, as captured by a corruption index, for several reasons. First, we follow the majority of studies of the impact of trust on institutions that generally focus on institutions that protect private property rights, as in Knack and Keefer (1997), Putnam (2001), Uslaner (2002), or Bjørnskov (2010). Second, although early contributions, such as as Putnam (1993), la Porta et al. (1997) and Uslaner (1999), suggested that trust also affected democratic institutions, their findings have been found to be weaker. Bjørnskov (2010), could for instance, observe an effect of trust only on the quality of economic-judicial institutions, but not on democratic institutions, once common covariates were taken into account. Similarly, Bjørnskov and Méon (2010) find that the effect of social trust on total factor productivity runs entirely through property-rights institutions, as opposed to political institutions. More generally, the impact of democratic institutions on economic performance is more elusive than the impact of economic-judicial institutions. Méon and Weill (2005) find that, out of the six dimensions of good governance distinguished by the World Bank, 'voice and accountability' is the one whose correlation with aggregate efficiency is the weakest.

2.2. Education

Cross-country evidence that educational achievements determine subsequent growth goes back at least to Mankiw et al. (1992). Barro and Lee (1994, 2010) provide more recent evidence although it

remains difficult to determine which type of education is relevant, as Pritchett (2001) remarks. Arguably, at low levels of development, improvements in primary schooling are most salient. Conversely, richer countries are likely to extend primary schooling to all, therefore making the development of cognitive skills and improvements in secondary and higher education more relevant (Hanushek and Woessman 2008).

The question here is to determine how and to what extent trust may affect education. From a theoretical point of view, one may distinguish supply and demand mechanisms. Coleman (1988) originally suggested that social capital could affects education by means of a supply-side mechanism, as he observed that students endowed with more social capital had lower drop-out risk. At the national level, one would therefore expect that educational systems in high-trust countries are more efficient, since students and teachers are more likely to solve local collective action problems related to the public goods elements of education. When documenting a strong and robust association between trust and enrolment in secondary education, Papagapitos and Riley (2009) interpret their finding that trust is related to education as evidence of this broad type of transmission mechanism. The notion that the quality of the educational system should be higher in more trusting countries is also put forward by Putnam (1993) and la Porta et al. (1997).

Supply-side mechanisms may be complemented by demand-driven mechanisms. First, the returns to education can be expected to be larger in more trusting societies. Knack and Keefer (1997) argue that, since work relationships are limited to small networks of people in non-trusting societies, education plays a minor role in hiring decisions, especially when compared to other personal attributes such as family ties or connections. By contrast, education becomes a key criterion in hiring decisions in trusting societies, which increases the returns to return to education. Another demand mechanism put forward by Knack and Keefer (1997) runs through the credit market. The idea here is that credit-constrained individuals can be prevented from investing in human capital, as argued by

Galor and Zeira (1993). If trust contributes to moderating credit-market imperfections and loosening credit constraints, as Guiso et al. (2004) show, it will allow individuals to more easily finance their investments in education in more trusting societies.

Bjørnskov (2009), in addition, claims that trust might also affect the demand for higher education. His argument's theoretical starting point is that high-trust employees are better at cooperating and require less monitoring. Firms that need to monitor employees performing complex tasks – not least the task associated with innovation technological progress – will therefore tend to adjust their demand for educated employees relative to the trust level. If educated employees are more trustworthy, firms can reduce monitoring costs and afford to employ a larger educated workforce. Embedded in a semi-endogenous growth model, this assumption feeds into a higher rate of innovation and technology adoption and, hence, output growth.[2] Bjørnskov (2009) subsequently finds evidence of an association between levels of trust and the growth of education since 1960, interpreting it as suggestive of a demand-driven mechanism. By associating education with productivity growth theoretically, he also identifies education as a main transmission mechanism connecting trust to economic growth and development.[3]

[2] In principle, one could think of arguments similar to discussions of the duration and protections offered by patent rights that would indicate some optimum level of trust. For example, extreme levels of trust may imply that industrial secrets are transmitted so slowly that the diffusion of technology is hampered.

[3] The early literature on social capital and trust outlined a number of direct mechanisms connecting social trust to output, summarized in Fukuyama (1995), Putnam (2001) and Bornschier (2005). They pertain to reduced transaction costs in society as a whole, and a general acceptance of anonymous cooperation in high-trust societies, as the perceived risk of someone taking advantage of another is lower. Ikeda (2008) also suggests that trust allows entrepreneurs to have more impersonal contacts, thereby accessing a wider range of knowledge resources. In general, though, the empirical literature has failed to support such direct transmission mechanisms.

2.3. Direct effects

While the quality of institutions and education are two channels through which trust may affect long-run economic development, they do not *a priori* rule out more direct effects of trust on the efficiency of the economy, as those suggested in the early contributions of Arrow (1972), Putnam (1993), and Fukuyama (1995).

Knack and Keefer (1997) argue that high levels of social trust allow the reallocating of resources away from protection against theft and expropriation towards production. As Arrow (1972) contends, trust also reduces transaction costs more generally. In line with Arrow's contention, la Porta et al. (1997) argue that high levels of social trust allow economic agents to write shorter contracts, covering only broad contingencies. By the same token, social trust allows firms to plan investments over longer time horizons, resulting in the funding of potentially more productive capital projects.

By reducing transaction costs and the risks of opportunism, trust may also affect economic development by encouraging physical capital accumulation. This mechanism is emphasized in Zak and Knack's (2001) theoretical contribution, in which lower transaction costs translate into proportionally larger investments. Accordingly, Knack and Keefer (1997) report a positive association between trust and the stock of physical capital.

The impact of trust on transaction costs and investment may moreover interact, because both the quantity and the quality of investment may be raised by social trust. In accordance with that notion, Dearmon and Grier (2009) observe, using growth regressions, that the marginal impact of investment on growth is larger in more trusting economies.

The relation between social trust and economic development is complex and multi-faceted. Figure 1 provides a summary of all those channels that may be considered.[4]

[4] We thank Martin Paldam for popularizing this type of easily interpretable figure.

*** Insert Figure 1 around here ***

In what follows, we assess the institutional and educational channels directly, which are represented by arrows 1 to 4 in Figure 1, and infer from the magnitude of those whether there is room left for the direct channel represented by arrow 5. We acknowledge that reverse effects such as those represented by arrows 6 to 10 may also be at work. Our empirical strategy aims at controlling for those effects.

3. Data and econometric strategy

Before we turn to our econometric strategy, the next subsection describes how we measure social trust and other explanatory variables, to explain the level of GDP.[5]

3.1 Data

Data on output were retrieved from the Penn World Tables, mark 7.0. Our main measure of development is output per capita in purchasing-power adjusted (PPP) dollars in 2007, which is the most recent year for which full data are available (Heston et al. 2011). In addition, data for 2008 and 2009 are affected severely by how the financial crisis hit specific countries. Following Acemoglu et al. (2001) or Acemoglu and Johnson (2005), we take the logarithm of per capita output. By taking logarithms, we simultaneously allow for effects to be larger in countries further away from the global production possibility frontier, and ensure that identification does not depend on the few super-rich country observations in the dataset. As a robustness check, we will also use logarithmic output per

[5] Descriptive variables are provided in Appendix A2.

worker in PPP dollars, again from the Penn World Tables 7.0, as a simple measure of labor productivity.

To measure education, we use the new dataset constructed by Barro and Lee (2010). More precisely, we use the percentage of the population over the age of 25 with some form of secondary education in 2005. This is the most commonly used level of education, as it both captures slightly more advanced learning than primary school, completion of which is a prerequisite for pursuing a higher education.[6] As education is expected to be growth-friendly, we expect its coefficient to be positive in regressions explaining per capita GDP.

The quality of institutions is measured by two alternative indices of corruption. The first is the index of the control of corruption from the World Governance Indicators constructed by Kaufmann et al. (2008). The second is the corruption perception index (CPI) published by Transparency International (2010); both refer to institutional quality in 2007-2008. Both indices aggregate the results of other surveys aimed at assessing corruption at the country level. Such indices, contrary to measures capturing economic and institutional policies, tend to be stable over longer periods of time, which makes the exact time at which they are measured relatively innocuous (cf. Sobel and Coyne 2011). We thus opt for measuring corruption at the same time as GDP since this allows us to collect data for a substantially larger sample than would be possible in choosing data available only a few years earlier.

We prefer these measures to the alternatives, because corruption can be seen as clear evidence of institutional failures. These failures derive from many different elements and levels of the institutional framework, but are all systemic and pertain to elements of what we term economic-judicial institutions. The measures thus do not capture more volatile differences in economic

[6] More precisely, we use the variable RGDPCH of the Penn World Tables for per capita GDP, GDPWOK for GDP per worker, and the ls25_2005 variable in Barro and Lee's dataset for education.

regulations or economic policy, which must be distinguished from institutional features typically subsumed as the "rule of law" (Aron 2000; Acemoglu and Johnson 2005), as well as from characteristics of political institutions (e.g., Munck and Verkuilen 2002). As such, using corruption as our institutional measure may therefore be superior to more specific alternatives capturing only the quality of certain elements of the framework. However, we use both, because the Kaufmann measure captures a broader understanding of institutional quality, as Knack and Langbein (2010) argue, while the CPI measure is conceptually 'cleaner'. Given that those indices are coded so as to increase when the quality of institutions increases, we expect their signs to be positive in regressions where per capita GDP is the dependent variable.

Social trust is measured thanks to the standard question "In general, do you think most people can be trusted?" To maximize the number of observations, we compiled several sources: the five waves of the World Values Survey between 1981 and 2005 (Inglehart et al. 2004), data from the 1995 and 2003 LatinoBarometro, the 2001-2004 Asian and East Asian Barometers, the 2001-2007 AfroBarometer, and the 2002-2004 Danish Social Capital Project.[7] We thus use all available sources that provide comparable information on trust.

Many countries are only observed in a single period. We therefore use the average of available observations. To do so, we need to make the implicit assumption that social trust does not vary significantly in the medium term. As Bjørnskov (2007) and Uslaner (2002, 2008) point out, social trust scores are, in general, very stable over time, and the assumption is therefore a priori reasonable.[8] All trust observations are reported in the appendix. We expect the coefficient of trust to be positive

[7] We get an additional observation for Jamaica from a large, representative survey. The survey is described in Bourne et al. (2010). The inclusion of Jamaica is the only difference from the dataset in Bjørnskov (2012). The list of trust scores is displayed in Table A1.

[8] We acknowledge that the assumption may be questionable in the case of the United States, where trust levels fell in the 1970s and 1980s.

in GDP regressions. Also, as trust should increase education and improve the quality of institutions, we expect its coefficient also to be significantly positive in regressions explaining education and corruption.

To provide evidence suggesting the existence of a causal effect of trust and avoid simultaneity bias, we need instruments for trust.[9] We follow recent work by using a set of instrumental variables suggested in Guiso et al. (2008), Tabellini (2008) and Bjørnskov (2012). More precisely, we include three instruments: a dummy variable capturing whether the predominant language of a country exhibits Chomsky's (1981) 'pronoun-drop' characteristic, the average temperature in the coldest month of the year, and a dummy variable capturing whether a country is a monarchy. We add a fourth instrumental described below to handle a specific problem ignored in the literature.

The first was introduced to the literature by Tabellini (2008). He argues that languages wherein the personal pronoun can be dropped (the pronoun-drop characteristic) tend to reflect less respect for the individual and for individual rights. In more collectivist cultures, asymmetric power relations may be more likely, and promises likely are conditional on whether or not the promised action is perceived to be to the collective benefit. Both traits signal a culture of individual mistrust, and should, therefore, exhibit a negative coefficient.

[9] Reverse causality would, for instance, be a concern if trust increases as countries grow richer from total factor productivity growth, as Paldam (2009) argues. We note that the contention has, however, been rejected by Delhey and Newton (2005) and Bjørnskov (2007). In general, recent studies suggest that trust in most countries is remarkably stable over time (e.g., Uslaner 2008; Nunn and Wantchekon 2011). As corruption certainly has declined and property rights institutions are stronger in most of the world, compared to immediately after World War II, while trust seems to have remained approximately stable in most of the Western world in the same period, it seems logical to assume that causality mainly runs from trust to institutional quality (Bjørnskov 2007).

The idea that the severity of winters can affect cultural characteristics, such as social trust, can be traced back to Aristotle and Hippocrates.[10] Its rationale is that survival through winters in cold climates historically depended on help from strangers. Extending one's trust circle to more unfamiliar people was then a dominant evolutionary strategy in cold countries. Scandinavia, with higher historical trust levels, fits the intuition well. The temperature instrument is considered in Bjørnskov (2010, 2012). Following his line of reasoning, we expect minimum winter temperatures to carry a negative coefficient.

The third instrument is a monarchy dummy that takes the value one if the country is a monarchy and zero otherwise, regardless of its constitutional status or the country's level of democracy. Bjørnskov (2007) notes two main mechanisms that would create an association between monarchy and trust. First, monarchs may be symbols common to all members of society, as well as sometimes playing the role of a national conscience. Monarchs may thus serve as role models and contribute to keeping negative social interactions under control, in a way that other types of regimes, such as temporary presidencies, are unable to do (Bjørnskov 2007; Robbins 2012). Second, modern monarchies may reflect even deeper sources of trust, supplying a level of social and political stability that has enabled them to survive. For example, high-trust societies, including Denmark, Norway and the Netherlands, have some of the Western world's most peaceful political histories. However, since monarchy is in essence an element of the political-institutional framework, we do not expect it to have any direct effect on long-run development. Indeed, the only paper to date to estimate any growth

[10] With Hippocrates, one can find arguments along these lines in his "On Airs, Waters, and Places", in particular, parts 12 and 23. The Aristotelian view, expressed in "The Politics", book 7, claims that populations in colder climates have more freedom, yet have no (formal) political organization.

or development effects of monarchy rejects its direct influence (Bjørnskov and Kurrild-Klitgaard 2008). We consequently expect the monarchy dummy to be positively associated with trust.[11]

Finally, we add one a priori rather peculiar instrument: Josh Parsons's (2010) rating of the aesthetics of national flags. While these ratings may seem to constitute an incredible and irrelevant instrument for social trust, they contain relevant information. In particular, Parsons assigns lower values to flags with either maps, writing or symbols, such as weapons, on them. Such features exist only in the flags of younger and poorer countries, and tend to be associated with countries with difficult beginnings. The flag rating may thereby proxy for countries characterized by low trust levels at independence. Entered in logs so as to give more weight to low ratings, this instrument solves a major problem that has gone unnoticed in the trust literature: almost all existing instruments, including the first three variables used here, fail to provide clear identification of trust among relatively poor and younger countries, thereby potentially biasing IV estimates (Dunning 2008).

For those variables to be used as instruments and to provide evidence suggesting causality, they must meet three conditions. First, they should meet the exclusion restriction, and have no direct effects on education, institutional quality, or GDP per capita. Second, they should be predetermined. Third, they must provide enough identification in first stage regressions to identify trust clearly; otherwise, estimates will be biased towards those obtained by simple OLS. We believe that the instruments that we use here meet those three conditions in the context of the question that we address in this paper. First, there seems to be no known reason why they should affect education, institutional quality and GDP per capita directly. Second, they are predetermined historically. Linguistic rules indeed evolve over horizons that exceed a century, and a country's winter climate is clearly exogenous

[11] An example often mentioned in this strand of the literature is that of Denmark. The last successful attempt at killing a leading politician dates back to 1286, while the last attempt occurred in 1885. Norwegian history, although substantially shorter as an independent nation, is equally peaceful.

to its economic and cultural development. Furthermore, colder climates could in principle affect economic development in either direction: while agriculture is evidently more productive in temperate climates, substantial seasonal temperature variation, as in very cold winters, could spur innovation. As such, any direct effect is likely to be ambiguous. Likewise, both monarchy and flag characteristics are related to deep historical factors not likely to affect economic development directly. Finally, we note that all first-stage regressions, which are reported with three-stage regressions in Tables 4 and 5 below, are all well identified. Our estimates are therefore unlikely to suffer from an underidentification bias.

However, as for most instruments, ours must be interpreted with caution. Their association with trust could be the outcome of a correlation with an unobserved variable affecting both our instruments and trust. Although such a caveat is unlikely for our climatic instrument, it may affect linguistic rules, the monarchy dummy, and flag ratings. We must, therefore, remain cautious when interpreting our results as implying causality. In what follows, we will carefully test the statistical relevance of those instruments.

Finally, we include control variables to avoid biasing our estimates. We thus enter a standard set of regional dummy variables (Latin America, Africa, MENA and Asia), and a small number of variables that may have affected institutions, education or GDP independently of trust. Namely, we relate education to fertility and to a dummy variable capturing whether a country has a communist past. A high fertility rate increases the cost of providing education to a large share of the population. We therefore expect that variable to be negatively associated with education. Socialist regimes are known to have invested heavily in education, as Heyneman's (2004) survey recalls. We would consequently expect the communist dummy to bear a positive coefficient.

We explain the quality of countries' property-rights institutions (or their failure, i.e., corruption) by their trade openness, the post-communist dummy variable, and the Polity IV democracy score

averaged across the previous 25 years, in addition to regional dummies. Following, e.g., Rodrik et al. (2004), Glaeser and Shleifer (2002) and Treisman (2000), we therefore take advantage of the standard finding that political institutions do not affect development when property rights institutions are taken into account (cf., Barro and Lee 1994). As outlined in the following, we deliberately keep the specification as parsimonious as possible in order not to preclude identification of effects of trust that could occur through particular transmission mechanisms. Treisman (2000) found openness to be associated with lower levels of corruption. We, therefore, expect openness to be associated with less corruption and to bear a positive sign. We expect the post-communist dummy to exhibit a negative sign, because, as Paldam (2002) argues, the often chaotic transition process was fertile ground for corruption. Finally, we expect democracy to be positively related to the control of corruption, because more established democratic regimes allow citizens to better monitor politicians and civil servants. This contention is in line with the empirical findings of Treisman (2000) and Paldam (2002).

3.2. Econometric strategy

To claim that trust affects development through both education and property rights institutions, we must report evidence of several causal relations. The first two are that trust affects education on the one hand, and institutions on the other. We do so by running a set of two-stage least-squares regressions. We always start with a parsimonious model, where the relevant variable is regressed on trust and a constant only. We then add regional dummies and control variables.

The second important step is to establish that trust affects income per capita or, in a robustness test, affects labor productivity as measured by income per worker. Again, we first use parsimonious two-stage least-squares estimations. As a first test of the role of institutions and education as mediators of trust, we then add a measure of education and institutions to the parsimonious model, to see how the coefficient of trust is affected.

In a third step, we run three-stage least-squares regressions, where both education and institutions are regressed on trust, and GDP is regressed on education and institutions. As in other estimates, trust is instrumented by the pronoun-drop rule, minimum annual temperature, the monarchy dummy and the log of national flag ratings. Whereas two-stage regressions offer clear tests of instrument strength and validity, such tests do not exist for three-stage techniques. However, proper identification of effects in the third stage rests on the assumption that the preceding stages are precisely identified. If care is not taken to ensure that the first stages of three-stage regressions do not suffer from overidentification problems, three-stage results can eventually be subject to a substantial bias. Likewise, weak first-stage identification can in practice cause problems of inflated standard errors in the third stage. We alleviate these problems in two ways. We first carefully test the identifying stages in two-stage regressions. As the overidentification problem cannot be tested formally, we have also examined the regression residuals in order to assess whether these residuals are correlated with trust.

4. Empirical results

Table 1 displays the results of the 2SLS regression of education on trust. Column 1.1 confirms the positive impact of trust on education, as the coefficient of trust is significant, and easily passes the 1% level test, although the fit of the regression is rather disappointing and the Sargan test is significant. When additional regressors are included, the fit improves, and the coefficient of trust remains strongly significant at the 1% level although its size is roughly halved. Accordingly, a one standard deviation increase in a country's trust score results in an increase in the share of the population over 25 with some form of secondary education amounting to almost 50% of a standard deviation, according to the more comprehensive model. By capturing other influences, the inclusion of additional variables also means that the instruments are credibly exogenous and pass the overidentification test by not being correlated with the residual.

Table 2 displays the results of 2SLS regressions wherein the level of corruption is explained by trust. In the first two such regressions, displayed in columns 2.1 and 2.2, corruption is measured by the World Governance Indicators index from Kaufman et al. (2008). That index appears to be correlated significantly with trust at the 1% level in both regressions, with an insignificant overidentification test throughout. As the coefficient is positive, the results imply that greater trust results in better control of corruption. The result holds regardless of the set of regressors: columns 2.3 and 2.4 confirm the results, using the Transparency International's index. Again, trust is correlated with the control of corruption. With both indexes, a one standard deviation increase in a country's trust score results approximately in more than a one-half standard deviation improvement in corruption, according to the more comprehensive model.

In Table 3, the dependent variable is the logarithm of output level per capita. In the first two columns, GDP per capita is regressed on trust only, then on trust and a series of control variables, in which case the instruments pass the overidentification test. In both cases, trust is strongly correlated with output at the 1% level of significance. Moreover, the coefficient of trust is significantly positive, confirming that trust is favorable to economic development. The estimated coefficient suggests that a one-point increase in a country's trust score results in a 3.7 to 7.5% increase in GDP per capita.

An interesting result appears in columns 3.3 to 3.5. In those columns, we complement the set of regressors by entering education, corruption, and both. Column 3.3 displays the result of the estimation when education is added to trust. The coefficient of education is, as expected, positive and significant. However, the coefficient of trust, though positive, shrinks and loses significance, which suggests that in previous estimations the coefficient of trust partly captured the indirect effect of trust on education. Column 3.4 displays the result of adding corruption instead of education to trust as an explanatory variable of GDP per capita. The sign of the coefficient of corruption is positive, implying that better corruption control increases GDP per capita. The coefficient of trust remains statistically

significant, but only at the 10% level of significance. Moreover, it shrinks again with respect to equation 3.1. We again consider this finding as evidence that the impact of trust is mediated, at least partly, by the quality of institutions. The most striking result appears when both education and corruption are included in the set of regressors, as in column 3.5. Here, both education and corruption are correlated with GDP per capita at the 1% level, but the coefficient of trust now becomes insignificant. This finding not only suggests that education and institutions are important mediators of the effect of trust on output, but that they are the main mediators of trust. In other words, controlling for education and corruption leaves little scope for the direct effects of trust on GDP that have been hypothesized in the literature.

Table 4a and 4b display the results of the 3SLS regressions that we perform to take stock of previous results. In those regressions, social trust is regressed on its four instruments, education and institutions are regressed on trust and control variables, and GDP is regressed on education and institutions and one control variable (openness). On the left-hand side of the tables, institutions are measured by the World Bank's control of corruption index, on the right-hand side, the measure is the CPI. The findings of previous regressions are confirmed. Namely, in columns 4a.1 to 4a.3 we find that trust is positively correlated with education and institutions, and that education and institutions are in turn correlated with GDP per capita.[12] On the right-hand side of the table, we perform the same exercise with Transparency International's CPI index instead of the World Bank index. We obtain the same qualitative results, where trust correlates both with education and institutions, which in turn

[12] A potential worry is that the findings are overidentified, even though the Sargan tests in Table 3 remain insignificant. As noted in section 3, we have addressed this by correlating the residuals from the 3SLS GDP estimates with social trust. While there is a significant negative association, it is limited in size. This suggests that the bulk of the impact of trust on GDP is mediated by education and institutions. Technically, this result also implies that our coefficients are approximately unbiased.

correlate with GDP. In addition, the coefficient of trust in education and corruption regressions remains quantitatively similar to the ones estimated in Tables 1 and 2.

Table 4b again reports the same exercise, but with our measure of labor productivity instead of average income. We note only a few differences, with one important exception. When using the CPI on the right-hand side, trust loses its importance in the education regression. While this may seem worrying, it is consistent with recent theory positing that it requires some level of technological sophistication before trust is associated with the demand for an educated workforce (Bjørnskov 2009).

We therefore repeat the exercises in Tables 4a and 4b, but excluding the least developed countries in our sample. The exclusion criterion is that we include all countries with a 2007 GDP per capita above 4000 USD. This excludes the 30% poorest countries, implying that the reduced sample consists of only countries categorized as middle or high-income. Table 5a presents the estimates with GDP per capita as the dependent variable.

We note that excluding the poorest countries in the income regressions in Table 5a has three main consequences. First, flag ratings lose significance in the trust regression, consistent with the assessment that their main role is to provide statistical identification in the poorest part of the sample. Second, social trust becomes strongly significant in the education regression with a substantial effect. And third, the control of corruption becomes relatively more important in the GDP regression.

Table 5b, which reports the results of regressing trust on labor productivity, replicates the results of the previous table with one important difference: while trust is both statistically and economically significant in the income estimates, it is substantially smaller than in the labor productivity regressions. As such, we find robust evidence only for an institutional transmission mechanism of trust for labor productivity, while there seems to be an additional mechanism through education when explaining variations in GDP per capita.

A last question is what these estimates mean quantitatively. All statistically significant results in Tables 4 and 5 are also economically meaningful. The estimates suggest that a one standard deviation change in trust is associated with a change in education and corruption of approximately 40% of a standard deviation and a subsequent improvement of GDP per capita and per worker of roughly 70% of a standard deviation. In terms of corruption differences, for example, this approximately corresponds to the difference between Brazil and Hungary; in terms of education, it is roughly the differences between Argentina and Ireland. In the full sample, the two mechanisms are roughly of similar importance while institutions as a transmission mechanism seem more important in the sample omitting very poor countries. As such, we find that social trust can potentially explain a relatively large fraction of cross-country differences in income and labor productivity.

5. Conclusions

In this paper we have asked whether social trust acts as the root of institutions, education, and the level of development, and assessed the relative importance of direct effects, and of the indirect effects of education and corruption. In a set of cross-country regressions, we found evidence that trust leads to persistently higher levels of education, institutional quality, and per capita GDP. Two-stage least-squares regressions where trust was instrumented with predetermined variables support a causal interpretation of the observed relations, where causality runs from trust to education, from trust to corruption / institutional quality, and from trust to GDP. Moreover, we found that, once the effects of trust on education and corruption are controlled for, the correlation between trust and GDP becomes statistically weak or insignificant. Those findings suggest that education and the quality of economic-judicial institutions are the two key channels through which trust affects long-run development. Once they are taken into account, direct effects become more difficult to observe.

Those results fill two holes in the literature on the economic impact of trust. First, they show that trust is significantly associated with the level of per capita GDP. In other words, we find that

trust affects growth in the very long term, and not growth only over a few decades, as previous studies had shown. Second, by identifying education and the quality of institutions as the main channels through which trust affects per capita GDP, we suggest a way to resolve the debate between Rodrik et al. (2004), who claim that 'institutions rule', and Glaeser et al. (2004), who claim that education is important while institutions are not. Admittedly, our estimates tend to provide more support for Glaeser et al. (2004), as a relatively larger share of the contribution of social trust to long-run development appears to run through the education mechanism.

While our results therefore suggest that social trust exerts a *causal* effect on long-run development, we acknowledge that no IV estimate is better than the instrumental variables upon which it relies. While our instruments are either historically or geographically determined, and thus clearly predetermined, one could perhaps imagine mechanisms through which they affected development other than through trust. However, several recent studies show that trust is remarkably stable over very long periods of time, some suggesting centuries and most providing evidence of stability at least since the 1940s. If any effect in the opposite causal direction were important, we would expect that trust levels would have increased visibly in conjunction with GDP during the decades following World War II. As such effects cannot be present since trust levels seem to have remained stable, we take this as further evidence in favor of the causal interpretation of our present findings.

The results suggest that once the effects of social trust operating these two channels are taken into account, its long-run consequences for economic development seem exhausted. In other words, isolating a direct effect of trust becomes difficult once the two channels are controlled for, unlike what the pioneers of the trust literature suggested. We do not claim that these two main channels are indeed exhaustive of the full effects of social trust, but merely observe that education and property rights institutions appear clearly important and worth considering in further research. In particular,

standard economic theorizing has dealt with how trust and related phenomena might directly influence long-run development. As the present findings suggest that indirect mechanisms are more important, relatively more work seems to be needed in political-economic theory on how social trust affects core institutions that are in turn central to development.

While our estimates provide evidence on the long-run influences of trust, we need to end the paper with a disclaimer. We have tested all effects in the full sample, yet the importance of trust may vary systematically across countries. The effects of social trust may, for example, depend on technological sophistication, democracy and political competition, and the overall complexity of society, although theory so far provides little guidance as to the direction and magnitude of those effects. Likewise, the consequences of introducing certain policies and regulations or changing key institutions may vary with the degree of social trust. Should trust be complementary to such changes, even standard policy recommendations may turn out to yield different effects depending on the level of trust among the population. Such non-linearities and conditional effects may provide food for thought and future research.

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Appendix

A1: Countries in the sample and trust scores

*** insert table A1 here ***

A2: Descriptive statistics

*** insert table A2 here ***

Table A1: Trust scores of countries in the sample

Country	Trust	Country	Trust	Country	Trust
Albania	20.7	Guatemala	21.5	Pakistan	25.7
Algeria	15.7	Honduras	18.8	Panama	22.3
Argentina	19.4	Hong Kong	32.3	Paraguay	9.5
Armenia	22.6	Hungary	25.4	Peru	9.9
Australia	47.1	Iceland	45.3	Philippines	7.8
Austria	37.4	India	33.9	Poland	21.1
Azerbaijan	32.7	Indonesia	32.4	Portugal	19.3
Bangladesh	22.2	Ireland	39.0	Puerto Rico	14.3
Belarus	34.1	Israel	23.5	Romania	16.8
Belgium	31.9	Italy	29.7	Russia	30.1
Benin	27.4	Jamaica	37.3	Rwanda	4.8
Bolivia	19.3	Japan	39.7	Saudi Arabia	53.0
Bosnia-Herzegovina	23.6	Jordan	31.0	Senegal	26.8
Botswana	11.7	Kenya	9.8	Serbia	18.5
Brazil	5.8	Kuwait	23.4	Singapore	24.8
Bulgaria	27.1	Kyrgyzstan	16.7	Slovakia	19.5
Burkina Faso	13.8	Latvia	19.6	Slovenia	20.3
Cambodia	7.8	Lebanon	15.8	South Africa	19.6
Canada	47.7	Lesotho	15.7	South Korea	33.2
Cape Verde	3.4	Lithuania	24.2	Spain	33.0
Chile	17.2	Luxembourg	30.7	Sweden	64.3
Colombia	16.3	Macedonia	10.9	Switzerland	47.1
Costa Rica	13.5	Madagascar	32.8	Taiwan	34.3
Croatia	21.0	Malawi	5.5	Tanzania	13.9
Cyprus	15.5	Malaysia	9.6	Thailand	35.8
Czech Republic	27.0	Mali	27.5	Trinidad and Tobago	3.8
Denmark	68.1	Malta	23.7	Turkey	8.9
Dominican Republic	26.5	Mexico	24.2	Uganda	13.6
Ecuador	16.1	Moldova	16.8	Ukraine	28.1
Egypt	28.2	Mongolia	11.4	United Kingdom	36.5
El Salvador	16.4	Montenegro	30.3	United States	41.5
Estonia	28.9	Morocco	18.7	Uruguay	27.3
Ethiopia	21.4	Mozambique	25.2	Venezuela	14.1
Finland	58.9	Namibia	20.5	Vietnam	50.4
France	22.9	Netherlands	54.7	Yemen	41.9
Georgia	18.4	New Zealand	51.2	Zambia	13.2
Germany	37.9	Nicaragua	18.7	Zimbabwe	12.6
Ghana	15.5	Nigeria	23.2		
Greece	21.6	Norway	66.4		

Trust is measured as the percent of respondents answering that “most people can be trusted”.

Table A2: Descriptive statistics

Variable	Mean	Std. dev.	Source
Africa	0.1810	0.3867	Own
Asia	0.1293	0.3369	Own
Corruption (WB)	0.2005	1.0128	Kaufmann et al. (2010)
Corruption (CPI)	4.5722	2.1775	Transparency International (2010)
Democracy	3.2069	5.5299	Marshall and Jaggers (2008)
Education	6.8714	2.7191	Barro and Lee (2010)
Fertility	3.5304	1.7534	World Bank (2010)
Latin America	0.1810	0.3867	Own
Log flag rating	4.1381	0.2052	Parsons (2010)
Log GDP per capita	8.9993	1.2874	Heston et al. (2011)
Log GDP per worker	9.7984	1.2306	Heston et al. (2011)
MENA	0.0862	0.2819	Own
Min. temperature	9.5086	10.5282	WMO (2010)
Monarchy	0.1638	0.3717	Own
Openness	78.8348	47.3723	Heston et al. (2011)
Post-communist	0.2155	0.4129	Own
Pronoun-drop	0.2759	0.4489	Bjørnskov (2010)
Social trust	25.4827	13.4656	Bjørnskov (2012)

Table 1: The impact of trust on education, 2SLS estimates

	(1.1)	(1.2)
Social trust	0.1771***	0.0939***
	(0.0256)	(0.0313)
Fertility		-0.9186***
		(0.1824)
Latin America		0.7622
		(0.9902)
Africa		-0.0619
		(1.1226)
MENA		0.3522
		(0.9052)
Asia		0.2787
		(0.6341)
Post-communist		0.9029
		(0.6767)
Constant	2.4255	7.3135
	(0.7309)	(1.4214)
Observations	106	106
Adjusted R-squared	0.167	0.682
2nd stage F-test	46.92	39.89
Sargan test (P-value)	0.0019	0.2081
1st stage F-test	16.03	7.39

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2: The impact of trust on institutions, 2SLS estimates

	(2.1) World Bank	(2.2) World Bank	(2.3) CPI	(2.4) CPI
Social trust	0.0661***	0.0410***	0.1438***	0.0867***
	(0.0088)	(0.0119)	(0.0186)	(0.0252)
Latin America		-0.5611		-1.1491
		(0.3859)		(0.8189)
Africa		-0.0555		-0.1969
		(0.3498)		(0.7360)
MENA		0.0178		0.0815
		(0.3760)		(0.7803)
Asia		-0.5536**		-0.9208*
		(0.2478)		(0.5379)
Openness		0.0066***		0.0137***
		(0.0015)		(0.0033)
Post-communist		-0.3342		-0.6331
		(0.2835)		(0.5859)
Democracy		0.0835***		0.1907***
		(0.0186)		(0.0389)
Constant	-1.4651***	-1.3678**	0.9239	1.1741
	(0.2502)	(0.5563)	(0.5258)	(1.1403)
Observations	115	112	115	112
Adjusted R-squared	0.236	0.686	0.249	0.697
2nd stage F-test	55.89	42.91	58.61	46.61
Sargan test (P-value)	0.6743	0.1627	0.4766	0.0629
1st stage F-test	14.61	6.15	14.61	6.15

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: The impact of trust on GDP per capita, 2SLS estimates

	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)
Social trust	0.0747***	0.0373**	0.0078	0.0209*	-0.0210
	(0.0124)	(0.0152)	(0.0103)	(0.0124)	(0.0132)
Latin America		-0.5599			
		(0.3653)			
Africa		-2.3316***			
		(0.4215)			
MENA		-0.8965**			
		(0.3990)			
Asia		-0.9949***			
		(0.3113)			
Post-communist		-0.5743**			
		(0.2747)			
Education			0.3606***		0.2889***
			(0.0335)		(0.0316)
Control of corruption (WB)				0.7631***	0.6099***
				(0.1072)	(0.1317)
Constant	7.1036***	8.9100***	6.3716***	8.3118***	7.4213***
	(0.3534)	(0.5933)	(0.1877)	(0.3134)	(0.2753)
Observations	115	115	106	115	106
Adjusted R-squared	0.149	0.605	0.667	0.539	0.729
2nd stage F-test	35.46	37.71	162.09	78.37	113.75
Sargan test (P-value)	0.0428	0.3058	0.0882	0.0388	0.1255
1st stage F-test	14.61	5.92	9.66	7.22	7.55

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4a: The impact of trust, education, and institutions on GDP per capita, 3SLS estimates

Dependent var. / Regressors	(4a.1) Trust	(4a.2) Education	(4a.3) Institutions (WB)	(4a.4) GDP	(4a.5) Trust	(4a.6) Education	(4a.7) Institutions (CPI)	(4a.8) GDP
Trust		0.0388*	0.0349***			0.0341	0.0893***	
		(0.0225)	(0.0087)			(0.0225)	(0.0199)	
Latin America		-0.2789	-1.0799***			-0.3755	-1.5887***	
		(0.6003)	(0.2437)			(0.5917)	(0.5612)	
Africa		-1.8251**	-0.5738**			-1.8147**	-1.1190*	
		(0.7293)	(0.2869)			(0.7277)	(0.6609)	
MENA		-0.8461	-0.1445			-0.8051	-0.5949	
		(0.7057)	(0.3503)			(0.7048)	(0.8068)	
Asia		-0.5563	-0.5162**			-0.5302	-1.2033**	
		(0.4911)	(0.2129)			(0.4897)	(0.4905)	
Fertility		-0.9883***				-1.0138***		
		(0.1476)				(0.1473)		
Democracy			0.0659***				0.1344***	
			(0.0162)				(0.0374)	
Openness			0.0056***	0.0017			0.0128***	0.0016
			(0.0010)	(0.0013)			(0.0024)	(0.0013)
Post-communist		-0.9848*	-0.6709***			-1.0020*	-1.6137***	
		(0.5205)	(0.2383)			(0.5188)	(0.5488)	
Pronoun-drop	8.1383***				7.8657***			
	(2.1211)				(2.1204)			
Min. temperature	-0.3056***				-0.3101***			
	(0.0919)				(0.0920)			
Monarchy	11.5243***				11.6222***			
	(2.5203)				(2.5206)			
Log flag rating	11.8904***				11.8897***			
	(4.3227)				(4.3186)			
Education				0.3606***				0.3543***
				(0.0462)				(0.0457)
Control of corruption				0.3285***				0.1663***
				(0.1237)				(0.0561)
Constant	-33.4728***	10.0434***	-.8202**	6.3565***	-33.0912***	10.2662***	1.9597***	5.6993***
	(17.9006)	(1.0415)	(0.4022)	(0.3166)	(17.8848)	(1.0377)	(0.9248)	(0.2045)
Observations	105	105	105	105	105	105	150	105
Adjusted R-squared	0.4524	0.7068	0.7198	0.7292	0.4528	0.7108	0.7028	0.7311
Chi squared	92.13	330.28	352.03	307.90	91.16	332.36	317.40	313.20

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4b: The impact of trust, education, and institutions on GDP per worker, 3SLS estimates

Dependent var. / Regressors	(4b.1) Trust	(4b.2) Education	(4b.3) Institutions (WB)	(4b.4) GDP	(4b.5) Trust	(4b.6) Education	(4b.7) Institutions (CPI)	(4b.8) GDP
Trust		0.0405*	0.0347***			0.0365	0.0884***	
		(0.0233)	(0.0087)			(0.0232)	(0.0199)	
Latin America		-0.3067	-1.0815***			-0.4002	-1.5991***	
		(0.6198)	(0.2439)			(0.6129)	(0.5609)	
Africa		-1.7909**	-0.5861**			-1.7791**	-1.1496*	
		(0.7581)	(0.2874)			(0.7561)	(0.6612)	
MENA		-0.7410	-0.1507			-0.7045	-0.5835	
		(0.7329)	(0.3510)			(0.7317)	(0.8074)	
Asia		-0.5360	-0.5231**			-0.5185	-1.2182**	
		(0.5086)	(0.2132)			(0.5072)	(0.4905)	
Fertility		-0.9783***				-1.0000***		
		(0.1527)				(0.1523)		
Democracy			0.0656***				0.1346***	
			(0.0163)				(0.0374)	
Openness			0.0056***	0.0016			0.0128***	0.0015
			(0.0010)	(0.0013)			(0.0024)	(0.0013)
Post-communist		-0.8901*	-0.6802***			-0.9160*	-1.6323***	
		(0.5324)	(0.2387)			(0.5308)	(0.5491)	
Pronoun-drop	8.0862***				7.8379***			
	(2.1205)				(2.1199)			
Min. temperature	-0.3006***				-0.3057***			
	(0.0920)				(0.0920)			
Monarchy	11.4877***				11.5441***			
	(2.5203)				(2.5201)			
Log flag rating	12.1159***				12.1674***			
	(4.3215)				(4.3181)			
Education				0.3221***				0.3201***
				(0.0457)				(0.0456)
Control of corruption				0.3395***				0.1648***
				(0.1224)				(0.0559)
Constant	-34.3779*	9.9370***	-.8092**	7.4229**	-34.2316*	10.1298***	1.9934**	6.7420***
	(17.8966)	(1.0786)	(0.4025)	(0.3130)	(17.8834)	(0.10749)	(0.9249)	(0.2042)
Observations	105	105	105	105	105	105	105	105
Adjusted R-squared	0.4525	0.7100	0.7202	0.7074	0.4526	0.7132	0.7041	0.7042
Chi squared	91.30	324.55	352.11	269.20	90.57	326.16	317.31	269.86

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. LDC limit is at a GDP of 4000 USD per capita.

Table 5a: The impact of trust, education, and institutions on GDP per capita, 3SLS estimates (no LDCs)

Dependent var. / Regressors	(5a.1) Trust	(5a.2) Education	(5a.3) Institutions (WB)	(5a.4) GDP	(5a.5) Trust	(5a.6) Education	(5a.7) Institutions (CPI)	(5a.8) GDP
Trust		0.0874***	0.0312***			0.0840***	0.0761***	
		(0.0200)	(0.0077)			(0.0200)	(0.0180)	
Latin America		-0.5992	-1.0072***			-0.5442	-1.6391***	
		(0.6429)	(0.2485)			(0.6436)	(0.5823)	
Africa		-0.8618	-0.5543			-0.6626	-1.1961	
		(1.0533)	(0.3551)			(1.0569)	(0.8311)	
MENA		-1.5790*	-0.2891			-1.3749	-0.9366	
		(0.8387)	(0.4285)			(0.8414)	(1.0107)	
Asia		0.5451	-0.2706			0.5433	-0.5409	
		(0.5709)	(0.2637)			(0.5699)	(0.6206)	
Fertility		-0.3783*				-0.4734***		
		(0.2196)				(0.2227)		
Democracy			0.0609***				0.1265**	
			(0.0232)				(0.0552)	
Openness			0.0052***				0.0113***	0.0009
			(0.0012)				(0.0028)	(0.0009)
Post-communist		0.0413	-0.7257***			0.0027	-1.7849***	
		(0.4965)	(0.2909)			(0.4960)	(0.6897)	
Pronoun-drop	8.4196***				7.8888***			
	(2.492)				(2.4787)			
Min. temperature	-0.4250***				-0.4314***			
	(0.1165)				(0.1162)			
Monarchy	13.0869***				13.2218***			
	(2.27698)				(2.7546)			
Log flag rating	6.8399				6.2252			
	(5.6068)				(5.5763)			
Education				0.0849*				0.1034**
				(0.0468)				(0.0471)
Control of corruption				0.5848***				0.2657***
				(0.0894)				(0.0410)
Constant	-11.6629	6.8079***	-0.6203	8.6605***	-8.3642***	7.1294***	2.6416**	7.3684***
	(23.0622)	(1.0073)	(0.4556)	(0.3610)	(22.9356)	(1.0117)	(1.0758)	(0.2642)
Observations	76	76	76	76	76	76	76	76
Adjusted R-squared	0.5227	0.5438	0.7122	0.7049	0.5239	0.5525	0.6879	0.6576
Chi squared	84.84	125.76	253.63	195.20	82.28	127.53	212.00	186.89

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. LDC limit is at a GDP of 4000 USD per capita.

Table 5b: The impact of trust, education, and institutions on GDP per worker, 3SLS estimates (no LDCs)

Dependent var. / Regressors	(5b.1) Trust	(5b.2) Education	(5b.3) Institutions (WB)	(5b.4) GDP	(5b.5) Trust	(5b.6) Education	(5b.7) Institutions (CPI)	(5b.8) GDP
Trust		0.0928***	0.0313***			0.0915***	0.0753***	
		(0.0201)	(0.0077)			(0.0201)	(0.0179)	
Latin America		-0.7625	-1.0179***			-0.6168	-1.7078***	
		(0.6437)	(0.2477)			(0.6469)	(0.5763)	
Africa		-0.7566	-0.5358			-0.6015	-1.1517	
		(1.0537)	(0.3545)			(1.0610)	(0.8237)	
MENA		-1.6917**	-0.2833			-1.5337*	-0.8859	
		(0.8391)	(0.4254)			(0.8448)	(0.9953)	
Asia		0.5635	-0.2763			0.5838	-0.5693	
		(0.5725)	(0.2626)			(0.5737)	(0.6135)	
Fertility		-0.2624				-0.3491		
		(0.2179)				(0.2218)		
Democracy			0.0594***				0.1231**	
			(0.0229)				(0.0541)	
Openness			0.0052***	0.0003			0.0112***	0.0006
			(0.0012)	(0.0008)			(0.0028)	(0.0009)
Post-communist		0.1811	-0.7305***			0.1498	-1.8149***	
		(0.4972)	(0.2889)			(0.4977)	(0.6804)	
Pronoun-drop	8.4929***				7.9102***			
	(2.4941)				(2.4829)			
Min. temperature	-0.4217**				-0.4309***			
	(0.1166)				(0.1162)			
Monarchy	13.0512***				13.1517***			
	(2.7715)				(2.7577)			
Log flag rating	6.9419				6.7333			
	(5.6106)				(5.5854)			
Education				0.0112				0.0385
				(0.0430)				(0.0447)
Control of corruption				0.6206***				0.2739***
				(0.0822)				(0.0389)
Constant	-12.2034	6.3512***	-0.6083	10.0175***	-10.4996	6.5757***	2.7106**	8.6245***
	(23.0777)	(1.0066)	(0.4529)	(0.3316)	(22.9752)	(1.0136)	(1.0629)	(0.2507)
Observations	76	76	76	76	76	76	76	76
Adjusted R-squared	0.5225	0.5318	0.7127	0.6924	0.5232	0.5379	0.6899	0.6168
Chi squared	84.93	124.68	252.69	180.75	82.78	126.05	210.93	161.89

Heteroscedasticity consistent standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. LDC limit is at a GDP of 4000 USD per capita.

Figure 1: The nexus between trust, education, corruption, and GDP