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**Christian Bjørnskov and Pierre-Guillaume Méon**

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# **Trust as the missing root of institutions, education, and development**

Christian Bjørnskov<sup>\*</sup>

Pierre-Guillaume Méon<sup>+</sup>

**Abstract:** In the paper, we argue that trust is the missing link relating education, institutions, and economic development. We argue that increased 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 show 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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<sup>\*</sup> Aarhus University, Department of Economics and Business, Fuglesangs Allé 4, DK-8210 Aarhus V, Denmark; phone: +45 87 16 48 19; e-mail: [ChBj@asb.dk](mailto:ChBj@asb.dk).

<sup>+</sup> Université libre de Bruxelles (ULB), Centre Emile Bernheim, CP-114/03, Avenue F.D. Roosevelt, 50, 1050 Bruxelles, Belgium; phone: +32 2 650 65 99; e-mail: [pgmeon@ulb.ac.be](mailto:pgmeon@ulb.ac.be).

## 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 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 Douglas 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 institutions and 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 countries.

The role of education is, however, difficult to integrate in the narrative that views institutions as the fundamental determinant of development.<sup>1</sup> Levine and Renelt (1992), Mankiw et al. (1992),

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<sup>1</sup> It bears mention 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 of education.

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. Dearmon and Grier (2009, 2011) instead find that education affects investment activity, which feeds back into a higher demand for education.

More to the point, Boix (2003) argues that an 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 to the “institutional view” vanishes once education 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 colonized countries’ institutions. Accordingly, they report a stronger correlation between settlers’ mortality, 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 grow out of poverty thanks to policies favouring 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. In particular, 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

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Berggren et al. (2008) and Beugelsdijk et al. (2004), in extreme bounds analysis, also only find weak support for education as an important growth factor.

personally. As Paldam (2000) argues, trust is one of the key concepts of social capital. We argue that this cultural feature could provide 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 education and the quality of institutions altogether. High trust countries may grow out of poverty by investing in education and developing well-functioning institutions, with a potential positive interaction. 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 investments (private and public) in education and 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.

The aim of the present paper is precisely to substantiate and measure the role of social trust as the causal link between institutions, education, and development. Using predetermined instruments, we provide evidence that exogenous variations in trust determine both the quality of institutions and education, which in turn both determine long-run income and labour productivity.

With this end in view, 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?

Our main argument is that social trust determines education and institutional quality, both of which cause cross-country differences in long-run economic development. Following Bohnet (2008), trust can be defined here 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 willingness to render oneself vulnerable to strangers' actions, due to a positive belief of the trustworthiness of most people. 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 discuss 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 showed in a previous paper that the quality of institutions led to economic growth (Knack and Keefer, 1995), a channel of transmission of trust to growth was provided.

The impact of social trust on institutions was moreover 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), better legal quality and bureaucratic efficiency and, perhaps, also more participation in the political process, as measured by voter turnout, by la Porta et al. (1997).

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 growth is through improving the quality of formal economic-judicial institutions, because he finds that trust affects long-run economic growth above its direct influence on education and investments. However, to the extent that trust works through 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.

## 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 relevant. Conversely, richer countries are likely to extend primary schooling to all, enabling the development of cognitive skills and improvements in secondary and higher education are therefore more relevant (Hanushek and Woessman, 2008).

The question here is to determine how and to which extent trust may affect education. Coleman (1988) originally suggested that social capital could affect education through a supply 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 complementarities and thereby 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 mechanism.

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. Placing this assumption in the context of a semi-endogenous growth model, firms that need to monitor employees performing complex tasks – not least tasks associated with innovative activity and technology implementation – will therefore tend to adjust their demand for educated employees relative to the trust level. If educated employees are more trustworthy, firms can save in monitoring costs and afford to employ a larger educated workforce, which feeds into a higher rate of innovation and technology adoption.<sup>2</sup> 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 mechanism. By associating this development theoretically to productivity growth, he also suggests education as a main transmission mechanism connecting trust to economic growth and development.<sup>3</sup>

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<sup>2</sup> In principle, one could think of argument similar to the discussion of the strength of 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.

<sup>3</sup> 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 Bornschieer (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 you 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 mechanisms.

### 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.<sup>4</sup>

#### 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 severely affected 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 superrich observations in the dataset. As a robustness check, we will also use logarithmic output per worker in PPP dollars, again from the Penn World Tables 7.0, as a simple measure of labour 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 and is also a precondition for higher education.<sup>5</sup>

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

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<sup>4</sup> Descriptive variables are provided in Appendix A2.

<sup>5</sup> 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.

et al. (2008). The second is the corruption perception index (CPI) published by Transparency International (2010). Both indices aggregate the results of other surveys aimed at assessing corruption at the country level. 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. 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’.

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.<sup>6</sup> 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.<sup>7</sup> All trust observations are reported in the appendix.

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<sup>6</sup> 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).

<sup>7</sup> We acknowledge that the assumption may be questionable in the case of the United States, whose trust level fell in the 1970s and 1980s.

To establish causality and avoid simultaneity bias, we need instruments for trust.<sup>8</sup> We follow recent work by using a set of instrumental variables for social trust suggested in Guiso et al. (2008), Tabellini (2008) and Bjørnskov (2012). More precisely, we include three instruments used in recent studies: 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 in the literature by Tabellini (2008). He argues that languages where the personal pronoun can be dropped (the pronoun-drop characteristic) tend to reflect less respect for the individual and individual rights. In more collectivist cultures, asymmetric power relations may be more likely, and promises are likely conditional on whether or not the promised action is perceived to be to the collective benefit. Both cultural traits signal a culture of individual mistrust.

The idea that the severity of winters can affect cultural characteristics, such as social trust, can be traced back to Aristotle and Hippocrates.<sup>9</sup> Its rationale is that survival through winters in cold climates historically depended on help from strangers. Extending one's trust radius 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).

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

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<sup>8</sup> Reverse causality would for instance be a concern if trust increases as countries grow richer from TFP growth, as Paldam (2009) argues. We note that the contention has, however, been rejected by Delhey and Newton (2005) and Bjørnskov (2007).

<sup>9</sup> 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.

democracy. Bjørnskov (2007) notes two main mechanisms that would create an association between monarchy and trust. First, monarchs may constitute symbols common to all members of society, as well as sometimes playing the role of a national conscience. Monarchs may thus provide a role model, and contribute to keeping adverse tendencies under control, in a way that other types of regime, such as temporary presidencies, are unable to do (Bjørnskov, 2007). Second, modern monarchies may reflect even deeper sources of trust, reflecting 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 most peaceful political histories of the Western world.<sup>10</sup>

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 instrument, 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 only exist in the flags of younger and poor 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).

Those instruments present two characteristics that make them particularly adapted to the question that we address in this paper. First, there seems to be no known reason why they should directly affect education, institutional quality, and GDP per capita. Second, they are historically

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<sup>10</sup> 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.

predetermined. Linguistic rules indeed evolve over horizons that exceed a century, and a country's minimum climate is clearly exogenous to its economic and cultural development. Likewise, both monarchy and flag characteristics are related to deep historical factors not likely to affect economic development directly.

Finally, we include control variables to avoid biasing our estimates. We thus control for a standard set of regional dummy variables (Latin America, Africa, MENA and Asia), and control for a small number of variables that may have affected institutions, education or GDP independently from trust. Namely, we relate education to fertility and to a dummy variable capturing whether a country has a communist past. A high fertility increases the cost of providing education to a large share of the population. Socialist regimes are known to have invested in education, as Heyneman's (2004) survey recalls. We explain 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; Treisman, 2000, we therefore take advantage of the standard finding that political institutions do not affect development when property rights institutions are controlled for (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.

### 3.2 Econometric strategy

To establish that trust affects development through both education and property rights institutions, we must establish 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. 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 labour 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 full-fledged 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 temperature, the monarchy dummy and the log to flag ratings.

#### 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 trust is strongly significant, and easily passes the one-percent 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 one-percent level although its size is roughly halved. By capturing other influences, the inclusion of additional variables also means that the instruments are credibly exogenous and pass the overidentification test.

Table 2 displays the results of 2SLS regressions where 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 significantly correlated with trust at the one-percent level in both regressions, with an insignificant overidentification test throughout. As the coefficient is positive, the results imply that increased

trust results in a 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 appears strongly correlated with the control of corruption.

In Table 3, the dependent variable is the 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 both cases, trust is strongly correlated with output at the one-percent level of significance. Moreover, the coefficient of trust is significantly positive, confirming that trust is favourable to economic development.

An interesting result appears in columns 3.3 to 3.5. In those columns, we complement the set of regressors by 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 highly 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 a better control of corruption increases GDP per capita. The coefficient of trust remains statistically significant, but only at the ten-percent 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, like in column 3.5. Here, both education and corruption are strongly correlated with GDP per capita at the one-percent 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, leaving little scope for a direct effect of trust on GDP.

Table 4a and 4b display the results of the 3SLS regressions that we perform to take stock of previous results. In those regressions, trust is regressed on its three instruments, education and institutions are regressed on trust and control variables, and GDP is regressed on education and institutions and one control variable (openness). In the left-hand side of the tables, institutions are measured by the World Bank's control of corruption index, in 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.<sup>11</sup> In 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 with both with education and institutions, which in turn correlate with GDP.

Table 4b again reports the same exercise, but with our measure of labour productivity instead of average income. We note only few differences with one important exception. When using the CPI in 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 percent poorest countries, implying that the

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<sup>11</sup> A potential worry is that the findings are overidentified, even though the Sargan tests in Table 3 remain insignificant. We have addressed this by correlating the residuals from the 3SLS GDP estimates with social trust. While there is a significant 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 unbiased.

reduced sample consists of only countries categorized as middle or high-income. Table 5a presented 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 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 labour productivity, replicates the results of the previous table with one important difference: while trust is both statistically and economically significant in the income estimates, the estimate is substantially smaller and insignificant in the labour productivity regressions. As such, we find robust evidence only for an institutional transmission mechanism of trust for labour productivity while there seems to be an additional mechanism through education when investigating GDP per capita.

A last question is what these estimates mean. All statistically significant results in Tables 4 and 5 are also economically meaningful. The estimates suggest that a one standard deviation change of trust is associated with a change of education and corruption of approximately 40 percent of a standard deviation and a subsequent improvement of GDP per capita and per worker of roughly 70 percent 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 without very poor countries. As such, we find that social trust can potentially explain a relatively large part of cross-country differences in income and labour productivity.

## 5 Conclusions

A series of relatively recent studies show that social trust is robustly associated with long-run economic growth (Zak and Knack, 2001; Beugelsdijk et al., 2004; Bjørnskov, 2012). This would seem to imply that high-trust countries would tend to be consistently richer than otherwise similar low-trust countries. However, whether this is actually so or whether long-run convergence brings low-trust countries up to the level of high-trust neighbours is uncertain. Likewise, the mechanisms generating this potential difference have remained untested. This paper makes a first attempt at filling these holes in the literature.

In a set of cross-country estimates, we find that trust leads to persistently higher levels of economic development. We isolate two main channels through which this effect operates. First, trust affects the quality of economic-judicial institutions, i.e., the rule of law and absence of corruption, which is causally associated with long-run development as Mauro (1995), Acemoglu et al. (2001), or Acemoglu and Johnson (2005) observe. Second, trust also affects the level of education enjoyed by the population, which also contributes to long-run development as Glaeser et al. (2004) report. By identifying both channels, 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. However, our estimates tend to provide more support for Glaeser et al. (2004), as a relatively larger share of the contribution of social trust on long-run development appears to run through the education mechanism. They also suggest that once its effects through these two channels are taken into account, the long-run economic consequences of trust seem exhausted. In other words, isolating a direct effect of social trust becomes difficult once the two channels are controlled for, unlike what by pioneers of the trust literature such as Putnam (1993) and Fukuyama (1995), 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.

While our estimates provide substantial evidence of long-run influences of trust, we need to end the paper with a disclaimer. We have tested all effects in the full sample, yet several recent theoretical contributions indicate that the importance of trust may vary systematically across countries (Zak and Knack, 2001; Aghion et al., 2010). Studies have for example suggested that the effects of social trust may depend on technological sophistication, democracy and political competition, and the overall complexity of society (Boix and Posner, 1998; Knack, 2002; Ahlerup et al., 2009; Bjørnskov, 2009, 2010). 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		

Table A2: Descriptive statistics

Variable	Mean	Std. dev.	Source
Africa	.1810	.3867	Own
Asia	.1293	.3369	Own
Corruption (WB)	.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	.1810	.3867	Own
Log flag rating	4.1381	.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	.0862	.2819	Own
Min. temperature	9.5086	10.5282	WMO (2010)
Monarchy	.1638	.3717	Own
Openness	78.8348	47.3723	Heston et al. (2011)
Post-communist	.2155	.4129	Own
Pronoun-drop	.2759	.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	.1771*** (.0256)	.0939*** (.0313)
Fertility		-.9186*** (.1824)
Latin America		.7622 (.9902)
Africa		-.0619 (1.1226)
MENA		.3522 (.9052)
Asia		.2787 (.6341)
Post-communist		.9029 (.6767)
Constant	2.4255 (.7309)	7.3135 (1.4214)
Observations	106	106
Adjusted R-squared	.167	.682
2nd stage F-test	46.92	39.89
Sargan test (P-value)	.0019	.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	.0661*** (.0088)	.0410*** (.0119)	.1438*** (.0186)	.0867*** (.0252)
Latin America		-.5611 (.3859)		-1.1491 (.8189)
Africa		-.0555 (.3498)		-.1969 (.7360)
MENA		.0178 (.3760)		.0815 (.7803)
Asia		-.5536** (.2478)		-.9208* (.5379)
Openness		.0066*** (.0015)		.0137*** (.0033)
Post-communist		-.3342 (.2835)		-.6331 (.5859)
Democracy		.0835*** (.0186)		.1907*** (.0389)
Constant	-1.4651*** (.2502)	-1.3678** (.5563)	.9239 (.5258)	1.1741 (1.1403)
Observations	115	112	115	112
Adjusted R-squared	.236	.686	.249	.697
2nd stage F-test	55.89	42.91	58.61	46.61
Sargan test (P-value)	.6743	.1627	.4766	.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	.0747*** (.0124)	.0373** (.0152)	.0078 (.0103)	.0209* (.0124)	-.0210 (.0132)
Latin America		-.5599 (.3653)			
Africa		-2.3316*** (.4215)			
MENA		-.8965** (.3990)			
Asia		-.9949*** (.3113)			
Post-communist		-.5743** (.2747)			
Education			.3606*** (.0335)		.2889*** (.0316)
Control of corruption (WB)				.7631*** (.1072)	.6099*** (.1317)
Constant	7.1036*** (.3534)	8.9100*** (.5933)	6.3716*** (.1877)	8.3118*** (.3134)	7.4213*** (.2753)
Observations	115	115	106	115	106
Adjusted R-squared	.149	.605	.667	.539	.729
2nd stage F-test	35.46	37.71	162.09	78.37	113.75
Sargan test (P-value)	.0428	.3058	.0882	.0388	.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.	(4a.1)	(4a.2)	(4a.3)	(4a.4)	(4a.5)	(4a.6)	(4a.7)	(3a.8)
Regressors	Trust	Education	Institutions (WB)	GDP	Trust	Education	Institutions (CPI)	GDP
Trust		.0388*	.0349***			.0341	.0893***	
		(.0225)	(.0087)			(.0225)	(.0199)	
Latin America		-.2789	-1.0799***			-.3755	-1.5887***	
		(.6003)	(.2437)			(.5917)	(.5612)	
Africa		-1.8251**	-.5738**			-1.8147**	-1.1190*	
		(.7293)	(.2869)			(.7277)	(.6609)	
MENA		-.8461	-.1445			-.8051	-.5949	
		(.7057)	(.3503)			(.7048)	(.8068)	
Asia		-.5563	-.5162**			-.5302	-1.2033**	
		(.4911)	(.2129)			(.4897)	(.4905)	
Fertility		-.9883***				-1.0138***		
		(.1476)				(.1473)		
Democracy			.0659***				.1344***	
			(.0162)				(.0374)	
Openness			.0056***	.0017			.0128***	.0016
			(.0010)	(.0013)			(.0024)	(.0013)
Post-communist		-.9848*	-.6709***			-1.0020*	-1.6137***	
		(.5205)	(.2383)			(.5188)	(.5488)	
Pronoun-drop	8.1383***				7.8657***			
	(2.1211)				(2.1204)			
Min. temperature	-.3056***				-.3101***			
	(.0919)				(.0920)			
Monarchy	11.5243***				11.6222***			
	(2.5203)				(2.5206)			
Log flag rating	11.8904***				11.8897***			
	(4.3227)				(4.3186)			
Education				.3606***				.3543***
				(.0462)				(.0457)
Control of corruption				.3285***				.1663***
				(.1237)				(.0561)
Constant	-33.4728***	10.0434***	-.8202**	6.3565***	-33.0912***	10.2662***	1.9597***	5.6993***
	(17.9006)	(1.0415)	(.4022)	(.3166)	(17.8848)	(1.0377)	(.9248)	(.2045)
Observations	105	105	105	105	105	105	150	105
Adjusted R-squared	.4524	.7068	.7198	.7292	.4528	.7108	.7028	.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&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1.

Table 4b: The impact of trust, education, and institutions on GDP per worker, 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)	(3a.8) GDP
Trust		.0405* (.0233)	.0347*** (.0087)			.0365 (.0232)	.0884*** (.0199)	
Latin America		-.3067 (.6198)	-1.0815*** (.2439)			-.4002 (.6129)	-1.5991*** (.5609)	
Africa		-1.7909** (.7581)	-.5861** (.2874)			-1.7791** (.7561)	-1.1496* (.6612)	
MENA		-.7410 (.7329)	-.1507 (.3510)			-.7045 (.7317)	-.5835 (.8074)	
Asia		-.5360 (.5086)	-.5231** (.2132)			-.5185 (.5072)	-1.2182** (.4905)	
Fertility		-.9783*** (.1527)				-1.0000*** (.1523)		
Democracy			.0656*** (.0163)				.1346*** (.0374)	
Openness			.0056*** (.0010)	.0016 (.0013)			.0128*** (.0024)	.0015 (.0013)
Post-communist		-.8901* (.5324)	-.6802*** (.2387)			-.9160* (.5308)	-1.6323*** (.5491)	
Pronoun-drop	8.0862*** (2.1205)				7.8379*** (2.1199)			
Min. temperature	-.3006*** (.0920)				-.3057*** (.0920)			
Monarchy	11.4877*** (2.5203)				11.5441*** (2.5201)			
Log flag rating	12.1159*** (4.3215)				12.1674*** (4.3181)			
Education				.3221*** (.0457)				.3201*** (.0456)
Control of corruption				.3395*** (.1224)				.1648*** (.0559)
Constant	-34.3779* (17.8966)	9.9370*** (1.0786)	-.8092** (.4025)	7.4229** (.3130)	-34.2316* (17.8834)	10.1298*** (.10749)	1.9934** (.9249)	6.7420*** (.2042)
Observations	105	105	105	105	105	105	105	105
Adjusted R-squared	.4525	.7100	.7202	.7074	.4526	.7132	.7041	.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.	(4a.1)	(4a.2)	(4a.3)	(4a.4)	(4a.5)	(4a.6)	(4a.7)	(3a.8)
Regressors	Trust	Education	Institutions (WB)	GDP	Trust	Education	Institutions (CPI)	GDP
Trust		.0874*** (.0200)	.0312*** (.0077)			.0840*** (.0200)	.0761*** (.0180)	
Latin America		-.5992 (.6429)	-1.0072*** (.2485)			-.5442 (.6436)	-1.6391*** (.5823)	
Africa		-.8618 (1.0533)	-.5543 (.3551)			-.6626 (1.0569)	-1.1961 (.8311)	
MENA		-1.5790* (.8387)	-.2891 (.4285)			-1.3749 (.8414)	-.9366 (1.0107)	
Asia		.5451 (.5709)	-.2706 (.2637)			.5433 (.5699)	-.5409 (.6206)	
Fertility		-.3783* (.2196)				-.4734*** (.2227)		
Democracy			.0609*** (.0232)				.1265** (.0552)	
Openness			.0052*** (.0012)				.0113*** (.0028)	.0009 (.0009)
Post-communist		.0413 (.4965)	-.7257*** (.2909)			.0027 (.4960)	-1.7849*** (.6897)	
Pronoun-drop	8.4196*** (2.492)				7.8888*** (2.4787)			
Min. temperature	-.4250*** (.1165)				-.4314*** (.1162)			
Monarchy	13.0869*** (.27698)				13.2218*** (2.7546)			
Log flag rating	6.8399 (5.6068)				6.2252 (5.5763)			
Education				.0849* (.0468)				.1034** (.0471)
Control of corruption				.5848*** (.0894)				.2657*** (.0410)
Constant	-11.6629 (23.0622)	6.8079*** (1.0073)	-.6203 (.4556)	8.6605*** (.3610)	-8.3642*** (22.9356)	7.1294*** (1.0117)	2.6416** (1.0758)	7.3684*** (.2642)
Observations	76	76	76	76	76	76	76	76
Adjusted R-squared	.5227	.5438	.7122	.7049	.5239	.5525	.6879	.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.	(4a.1)	(4a.2)	(4a.3)	(4a.4)	(4a.5)	(4a.6)	(4a.7)	(3a.8)
Regressors	Trust	Education	Institutions (WB)	GDP	Trust	Education	Institutions (CPI)	GDP
Trust		.0928*** (.0201)	.0313*** (.0077)			.0915*** (.0201)	.0753*** (.0179)	
Latin America		-.7625 (.6437)	-1.0179*** (.2477)			-.6168 (.6469)	-1.7078*** (.5763)	
Africa		-.7566 (1.0537)	-.5358 (.3545)			-.6015 (1.0610)	-1.1517 (.8237)	
MENA		-1.6917** (.8391)	-.2833 (.4254)			-1.5337* (.8448)	-.8859 (.9953)	
Asia		.5635 (.5725)	-.2763 (.2626)			.5838 (.5737)	-.5693 (.6135)	
Fertility		-.2624 (.2179)				-.3491 (.2218)		
Democracy			.0594*** (.0229)				.1231** (.0541)	
Openness			.0052*** (.0012)	.0003 (.0008)			.0112*** (.0028)	.0006 (.0009)
Post-communist		.1811 (.4972)	-.7305*** (.2889)			.1498 (.4977)	-1.8149*** (.6804)	
Pronoun-drop	8.4929*** (2.4941)				7.9102*** (2.4829)			
Min. temperature	-.4217** (.1166)				-.4309*** (.1162)			
Monarchy	13.0512*** (2.7715)				13.1517*** (2.7577)			
Log flag rating	6.9419 (5.6106)				6.7333 (5.5854)			
Education				.0112 (.0430)				.0385 (.0447)
Control of corruption				.6206*** (.0822)				.2739*** (.0389)
Constant	-12.2034 (23.0777)	6.3512*** (1.0066)	-.6083 (.4529)	10.0175*** (.3316)	-10.4996 (22.9752)	6.5757*** (1.0136)	2.7106** (1.0629)	8.6245*** (.2507)
Observations	76	76	76	76	76	76	76	76
Adjusted R-squared	.5225	.5318	.7127	.6924	.5232	.5379	.6899	.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&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1. LDC limit is at a GDP of 4000 USD per capita.