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The productivity of trust

Christian Bjørnskov and Pierre-Guillaume Méon

This paper returns to one of the early questions of the literature on social trust, whether trust affects total factor productivity (TFP). Using both development and growth accounting, we find strong evidence of a causal effect of trust on the level and growth of TFP. Using a three-stage least-squares procedure, we moreover observe that the effect of trust on TFP runs entirely through property-rights institutions and not political institutions. Those findings resist a series of robustness checks.

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The productivity of trust

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Abstract: This paper returns to one of the early questions of the literature on social trust, whether trust affects total factor productivity (TFP). Using both development and growth accounting, we find strong evidence of a causal effect of trust on the level and growth of TFP. Using a three-stage least-squares procedure, we moreover observe that the effect of trust on TFP runs entirely through property-rights institutions and not political institutions. Those findings resist a series of robustness checks.

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1. Introduction

Since Coleman's (1988) and Putnam' (1993) groundbreaking work, the literature on social trust has virtually exploded. While the concept of social capital, of which social trust was initially seen as an integral component, originated in sociology and political science, economists quickly joined the research agenda as some of the earliest results indicated that such features could work as factors explaining economic growth (Putnam, 1993; Helliwell and Putnam, 1995). The careful work of Knack and Keefe (1997) supported this contention, thereby fuelling the economic interest in trust differences across countries and regions.

More recent studies have shown that the association between social trust and economic growth is both robust and of economic significance (Whiteley, 2000; Zak and Knack, 2001; Beugelsdijk et al., 2004) but only hinted at what the transmission mechanisms are.[1] Whereas the evidence that trust affects level and growth of output is convincing, it is not clear whether its impact

[1] A partial exception is Berggren et al. (2008), who find that the trust-growth association is somewhat shaky in the medium run. Focusing on the 1990s, the authors conclude that the association is not particularly robust, but still more robust than other determinants of growth such as education that are often taken for granted by most economists.

is only quantitative or also qualitative. More specifically, whether trust affects factor accumulation only or also productivity is still food for debate.

There is consistent evidence that trust affects factor accumulation, as reported in the original contributions of Knack and Keefer (1997) and Zak and Knack (2001). More recently, Dearmon and Grier (2008) show that trust is a determinant of both physical and human capital accumulation, and that there seems to be a spill-over between these effects, clearly confirming that trust is an important determinant of factor accumulation. The impact of trust on productivity is more debated. On the one hand, the theoretical literature suggested right from its inception that social trust could enable cooperation and reduce rent-seeking behaviour thereby increasing total factor productivity (TFP), a point made by Arrow (1972), Putnam (1993), and Fukuyama (1995). On the other hand, the empirical evidence has remained somewhat scarce. In particular, Knack and Keefer (1997) in their original work noted a correlation between social trust and labour productivity but Zak and Knack (2001) found that social trust mainly leads to higher investment in physical capital, i.e. an effect on factor accumulation. Bjørnskov (in press) instead finds evidence of both an indirect effect, as trust improves the level of education, which subsequently increases the investment rate, and a more direct effect, through improved governance, which is not associated with investments or education, and tentatively interpreted as a productivity effect. However, whether this is actually a productivity effect or not remains to be seen.

The question is important, because TFP has been shown to be the main driver of economic performance. This is a standard result of growth accounting, going back to Solow's (1957) first attempt at measuring TFP). It has since then been confirmed on a large sample of countries, for instance by Klenow and Rodriguez-Clare (1997), who observed that differences in TFP growth explain the bulk of cross-country growth differences over 1960-85. The more recent development accounting literature, featuring papers such as Hall and Jones (1999) or Caselli (2005), that decomposes income levels instead of growth rates, indeed comes to the similar conclusion that differences in TFP levels explain the bulk of cross-country differences in per capita incomes. That literature shows that it is not factor endowments but TFP that can account for observed differences in output levels. Hence, while the growth accounting and development accounting literatures show that long-run growth and economic development are mainly driven by TFP, the more specific literature on the trust-growth association provides no clear answer as to whether trust affects TFP in addition to factor accumulation. In a nutshell, we know that trust affects the level and the growth of output, but we do not know whether it affects the main engine of output growth.

This paper consequently looks further into the association between social trust and both the level and the growth of TFP. In doing so, we extend the work of Hall and Jones (1999) and Olson et al. (2001) who respectively showed a positive relationship between institutional quality and both the level and the growth of TFP. In Williamson's (2000) terms, we therefore take the analysis from the second to the first level of social analysis, the social embeddedness level, where norms, traditions and basic beliefs are located. We first find a clear and robust association between levels of TFP and social trust. We next move on to showing a clear and robust relation between social trust and the growth of TFP. Most of all, we find in both instances that trust affects TFP by increasing the quality of some formal institutions. More precisely, we find the transmission channel of trust to TFP to be property-rights institutions, but not political institutions. In other words, we find that a dimension of the first level of social analysis works its way to TFP through a specific dimension of the second level of social analysis.

To reach those conclusions, the rest of the paper is structured as follows. Section 2 briefly discusses the theoretical reasons to believe that social trust affects TFP. Section 3 describes the data to be used in the empirical sections 4 and 5. Section 6 discusses the relevance of the results and concludes.

2. Why would trust affect productivity?

A first theoretical question to ask is why we would expect social trust to affect total factor productivity. The existing literature on the association between trust and economic growth surveyed in Bjørnskov (2009a) provides a number of clues. The arguments can logically be split into two different strands: 1) mechanisms directly enabling positive effects through pro-social behaviour and improved information flows; and 2) indirect mechanisms associating trust with better formal institutions that in turn affect economic outcomes.

2.1. Economic effects connecting trust and TFP

Knack and Keefer (1997) pioneered the thinking on pure economic effects, and provided a series of arguments relating trust and productivity. They first of all note that with higher levels of trust comes less need to devote resources to securing individuals and firms from theft and expropriation, which allows reallocating resources from protection to actual production. Moreover, higher levels of social trust reduce the transaction costs implicit in any economic activity, as trust reflects the average trustworthiness of people and thus the likelihood that they abide by both formal

rules and informal social contracts (cf. Arrow, 1972). As a result trustworthiness allows producing a larger output with the same endowments of production factors. This is precisely what TFP measures at the aggregate level.

By the same token, trust in other people implies that firms can apply longer time horizons when taking investment decisions, which allows them to invest in riskier, but potentially more productive processes. Through this mechanism, the returns to the average (although arguably not to the marginal) investment might be higher. A related mechanism stressed by la Porta et al. (1997) is that high levels of social trust allow economic agents to write shorter contracts, covering only broad contingencies. As such, trust would allow contracting for productivity gains since such gains cannot logically be precisely described or covered by exact contractual contingencies. La Porta et al.'s (1997) argument is consistent with Dearmon and Grier's (2009) finding of a positive interaction between investment and trust in a series of growth regressions. Namely, the marginal impact of investment on growth is larger in more trusting economies. One interpretation of their result is that the quality of investment is larger in higher-trust countries, which leads to productivity gains in addition to the accumulation of physical and human capital.

A second series of potential mechanisms relates trust to innovation and technical progress. Knack and Keefer (1997) note that research activities, which are important to firms' and countries' continued placement close to the productivity frontier, are essentially non-monitorable and often intangible. As Maskell (2000) notes, pure market interactions are generally incapable of transmitting the qualitative information needed to develop new products in interaction between firms, because the distribution of information between the seller and the buyer regarding the main characteristics of what is offered for sale is asymmetric. This problem and the inherent characteristic of non-monitorability would mean that firms either have to closely screen such information or, alternatively, employ it on their trust in the agents providing it.[2] As such, the optimal screening effort is decreasing in social trust, which thereby affects the transaction cost of hiring the potentially most productive employees. This would mean that firms in high-trust societies

[2] This argument rests on the assumption that trust and trustworthiness is approximately the same at the aggregate level. As outlined in Bjørnskov (2007), if this were not the case a substantial part of the population would continue to have systematically biased beliefs about the trustworthiness of others. Noting that most national trust scores are remarkably stable and thus tend to reflect long-run equilibria, the existence of such a bias is implausible. Similar implications follow from the literature on trust responsiveness briefly surveyed in Bjørnskov (2007, 2010).

are both more likely to be close to the technological frontier and more likely to adopt new technologies early (Bornschier, 2005).

Emphasizing an indirect mechanism related to the above direct mechanism, Bjørnskov (2009b) instead presents a simple semi-endogenous growth model in which firms invest in labour-augmenting technological improvements to the extent that it pays for them to do so. This extent is determined by the costs and necessity of monitoring employees with complex work tasks, which determines their demand for educated employees and thus their ability to benefit from potential productivity increases. As high-trust employees are both better at cooperating and need less monitoring – they are more likely to follow common work norms and do their job without being monitored – social trust comes to affect long-run TFP directly through its effects on the demand for higher education while the model also leaves room for a more intangible effect through norms of cooperation. This contention is consistent with Dearmon and Grier's (2009) finding that trust increases the impact of education on growth. In other words, education in high-trust countries has an impact that goes beyond the mere accumulation of human capital. It must therefore impact TFP growth.

Ikeda (2008) offers and additional link between trust and TFP, based on Austrian entrepreneurship theory, in which increases in TFP are partially the outcome of entrepreneurial discovery (cf. Kirzner, 1997). He stresses the effects of "structural holes" in entrepreneurial activity, as the efficient exploitation of information available in networks. Ikeda (2008) argues that a minimum of social trust is necessary to access such information through what Granovetter (1973) termed "weak ties", i.e. social ties to people one either does not know or only knows faintly. Without trust, people may not engage in networks at all, or alternatively, exchanges of information in networks may take on a more personalized character in which specific favours are exchanged for specific other favours, instead of a more general exchange that allows for a flow of more diverse and non-specific information.

In other words, trust allows entrepreneurs, who move the production possibility frontier forward through process innovation, to have more impersonal contacts and rely more on the market process, thereby accessing a wider range of knowledge resources. Because the types of information and resources an entrepreneur or innovator needs in a process of discovery are unforeseeable, stable relations with established reputations are less valuable than for other transactions. High-trust societies should therefore have a competitive edge in innovative activities by enabling information to flow through impersonal relations. Kwon and Arenius (2010) further similar arguments and

present cross-country evidence to support a link between trust, weak tie investments, and entrepreneurial activity. The idea is further corroborated by Akçomak and ter Weel (2009), who explore the effects of social capital on TFP, and in particular the effects of social trust. In a study of 102 European regions, they find that trust significantly affects patentable innovation activity, measured by the number of patent applications. They suggest that this effect explains the significant association between social trust and regional economic growth differences across Europe, documented for example in Moesen et al. (2000). As patents are bound to affect productivity, at least in some industries, one should therefore expect trust to correlate not only with the level of TFP but also with its growth.

In a similar vein, one may connect trust and TFP through its influence on tolerance of behaviour and lifestyles different from one's own. Uslaner (2002) shows that trusting individuals are, on average, more tolerant of different lifestyles. Hence, if innovations, as argued by Florida and Gates (2001) or Florida (2002), typically come from atypical groups, the adoption of innovations would be more likely in high-trust societies.[3] Similar arguments can be found in the early trust literature in which a culture of open-mindedness is argued to be consistent with high levels of trust (e.g. Fukuyama, 1995).

Finally, trust also impacts the integration of a country in the international economy. Guiso et al. (2009) find that higher trust in a country results in larger bilateral trade-flows, while Edwards (1998) found that TFP growth was positively related to openness to trade. One may therefore infer that trust affects the level of productivity by allowing countries to better exploit their comparative advantages. Moreover, Guiso et al. (2009) observe that higher trust not only affects the volume but also the quality of exchanged goods, with trust leading to larger trade volumes in more sophisticated goods. As a result, trust should also affect countries' TFP through trade, by moving their specialization up the quality ladder. Lastly, Guiso et al. (2009) report that trust results in more

[3] In the present sample, the correlation between trust and the World Values Survey question on tolerance of homosexuals is only .38. We should stress that we do not expect this mechanism to work out in detailed data. However, Berggren and Elinder (2009) show that different aspects of social tolerance are associated in different ways with economic growth. While tolerance of other races is positively associated with growth, tolerance of homosexuality appears to be negatively associated with growth.

foreign direct investment.[4] Since FDI has been found to boost TFP growth, for instance by Kose et al. (2009), this is another reason why trust should positively affect TFP.

2.2. Institutional effects connecting trust and TFP

Knack and Keefer (1997) originally argued that part of the influence of social trust on economic growth might come about due to being associated with the quality of legal and bureaucratic institutions, which they had shown to be a strong predictor of economic growth in a previous paper (Knack and Keefer, 1995). More directly, two recent studies estimating the transmission mechanisms through which trust affects economic growth both identify institutional quality as an important link (Bjørnskov, in press; Boulila et al., 2008). Noting that trust affects long-run economic growth above its direct influence on education and investments, Bjørnskov (2009b) therefore suggests that the main mechanism through which trust generates growth is through improving the quality of formal economic-judicial institutions, which in turn affects the rate of TFP growth. For this transmission channel to operate, two conditions must be met. First, trust must affect the quality of the relevant institutions. Second, the quality of institutions must affect TFP.

First, the importance of social trust for the quality of formal institutions was indeed central to Putnam's (1993) seminal study of regional governance in Italy. Knack (2002) likewise shows that social trust is a determinant of the quality of state institutions and policies across the US. In cross-country studies, trust is also significantly associated with corruption (Putnam, 2001; Uslaner, 2002), legal quality and bureaucratic efficiency and perhaps also participation in the political process as measured by voter turnout (la Porta et al., 1997).

Radical productivity enhancing innovations may often cause unforeseen institutional challenges. In recent times, the arrival of the internet revolutionized global information flows. However, it also poses challenges of how to legislate around all sorts of cross-border information flows as well as many similar problems. Not finding solutions to such challenges arguably prevents many innovations from being adapted in actual production as such adoption would happen in a regulatory and legal grey zone. Any factor enabling reforms and legal/regulatory development (in civil law systems) or legal reinterpretation (under common law) would prevent potential

[4] It is nevertheless important to stress that Guiso et al. (2009) calculate the net effects on trade volumes by assuming that trade is not simply redirected to countries with relatively good trust scores. If this is the case, trade is likely to be more profitable for high-trust countries even though trade volumes are unaffected.

productivity deadlocks. Connecting this problem to the present topic, Knack (2002) and Heinemann and Tanz (2008) suggest that trust enables institutional reforms, i.e. the sort of institutional adaptation that would be necessitated as a by-product of radical innovation. A related candidate is the quality of regulatory activity, which could likewise affect total factor productivity negatively (Nicoletti and Scarpetta, 2003.

Secondly, institutional quality may affect productivity in many ways. First, poor institutions or uncertainty about their quality can act as a tax on investors, thereby giving them an incentive to use existing resources less intensively. Knack and Keefer (1997) for example note that with better institutions, whether they are formal or informal, market agents will optimally devote a smaller part of their time and resources to monitoring and protection against expropriation. While good judicial institutions therefore can provide incentives for the efficient use of resources and search for productivity improvements, the effects of democratic political institutions are ambiguous. The checks and balances associated with democracy may reduce policy and institutional uncertainties, yet short-run election motives and the risk of popular incompetence would likely increase uncertainty.

Second, institutional deficiencies such as prevalent lobbyism or corruption – predominantly failures of economic-judicial institutions – may induce agents to divert resources from productive to unproductive activities, such as predation, rent-seeking, or the protection of their property against those (Baumol, 1990). Third, poor institutions may result in the accumulation of less than fully efficient factors of production. This would for instance be the case if agents invested in general-purpose as oppose to specific factors of production to hedge against the risk of policy reversals.[5] Again, economic-judicial institutions are likely to protect against such reversals while the net effect of democratic political institutions is ambiguous.

The contention that the quality of formal institutions affects productivity is indeed backed by consistent evidence. Hall and Jones (1999) document a strong causal link from what they refer to as "social infrastructure" to total factor productivity. Their index of social infrastructure is essentially a measure of the protection of property rights by the government, namely law and order, bureaucratic quality, corruption, risk of expropriation, and government repudiation of contracts, More recently, Méon and Weill (2005) and Klein and Luu (2003) show that a broad spectrum of measures of the quality of governance is associated with higher aggregate efficiency.

[5] To save on space, we only briefly sketch the impact of institutions on productivity. The interested reader will find more exhaustive discussions in Hall and Jones (1999), Méon and Weill (2005), or Méon et al. (2009).

Now, the concept of institutions is a broad concept, and specific facets of institutions may relate differently to trust and to TFP. Most studies of the impact of trust on institutions consider institutions that protect private property rights and allow for efficient provision of central public goods, be it because they result in a stronger rule of law, as in Knack and Keefer (1997) or Bjørnskov (in press), lower corruption, as in Putnam (2001) or Uslaner (2002), or a more efficient public bureaucracy as in Bjørnskov (2010). Some predominantly early papers however suggest that trust also matters to institutions that determine the way governments are elected and deposed, as Putnam (1993), La Porta et al. (1997), or Uslaner (1999). We refer to the former as economic-judicial institutions and the latter as political institutions.

The distinction may be important when assessing the economic consequences of trust mediated through institutions. First, while almost all measures of formal institutions covary, these two overall types are conceptually different and statistically separable (Munck and Verkuilen, 2002; Knack and Langbein, 2010). Bjørnskov (2010) moreover demonstrates that once common covariates are taken into account, trust only affects the quality of economic-judicial institutions but not political / democratic institutions. By the same token, while the impact of the rule of law on growth and TFP has been clearly observed by Knack and Keefer (1995) and Hall and Jones (1999), the impact of democratic institutions is more difficult to document. Rivera-Batiz (2002) for instance finds that democracy ceases to be significantly correlated with TFP growth once the quality of governance is controlled for. Moreover, Méon and Weill (2005) find that the 'voice and accountability' indicator is the dimension of governance that correlates the most weakly with aggregate efficiency out of the six indicators published by the World Bank. In the following, we therefore attempt to keep economic/judicial and political institutions separate.

In summary, there are two main, separable channels through which social trust may positively influence TFP. It may affect TFP both directly and indirectly, through its effect on institutions. In the next section, we outline the data and empirical strategy to estimate these mechanisms.

3. Data and econometric strategy

Since we want to investigate how trust may affect productivity, we first need to be able to measure total factor productivity and total factor productivity growth. To do so, we resort to standard development accounting and growth accounting techniques, which we describe in the first subsection. The following subsections then describes how we measure social trust and other

explanatory variables, to explain the level and variation of TFP. The fourth subsection describes our econometric strategy.[6]

3.1. Measuring TFP and TFP growth

Development accounting decomposes observed differences in the levels of output per worker across countries into differences in factor endowments and differences in TFP while growth accounting decomposes output growth into growth of factor endowments and TFP growth. In both instances, TFP and TFP growth are computed as residuals. The basic assumption of both methods is that all countries' output can be approximated by the same aggregate production function. We assume the following standard production function:

$$Y = AK^{\alpha}(Lh)^{1-\alpha} \quad (1)$$

where Y stands for output, K for the aggregate capital stock, L for the number of workers, and h is the average stock of human capital. Lh thus measures the quality-adjusted labour force or "effective labour". Parameter α captures the elasticity of output to capital. A is total factor productivity, namely our variable of interest. This specification of the production function is the main specification used in Caselli's (2005) survey. Similar specifications have been used by King and Levine (1994), Klenow and Rodriguez-Clare (1999), Prescott (1998), and Hall and Jones (1999).

The next step is to rewrite the production function in per-worker terms. Doing so gives:

$$y = Ak^{\alpha}h^{1-\alpha} \quad (2)$$

where lower-case letters refer to per-worker variables.

Since y, k, h and α can be either observed directly or estimated, expression (2) is an equation with one unknown, A. Total factor productivity is then simply estimated by solving the equation for A. Our workhorse measure of TFP is thus given by the following expression:

$$A = y / (k^{\alpha}h^{1-\alpha}) \quad (3)$$

Growth accounting is essentially equivalent to development accounting, except that it considers the variations of all variables, as opposed to their levels. To determine the relationship between the growth rates of output, factor endowments, and TFP, we first take the logarithm of expression (2) and differentiate with respect to time. This gives:

$$\hat{y} = \hat{A} + \alpha\hat{k} + (1-\alpha)\hat{h} \quad (4)$$

where variables with a hat correspond to growth rates.

[6] Descriptive variables are provided in Appendix A2.

Since the growth rates of output, of the physical capital stock, and of the human capital stock are again observable, one can easily infer the growth rate of TFP as a Solow residual:

$$\hat{A} = \hat{y} - \alpha\hat{k} - (1-\alpha)\hat{h} \qquad (5)$$

To obtain TFP, with expression (3), or TFP growth, with expression (5), one needs the same data. Specifically, one needs a value for α and data on *Y*, *K*, *L*, and *h* to compute both *A* and $\hat{A}$.

The number of workers and GDP can both be obtained from the Penn World Tables 6.2 dataset (Heston et al., 2006). That dataset provides output per worker directly, and allows us to infer the number of workers from its other measures.[7]

The physical capital stock is not measured directly. Instead, it can be estimated using the perpetual inventory method. A country's physical capital stock in a given year is thus defined as the discounted sum of past investments. Accordingly:

$$K_t = K_{t-1} \times (1 - \delta) + I_{t-1} \qquad (5)$$

δ is the depreciation rate and is set to 0.06, which is considered a reasonable parameterization in the literature. The Penn World Tables dataset provides investment series from 1950 to 2004, but leave the initial stock of capital to be estimated. A common way to get an estimate is to assume that it is equal to its steady-state value in the Solow growth model. Accordingly, the initial stock of physical capital is given by $K_0 = I_0 / (g + \delta)$, where I_0 stands for the value of investment in the first year for which an observation is available, and *g* the average rate of growth for the investment series between that year and 1970.

Assuming that the initial capital stock corresponds to its steady state value in all countries is most likely a coarse approximation. Precautions must therefore be taken to minimize its impact on estimates of TFP. One way to do so is to refrain from using estimates of the capital stock that are too close in time to the initial year. We therefore include no country for which the investment series starts later than 1970, and compute TFP for the latest possible year, that is 2000. With an annual rate of depreciation set to six percent, the share of the initial capital stock still in use in 2000 does not exceed 15% of its initial value, which makes our assumptions on the initial capital stock virtually innocuous. One may moreover remark that this disclaimer only applies to development accounting and not growth accounting. Indeed, the latter only needs to consider variations of inputs. As a result, it does not require specifying the initial value of the capital stock. This allows us to

[7] Specifically, the number of workers was obtained by dividing total GDP by GDP per worker, that is *rgdpch*×*pop*×1000/*rgdpwok* according to notations in the PWT6.2.

study TFP growth on a longer period than the level of TFP and thereby get a priori more precise estimates.[8]

The stock of human capital cannot be observed directly either. To get an estimate, we follow the standard procedure, and proxy it as a function of years of schooling in the population. Specifically, we follow Hall and Jones (1999) and Caselli (2005), and define h as:

$$h = e^{\phi(s)} \tag{6}$$

where s is the average number of years of schooling in the population over the age of 25. It is taken from the Barro and Lee (2001) dataset. ϕ is a piecewise linear function such that $\phi(s) = 0.134 \times s$ if $s \leq 4$, $\phi(s) = 0.134 \times 4 + 0.101 \times (s - 4)$ if $4 < s \leq 8$, and $\phi(s) = 0.134 \times 4 + 0.101 \times 4 + 0.068 \times (s - 8)$ if $s > 8$.

Hall and Jones (1999) motivate this specification by remarking that in standard neoclassical frameworks, workers' wages should be proportional to their human capital. As the relationship between wages and education is commonly assumed log-linear at the country-level, but the cross-country pattern of this profile seems convex, a piecewise linear specification accounts for both within and cross-country evidence.

Finally, one needs an estimate for α. Caselli (2005) shows that this parameter is critical in development accounting exercises, but there is disagreement on its value. A frequent assumption is to set it around 0.3, as in Hall and Jones (1999), Klenow and Rodriguez-Clare (1999), Prescott (1998), or Collins et al. (1996).[9] However, the estimates of α that are reported in the literature may be quite different. Cavalcanti Ferreira et al. (2004) estimate α to revolve around 0.43. Abu-Qarn and Abu-Bader (2007) find that α in oil-rich MENA countries can exceed 0.6 while Senhadji (2000) finds a mean of 0.55 in a sample of developed and developing countries. To limit the impact of arbitrary assumptions, we estimated α in our sample of countries using alternative

[8] More precisely, all growth regressions report the second stage of an estimation, where the country fixed effects estimated in the first stage are regressed on time-invariant explanatory variables. The results of the first-stage regression are reported in table A5 in the appendix. The results suggest that TFP growth is negatively correlated with initial output and positively with initial human capital stock. The F test for country effects being jointly equal to zero supports the existence of country fixed effects and the Hausman test supports fixed effects over random effects, thereby validating the two-stage strategy.

[9] To be specific, Caselli (2005) and Hall and Jones (2003) precisely assume $\alpha = 0.3$, whereas Prescott (1998) considers $\alpha = 0.25$, and Collins et al. (1996) assume $\alpha = 0.35$.

strategies. They all yielded remarkably stable estimates of the parameter that were close to 0.4.[10] Since this estimate is not extremely different from usual assumption, we used it to run baseline estimations. However, we also performed all analyses in the robustness checks section with alternative TFP measures, corresponding to different values of α.

Since Barro and Lee's (2001) data stop in 2000, we focus on that year to estimate TFP. As data on human capital stocks are available for spells of five years, we compute TFP growth rates over periods of five years, and over the whole 1980-2000 period.

3.2. Measuring social trust

To measure social trust, we rely on the standard question "In general, do you think most people can be trusted?", which has been asked in a number of surveys since the late 1950s. The trust data employed in this paper derive from a number of surveys, first and foremost the five waves of the World Values Survey (Inglehart et al., 2004). These data are supplemented by 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.[11] As most countries are only observed in one period, we use the average of all available observations and thus impose the restriction upon the data that social trust does not vary significantly in the medium run. Whereas this assumption may be questionable in the case of the United States that saw falling trust levels in the 1970s and 1980s, Bjørnskov (2007) suggests that social trust scores in general are very stable over time. Another strand of the literature documents a strong association between present day trust levels in Europe and that of second and third generation immigrants in the US whose ancestors

[10] All estimations are displayed in appendix A3.

[11] Some commentators have questioned the validity of the trust measures (Fine, 2001; Durlauf, 2002; Beugelsdijk, 2006). However, most find that national trust scores are relatively good proxies for trust and trustworthiness based on actual honest behavior. For example, Knack and Keefer (1997) note that the trust scores correlate strongly with return rates from wallet drop experiments and Sapienza et al. (2007) show in a series of experiments that trust scores are good predictors of behavior when the stakes are economically relevant. Furthermore, Uslaner (2002) provides evidence from in-depth interviews that a majority of respondents consider 'the man in the street' or other strangers when answering the trust question. As such, social trust is a very different concept and even correlates negatively with particularized forms of trust as measured by respondents' trust in family, friends and colleagues (Uslaner, 2002; Alesina and Guiliano, 2009). Finally, the evidence in Reeskens and Hooghe (2008) shows (despite their conclusions) that the simple trust question is superior to alternative measures of perceived trust and trustworthiness. Trust scores are reported in Appendix A4.

came from Europe (Uslaner, 2008; Guiso et al., 2008; Tabellini, 2008). We therefore use the averages of all available observations, at least as a first valid approximation. All trust observations are reported in the appendix.

While it would be difficult to argue for the direct reverse causality, i.e. that TFP affects trust, a number of indirect mechanisms may cause simultaneity as well as less direct reverse causal mechanisms. This would be a worry if, for example, trust becomes more prevalent as countries grow richer from TFP growth, as Paldam (2009) argues. Although the contention has been rejected by a number of other studies, like Delhey and Newton (2005) and Bjørnskov (2007), we control of causality by systematically complementing OLS estimates by estimates obtained with instrumental variables regressions. To do so, we apply a set of instrumental variables for social trust following suggestions in Guiso et al. (2008), Tabellini (2008) and Bjørnskov (in press). These variables include a dummy variable capturing whether the predominant language of a country exhibits Chomsky's (1981) 'pronoun-drop' characteristic, and the average temperature in the coldest month of the year. Tabellini (2008) argues forcefully that cultures in which the language allows dropping the personal pronoun (the pronoun-drop characteristic) tend to exhibit less respect for the individual and individual rights, which tends to reflect a culture of individual mistrust. In collectivist cultures, asymmetric power relations among individuals would be more likely to develop, and promises would be conditional on whether or not the promised action is to the collective benefit, both of which tend to reflect a culture of individual mistrust.

The idea that the severity of winters can affect cultural characteristics such as social trust goes back to Aristotle. It is based on the argument that historically, survival through winters to a much larger extent depended on the help from strangers in relatively colder climates than, for example, in the mild climates around the Mediterranean. This would make extending one's trust radius to less familiar people a dominant evolutionary strategy outside this region.[12]

Linguistic rules are inherited or evolve over horizons that exceed a century. They can therefore be considered predetermined. Moreover, apart from their impact on culture, there is no reason why they should affect productivity. Similarly, a country's minimum temperature is clearly exogenous to its economic and cultural development and has little direct impact on its productivity.

[12] Regressing trust on those two instruments explains about one half of the cross-country variation in trust scores. Note that Durante (2009) tells a very similar story and finds substantial support for geographical and climactic determinants of trust.

Both factors are therefore not only predetermined but also valid instruments of trust in regressions with both TFP and institutional quality.

3.3. Measures of institutional quality

Finally, in order to test for the importance of indirect mechanisms running through the quality of formal institutions, we distinguish political institutions, primarily determining the way governments are elected and deposed, and economic-judicial institutions that protect private property rights and allow for efficient provision of central public goods. As for the measure of the quality of economic-judicial institutions, much of the recent literature has used the governance indices developed by Kaufmann et al. (2008) at the World Bank. However, these measures exhibit significant shortcomings (Bjørnskov, 2010; Knack and Langbein, 2010). We therefore used the conceptually cleaner Fraser Institute indicator of the characteristics of the legal system to proxy for the quality of the legal system (Gwartney and Lawson, 2008).[13] Our preferred measure of political institutions is Marshall and Jaggers (2004) Polity IV index, which has the benefit that it rests on a relatively minimalist definition of democracy. We therefore minimize the risk of conceptual overlap between the two indicators.

In a further set of robustness tests, we use the Gastil index of political rights and civil liberties, either in full or as two separate measures of the two concepts (Freedom House, 2008). Our alternative indicators of economic-judicial institutions are the specific measure of judicial independence from the Fraser Institute, the Law and Order index from ICRG (2009), and the Corruption Perceptions Index (CPI) from Transparency International (2008), the latter capturing the quality of institutions by measuring their evident failure (cf. Knack and Langbein, 2010).

[13] The index developed by the Fraser Institute is an unweighted average of a set of subindices covering judicial independence, the impartiality of the courts, the protection of intellectual property rights, the degree of military interference in law and politics, and the integrity of the legal system. As such, the index conceptually measures the efficiency and independence of the judicial system and thus provides a clean measure of the likely quality of national judicial institutions.

3.4. Econometric strategy

To assess the relationship between the level of TFP and trust more rigorously, we follow Hall and Jones (1999), and regress it on the social trust index on the cross-section of countries in the latest year for which data are available. The specification thus reads:

$$TFP_i = a_0 + a_1\, trust_i + A.D_i + u_i \quad (7)$$

where TFP_i is the estimate of total factor productivity obtained for country i from (3), and $trust_i$ is that country's trust index. A is a vector of coefficients, D_i a vector of control variables pertaining to country i, and u_i a random shock.

Although there is no standard specification, the most obvious control variables are openness, measured as trade volume as percent of GDP, and being a post-communist country. To capture the potential indirect mechanisms through which trust might work, we include a set of institutional α of 0.4. Here again higher levels of trust appear correlated with faster TFP growth. The correlation between trust and average TFP growth is slightly less than 0.54. Two different outliers now appear around the otherwise compact scatter plot, Ireland, whose TFP grew faster than expected, and Jordan, whose TFP grew more slowly than other countries displaying the same level of trust.

Figure 2 now sketches the relationship between trust and TFP average growth over 1980-2000 for an

*** insert figure 2 here ***

The strategy used to measure the impact of social trust on TFP growth is slightly less straightforward than for the level of TFP. As explained above, we can be more confident in the panel dimension of the dataset here, and therefore want to use that dimension. On the other hand, social trust is a country's deep structural characteristic, and is consequently best considered time-invariant. We therefore resort to the same two-stage method as Olson et al. (2001). Namely, in a first stage, we run a panel regression, where TFP growth over spells of five years is explained by time-variant control variables, and country fixed effects:

$$\hat{TFP}_{it} = b_0 + B.V_{it} + \eta_i + \varepsilon_{it} \quad (8)$$

where B is a vector of coefficients, V_{it} a vector of time-variant control variables pertaining to country i, η_i is country i's fixed effect, and ε_{it} the error term.

In the second stage, we regress the fixed country effects estimated in the first stage on trust and a set of control variables. The resulting cross-section regression thus reads:

$$\eta_i = c_0 + c_1\, trust_i + C.F_i + e_i \quad (9)$$

where C is a vector of coefficients, F_i a vector of time-invariant control variables pertaining to country i, and e_i a random shock.

In what follows, the time-variant control variables used in the first-stage regression are initial per capita income and initial human capital stock, to control for conditional convergence. We will use the same sets of control variables in the second-stage equation as in regressions explaining TFP levels.

Finally, we want to test the hypothesis that trust causally affects TFP via the quality of institutions. Indeed, the association between trust and TFP could in principle be due to institutions creating trust or a simple reflection effect (cf. Berggren and Jordahl, 2006). In general, the trust literature is still undecided on whether trust affects institutions, institutions affect trust, or the association is bidirectional. However, most recent studies suggest that social trust is relatively stable over time and causes institutional quality, although perhaps not under all political circumstances (cf. Knack, 2002; Uslaner, 2002; Bjørnskov, 2007, 2010). To test the hypothesis, we resort to three-stage least-squares estimation. We therefore estimate a system of equations, where trust in regressed on predetermined instruments in the first-stage equation, the relevant measure of institutional quality is regressed on trust in the second-stage equation, and TFP is regressed on the relevant measure of institutional quality in the third-stage equation.

4. Empirical results

A casual glance at the data reveals an apparent association between social trust and TFP. Applying an α of 0.4, the average TFP number in the full sample is 126.6, yet the average of the low-trust half – which includes countries such as France and Portugal – is only 102.3 while the average of the high-trust sample, including a number of developing countries, is 150.8 (a difference significant at any conventional level). The overall correlation of 0.5 between trust and TFP is also visible in Figure 1a, even though the figure also shows two clear outliers (Ireland and Thailand).

*** insert figures 1a and 1b here ***

By the same token, Figure 1b uncovers a positive association between trust scores and the average growth of TFP over the period 1980-2000. Again, two outliers appear on the figure, Ireland and Jordan, while the overall association is clear.

In the rest of this section, we back the graphic intuitions provided by Figure 1a and 1b by proper econometric testing. The first sub-section reports estimates obtained in a parsimonious specification, so as to measure the simple association between the level and growth of TFP and their explanatory variables. Thise sub-section also controls for endogeneity and establishes causality thanks to 2SLS and 3SLS regressions. The latter bring in the picture the role of institutions as the transmission channel of trust to TFP using 3SLS regressions. A second sub-section provides evidence with TFP measures obtained by different parameter values. A final sub-section provides a series of robustness tests, including adding control variables, using alternative governance indicators, and jackknife and bootstrap exercises.

4.1. TFP, formal institutions and trust – OLS estimates

In this section, we first report the results pertaining to the impact of trust on the level of TFP then those that assess the impact of trust on TFP growth. We start by providing simple estimates of the association evident in the figures, with and without controls for two types of institutions. The results are reported in Tables 1a and 1b.

*** insert tables 1a and 1b here ***

The results in the tables suggest that the simple relations in the figures are not trivial, as the associations between trust and TFP levels and TFP growth, respectively, now appear to be statistically significant at the one-percent level. The results suggest that a one standard deviation change in social trust is associated with an increase in TFP levels of approximately 40 percent of a standard deviation. The similar estimates of trust on TFP growth imply that a one-point increase in the trust score results in a 0.3 to 0.4 percentage points increase in the average five-year growth rate of TFP. This estimate in turn implies that a one standard increase in trust would result in a more than 6 percentage point increase in the average growth rate of TFP. However, including the Fraser Institute measure of legal quality, but not the Polity IV democracy indicator, yields estimates of institutions significant at the one-percent level, but also makes the coefficient of trust undistinguishable from zero at any reasonable level of significance. In other words, controlling for such institutions reduces any direct impact of trust on TFP to zero. This suggests that the impact of trust on productivity may in fact be mediated by institutional quality.

4.2. TFP, formal institutions and trust – 2SLS estimates

The estimates in Tables 1a and 1b could in principle be affected by simultaneity bias. Since we used end-of-period trust data, we in particular cannot rule out the possibility of our results being driven by unobserved social characteristics associated with trust. A period of growth may, for example, reduce social tensions, thereby increasing trust. Tables 2a and 2b therefore reproduce the regressions in the previous tables, but use 2SLS instead of OLS, instrumenting social trust by a dummy variable capturing whether the predominant language of a country exhibits the 'pronoun-drop' characteristic, and the average temperature in the coldest month of the year. In first stage regressions, the two instruments explain about one half of the variation of trust across our sample. Most first stage F-tests exceed the standard rule-of-thumb level of ten, and all Sargan tests signal no significant correlation between instruments and residuals. Our instruments therefore appear statistically valid.

*** insert table 2a here ***

*** insert table 2b here ***

The results of 2SLS regressions are qualitatively the same as those obtained with OLS. In a nutshell, social trust is correlated with TFP at the one-percent level of significance until one controls for the quality of economic-judicial institutions. The 2SLS estimates, as the OLS estimates, thereby emphasize the need to separate types of institutions, as our preferred measure of political institutions remains insignificant and do not affect the significance of trust.

The results obtained with 2SLS are also similar to those obtained with OLS. The point estimate of the impact of trust on the level of TFP even increases slightly, suggesting that a one standard deviation increase in trust results in an increase in TFP of almost 60 percent of a standard deviation. By the same token, a one point increase in the trust score results in a 0.6 to 0.69 percentage points increase in the five-year TFP growth rate. These estimates are similar or slightly greater than the point estimates obtained with OLS.

4.3. TFP, formal institutions and trust – 3SLS estimates

So far, the estimates thus suggest that trust exerts a significant and causal effect on TFP. However, including measures of formal institutions suggests that the effect of trust takes place

through its effects on the quality of economic-judicial institutions. To make sure that those results are not due to institutions creating trust or a simple reflection effect, we here provide a set of 3SLS estimates in Table 3a and 3b in which we instrument trust in a first stage in order to be certain that this part of the causal chain is in fact causal. The remaining part thus tracks the effect of social trust on TFP through formal institutions, although it must be kept in mind that we thereby force all effects through this channel. Table 5a estimates the effects on TFP levels while Table 5b reports estimates on TFP growth rates.

*** insert tables 3a and 3b here ***

The results in both tables suggest that we are not making a major mistake if we treat the findings from previous tables as evidence of a causal channel in either levels or growth regressions. Even though we by construction force all trust effects through formal institutions, we nevertheless still find that results are substantially stronger when exploring economic-judicial institutions. The third-stage test statistics suggest major identification problems when using measures of political institutions whereas, the results using either measure of economic-judicial institutions are relatively clean. Following Williamson's (2000) typology, our estimates thus reflect how factors at the first level of analysis can affect overall development by affecting specific factors at higher levels of analysis.

Moreover, the effect of trust on the level of TFP remains quantitatively similar to estimates obtained with OLS and 2SLS. For TFP, increasing trust by one standard deviation results in an increase in TFP of nearly 60%. The same holds for TFP growth. 3SLS estimates again imply that a one point increase in the trust score should raise five-year average TFP growth by at least 0.6 percentage points. As a result, a one standard increase in trust would cause a more than a six percentage point increase of five-year average TFP growth. The results therefore imply that the impact of trust on TFP and TFP growth is not only statistically but quantitatively significant. In the next section, we check the robustness of the results.

*** insert table 4 here ***

5. Robustness checks

While results have so far been clear, both relationships, on TFP level and TFP growth may be subject to similar caveats: misleading TFP estimates, omitted variables bias, and forms of outlier and other spurious influences. We therefore proceed in this section by outlining the results of addressing each possible limitation and determining the extent to which it may affect our results for both the level and the growth of TFP.[14]

5.1. Changing the value of α

In the development accounting and the growth accounting literature, it is well established that measures of TFP and TFP growth are sensitive to the value of α, as Caselli (2005) reports. The natural first robustness check is therefore to assess the impact of that parameter. We have so far used $\alpha = 0.4$ to calibrate our production function, which is the value that we endogenously obtained when estimating the production function on our data set. However, a value of 0.3 is more common in the literature. We have replicated the above analyses with $\alpha = 0.3$ for the level and growth of TFP, using the same two- and three stage procedures as in previous tables. We report the 2SLS estimates in Tables 4a and 4b, and 3SLS estimates in Tables 5a and 5b. Similarly, Tables 6a, 6b, 7a and 7b report the results of assuming a value of $\alpha = 0.5$.

*** insert tables 4a and 4b here ***

*** insert tables 5a and 5b here ***

*** insert tables 6a and 6b here ***

*** insert tables 7a and 7b here ***

The former set of tables with α set at 0.3 shows that results are qualitatively unchanged. Trust remains positively correlated with TFP, unless institutional quality is controlled for. The main difference is in fact quantitative. The coefficients of trust in the regressions are substantially larger with $\alpha = 0.3$ than with $\alpha = 0.4$, with 2SLS. Likewise, the implied effects of trust in the 3SLS estimates are similarly larger.

[14] All results in this section can be obtained from the authors. We do not report the specifics in order to keep the paper relatively short.

The rationale for this finding is straightforward, once one recalls that trust affects the accumulation of production factors, that TFP is estimated as a residual, and that the variation of the physical capital stock across countries is larger than the variation of the human capital stock. By decreasing the value of α, one decreases the role of differences in the capital stock in explaining differences in output, and conversely raises the role of TFP. Since higher trust results in larger capital stocks, decreasing α implies that the share of the impact of trust on output that is attributed to its impact on TFP increases.

Increasing the value of α is a more demanding test than decreasing it. In so doing, the role of physical capital accumulation in explaining income differences is inflated, leaving less room for TFP. Nevertheless, we raised α to 0.5, and started the analysis afresh.[15] Expectedly, the coefficient of trust shrinks when raising α, regardless of the estimation technique. However, it remains significant at least at the five-percent level of significance in level regressions, and beyond the one-percent level of significance in growth regressions. Unsurprisingly, it becomes insignificant again as soon as institutional quality is controlled for. It must moreover be stressed that the impact of the quality of economic-judicial institutions remains quite significant at the one-percent level, in both level and growth regressions. The evidence that social trust impacts productivity through institutions is therefore robust to the assumed value of the capital share in the production function.

5.2. Alternative measures of institutions

As main results are robust to relatively larger changes in α, we proceed with using a value of 0.4. We next rerun all regressions using a set of alternative institutional indicators, three of which proxy for political institutions while the other three proxy for the quality of economic-judicial institutions. Our results pertaining to these alternative measures are reported in Tables 8a, 8b, 9a, 9b, 10a and 10b.

*** insert tables 8a and 8b here ***

*** insert tables 9a and 9b here ***

[15] We even raised α to 0.6, which is the threshold value where the role of TFP becomes very limited, as Caselli (2005) reports. We found that whereas no variable significantly correlated with trust in level regressions, the results of growth regressions remained qualitatively unchanged.

*** insert tables 10a and 10b here ***

Again, we find qualitatively and quantitatively similar results. In Table 8a (TFP levels) and 8b (TFP growth), none of the measures of political institutions become significant. Conversely, all economic-judicial measures are significant in the former table while only the corruption indicator is significant in the latter. In Tables 9a, 9b, 10a and 10b, in which we force the trust effect through each institutional measure, we find significant results throughout. We do, however, note that the goodness-of-fit tests are questionable and indicative of problems with most measures of political institutions, but unproblematic when we employ measures of economic-judicial institutions. The evidence that social trust impacts productivity through institutions is therefore also robust to applying a broad set of different institutional indicators. Noting the overall robustness of our findings to the choice of institutional indicator, we proceed to the final two sets of robustness tests.

5.3. Adding control variables

We next address the potential problem of omitted variables bias. Yet one of the challenges, compared to studies of growth and development, is that there is no established minimum baseline specification in the empirical study of TFP differences. We therefore follow basic economic intuition and recent papers in choosing a small set of different control variables (e.g., Klein and Luu, 2003; Dreher et al., 2007). These variables include government expenditures (percent of GDP), openness to trade, a dummy for postcommunist countries, and a measure of the size of the unofficial economy (shadow economy).

Although the TFP literature has not resulted in any consensus on what would be a standard specification, we include four control variables that are intuitively connected to productivity. Openness, measured as trade volumes in percent of GDP in the Penn World Tables, is included, as exposure to international competition provides a strong incentive to invest in productivity enhancing activities. We also include government final expenditures (% of GDP), although we note two different possible effects. On the one hand, government sectors are often less productive than private sectors, as well as less likely to innovate (cf. Mueller, 2003). They may also have a tendency to become relatively more expensive and thus less productive over time through what is sometimes termed the Baumol-effect (Baumol and Bowen, 1966). On the other hand, the efficiency of the government could well determine the quality of public investments. According to Pritchett's (2000)

CUDIE argument, government expenditures could therefore, by reflecting the quality of public investments, cause higher observed TFP. Both of these variables are from the Penn World Tables, mark 6.2, and measured as ten-year averages (Heston et al., 2006).

Our control variables also include a dummy for postcommunist countries in order to take out any potential remains of highly unproductive communist facilities. As the fourth control variable, we include the share of economic activity that takes place in the unofficial or shadow economy. Lassen (2007) argues that ethnic fractionalization decreases trust, which in turn increases the size of the shadow economy. Trust may thereby reduce official output and decrease TFP measured with official figures simply because some activity is not recorded in official statistics. While recent studies of the determinants of trust suggest that trust is not associated with ethnic diversity (Anderson and Paskeviciute, 2006; Bjørnskov, 2007), we nonetheless make sure that the association between trust and TFP is not driven by a simple accounting issue by controlling for the size of the shadow economy, using the data provided by Schneider (2005a, 2005b).

Again assuming that $\alpha = 0.4$, we report the results of the inclusion of this set of control variables in all estimates in section 4 in Tables 11-15 (a and b). We include both each single variable as well as the full set of control variables.

*** insert tables 11a and 11b here ***

*** insert tables 12a and 12b here ***

*** insert tables 13a and 13b here ***

*** insert tables 14a and 14b here ***

*** insert tables 15a and 15b here ***

While we get inevitable problems of multicollinearity in a number of the regressions reported in the six first tables, the results overall confirm the findings from previous tables. In particular, the introduction of control variables in Tables 11a and 11b, in which we do not control for formal institutions, does not affect the point estimates of trust at all. Likewise, in Tables 14a, 14b, 15a and 15b, which report the 3SLS estimates that by construction do not suffer from multicollinearity problems, results are virtually unchanged, compared to Tables 3a and 3b. Again, our results appear to be as robust as could be wished for.

5.4. Sample selection

Given the size of the sample, on may be concerned that our results be sensitive to the countries included in the sample. To test for the influence of specific observations, we run a jack-knife experiment, where each regression is run anew excluding one country at a time. Tables 16-18 (a and b) report the extreme values and the means of the coefficients of interest that resulted from the experiment.

*** insert tables 16a and 16b here ***

*** insert tables 17a and 17b here ***

*** insert tables 18a and 18b here ***

Overall, the jack-knife set of regressions confirms previous results. It is particularly true for regressions where the level of TFP is the dependent variable. In that case, not only are estimated coefficients quite stable, but no coefficient ever loses significance due to the deletion of a single observation. The only new result is that the Polity IV index sometimes becomes significantly positive when some countries are individually dropped from the sample (Egypt, Lesotho, Romania, Kenya, and Singapore). This result however only holds for OLS regressions and does not affect 2SLS nor 3SLS regressions, which are both qualitatively and quantitatively robust to dropping individual regressions.

Regressions where the dependent variable is the estimated fixed effects are slightly more sensitive to the exclusion of individual observations. OLS regressions confirm the results of previous regressions, as trust and legal quality are robust to dropping individual observations. However, jack-knife OLS regressions suggest that the association between TFP growth and the Polity IV index is rather shaky when trust is controlled for, thereby confirming that political institutions do not constitute a robust channel of transmission of trust. The same holds for the judicial quality index, which was already the case in OLS regressions. Again 3SLS regressions are both qualitatively and quantitatively robust to excluding individual countries.

5.5. Bootstrapping

Our final concern was that, as TFP and TFP growth are estimated variables, standard errors may be underestimated, thereby biasing statistical inference. Observed associations may thus

artificially appear significant. We therefore run all our estimations again using bootstrapped standard errors.

Tables 19-21 (a and b) provide the full set of results with bootstrapped standard errors. As such, we ensure that no single observations or combinations induces noise that either prevents us from identifying effects or. The results again provide ample support for the findings in previous tables, although with one significant difference: even when we force the effects of trust through institutions in the 3SLS estimates in Tables 21a and 21b, political institutions are insignificant in the latter table in which the dependent variable is TFP growth. This result provides further evidence supporting the hypothesis that judicial and economic institutions, but not political institutions, are the channel of transmission from trust to TFP growth.

*** insert tables 19a and 19b here ***

*** insert tables 20a and 20b here ***

*** insert tables 21a and 21b here ***

6. Conclusion

In this paper, we have revisited the question of the impact of social trust on total factor productivity. This was a central question in the early literature on trust, yet has remained an open question since being brought up by Fukuyama (1995) and Knack and Keefer (1997). A set of theoretical indications from a diverse literature on factor productivity and innovation suggested a number of potential channels through which trust could directly influence TFP. The productivity literature, in particular, also stresses the importance of formal institutions, indicating a potential indirect channel of trust, since recent studies document the causal link between trust and the quality of such institutions (e.g. Knack, 2002; Bjørnskov, 2010).

Calculating levels and long-run growth rates of TFP in a cross-section of 67 countries in the early 2000's, and regressing those numbers on social trust indicates a strong positive association. This association is robust to controlling for a priori relevant control variables and the effect of political institutions, to other robustness tests, and to being instrumented in 2SLS estimates. However, the direct association between trust and TFP loses significance when entering standard measures of the quality of economic-judicial institutions.

Yet, this does not indicate that trust does not affect TFP. Instead, further results, in which we trace the effects of trust on institutional quality, strongly suggest that trust affects TFP through its influence on the quality of formal institutions, an indirect mechanism that seems exhaustive of the association. As such, the many theories of how social trust directly affects transaction costs and improves information flows receive no support. Although this may seem slightly embarrassing for the theoretically rich early trust research, it is consistent with the findings in Bjørnskov (in press) that suggest that the trust-governance-growth channel may reflect the full effects of social trust on productivity growth.

The evidence in this paper should not be taken to mean that direct mechanisms do not exist. All process innovations can indeed not be protected by formal legislation. For example, some productivity-enhancing progress is inherently non-patentable. Moreover, trust may also affect factor accumulation through various channels not explored in this paper. The evidence, however, implies that the general effect of trust on productivity operates through legal and regulatory governance. Overall, the findings point towards a re-assessment of how social trust affects society.

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Appendix

A1: Countries in the sample

Algeria, Argentina, Australia, Austria, Belgium, Benin, Bolivia, Brazil, Canada, Chile, Colombia, Costa, Rica, Denmark, Dominican, Republic, Ecuador, Egypt, El Salvador, Finland, France, Ghana, Greece, Guatemala, Honduras, Hong Kong, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Republic of Korea, Lesotho, Malawi, Malaysia, Mali, Mexico, Mozambique, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Portugal, Romania, Rwanda, Senegal, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, Uganda, United Kingdom, United States, Uruguay, Zambia, Zimbabwe.

A2: Descriptive statistics

*** insert table A1 here ***

A3: Estimates of the capital share

The first way to estimate the production function is to use the levels of per capita production and capital stocks. In a regression of the logarithm of output on the logarithm of the physical and human capital stocks, the coefficient of the physical capital stock directly provides an estimate of alpha. Using panel data for the largest available period (1950-2000), we ran both between and within regressions, the latter being estimated with both fixed and random country effects. The results are displayed in table A2 below.

*** insert table A2 here ***

The between estimate of alpha tops 0.5. When country effects are allowed, however, the coefficient of the physical capital stock becomes smaller. Also the Hausman test suggests using fixed-country effects, the estimates of alpha obtained with fixed and random effects remain similar and in the vicinity of 0.4.

Finally, one may also notice that the F test for the restriction that the shares of the physical and human capital stocks sum up to one suggests that the probability of this restriction holding in the data is quite large. This finding provides support for using a Cobb-Douglas function with constant returns to scale.

An alternative way to estimate the coefficient of the production function is to run a regression on growth rates. We therefore regressed the average growth rate of per worker output on the average growth rates of the physical and human capital stocks over 1980-2000 using OLS. Here again, the coefficient of the physical capital stock in that regression provides a direct estimate of alpha.

*** insert table A3 here ***

We ran both an unconstrained regression and a regression restricting the sum of the coefficients of the physical and human capital stocks to be equal to one. In both cases, we again found that the coefficient of the physical capital stock was close to 0.4.

A4: Trust scores

*** insert table A5 here ***

A5: Panel regression of TFP growth on time-variant variables

*** insert table A5 here ***

Figure 1a: Trust and TFP, $\alpha = 0.4$

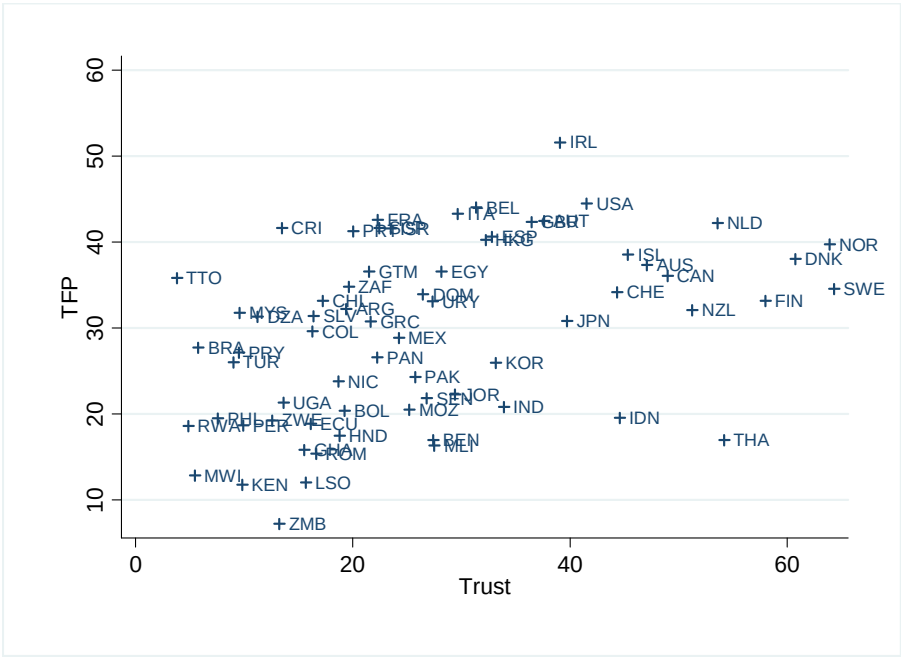

Figure 1b: Trust and TFP average growth 1980-2000, $\alpha = 0.4$

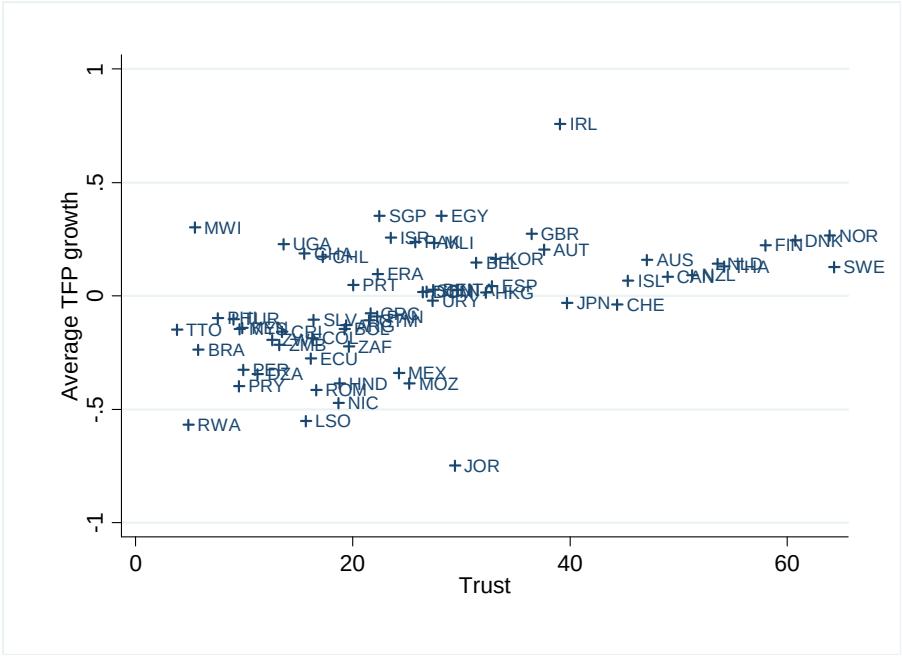

Table 1a: Dependent variable: TFP level, OLS estimations

	(1a.1)	(1a.2)	(1a.3)
Social trust	0.277	-0.0513	0.231
	(3.725)	(0.605)	(2.940)
	***		***
Legal quality		3.313	
		(5.422)	
		***	
Polity IV			0.443
			(1.563)
Constant	22.16	12.42	20.09
	(9.673)	(4.629)	(7.695)
	***	***	***
Observations	67	66	66
R-squared	0.176	0.434	0.205
Adjusted R-squared	0.163	0.416	0.180
F test	13.87	24.11	8.134

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1b: Dependent variable: TFP growth fixed effects, OLS estimations

	(1b.1)	(1b.2)	(1b.3)
Social trust	0.00468	-0.000412	0.00370
	(3.573)	(0.301)	(2.712)
	***		***
Legal quality		0.0491	
		(4.945)	
		***	
Polity IV			0.00950
			(1.931)
			*
Constant	-0.110	-0.241	-0.154
	(2.724)	(5.523)	(3.396)
	***	***	***
Observations	66	65	65
R-squared	0.166	0.407	0.212
Adjusted R-squared	0.153	0.387	0.187
F test	12.77	21.24	8.345

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2a: Dependent variable: TFP level, 2SLS estimations

	(2a.1)	(2a.2)	(2a.3)
Social trust	0.388	-0.0716	0.365
	(3.505)	(0.293)	(3.019)
	***		***
Legal quality		3.329	
		(2.456)	
		**	
Polity IV			0.283
			(0.926)
Constant	19.74	13.04	18.22
	(6.306)	(4.431)	(5.919)
	***	***	***
Observations	62	61	61
R-squared	0.177	0.415	0.199
Adjusted R-squared	0.163	0.395	0.171
2nd stage F-test	12.29	20.69	8.212
Sargan test (P-value)	0.655	0.278	0.743
1st stage F-test	25.65	26.80	19.21

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2b: Dependent variable: TFP growth fixed effects, 2SLS estimations

	(2b.1)	(2b.2)	(2b.3)
Social trust	0.00691	0.00252	0.00638
	(3.620)	(0.646)	(3.093)
	***		***
Legal quality		0.0306	
		(1.409)	
Polity IV			0.00650
			(1.246)
Constant	-0.155	-0.204	-0.189
	(2.872)	(4.339)	(3.605)
	***	***	***
Observations	62	61	61
R-squared	0.174	0.366	0.212
Adjusted R-squared	0.160	0.344	0.184
2nd stage F-test	13.10	17.88	9.615
Sargan test (P-value)	0.936	0.525	0.801
1st stage F-test	25.65	26.80	19.21

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3a: Dependent variable: TFP level, 3SLS estimations

	(3a.1) Trust	(3a.2) Institutions	(3a.3) TFP	(3a.4) Trust	(3a.5) Institutions	(3a6) TFP
Pronoun drop	14.55			13.95		
	(4.480)			(3.940)		
	***			***		
Min. temperature	-0.614			-0.663		
	(3.973)			(3.915)		
	***			***		
Social trust		0.139			0.105	
		(7.135)			(2.394)	
		***			**	
Legal quality			2.726			
			(4.179)			
			***			
Polity IV						3.796
						(2.766)
						***
Constant	14.48	2.070	14.60	15.48	4.317	2.973
	(2.746)	(3.751)	(3.788)	(2.633)	(3.428)	(0.301)
	***	***	***	***	***	
Observations	61	61	61	61	61	61
R-squared	0.465	0.436	0.414	0.475	0.114	-1.706
F-test	26.61	50.91	17.47	27.67	7.651	5.730

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3b: Dependent variable: TFP growth fixed effects, 3SLS estimations

	(3b.1) Trust	(3b.2) Institutions	(3b.3) TFP	(3b.4) Trust	(3b.5) Institutions	(3b.6) TFP
Pronoun drop	14.24			14.30		
	(4.388)			(4.043)		
	***			***		
Min temp	-0.629			-0.651		
	(4.079)			(3.842)		
	***			***		
Social trust		0.139			0.117	
		(7.142)			(2.645)	
		***			***	
Legal quality			0.0479			
			(4.655)			
			***			
Polity IV						0.0590
						(2.597)
						**
Constant	15.07	2.067	-0.237	14.88	4.002	-0.393
	(2.862)	(3.744)	(3.898)	(2.533)	(3.154)	(2.408)
	***	***	***	**	***	**
Observations	61	61	61	61	61	61
Adjusted R-squared	0.465	0.435	0.383	0.475	0.109	-1.171
F-test	26.59	51.01	21.67	27.86	7.00	6.743

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4a: Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.3$

	(4a.1)	(4a.2)	(4a.3)
Social trust	2.388	2.223	-0.0260
	(4.241)	(3.664)	(0.0223)
	***	***	
Polity IV		1.882	
		(1.227)	
Legal quality			17.54
			(2.717)
			***
Constant	64.54	54.86	28.76
	(4.057)	(3.553)	(2.053)
	***	***	**
Observations	62	61	61
R-squared	0.222	0.261	0.521
Adjusted R-squared	0.209	0.235	0.505
2nd stage F-test	17.98	12.49	31.58
Sargan test (P-value)	0.568	0.672	0.196
1st stage F-test	25.65	19.21	26.80

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4b: Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.3$

	(4b.1)	(4b.2)	(4b.3)
trust2005avfull	0.00872	0.00798	0.00386
	(4.192)	(3.598)	(0.870)
	***	***	
Polity IV		0.00843	
		(1.504)	
Legal quality			0.0344
			(1.396)
Constant	-0.198	-0.241	-0.259
	(3.369)	(4.265)	(4.832)
	***	***	***
Observations	62	61	61
R-squared	0.206	0.261	0.404
Adjusted R-squared	0.192	0.235	0.383
2nd stage F-test	17.57	13.23	21.68
Sargan test (P-value)	0.817	0.968	0.373
1st stage F-test	25.65	19.21	26.80

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5a: Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.3$

	(5a.1) Trust	(5a.2) Institutions	(5a.3) TFP	(5a.4) Trust	(5a.5) Institutions	(5a.6) TFP
Pronoun drop	13.90			14.46		
	(3.966)			(4.447)		
	***			***		
Min. temperature	-0.665			-0.618		
	(3.944)			(4.000)		
	***			***		
Social trust		0.104			0.139	
		(2.479)			(7.136)	
		**			***	
Polity IV			23.49			
			(3.140)			
			***			
Legal quality						16.85
						(5.429)
						***
Constant	15.56	4.350	-39.53	14.65	2.070	32.00
	(2.673)	(3.590)	(0.734)	(2.776)	(3.750)	(1.744)
	***	***		***	***	*
Observations	61	61	61	61	61	61
R-squared	0.475	0.115	-2.367	0.465	0.436	0.521
F-test	27.68	6.15	9.862	26.61	50.92	29.47

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5b: Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.3$

	(5b.1) Trust	(5b.2) Institutions	(5b.3) TFP	(5b.4) Trust	(5b.5) Institutions	(5b.6) TFP
Pronoun drop	14.18			14.09		
	(4.052)			(4.352)		
	***			***		
Min temp	-0.655			-0.636		
	(3.887)			(4.134)		
	***			***		
Social trust		0.112			0.139	
		(2.651)			(7.146)	
		***			***	
Polity IV			0.0787			
			(2.972)			
			***			
Legal quality						0.0609
						(5.263)
						***
Constant	15.08	4.120	-0.528	15.33	2.065	-0.308
	(2.595)	(3.359)	(2.772)	(2.920)	(3.742)	(4.510)
	**	***	***	***	***	***
Observations	61	61	61	61	61	61
Adjusted R-squared	0.476	0.112	-1.760	0.465	0.435	0.432
F-test	27.85	7.03	8.84	26.59	51.06	27.69

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6a: Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.5$

	(6a.1)	(6a.2)	(6a.3)
Social trust	0.0482	0.0477	-0.0351
	(2.147)	(1.917)	(0.646)
	**	*	
Polity IV		0.0165	
		(0.261)	
Legal quality			0.598
			(1.980)
			*
Constant	5.870	5.744	4.698
	(9.262)	(9.064)	(7.162)
	***	***	***
Observations	62	61	61
R-squared	0.0926	0.0918	0.206
Adjusted R-squared	0.078	0.061	0.178
2nd stage F-test	4.612	2.741	8.393
Sargan test (P-value)	0.873	0.908	0.501
1st stage F-test	25.65	19.21	26.80

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6b: Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.5$

	(6b.1)	(6b.2)	(6b.3)
Social trust	0.00511	0.00478	0.00118
	(2.833)	(2.424)	(0.339)
	***	**	
Polity IV		0.00456	
		(0.914)	
Legal quality			0.0267
			(1.376)
Constant	-0.112	-0.138	-0.150
	(2.198)	(2.743)	(3.562)
	**	***	***
Observations	62	61	61
R-squared	0.128	0.147	0.296
Adjusted R-squared	0.113	0.118	0.272
2nd stage F-test	8.029	5.736	12.54
Sargan test (P-value)	0.662	0.566	0.774
1st stage F-test	25.65	19.21	26.80

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7a: Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.5$

	(7a.1) Trust	(7a.2) Institutions	(7a.3) TFP	(7a.4) Trust	(7a.5) Institutions	(7a.6) TFP
Pronoun drop	14.01			14.56		
	(3.912)			(4.494)		
	***			***		
Min. temperature	-0.661			-0.613		
	(3.877)			(3.981)		
	***			***		
Social trust		0.107			0.139	
		(2.294)			(7.136)	
		**			***	
Polity IV			0.461			
			(1.945)			
			*			
Legal quality						0.334
						(2.311)
						**
Constant	15.37	4.254	3.855	14.46	2.070	5.288
	(2.583)	(3.199)	(2.269)	(2.752)	(3.751)	(6.200)
	**	***	**	***	***	***
Observations	61	61	61	61	61	61
Adjusted R-squared	0.475	0.114	-0.738	0.465	0.436	0.216
F-test	27.66	5.26	3.78	26.61	50.92	5.34

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 7b: Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.5$

	(7b.1) Trust	(7b.2) Institutions	(7b.3) TFP	(7b.4) Trust	(7b.5) Institutions	(7b.6) TFP
Pronoun drop	14.30			14.36		
	(4.003)			(4.418)		
	***			***		
Min temp	-0.650			-0.623		
	(3.821)			(4.034)		
	***			***		
Social trust		0.119			0.139	
		(2.578)			(7.140)	
		**			***	
Polity IV			0.0410			
			(2.120)			
			**			
Legal quality						0.0349
						(3.756)
						***
Constant	14.88	3.942	-0.270	14.84	2.068	-0.165
	(2.509)	(2.993)	(1.946)*	(2.813)	(3.747)	(3.017)
	**	***		***	***	***
Observations	61	61	61	61	61	61
Adjusted R-squared	0.475	0.108	-0.638	0.465	0.435	0.302
F-test	27.80	6.65	4.49	26.60	50.98	14.11

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8a: Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.4$

	(8a.1)	(8a.2)	(8a.3)	(8a.4)	(8a.5)	(8a.6)
Social trust	0.340	0.272	0.311	0.0601	-0.106	-0.322
	(2.522)	(1.743)	(2.157)	(0.285)	(0.393)	(1.101)
	**	*	**			
Political rights	-1.047					
	(1.089)					
Civil liberties		-2.043				
		(1.480)				
Gastil total			-1.481			
			(1.275)			
Judicial independence				2.326		
				(2.212)		
				**		
Law and Order					2.699	
					(2.183)	
					**	
Corruption						4.461
						(3.002)
						***
Constant	23.34	27.59	25.16	15.60	10.95	15.52
	(4.296)	(3.879)	(4.049)	(5.870)	(2.556)	(6.731)
	***	***	***	***	**	***
Observations	61	61	61	60	59	62
R-squared	0.220	0.272	0.243	0.384	0.363	0.448
Adjusted R-squared	0.194	0.246	0.217	0.362	0.340	0.430
2nd stage F-test	10.21	12.41	11.25	18.11	16.40	26.24
Sargan test (P-value)	0.757	0.829	0.789	0.991	0.473	0.767
1st stage F-test	23.42	24.48	24.14	26.90	27.81	31.22

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8b: Alternative governance indices

Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.4$

	(8b.1)	(8b.2)	(8b.3)	(8b.4)	(8b.5)	(8b.6)
Social trust	0.00631	0.00559	0.00599	0.00477	0.00119	-0.00217
	(2.697)	(2.032)	(2.376)	(1.178)	(0.301)	(0.421)
	***	**	**			
Political rights	-0.0147					
	(0.880)					
Civil liberties		-0.0250				
		(1.029)				
Gastil total			-0.0195			
			(0.959)			
Judicial independence				0.0132		
				(0.654)		
Law and Order					0.0278	
					(1.543)	
Corruption						0.0572
						(2.188)
						**
Constant	-0.107	-0.0620	-0.0867	-0.169	-0.216	-0.210
	(1.133)	(0.495)	(0.799)	(3.314)	(3.465)	(5.171)
				***	***	***
Observations	61	61	61	60	59	62
R-squared	0.205	0.235	0.219	0.216	0.369	0.422
Adjusted R-squared	0.178	0.209	0.192	0.188	0.346	0.403
2nd stage F-test	10.21	11.32	10.81	9.524	16.69	21.66
Sargan test (P-value)	0.833	0.783	0.809	0.962	0.728	0.780
1st stage F-test	23.42	24.48	24.14	26.90	27.81	31.22

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9a: Alternative governance indices: Political institutions

Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.4$

	(9a.1) Trust	(9a.2) Institutions	(9a.3) TFP	(9a.4) Trust	(9a.5) Institutions	(9a.6) TFP	(9a.7) Trust	(9a.8) Institutions	(9a.9) TFP
Pronoun drop	14.00			13.56			13.82		
	(4.003)***			(3.884)***			(3.945)***		
Min temp	-0.660			-0.682			-0.669		
	(3.915)			(4.095)			(3.985)		
	***			***			***		
Social trust		-0.0520			-0.0600			-0.0561	
		(3.181)			(4.701)			(3.926)	
		***			***			***	
Political rights			-7.679						
			(3.084)						
			***						
Civil liberties						-6.622			
						(3.741)			
						***			
Gastil total									-7.100
									(3.440)
									***
Constant	15.37	3.716	47.86	16.19	3.990	45.79	15.71	3.856	46.72
	(2.647)	(8.021)	(7.885)	(2.805)	(11.06)	(10.28)	(2.704)	(9.541)	(9.142)
	***	***	***	***	***	***	***	***	***
Observations	61	61	61	61	61	61	61	61	61
R-squared	0.475	0.248	-0.474	0.475	0.339	0.148	0.475	0.300	-0.067
F-test	27.68	10.12	9.510	27.67	22.10	14.00	27.66	15.41	11.83

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9b: Alternative governance indices: Political institutions

Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.4$

	(9b.1) Trust	(9b.2) Institutions	(9b.3) TFP	(9b.4) Trust	(9b.5) Institutions	(9b.6) TFP	(9b.7) Trust	(9b.8) Institutions	(9b.9) TFP
Pronoun drop	14.47			13.92			14.25		
	(4.148)			(4.003)			(4.080)		
	***			***			***		
Min temp	-0.643			-0.667			-0.652		
	(3.823)			(4.015)			(3.893)		
	***			***			***		
Social trust		-0.0540			-0.0606			-0.0572	
		(3.307)			(4.753)			(4.008)	
		***			***			***	
Political rights			-0.128						
			(2.979)						
			***						
Civil liberties						-0.114			
						(3.642)			
						***			
Gastil total									-0.121
									(3.350)
									***
Constant	14.58	3.769	0.326	15.55	4.007	0.300	14.96	3.885	0.313
	(2.517)	(8.139)	(3.103)	(2.705)	(11.12)	(3.800)	(2.585)	(9.621)	(3.493)
	**	***	***	***	***	***	**	***	***
Observations	61	61	61	61	61	61	61	61	61
Adjusted R-squared	0.475	0.248	-0.445	0.475	0.337	0.095	0.476	0.298	-0.097
F-test	27.96	10.94	8.877	27.76	22.59	13.26	27.84	16.07	11.22

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10a: Alternative governance indices: Economic/judicial institutions.
Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.4$

	(10a.1) Trust	(10a.2) Institutions	(10a.3) TFP	(10a.4) Trust	(10a.5) Institutions	(10a.6) TFP	(10a.7) Trust	(10a.8) Institutions	(10a.9) TFP
Pronoun drop	15.04			14.01			13.66		
	(4.211)			(4.324)			(4.260)		
	***			***			***		
Min temp	-0.577			-0.653			-0.660		
	(3.434)			(4.161)			(4.334)		
	***			***			***		
Social trust		0.140			0.171			0.159	
		(6.480)			(7.301)			(7.795)	
		***			***			***	
Judicial independence			2.754						
			(4.087)						
			***						
Law and Order						2.051			
						(3.745)			
						***			
Corruption									2.448
									(4.448)
									***
Constant	13.74	1.895	14.79	15.60	3.772	13.52	16.04	0.951	17.38
	(2.353)	(3.047)	(3.764)	(2.959)	(5.591)	(2.890)	(3.102)	(1.650)	(5.861)
	**	***	***	***	***	***	***		***
Observations	60	60	60	59	59	59	62	62	62
R-squared	0.467	0.446	0.389	0.472	0.468	0.369	0.465	0.498	0.468
F-test	26.28	42.00	16.71	26.47	53.31	14.02	26.96	19.78	60.77

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10b: Alternative governance indices: Economic/judicial institutions.
Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.4$

	(10b.1) Trust	(10b.2) Institutions	(10b.3) TFP	(10b.4) Trust	(10b.5) Institutions	(10b.6) TFP	(10b.7) Trust	(10b.8) Institutions	(10b.9) TFP
Pronoun drop	15.07			13.84			13.50		
	(4.247)			(4.265)			(4.188)		
	***			***			***		
Min temp	-0.575			-0.662			-0.668		
	(3.452)			(4.213)			(4.361)		
	***			***			***		
Social trust		0.140			0.171			0.159	
		(6.481)			(7.303)			(7.792)	
		***			***			***	
Judicial independence			0.0472						
			(3.623)						
			***						
Law and Order						0.0345			
						(4.325)			
						***			
Corruption									0.0434
									(4.388)
									***
Constant	13.69	1.894	-0.234	15.93	3.771	-0.241	16.33	0.953	-0.196
	(2.364)	(3.047)	(3.075)	(3.017)	(5.590)	(3.531)	(3.138)	(1.653)	(3.678)
	**	***	***	***	***	***	***		***
Observations	60	60	60	59	59	59	62	62	62
Adjusted R-squared	0.467	0.446	0.213	0.473	0.468	0.374	0.465	0.499	0.421
F-test	26.28	42.00	13.13	26.47	53.33	18.70	26.96	60.71	19.26

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11a: Introducing control variables. Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.4$

	(11a.1)	(11a.2)	(11a.3)	(11a.4)	(11a.5)
Social trust	0.415	0.400	0.394	0.415	0.451
	(3.839)	(3.648)	(3.596)	(3.351)	(3.753)
	***	***	***	***	***
Openness	0.0319				0.0306
	(1.444)				(1.301)
Postcommunist		-10.85			-10.35
		(1.148)			(1.058)
Government expenditures			-0.202		-0.154
			(1.267)		(0.916)
Shadow economy				-0.0154	-0.0326
				(0.192)	(0.400)
Constant	16.67	19.60	23.37	19.47	19.89
	(4.966)	(6.271)	(5.110)	(4.252)	(3.263)
	***	***	***	***	***
Observations	62	62	62	58	58
R-squared	0.191	0.189	0.196	0.164	0.204
Adjusted R-squared	0.164	0.162	0.169	0.134	0.127
2nd stage F-test	8.976	7.885	8.056	5.830	4.578
Sargan test (P-value)	0.439	0.429	0.695	0.782	0.358
1st stage F-test	18.72	17.90	17.92	14.32	8.45

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 11b: Introducing control variables. Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.4$

	(11b.1)	(11b.2)	(11b.3)	(11b.4)	(11b.5)
Social trust	0.00713	0.00701	0.00710	0.00719	0.00752
	(3.792)	(3.684)	(3.856)	(3.356)	(3.669)
	***	***	***	***	***
Openness	0.000289				0.000228
	(0.751)				(0.568)
Postcommunist		-0.114			-0.124
		(0.698)			(0.745)
Government expenditures			-0.00600		-0.00566
			(2.240)		(1.974)
			**		*
Shadow economy				-0.000585	-0.000824
				(0.422)	(0.594)
Constant	-0.182	-0.156	-0.0474	-0.145	-0.0541
	(3.119)	(2.873)	(0.616)	(1.831)	(0.521)
	***	***		*	
Observations	62	62	62	58	58
R-squared	0.175	0.177	0.234	0.153	0.219
Adjusted R-squared	0.147	0.150	0.208	0.122	0.144
2nd stage F-test	7.787	7.414	11.36	6.027	4.795
Sargan test (P-value)	0.936	0.910	0.848	0.786	0.982
1st stage F-test	18.72	17.90	17.92	14.32	8.45

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12a: Complementing political institutions by control variables.
Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.4$

	(12a.1)	(12a.2)	(12a.3)	(12a.4)	(12a.5)
Social trust	0.382	0.375	0.373	0.401	0.431
	(3.211)	(3.132)	(3.096)	(3.010)	(3.293)
	***	***	***	***	***
Polity IV	0.314	0.290	0.235	0.223	0.212
	(1.015)	(0.946)	(0.764)	(0.694)	(0.645)
Openness	0.0341				0.0334
	(1.351)				(1.252)
Postcommunist		-11.54			-10.89
		(1.221)			(1.103)
Government expenditures			-0.164		-0.141
			(0.996)		(0.815)
Shadow economy				-0.00903	-0.0240
				(0.111)	(0.291)
Constant	15.15	18.09	21.46	17.93	18.22
	(4.316)	(5.899)	(4.589)	(3.884)	(2.885)
	***	***	***	***	***
Observations	61	61	61	57	57
R-squared	0.215	0.214	0.208	0.175	0.212
Adjusted R-squared	0.174	0.173	0.166	0.129	0.118
2nd stage F-test	6.997	6.698	6.092	4.920	3.946
Sargan test (P-value)	0.494	0.490	0.762	0.847	0.361
1st stage F-test	15.36	15.08	14.53	12.05	7.65

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 12b: Complementing political institutions by control variables.
Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.4$

	(12b.1)	(12b.2)	(12b.3)	(12b.4)	(12b.5)
Social trust	0.00646	0.00644	0.00665	0.00685	0.00714
	(3.159)***	(3.137)***	(3.303)***	(2.997)***	(3.215)***
Polity IV	0.00678	0.00663	0.00489	0.00536	0.00417
	(1.275)	(1.263)	(0.952)	(0.973)	(0.749)
Openness	0.000260				0.000237
	(0.599)				(0.522)
Postcommunist		-0.130			-0.134
		(0.805)			(0.799)
Government expenditures			-0.00540		-0.00526
			(1.967)*		(1.794)*
Shadow economy				-0.000409	-0.000647
				(0.294)	(0.462)
Constant	-0.212	-0.190	-0.0824	-0.182	-0.0877
	(3.509)***	(3.606)***	(1.055)	(2.294)**	(0.818)
Observations	61	61	61	57	57
R-squared	0.214	0.219	0.253	0.178	0.230
Adjusted R-squared	0.172	0.177	0.214	0.131	0.137
2nd stage F-test	6.876	7.035	8.556	5.526	4.193
Sargan test (P-value)	0.914	0.973	0.755	0.693	0.937
1st stage F-test	14.53	15.08	14.53	12.05	7.65

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13a: Complementing economic/judicial institutions by control variables.
Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.4$

	(13a.1)	(13a.2)	(13a.3)	(13a.4)	(13a.5)
Social trust	-0.00718	0.0182	-0.0543	-0.0488	0.138
	(0.0237)	(0.0787)	(0.225)	(0.189)	(0.452)
Legal quality	2.912	2.820	3.216	3.284	2.140
	(1.652)	(2.188)	(2.390)	(2.374)	(1.231)
		**	**	**	
Openness	0.0105				0.0169
	(0.431)				(0.639)
Postcommunist		-12.17			-11.41
		(1.553)			(1.363)
Government expenditures			-0.0892		-0.0470
			(0.581)		(0.278)
Shadow economy				0.00984	-0.00621
				(0.149)	(0.0886)
Constant	12.96	13.79	14.86	12.21	14.23
	(4.382)	(4.755)	(3.512)	(3.078)	(2.626)
	***	***	***	***	**
Observations	61	61	61	57	57
R-squared	0.420	0.439	0.420	0.426	0.427
Adjusted R-squared	0.389	0.409	0.390	0.393	0.358
2nd stage F-test	13.73	14.93	13.77	13.11	6.663
Sargan test (P-value)	0.230	0.120	0.310	0.371	0.131
1st stage F-test	19.79	20.36	19.91	16.23	9.11

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13b: Complementing economic/judicial institutions by control variables.
Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.4$

	(13b.1)	(13b.2)	(13b.3)	(13b.4)	(13b.5)
Social trust	0.00486	0.00348	0.00274	0.00285	0.00682
	(0.953)	(0.913)	(0.704)	(0.681)	(1.244)
Legal quality	0.0156	0.0251	0.0291	0.0294	0.00449
	(0.524)	(1.181)	(1.345)	(1.310)	(0.144)
Openness	0.000364				0.000509
	(0.888)				(1.076)
Postcommunist		-0.135			-0.113
		(1.045)			(0.750)
Government expenditures			-0.00106		-7.27e-06
			(0.428)		(0.00240)
Shadow economy				-0.000213	-0.000591
				(0.199)	(0.470)
Constant	-0.207	-0.196	-0.183	-0.202	-0.186
	(4.154)	(4.102)	(2.680)	(3.139)	(1.917)
	***	***	***	***	*
Observations	61	61	61	57	57
R-squared	0.304	0.354	0.363	0.354	0.212
Adjusted R-squared	0.267	0.320	0.330	0.317	0.117
2nd stage F-test	10.90	12.11	11.75	10.61	4.524
Sargan test (P-value)	0.423	0.354	0.564	0.679	0.369
1st stage F-test	19.79	20.36	19.91	16.23	9.11

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 14a: Complementing political institutions by control variables. Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.4$

	(14a.1) Trust	(14a.2) Institutions	(14a.3) TFP	(14a.4) Trust	(14a.5) Institutions	(14a.6) TFP	(14a.7) Trust	(14a.8) Institutions	(14a.9) TFP	(14a.10) Trust	(14a.11) Institutions	(14a.12) TFP	(14a.13) Trust	(14a.14) Institutions	(14a.15) TFP
pronoundrop	13.53			13.57			13.86			15.04			13.76		
	(3.918)			(3.891)			(3.931)			(4.132)			(3.961)		
	***			***			***			***			***		
mintemp	-0.677			-0.676			-0.665			-0.558			-0.611		
	(4.042)			(4.011)			(3.940)			(3.153)			(3.568)		
	***			***			***			***			***		
Social trust		0.0874			0.0923			0.112			0.104			0.0885	
		(1.966)			(2.103)			(2.545)			(2.199)			(1.764)	
		*			**			**			**			*	
Polity IVv			4.768			4.432			3.640			4.165			5.431
			(2.774)			(2.936)			(2.631)			(2.194)			(2.039)
			***			***			***			**			**
Openness			0.0589												0.0591
			(1.797)												(1.535)
			*												
Postcommunist						-17.56									-18.47
						(1.843)									(1.640)
						*									
Government expenditures									-0.173						-0.161
									(0.939)						(0.617)
Shadow economy												0.0167			0.0186
												(0.142)			(0.132)
Constant	16.18	4.771	-8.068	16.11	4.644	-1.226	15.61	4.138	7.353	12.19	4.243	0.154	14.47	4.624	-9.458
	(2.822)	(3.743)	(0.575)	(2.780)	(3.682)	(0.114)	(2.667)	(3.280)	(0.604)	(1.984)	(3.239)	(0.00939)	(2.482)	(3.353)	(0.333)
	***	***		***	***		***	***		**	***		**	***	
Observations	61	61	61	61	61	61	61	61	61	57	57	57	57	57	57
R-squared	0.475	0.115	-2.856	0.475	0.115	-2.452	0.475	0.112	-1.554	0.454	0.100	-2.285	0.452	0.101	-4.077
F-test	27.55	3.872	3.866	27.53	27.53	27.53	6.475	6.475	6.475	23.79	5.169	5.169	4.541	23.37	23.37
F-test	3.866	3.866	27.55	4.421	4.421	4.545	27.58	27.58	27.58	4.835	23.79	4.835	23.37	3.110	3.110
F-test	3.872	27.55	3.872	4.545	4.545	4.421	7.528	7.528	7.528	5.169	4.835	23.79	3.110	4.541	4.541

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 14b: Complementing political institutions by control variables.
Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.4$

	(14b.1) Trust	(14b.2) Institutions	(14b.3) TFP	(14b.4) Trust	(14b.5) Institutions	(14b.6) TFP	(14b.7) Trust	(14b.8) Institutions	(14b.9) TFP	(14b.10) Trust	(14b.11) Institutions	(14b.12) TFP	(14b.13) Trust	(14b.14) Institutions	(14b.15) TFP
Pronoun drop	14.26			14.16			14.32			15.49			14.93		
	(4.101)			(4.052)			(4.084)			(4.260)			(4.294)		
	***			***			***			***			***		
Min temp	-0.652			-0.656			-0.648			-0.540			-0.563		
	(3.881)			(3.889)			(3.852)			(3.053)			(3.283)		
	***			***			***			***			***		
Social trust		0.101			0.106			0.124			0.117			0.0993	
		(2.248)			(2.390)			(2.830)			(2.452)			(1.975)	
		**			**			***			**			*	
Polity IV			0.0708			0.0671			0.0567			0.0611			0.0794
			(2.515)			(2.700)			(2.488)			(1.968)			(1.851)
			**			***			**			*			*
Openness			0.00056												0.00056
			(1.010)												(0.886)
Postcommunist						-0.212									-0.234
						(1.313)									(1.262)
Government expenditures									-0.0060						-0.0062
									(1.987)						(1.464)
									**						
Shadow economy												-0.00031			-0.0003
												(0.162)			(0.132)
Constant	14.95	4.418	-0.515	15.11	4.288	-0.447	14.83	3.811	-0.263	11.39	3.897	-0.394	12.38	4.352	-0.438
	(2.590)	(3.438)	(2.244)	(2.602)	(3.371)	(2.519)	(2.549)	(3.019)	(1.310)	(1.855)	(2.936)	(1.472)	(2.120)	(3.150)	(0.956)
	**	***	**	**	***	**	**	***		*	***		**	***	
Observations	61	61	61	61	61	61	61	61	61	57	57	57	57	57	57
R-squared	0.476	0.115	-1.867	0.476	0.114	-1.636	0.475	0.105	-1.056	0.454	0.094	-1.418	0.454	0.101	-2.728
F-test	27.96	5.056	3.651	27.90	5.71	3.68	27.82	8.008	11.20	24.04	6.012	5.029	23.87	3.900	6.184

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 15a: Complementing judicial/economic institutions by control variables. Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.4$

VARIABLES	(1) Trust	(2) Institutions	(3) TFP	(4) Trust	(5) Institutions	(6) TFP	(7) Trust	(8) Institutions	(9) TFP	(10) Trust	(11) Institutions	(12) TFP	(13) Trust	(14) Institutions	(15) TFP
Pronoun drop	13.13			14.34			14.31			15.53			13.47		
	(4.173)			(4.403)			(4.419)			(4.609)			(4.145)		
	***			***			***			***			***		
Min temp	-0.557			-0.617			-0.607			-0.509			-0.460		
	(3.725)			(3.988)			(3.943)			(3.216)			(3.014)		
	***			***			***			***			***		
Social trust		0.163			0.140			0.142			0.143			0.173	
		(8.423)			(7.419)			(7.430)			(6.542)			(8.289)	
		***			***			***			***			***	
Legal quality			2.892			2.816			2.747			2.861			3.134
			(4.785)			(4.442)			(4.277)			(4.114)			(4.950)
			***			***			***			***			***
Openness			0.00980												0.0100
			(0.500)												(0.491)
Postcommunist						-12.43									-12.52
						(1.662)									(1.673)
						*									*
Government expenditures									-0.0837						-0.0690
									(0.562)						(0.457)
Shadow economy												0.00731			0.00312
												(0.114)			(0.0487)
Constant	15.68	1.424	12.93	14.80	2.033	14.29	14.72	1.972	16.02	11.33	1.982	13.43	13.41	1.219	12.77
	(3.081)	(2.568)	(3.881)	(2.792)	(3.777)	(3.804)	(2.797)	(3.614)	(3.252)	(2.056)	(3.317)	(2.729)	(2.522)	(2.108)	(2.350)
	***	**	***	***	***	***	***	***	***	**	***	***	**	**	**
Observations	61	61	61	61	61	61	61	61	61	57	57	57	57	57	57
R-squared	0.461	0.302	0.419	0.465	0.430	0.440	0.465	0.420	0.418	0.441	0.381	0.424	0.435	0.193	0.453
F-test	22.48	70.95	14.69	26.66	55.05	11.92	26.12	55.20	9.74	22.71	42.80	8.720	18.70	68.71	7.879

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 15b: Complementing judicial/economic institutions by control variables.
Dependent variable: TFP growth fixed effects, 3SLS estimations, $\alpha = 0.4$

	(15b.1) Trust	(15b.2) Institutions	(15b.3) TFP	(15b.4) Trust	(15b.5) Institutions	(15b.6) TFP	(15b.7) Trust	(15b.8) Institutions	(15b.9) TFP	(15b.10) Trust	(15b.11) Institutions	(15b.12) TFP	(15b.13) Trust	(15b.14) Institutions	(15b.15) TFP
Pronoun drop	12.86			13.94			14.05			15.30			13.22		
	(4.107)			(4.303)			(4.349)			(4.553)			(4.101)		
	***			***			***			***			***		
Min temp	-0.569			-0.635			-0.620			-0.522			-0.471		
	(3.816)			(4.123)			(4.040)			(3.307)			(3.109)		
	***			***			***			***			***		
Social trust		0.163			0.140			0.142			0.143			0.173	
		(8.426)			(7.438)			(7.436)			(6.548)			(8.295)	
		***			***			***			***			***	
Legal quality			0.0492			0.0489			0.0480			0.0488			0.0513
			(5.125)			(4.833)			(4.731)			(4.416)			(4.998)
			***			***			***			***			***
Openness			0.000220												0.000265
			(0.714)												(0.808)
Postcommunist						-0.165									-0.158
						(1.389)									(1.322)
Government expenditures									-0.00131						-0.00088
									(0.561)						(0.367)
Shadow economy												-0.00012			-0.00024
												(0.121)			(0.240)
Constant	16.16	1.422	-0.260	15.52	2.024	-0.240	15.21	1.969	-0.214	11.77	1.979	-0.242	13.86	1.217	-0.252
	(3.194)	(2.565)	(4.928)	(2.946)	(3.761)	(4.001)	(2.900)	(3.609)	(2.749)	(2.146)	(3.312)	(3.092)	(2.635)	(2.103)	(2.892)
	***	**	***	***	***	***	***	***	***	**	***	***	***	**	***
Observations	61	61	61	61	61	61	61	61	61	57	57	57	57	57	57
R-squared	0.461	0.301	0.377	0.465	0.428	0.396	0.465	0.419	0.384	0.441	0.380	0.377	0.435	0.193	0.380
F-test	22.41	71.00	17.44	26.59	55.32	13.27	26.12	55.29	11.84	22.70	42.87	10.26	18.62	68.80	8.315

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 16a: Jack-knife: Dependent variable: TFP level, OLS estimations, $\alpha = 0.4$

		(16a.1)	(16a.2)	(16a.3)
Trust	Min.	0.26	-0.0876	0.21
		(3.570)	(1.097)	(2.674)
		***		***
	Excluded:	THA	ZMB	EGY
	Max.	0.314	-0.00926	0.269
		(4.260)	(0.105)	(3.453)
		***		***
		ZMB	THA	THA
	Average	0.277	-3.378	0.231
Legal quality	Min.		3.096	
			(4.979)	
			***	
	Excluded:		THA	
	Max.		3.511	
			(5.715)	
			***	
	Excluded:		DOM	
	Average		3.313	
PolityIV	Min.			0.386
				(1.365)
	Excluded:			CRI
	Max.			0.637
				(2.070)
				**
	Excluded:			EGY
	Average			0.444

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression.

Table 16b: Jack-knife: Dependent variable: TFP growth fixed effects, OLS estimations, $\alpha = 0.4$

		(16b.1)	(16b.2)	(16b.3)
Trust	Min.	0.00424	-0.00044	0.00376
		(3.625)	(0.321)	(2.732)
		***		***
	Excluded:	LSO	ARG	ARG
	Max.	0.00515	-0.000402	0.00366
		(3.885)	(0.291)	(2.676)
		***		***
	Excluded:	THA	ZWE	ZWE
	Average	0.00468	-0.000412	0.241
Legal quality	Min.		0.0501	
			(5.047)	
			***	
	Excluded:		ARG	
	Max.		0.0495	
			(4.928)	
			***	
	Excluded:		ZWE	
	Average		0.0491	
PolityIV	Min.			0.00796
				(1.537)
	Excluded:			UGA
	Max.			0.0125
				(2.321)
				**
	Excluded:			EGY
	Average			0.00951

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression.

Table 17a: Jack-knife: Dependent variable: TFP level, 2SLS estimations

		(17a.1)	(17a.2)	(17a.3)
Trust	Min.	0.346	-0.16	0.368
		(3.528)	(0.676)	(3.011)
		***		***
	Excluded:	THA	TTO	ARG
	Max.	0.42	0.0182	0.369
		(3.460)	(0.0787)	(3.082)
		***		***
	Excluded:	SWE	ROM	ZWE
	Average	0.388	-0.0716	0.365
Legal quality	Min.		2.82	
			(2.188)	
			**	
	Excluded:		ROM	
	Max.		3.808	
			(2.908)	
			***	
	Excluded:		TTO	
	Average		6.628	
PolityIV	Min.			0.276
				(0.892)
	Excluded:			ARG
	Max.			0.255
				(0.766)
	Excluded:			ZWE
	Average			0.284

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression.

Table 17b: Jack-knife: Dependent variable: TFP growth fixed effect, 2SLS estimations

		(17b.1)	(17b.2)	(17b.3)
Trust	Min.	0.006	0.001	0.006
		(3.479) ***	(0.29	(3.055) ***
	Excluded:	MLI	MLI	THA
	Max.	0.007	0.004	0.007
		(3.516) ***	(0.949	(3.028) ***
	Excluded:	SWE	SGP	SWE
	Average	0.007	0.003	0.006
Legal quality	Min.		0.019	
			(0.732)	
	Excluded:		SGP	
	Max.		0.038	
			(1.877) *	
	Excluded:		TTO	
	Average		0.031	
PolityIV	Min.			0.005
				(0.904)
	Excluded:			UGA
	Max.			0.009
				(1.533)
	Excluded:			ZWE
	Average			0.007

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression.

Table 18a: Jack-knife: Dependent variable: TFP level, 3SLS estimations

		(18a.1)	(18a.2)
Trust	Min.	0.13	0.0834
		(7.719)	(2.033)
(Institutions)		***	**
	Excluded:	THA	SGP
	Max.	0.148	0.121
		(6.899)	(2.649)
		***	***
	Excluded:	SWE	JOR
	Average	0.139	6.411
Legal quality	Min.	2.527	
		(3.804)	
(TFP level)		***	
	Excluded:	IRL	
	Max.	2.858	
		(4.211)	
		***	
	Excluded:	FIN	
	Average	2.727	
PolityIV	Min.		3.229
			(2.656)
(TFP level)			***
	Excluded:		THA
	Max.		5.079
			(2.687)
			***
	Excluded:		SGP
	Average		3.794

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression. Dependent variable in parentheses in the first column.

Table 18b: Jack-knife: Dependent variable: TFP growth fixed effects, 3SLS estimations

		(18b.1)	(18b.2)
Trust	Min.	0.131	0.0959
		(7.727)	(2.324)
(Institutions)		***	**
	Excluded:	THA	SGP
	Max.	0.148	0.127
		(6.905)	(2.780)
		***	***
	Excluded:	SWE	JOR
	Average	0.13865574	0.11719508
Legal quality	Min.	0.0442	
		(4.491)	
(TFP growth)		***	
	Excluded:	MLI	
	Max.	0.0497	
		(4.838)	
		***	
	Excluded:	JOR	
	Average	0.0479	
PolityIV	Min.		0.0523
			(2.427)
(TFP growth)			**
	Excluded:		MLI
	Max.		0.0781
			(2.489)
			**
	Excluded:		SGP
	Average		0.059

Absolute t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The last line of each cell indicates the ISO code of the country excluded in the relevant regression. Dependent variable in parentheses in the first column.

Table 19a: Bootstrap: Dependent variable: TFP level, OLS estimations, $\alpha = 0.4$

	(19a.1)	(19a.2)	(19a.3)
Social trust	0.277	-0.0513	0.231
	(4.020)	(0.716)	(3.710)
	***		***
Legal quality		3.313	
		(6.867)	
		***	
Polity IV			0.443
			(1.674)
			*
Constant	22.16	12.42	20.09
	(9.181)	(5.971)	(9.031)
	***	***	***
Observations	67	66	66
R-squared	0.176	0.434	0.205
Adjusted R-squared	0.163	0.416	0.180
Chi2	16.16	114.5	27.90

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 19b: Bootstrap: Dependent variable: TFP growth fixed effects, OLS estimations, $\alpha = 0.4$

	(19b.1)	(19b.2)	(19b.3)
Social trust	0.00468	-0.000412	0.00370
	(4.469)	(0.340)	(3.411)
	***		***
Legal quality		0.0491	
		(5.474)	
		***	
Polity IV			0.00950
			(1.867)
			*
Constant	-0.110	-0.241	-0.154
	(2.838)	(5.910)	(3.191)
	***	***	***
Observations	66	65	65
R-squared	0.166	0.407	0.212
Adjusted R-squared	0.153	0.387	0.187
Chi2	19.98	72.89	25.52

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 20a: Bootstrap: Dependent variable: TFP level, 2SLS estimations, $\alpha = 0.4$

	(20a.1)	(20a.2)	(20a.3)
Social trust	0.388	-0.0716	0.365
	(4.326)	(0.251)	(3.092)
	***		***
Legal quality		3.329	
		(2.153)	
		**	
Polity IV			0.283
			(1.126)
Constant	19.74	13.04	18.22
	(8.421)	(4.576)	(5.920)
	***	***	***
Observations	62	61	61
R-squared	0.177	0.415	0.199
Adjusted R-squared	0.163	0.395	0.171
Sargan test (P-value)	0.655	0.278	0.743

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 20b: Bootstrap: Dependent variable: TFP growth fixed effects, 2SLS estimations, $\alpha = 0.4$

	(20b.1)	(20b.2)	(20b.3)
Social trust	0.00691	0.00252	0.00638
	(3.646)	(0.322)	(3.991)
	***		***
Legal quality		0.0306	
		(0.801)	
Polity IV			0.00650
			(1.278)
Constant	-0.155	-0.204	-0.189
	(2.509)	(3.990)	(3.775)
	**	***	***
Observations	62	61	61
R-squared	0.174	0.366	0.212
Adjusted R-squared	0.160	0.344	0.184
Sargan test (P-value)	0.936	0.525	0.801

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 21a: Bootstrap: Dependent variable: TFP level, 3SLS estimations, $\alpha = 0.4$

	(21a.1) Trust	(21a.2) Institutions	(21a.3) TFP	(21a.4) Trust	(21a.5) Institutions	(21a.6) TFP
Pronoun drop	14.55			13.95		
	(3.589)			(3.491)		
	***			***		
Min temp	-0.614			-0.663		
	(2.593)			(2.944)		
	***			***		
Social trust		0.139			0.105	
		(6.127)			(2.001)	
		***			**	
Legal quality			2.726			
			(4.651)			
			***			
Polity IV						3.796
						(2.569)
						**
Constant	14.48	2.070	14.60	15.48	4.317	2.973
	(1.994)	(2.925)	(4.067)	(2.339)	(2.831)	(0.254)
	**	***	***	**	***	
Observations	61	61	61	61	61	61
R-squared	0.465	0.436	0.414	0.475	0.114	-1.706
F-test	26.61	50.91	17.47	27.67	5.73	7.65

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 21b: Bootstrap: Dependent variable: TFP growth fixed effect, 3SLS estimations, $\alpha = 0.4$

	(21b.1) Trust	(21b.2) Institutions	(21b.3) TFP	(21b.4) Trust	(21b.5) Institutions	(21b.6) TFP
Pronoun drop	14.24			14.30		
	(3.537)			(3.431)		
	***			***		
Min temp	-0.629			-0.651		
	(3.314)			(2.758)		
	***			***		
Social trust		0.139			0.117	
		(6.306)			(3.681)	
		***			***	
Legal quality			0.0479			
			(5.516)			
			***			
Polity IV						0.0590
						(1.459)
Constant	15.07	2.067	-0.237	14.88	4.002	-0.393
	(2.255)	(2.996)	(3.914)	(2.000)	(3.722)	(1.264)
	**	***	***	**	***	
Observations	61	61	61	61	61	61
Adjusted R-squared	0.465	0.435	0.383	0.475	0.109	-1.171
F-test	26.59	51.01	21.67	27.86	7.00	6.74

Absolute z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A1: Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
Per worker output	25528.18	20164.3	1742.45	63909.14
Per worker physical capital stock	5855969	5771045	57405.35	1.93E+07
Per worker human capital stock	2.264	0.578	1.11	3.33
TFP, $\alpha = 0.3$	124.8134	53.7687	24.99866	233.4175
TFP, $\alpha = 0.4$	29.56481	10.19327	7.211648	51.62864
TFP, $\alpha = 0.5$	7.105934	1.936396	2.080427	11.41952
TFP growth, $\alpha = 0.3$	-0.00271	0.123	-0.314	0.267
TFP growth, $\alpha = 0.4$	-0.00559	0.120	-0.348	0.255
TFP growth, $\alpha = 0.5$	-0.00846	0.119	-0.383	0.245
Trust 2005a~l	26.62	15.51	3.79	64.27
Legal quality	5.64	2.15	1.92	9.17
Polity IV	7.11	4.33	-7	10
Political rights	2.37	1.61	1	7
Civil liberties	2.46	1.35	1	6
Gastil total	2.42	1.45	1	6.5
Jud indepfr~r	5.64	2.42	0.91	9.15
law_o~0_2000	8.19	2.71	3.09	12
CPI 2008	5.02	2.41	1.8	9.3
open62_10	74.27	54.08	18.24	337.86
gov62_10	18.82	7.42	5.36	47.75
Post communist	0.0161	0.127	0	1
Shadow economy	34.01	15.84	8.4	68.3

Table A2: Estimates of the production function using levels

	Method	*k*	*h*	*Int.*	
A1.1	*Between*	0.549 (13.67) ***	0.532 (2.41) **	1.212 (2.60) **	R^2=0.881
A1.2	*Fixed country effects*	0.384 (23.27) ***	0.626 (8.61) ***	3.494 (16.67) ***	R^2=0.879
A1.3	*Random country effects*	0.423 (27.61) ***	0.626 (8.86) ***	2.935 (15.14) ***	R^2=0.880
		Hausman test for fixed effects			43.07 ***
		F Test for $\alpha_K + \alpha_L = 1$ (P value for the fixed effect model)			0.88

Table A3: Estimates of the production function using average growth rates

	Method	*k*	*h*	*Int.*	
A2.1	*Unconstrained*	0.407 (8.62) ***	-0.0236 (0.09)	0.07 (1.08)	R^2=0.502 Adj. R^2=0.488 F=37.24
A2.2	$\alpha_K + \alpha_L = 1$	0.419 (8.70) ***	0.581 (12.05) ***	-0.0521 (1.45)	RMSE=0.303

Table A4. Trust scores

Name	Trust	Name	Trust	Name	Trust
Albania	25.68	Guatemala	21.50	Panama	22.25
Algeria	11.22	Honduras	18.75	Paraguay	9.50
Argentina	19.39	Hong Kong	32.24	Peru	9.90
Armenia	24.68	Hungary	26.28	Philippines	7.57
Australia	47.07	Iceland	45.34	Poland	20.01
Austria	37.58	India	33.87	Portugal	20.01
Azerbaijan	20.53	Indonesia	44.55	Puerto Rico	14.31
Bangladesh	22.22	Ireland	39.06	Romania	16.62
Belarus	30.48	Israel	23.46	Russia	30.15
Belgium	31.36	Italy	29.65	Rwanda	4.84
Benin	27.00	Japan	39.71	Saudi Arabia	53.00
Bolivia	19.25	Jordan	29.38	Senegal	26.80
Bosnia	22.04	Kenya	9.80	Serbia	20.75
Botswana	14.74	Kyrgyzstan	16.70	Singapore	22.45
Brazil	5.77	Latvia	18.46	Slovakia	21.19
Bulgaria	28.97	Lesotho	15.65	Slovenia	19.57
Burkina Faso	13.82	Lithuania	23.03	South Africa	19.61
Canada	48.96	Luxembourg	30.53	South Korea	33.16
Chile	17.24	Macedonia	10.86	Spain	32.81
Colombia	16.28	Madagascar	32.80	Sweden	64.27
Costa Rica	13.47	Malawi	5.45	Switzerland	44.33
Croatia	21.01	Malaysia	9.56	Taiwan	38.20
Cyprus	18.66	Mali	27.49	Tanzania	13.86
Czech Republic	26.24	Malta	24.62	Thailand	54.17
Denmark	60.73	Mexico	24.21	Trinidad and Tobago	3.79
Dominican Republic	26.45	Moldova	18.16	Turkey	8.99
Ecuador	16.10	Mongolia	12.57	Uganda	13.61
Egypt	28.15	Montenegro	33.01	Ukraine	27.81
El Salvador	16.38	Morocco	18.14	United Kingdom	36.45
Estonia	28.20	Mozambique	25.20	United States	41.51
Ethiopia	21.40	Namibia	20.50	Uruguay	27.33
Finland	57.97	Netherlands	53.57	Venezuela	14.11
France	22.28	New Zealand	51.23	Vietnam	46.12
Georgia	18.71	Nicaragua	18.65	Zambia	13.24
Germany	37.72	Nigeria	20.88	Zimbabwe	12.58
Ghana	15.52	Norway	63.87		
Greece	21.65	Pakistan	25.72		

Table A5: Panel regression of TFP growth on time-variant explanatory variables (1950-2000), five-years subperiods

Dependent variable	TFP growth
Constant	1.631
	(6.283)
	***
Initial human capital stock	0.204
	(2.533)
	**
Initial output per worker	-0.187
	(6.039)
	***
Observations	623
Number of countries	80
R-squared	0.0701
F-test for no country effects	2.04
Hausman test (Chi-squared)	47.50

t-statistics in parentheses

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