Can trust effects on development be generalized? 
A response by quantile

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Abstract

While the beneficial effects of social trust on economic performance have been largely recognized, we analyze if these effects can be generalized for economies at different stages of economic development and for different time horizons. Contrary to previous studies on this issue based on average effects (mostly considering ordinary least squares estimations), we follow a quantile regression approach, which enables to capture heterogeneous effects of trust, which are dependent on the level of development. By considering data of 80 countries and using trust indicators from five different waves of the World Values Survey (WVS), our results by quantile indicate that high-growth processes are strongly influenced by the previous stock of trust available in the country, and that trust is less relevant for the poorest economies. This would suggest, not only that trust effects cannot be generalized for all countries, as some previous studies suggested, but also that the implications of trust for short and long term development actually differ.

Keywords: Trust, GDP per capita, economic growth, quantile regression
JEL Classification: A13; Z13
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1. Introduction

Among those theories explaining the determinants of economic growth, one of the most successful ones in relatively recent times is that considering the influence of trust, confidence or, more broadly, social capital\(^1\), a concept introduced during the eighties in Sociology by authors such as Olson (1982) or Coleman (1988). The growing interest in the particular links between social capital and economic development has resulted into a blooming of empirical economic applications of the concept. In this field of research, scholars have attempted to ascertain whether the level of trust in a given country or region is a key driver for economic development, among other related questions. Many studies on this particular field of research were triggered by Putnam’s (1993) findings, whose pioneering study concluded that social capital was a relevant determinant of the economic disparities across Italian regions.

Subsequently, following Putnam’s footsteps, contributions such as Keefer and Knack (1997), Hall and Jones (1999) and, more recently, Beugelsdijk and Van Schaik (2005) or Dearmon and Grier (2009), among others, have highlighted positive effects flowing from social capital to growth, using different samples of countries or regions, and different time periods. Yet this is not free from controversy, due to the concept and the definitions used differ slightly from one study to another.\(^2\) Nevertheless, positive effects for the most widely accepted measures of social capital, namely, trust and associational activity have been found, which has led to reaching a broad consensus on this particular issue.

Although the above-mentioned papers have highlighted interesting and useful insights on the role of social capital for explaining growth processes, more evidence is needed on some particular fronts. For instance, a common strategy to measure social capital effects on economic performance is to follow a variant of the economic growth model developed by Solow (1957), expanded with social capital. In so doing, scholars have used growth rates and GDP per capita levels as dependent variables, although the implications are different. Whereas growth rates may be considered to better quantify short-run (or cyclical) economic performance and, consequently, differences in the behavior between high-growing and low-growing countries, levels may be more linked to long-run patterns and, therefore,

\(^1\)Social capital is a broad concept that includes trust, associationism, networks, public-spiritedness or interpersonal relationships. However, scholars consider trust as one of the best proxies for social capital and its use in applied studies is crescent.

\(^2\)The intangible nature of social capital adds further difficulties to the task of finding an unanimously accepted definition. This vagueness has been manifested by Torsvik (2000).
differences between poor and rich countries (Osborne, 2006).

While the positive effects of trust have been highlighted using both dependent variables—growth and levels—recent contributions advocate for the effects of trust in the long term. In this line of research, Uslaner (2008) and Algan and Cahuc (2010), underline the stable path followed by trust, and Tabellini (2008), noted that under adverse initial conditions discouraging trust, the capability of one society to generate a bigger stock of trust in the future is limited, even under a future favorable scenario. These considerations lead naturally to the following question: does an economy need trust to grow, or maybe trust is just necessary to keep certain level of development? What seems clear is that, while positive effects of social capital may exist, both in the short and long terms, these impacts may differ from one case to the other. This paper attempts to provide a response on this respect, and to provide empirical evidence as to when social capital is relevant, and by how much.

Another aspect on which no consensus has yet been reached relates to determining if social capital effects are stronger in poorer or richer countries. Previous evidence on that issue is based on average effects, mainly using ordinary least squares (OLS). Yet that approach suffers some limitations. On the one hand, in the big samples of countries on which studies are based on, outlying observations are common. That may yield estimated coefficients heavily affected by these outliers, and therefore biased. This may advocate for using other techniques such as those considered in Henderson et al. (2011). On the other hand, even when outliers are identified and controlled for, trust may be affecting economic development with different intensity depending on the country, or region’s, stage of development. This argument has become one of the most challenging issues in social capital studies. This is highlighted by Knack and Keefer (1997), who included in their regression the interaction term $\text{trust} \times \text{initial income}$, finding a negative coefficient, implying that the effects might be stronger for poorer economies. Other authors have followed different strategies. For instance, Dearmon and Grier (2009), and also Roth (2009), split the sample in two sub-samples based on the 25 (poorest) and 75 (richest) percentiles, carrying out Chow tests which showed no differential impacts. In most cases, though, the importance of this issue is only justified theoretically. It is the case of Putnam (1993, p.178), who argued that “the importance of social capital increases as development proceeds. This may help explain why the gap between the civic North and the uncivic South of Italy has widened over the last century”. In any case, the previous discussion provides evidence on scholars’ interest in highlight non-linearities on the impact of trust.
The present contribution attempts to provide a response to these issues by using quantile regression, a methodology initially developed by Koenker and Bassett (1978). This technique, whose popularity in the field of economic growth is increasing, as recent studies by Mello and Perrelli (2003), Barreto and Hughes (2004) or Crespo-Cuaresma et al. (2011) (among others) show, enables us to quantify the different magnitude of the covariates’ effect on the entire distribution of the variable of interest, in our case, either growth rates or income levels. Different results by quantile would be suggesting heterogeneous effects of trust for different degrees of economic development, an unresolved question as argued in the preceding paragraphs. Additionally, as we will see later on, quantile regression has other powerful advantages especially useful in this particular context. Those are, for instance, its efficiency when dealing with non-normal dependent variables, and when the analyst faces the difficulty of taking into account the whole set of variables that may be affecting economic performance.

Additionally, previous studies on this issue, are based on data provided by a single wave of the World Values Survey (WVS)\(^3\), with few exceptions such as Dearmon and Grier (2009, 2011), who employed four waves. Our study is based on the latter contribution, but enlarges their sample with 89 additional observations, considering also data from the most recent WVS wave (2005-2007). Therefore, the aim of the paper is twofold. First, we evaluate the effects of social capital on development taking into account the differential effects it can have on the short and long term. Second, thanks to quantile regression, we study the likely existence of heterogeneous effects of trust on high-growing and slow-growing countries, when the dependent is growth, and rich and poor countries when the dependent is income level. This twofold analysis might shed additional light on the true behavioral pattern showed by trust.

The paper is organized as follows. Section 2 provides a review of the literature. Section 3 is devoted to provide some insights on the quantile regression approach used in the paper. In Section 4 we present both the models to be estimated and the data, along with some descriptive statistics. Section 5 analyzes the results and, finally, Section 6 outlines some concluding remarks.

\(^3\)See [http://www.worldvaluessurvey.org](http://www.worldvaluessurvey.org)
2. Literature review

Social capital has generated a remarkable number of contributions in the recent years, not only in the field in which the concept was initially introduced (Sociology), but also in other areas where applications are blooming such as the one we are focusing on—i.e. economic development. However, scholars have been traditionally confronted with two main difficulties, namely, the vagueness of the concept (Torsvik, 2000), referred to the lack of an unanimous definition on what should be understood as social capital, and problems concerning measurement, which have been partly overcome today due to to the existence of databases such as the WVS.

One of the pioneering definitions of social capital is that proposed by Coleman (1988). If A and B are two representative individuals in a given specific society, social capital would be “the expectation created in A of being returned by B when A does something for B”, a definition close to the term “trust”. Coleman also referred to “authority relations, trust and consensual allocations of rights which establish norms”. However, social capital is a multifaced concept (Bjørnskov, 2006), and therefore empirical applications of the concept, and particularly in the field of economics, are related to between cultural and moral values (Granato et al., 1996; Swank, 1996), the role of the institutions (Knack and Keefer, 1995; Keefer and Knack, 1997; Hall and Jones, 1999) and trust and associationism (Knack and Keefer, 1997; Zak and Knack, 2001; Schneider et al., 2000; Beugelsdijk and Van Schaik, 2005; Dearmon and Grier, 2009), to name few.

We chose an indicator of generalized trust as a proxy of social capital. There are several reasons underlying this selection. Firstly, the number of studies using trust indexes as a proxy of social capital in the last decade is increasing, as shown in the preceding lines. Therefore it might be of interest to provide evidence on the possibility of heterogeneous effects on this indicator. Secondly, national social trust has been proved to be a reliable measure of honesty, generalized trust and trustworthiness, as shown in Knack and Keefer (1997) and Uslaner (2002). Thirdly, the exogeneity of social trust has been recently proved, as we will see in the preceding paragraphs. Fourthly, although we could have included several social capital indicators, an indepth study should be focused on just one aspect of social capital (Yamamura, 2012).

The mechanisms of social capital affecting growth are also diffuse and multilateral—i.e. they follow multiple paths. Social capital theory points out, as a direct effect, the reduction of the transaction costs. Economic operations in low-trust societies are characterized
by strong regulations and bureaucratic procurements that impose costs and reduce efficiency (Whiteley, 2000). A stock of trust might facilitate and lubricate complex transactions and improve their efficiency (Putnam, 1993), saving costs and, ultimately, enhancing economic output (Knack and Keefer, 1997). As Durlauf and Fafchamps (2005) noted, this might occur due to an increase in the information flows, groups, flexibility and coordinated actions. A similar argument is held by Dearmon and Grier (2009), who concluded that trust mitigates information asymmetries between the parts in a negotiation, and it may facilitate contracts and agreements. Beugelsdijk and Van Schaik (2005) considered trust as essential for economic development in the sense that “even in the presence of well-functioning institutions, some transactions would be almost impossible in the absence of trust” (Beugelsdijk and Van Schaik, 2005, p.305).

In addition, there are also indirect effects of social capital, channeled through positive links to other relevant economic development determinants, fostering their effects. These effects have been largely demonstrated, and they would include investment (Knack and Keefer, 1997; Dearmon and Grier, 2011), human capital (Dearmon and Grier, 2011), technological innovation (Akçomak and Ter Weel, 2009; Miguélez et al., 2011), or financial development (Guiso et al., 2004), to name few. These effects, both direct and indirect, tend to be, following Putnam (1993), self-reinforcing and cumulative, involving economies in a virtuous circle of high—or low—trust situation, difficult to reverse.

Despite the controversy generated on the true causality direction of these effects (i.e. endogeneity of trust), recent studies such as those by Bergh and Bjørnskov (2011a,b) and Fairbrother and Martin (2012) advocate for links from social trust to welfare, income equality and economic development, but not for the inverse causal relationship. Additional evidence on this issue is available in Bjørnskov (2012), who concluded that the effects from trust to economic growth are channeled through schooling and better governance, and not inversely. These quantitative findings corroborate the exogeneity of social trust and strongly supports previous theoretical considerations on this issue. Causality running from economic development to trust is not plausible in the sense that the changing growth rates and income levels are difficult to reconcile with the stability of trust along time. Consequently, these variables may not be explaining the present levels of trust (Uslaner, 2002).

Therefore, two preliminary arguments may be inferred from the above discussion. The
first one is that trust is, *a priori*, important for growth, since high-growth processes are accompanied by an increase in the number of transactions where trust may turn essential. Furthermore trust may foster other activities which affect growth, as those revisited along this section. The second one is that trust would also be important to explain long-run patterns, since trust effects are relatively stable—or permanent and self-reinforcing. Consequently, its impact may be relevant to explain why a country is able to keep certain level of development in the long term. This would corroborate Putnam’s (1993) findings for the Italian regions.

3. A brief outline on quantile regression methods

Quantile regression (QR) was initially developed by Koenker and Bassett (1978), although applications in the economic growth literature are relatively recent, concentrated from ten years to now. The numerous advantages provided by this technique have made the number of contributions to increase, including Mello and Perrelli (2003), Barreto and Hughes (2004), Osborne (2006) and Crespo-Cuaresma et al. (2011), among others, as commented on in the introduction. In the specific context of trust, applications are yet to come, and previous results have been generally reached by using the standard Ordinary Least Squares (OLS) estimations, which contribute to explain average effects on the variable of interest.

Although OLS provide a useful framework to start from, its use in this particular context might be troublesome for some reasons. For instance, the economic growth literature uses samples made up of strongly heterogeneous countries or regions, with large disparities in terms of wealthy levels, and showing dissimilar growth patterns. The same practice is followed in the specific case of measuring trust effects on development, where the generalization of trust impacts based on average effects is common practice. In such a situation, with heavy-tailed distributions of the dependent variable, and thus favoring the existence of outliers, mean effects provided by OLS may be actually driven by these extreme observations. Furthermore, focusing only on the central tendency of the variable of interest (trust in our case) may be obscuring important information about its effects on other points of the distribution of the dependent variable (Maloney et al. 2004). In this sense, some authors

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5 There are few exceptions, like Beugelsdijk and Van Schaik (2005), who employed a homogeneous sample of European regions. However, their choice was not based on avoiding great disparities in growth rates, but rather on the attempt of reducing to the minimum differences on how social capital is understood in the different regions. Nevertheless, Paxton (2002) had previously argued that the WVS question about trusting others is understood in a close way in countries culturally different, what would imply that the meaning of trust is relatively universal.
such as Putnam (1993), Knack and Keefer (1997), Dearmon and Grier (2009) or Roth (2009),
to name few, have been previously interested in disentangle such an important matter, but
as of today the consensus is not wide.

As an attempt to provide an accurate response to the previous unresolved issues, we
use quantile regression, which provides results not only on the average effect. Rather, it
enables drawing conclusions as to how the covariates impact on the entire distribution of
the response variable. For this, different quantiles (\(\tau\)) are selected (for instance, selecting
quantile \(\tau = 0.5\) would refer to median regression, analogously to OLS when referring to
average regression) and, therefore, different slopes are estimated for the different quantiles,
highlighting the existence of heterogeneous effects and non-linearities.

Following Koenker and Basset (1978), each \(\hat{\beta}\) parameter is estimated by minimizing the
absolute sum of the residuals—not the squared sum as OLS technique does. It is expressed
as follows:

\[
\min Q(\beta_\tau) = \sum_{i: y_i \geq x_i \beta} \tau |y_i - x_i \beta_\tau| + \sum_{i: y_i < x_i \beta} (1 - \tau) |y_i - x_i \beta_\tau| \tag{1}
\]

where \(\tau\), which lies within the \([0, 1]\) interval, represents an specific quantile.

The above function is not differentiable and then, it cannot be optimized with the clas-
sical gradient methods. A linear programming problem is solved instead.\(^6\) Each estimated
\(\hat{\beta}_\tau\) is asymptotically distributed as \(N \rightarrow (0, \Omega_\tau)\), where \(\Omega_\tau\) is the variance convariance
matrix of \(\hat{\beta}_\tau\) for a given \(\tau\). The algorithm used to compute the fit is the proposed by
Barrodale and Roberts (1974), explained in detail in Koenker and d’Orey (1987), which is
suitable for samples with less than 5,000 observations, which is our case. Standard devia-
tions are computed using Hall-Sheather bandwidth rule, although as Koenker and Hallock
(2001, p.15) suggested “the discrepancies among competing methods are slight, and in-
ference for quantile regression is, if anything, more robust than for most other forms of
inference commonly encountered in econometrics”.

One of the most interesting advantages provided by quantile regression is its semi-
parametric nature, in the sense that it avoids assumptions about parametric distribution
of regression errors, what makes quantile regression especially useful when dealing with
heteroskedastic errors. Another advantage, underlined by Coad and Rao (2008), is the ro-

ducessness of the quantile estimator under non-normal distributions of the response variable,
whilst OLS estimator losses efficiency under that circumstance. As will be commented on

\(^6\)Further theoretical explanations on quantile regression fall outside the scope of this paper. Koenker (2005),
provides an excellent discussion on the advanced statistical details concerning this technique.
the next section, the distributions of the dependent variables employed in the present study depart from the Gaussian distribution (the reader might take a preliminary look to Figure 1). Therefore, the use of the quantile estimator may give a most accurate result.

Additionally, Durlauf (2002) claimed that those studies measuring trust effects are based on models where the number of control variables included, together with trust, is not high enough, leading to omitted variable biases. As a result, it may lead to an imprecise predictive relationship between the mean of the dependent variable distribution and the measured covariates. In such a case, quantile regression may lead to useful predictive relationships with other parts of the response variable distribution (Cade and Noon, 2003).

Following the last authors, quantile regression is specially useful when there is more than a single factor affecting the response variable, and not all factors are measured, and also when the factors show heterogeneous effects. Therefore, in our context, its use might provide useful insights in determining if trust effects describe a different pattern depending on the intensity of growth (short-run), and the wealthy level (long-run), or if differences are not remarkable after all.

4. Models, data and descriptive statistics

4.1. Models

In the particular context of growth, the number of models differing in the selected covariates is relatively wide. Brock and Durlauf (2001) referred to this fact as “theory-openendedness” in the sense that, whereas a lot of theories and models may be explaining economic growth, no specific theory is more powerful than the others (Henderson et al., 2011). Being aware of the above arguments, we adopt a version of the widely-accepted Neoclassical growth model, expanded by including trust. Due to the study evaluates the effects of trust, both on growth rates and GDP levels, two models will be estimated—although differences among them will be confined to the dependent variable and one of the covariates only.

In the case where the response variable is real GDP per capita growth (GGDPPC), we include as a covariates the following variables: (i) GDPPC0, controlling for the initial level of income in each period (in logs); (ii) GWORK, corresponding to the growth of working
population, plus a fixed coefficient equal to 0.05; (iii) \( IGDP \), which is the rate of investment as a percentage of GDP; (iv) \( HK \), measuring the rate of working population with secondary studies; and (v) \( TRUST \), measuring social trust. Additionally, time effects, \( (t) \), are also controlled for, including dummy variables for the different periods. Following the recommendation of Dearmon and Grier (2009), fixed effects by country are not included because, as in their case, for some of the countries only one observation is available. Data are aggregated in the periods for which information on TRUST is available. Therefore, the model to be estimated can be expressed as follows:

\[
GDPPC_{\text{w}} = \beta_0 + \beta_1 GDPPC_{\text{w}} + \beta_2 GWORK_{\text{w}} + \beta_3 IGDP_{\text{w}} + \beta_4 HK_{\text{w}} + \beta_5 TRUST_{\text{w}} + \beta_6 t_{\text{w}} + \epsilon_{\text{w}}
\]  

(2)

where the subindex \( w \) represents the time period.

When the dependent variable is the real GDP per capita (\( GDPPC \)) (in logs), we estimate a model close to Dearmon and Grier (2009). The covariates included are the same as in the growth model, except the variable \( (GDPPC_0) \), which is not included. That variable is, however, included in Dearmon and Grier’s (2009) model, which also uses GDP levels as a dependent variable. We avoid its inclusion because it would only be justified when the dependent variable is growth, and not levels, since it is measuring if poorer countries at the beginning of the corresponding period grow more than the richer one. When using levels, the expected value of its associated \( \beta \) is close to 1, as precisely found by Dearmon and Grier (2009), since when aggregating data (by means of computing averages of shorter subperiods), the initial level of GDP in every single period, may not differ substantially from the average GDP in that short period—since the average is also including the value of the first year of that period. Following this argument, as well as other contributions such as Mankiw et al. (1992) and Osborne (2006), who did not include that variable in the level version of their model, our strategy is to include the initial income only in the growth equation. Therefore, the model estimated is:

\[
GDPPC_{\text{w}} = \beta_0 + \beta_1 GWORK_{\text{w}} + \beta_2 IGDP_{\text{w}} + \beta_3 HK_{\text{w}} + \beta_4 TRUST_{\text{w}} + \beta_5 t_{\text{w}} + \epsilon_{\text{w}}
\]  

(3)

where the subindex \( w \) represents the time period.

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8We follow Mankiw et al. (1992) for this consideration. This fixed coefficient represents technological advance and depreciation.

9Detailed information on how this variable is constructed on Section 4.2.
4.2. Data and descriptive statistics

Data on trust are available in the World Values Survey (WVS). We take data from five different waves corresponding to the periods 1981–1984, 1989–1993, 1994–1998, 1999–2004 and 2005–2007. Trust is measured using the answers to the following question: “Generally speaking, would you say that most people can be trusted, or that you cannot be too careful in dealing with people?” The possible answers are two, namely: (i) “most people can be trusted”; and (ii) “can’t be too careful”. An index of trust is then constructed taking the percentage of respondents who answered “most people can be trusted”. The rest of the control variables come from three different databases, namely, the Penn World Tables (PWT 6.3), the Barro-Lee education database (BL), the World Development Indicators (WDI). A full description of the variables and its sources is available in Table 2.

When studying economic growth in long periods, which is precisely our case, data are generally aggregated in subperiods of four or five years, as suggested by Islam (1995). Nevertheless, whereas PTW and WDI provide yearly data and BL with quinquennial frequency, which would allow to follow that strategy, WVS only provides data for the periods detailed above. Therefore, we aggregate the data on these five subperiods, likewise Dearmon and Grier (2009), although their study does not include the latest WVS wave.

An inconvenient when dealing with WVS data, refers to the different number of countries for which data are available in each wave. For example, the first wave (1981-1984) offers only data for 19 countries, whereas the most recent wave (2005-2007) provides information for 49 countries. This circumstance causes that we have countries with five observations, whilst for others only one is available. We take the maximum number of observations, after merging the WVS data with the rest of databases. In some cases, despite data on trust are available, data for the rest of covariates are not. This merger yields 80 countries and 208 observations, (see Table 1). Hence, we expand Dearmon and Grier’s (2009) sample with 89 additional observations. Other samples in this context are considerably smaller; for instance, Knack and Keefer (1997) (29 countries), Whiteley (2000) (34 countries) or Beugelsdijk and Van Schaik (2005) (54 regions). Therefore, our sample is, to our knowledge, the largest one considering the previous literature analyzing the trust effects on economic development.

10See http://pwt.econ.upenn.edu/
11See http://www.barrolee.com/data/dataexp.htm
12See http://www.worldbank.org/
Some descriptive statistics are provided in Table 3 which shows important disparities. Focusing on our variable of interest—i.e. TRUST—is striking the comparison between its maximum value, 74%, and its minimum, 2.8%, showing how much important the differences really are. However, such an important disparities are not exclusively confined to TRUST, but the rest of the variables under study also present remarkable differences, as the reader might notice by looking at Table 4.

Figure 1 a) and b), shows kernel densities of the two dependent variables. As briefly introduced in Section 3 both densities deviate from the Gaussian distribution. Barro and Sala-i-Martin (1995) and Mello and Perrelli (2003) argued that distributions of the average GDP per capita are usually strongly skewed. In our case, as shown in Figure 1 the distributions of both, GDP growth (GGDPPC) and GDP per capita levels (GDPPC), depicted using kernel smoothing, present long tales, departing from the Normal distribution. Normality is formally tested by using Shapiro and Wilk’s (1965) and Doornik and Hansen’s (2008) test, and in both cases, the normality assumption is strongly rejected.13

5. Results

5.1. Results for trust in the short run

In order to evaluate a direct link between trust (TRUST) and growth (GGDPPC), previously to the estimation of the full model described by Equation (2), we perform a simple OLS regression, where TRUST is included as a single regressor. Figure 2 a), shows the results not only for OLS, which provides results on the average impact, but also for the median (“median regression”), as well as some percentiles (additional details are available in the footnote of the figure). Despite we cannot draw definitive conclusions from this analysis (control variables are not included, and inference could be seriously affected by omitted variable biases), its usage is, at first sight, interesting. It clearly shows different slopes for TRUST, depending on the percentile. Such a finding implies that the generalization of the OLS results should be, at the very least, questioned.

Considering now that we estimate the full model, including the control variables. We firstly perform an OLS estimation. Results for all the covariates are available in Table 4. The variable TRUST is non-significant, although its associated p-value is certainly in the limit on the rejection area (if results were reported for the 10% significance level),

13Results from these test can be provided by the authors if requested.
and that casts some doubts on its true impact. Some previous studies using the same indicator for trust are contrary to this result, as for instance, Knack and Keefer (1997) and Zak and Knack (2001). Yet, as in our case, also non-significant relationships have been found (Beugelsdijk and Van Schaik, 2005), or even negative links (Schneider et al., 2000). Given that the indicator for TRUST is actually the same as the one used in those papers, and the rest of the control variables included in the above-cited studies are also very close to each other, these divergences should be explained by the different composition of the samples.

When we perform a quantile estimation, a clear pattern for TRUST can be observed. Results for the ten main percentiles are reported in Table 6 but more detailed are those in Figure 3a), where the estimates for the 100 percentiles are graphically displayed. The solid red line, constant across quantiles, corresponds to the OLS estimation. The dashed red lines are 90% confidence intervals. The dotted black line reflects the results by quantile and the shadowed area, the associated 90% confidence intervals. Another black solid line set at zero, helps us to see at first sight when a variable is or not significant departing whether it overlaps with the confidence bands.

The results by quantile show that TRUST is only significant for the area comprised between the percentiles 50 and 80. Such a result implies that trust effects are only relevant for those countries that have experienced relatively high growth rates, or at least, above the average. From Figure 3a), it becomes apparent that for those countries that have experienced the lowest growth rates, TRUST is non-significant, since confidence intervals contain the zero. According to the Neoclassical growth model, poorer economies should grow faster than the richer, but not every single poor country grows as expected, and it is in this particular point, where trust plays an important role.

Scott and Storper (2003) concluded that economic development is driven by a mixture of exogenous constrains, asset’s organization and social capital (—i.e.—social trust). All those factors are finally the responsible for generating dynamic and creative agglomerations of activity that would enhance economic development. Therefore, having high levels of these “assets” becomes the key factor for poorer economies to join the high-income convergence club. A good example are Asian economies (Scott and Storper, 2003). More explicitly, Zak and Knack (2001) argued that those poor countries with a lower stock of trust, despite the presumption of the economic growth model of higher returns to cap-

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14The control variables used are those commented on Section 4.
ital and potential faster growth, may not take the most of their backwardness situation. That situation is known as the social trap (Rothstein and Uslaner, 2005), or low-trust poverty trap (Zak and Knack, 2001). However, those poor countries where trust is high would take advantage of that backwardness and, therefore, trust would become the “lubricant” for development.

In our particular case, those countries that have experienced the highest growth rates are those located in the Southeast of Asia (China, Vietnam or South Korea), India in South Asia, and also the case of Ireland in Europe, although that country departed from a much better position than those mentioned before. These countries, which have grown far above the mean, trust is also clearly above the mean, and quantile regression yields positive and significant (10%)\(^{15}\) coefficients. Nevertheless, those poor countries, especially African countries such as Mali, Ghana, Uganda, Zambia and Zimbabwe, or Caribbean countries like El Salvador and Guatemala, present low growth rates, accompanied by the lowest levels of trust. For these countries, trust is non-significant. Therefore, the quantile estimation corroborates Zak and Knack’s (2001) as well as Scott and Storper’s (2003) suggestions. In contrast, they are contrary to Roth (2009), who concluded that in those countries enjoying high levels of trust, an increase of trust hampers economic growth.

The results obtained in this part of the study reflect that trust may be necessary for short-term growth experiences. Trust might facilitate and lubricate the complex transactions that accompany economic growth, but the results cannot be generalized. Only those countries where trust is relatively high, are able to take advantage of its benefits and are precisely, those who have experienced growth rates above the mean.

5.2. Results for trust in the long run

When analyzing long run, we find different patterns. Similarly to the previous analysis, we firstly run OLS regressions of Equation (3). Results are reported in Table 5. \(\text{TRUST}\) is highly significant (1% level), in concordance with Dearmon and Grier (2009) who, analogously to ours in this section of the paper, used levels as a dependent variable. That positive and significant effect of \(\text{TRUST}\) would be corroborating that this indicator should be considered when explaining long-run welfare patterns. However, effects of trust may vary, which is actually the case, across quantiles, implying differing behaviors depending

\(^{15}\)Is common use in those studies evaluating the effects of social capital, considering the 10% of significance as the limit of the area of hypothesis rejection.
on the country’s wealth. Results for the main percentiles are available in Table 7 and more detailed and accurate results are displayed by Figure 3b).

Focusing on Figure 3b, results by quantile exhibit a convex pattern, showing how the strongest impact of TRUST would be for those quantiles just in the middle of the distribution. TRUST is clearly non-significant for the first 25 percentiles, implying that it is not relevant for those inside the group of the 25% poorest countries in the sample. In countries in the fourth and fifth deciles, the coefficient reaches its maximum. The estimated $\hat{\beta}$ coefficient raises and then it falls abruptly, becoming even non-significant for the richest countries (those on the right of the 95 percentile). The above results indicate that trust effects on GDP levels, which would be actually measuring long-run wealthy patterns, cannot be generalized. According to our findings, the impact of trust is stronger for those countries in the middle of the conditional distribution (percentiles 35-60 approximately).

Our findings are, somehow, in conflict with [Knack and Keefer (1997)], who suggested that trust effects should be stronger for poorer countries. They held that those countries are characterized by weak institutions and legal framework, and trust may generate an informal framework to guarantee transactions. Just on the opposite side, and in line with our own findings, is the argument held by [North (1990)]. He suggested that as societies get more advanced and complex, the nature of transactions gets more complex as well and therefore, the returns of opportunism, cheating and shirking rise. Consequently, trust is apparently essential for those complex agreements, contracts and activities only present, or at least with higher frequency, in the relatively richer economies. This argument is also supported by [Putnam (1993)] and [Beugelsdijk and Van Schaik (2005)], as already commented in Section 2.

Nevertheless, our results also indicate that, once an economy reaches certain level of development, trust effects decrease parabolically. That result may indicate, (considering trust as an additional production factor), that trust is affected by diminishing returns. [Dearmon and Grier (2011)] obtained similar results, although in their case the dependent variable was investment, instead of GDP. Comparing the magnitude of the trust coefficient obtained in the previous section (growth rates), and this section (levels), may be inferred that the impact of trust is stronger in the long term (model in levels). That result would corroborate [Uslaner’s (2008) and Algan and Cahuc’s (2010)] suggestions about the “permanent” effect of trust.
5.3. Results for the control variables in the short run

Despite not being the main objective of the present contribution, results for the other variables included as controls in Equation (2), are available in Table 6 and Figure 4. The variable controlling for the initial level of income (GDPPC) shows the expected pattern, being more relevant for those countries presenting the highest growth rates. Focusing on the growth of working age population (GWORK), while this variable is commonly included in growth models, and its expected sign is negative, our results suggest a positive but non-significant sign for the OLS estimation in Table 6. Results by quantile yield a positive sign until approximately the percentile 25, and the expected negative but non-significant coefficient for the rest of the conditional distribution. This result would be indicating that changes in working age population are not behind cyclical growth periods.

Evaluating investment (IGDP), OLS estimation yields the expected positive and significant coefficient, as shown in Table 5. Quantile regression, shows a slightly increasing and significant coefficient along the conditional percentiles. Other papers such as Barreto and Hughes (2004) and Canarella and Pollard (2004), found a similar behavior for the investment coefficient, corroborating the important role played by investment in the growth processes.

Finally, regarding human capital (HK), a expected positive and significant effect is reported in the OLS estimation in Table 6. Since the seminal contribution of Mankiw et al. (1992), who highlighted the positive influence of human capital on growth, this variable became fixed in virtually all the growth regressions. Results by quantile reveal that human capital becomes significant for the range of percentiles comprised between the 20 and the 80. The path followed by HK is similar to that followed by TRUST. Although HK becomes significant relatively earlier than TRUST, its maximum effects coincide with the area where TRUST is significant, and after the 80 percentile, when TRUST effects disappear, so does the effect of HK.

5.4. Results for the control variables in the long run

The quantile estimation provides also interesting insights for the rest of the covariates included in Equation (3). Analogously to the previous section, analytical results are available in Table 7 while Figure 5 provides the graphical results. Focusing on the results for the working population growth (GWORK), OLS estimation yields a negative and highly significant coefficient. This result is also reached by Mankiw et al. (1992) and, later on,
by Dearmon and Grier (2009). However, the quantile estimation unveils that this result is strongly influenced by the lowest percentiles, highly significant, while the higher percentiles (approximately from 55 percentile ahead), are not. A possible explanation is that the economy of the poorest countries relies mostly on low added value activities. Then, increases in population are not offset by a proportional increase in the total output.

Concerning the investment ($IGDP$), results provided by the OLS estimation are positive and significant at the 1% level. Previous evidence of the importance of investment on per capita GDP level can be found in Dearmon and Grier (2009), although the related literature is vast. A very close result is obtained for the ninth deciles when quantile regression is performed. This stable pattern may be suggesting that, although investment is a relevant factor for the long-term welfare levels, its impact is very similar across the entire distribution of the response variable.

Finally, considering human capital ($HK$), the OLS estimated coefficient is positive and significant. This is not a surprising result, since positive impacts of human capital have been largely supported by the most prominent cross-country studies (Barro, 1991; Mankiw et al., 1992; Sala-i-Martin, 1997), and also focusing on regions (Beugelsdijk and Van Schaik, 2008; Crespo-Cuaresma et al., 2009). Nevertheless, the quantile estimation highlights significant coefficients only for a well-delimited area comprised between percentiles 35 and 80 approximately, and is clearly non-significant for the poorest countries. Such a result, may be affected by selecting secondary studies as a proxy for human capital.\footnote{We chose secondary studies following the Neoclassical model and the previous literature. Likely, if tertiary studies were selected, the effect would be also significant for the richest economies.} Contrary to us, previous evidence using levels (Osborne, 2006), found also significant effects for the poorest countries, but also, in concordance with our results, a crescent tendency of its associated coefficient.

6. Concluding remarks

The majority of the studies evaluating the role of trust on economic development concluded that trust influences economic development, following both, direct and indirect channels. Yet in most cases scholars have generalized the outcomes of trust, disregarding if these impacts are fostering high-growing processes or, long-run wealthy patterns instead. Furthermore, previous evidence on this issue is based on average effects, neglecting the possibility of heterogeneous effects of trust, depending on the intensity of the growth process, or the
wealth level of one country or region.

This study contributes to this literature in three different aspects. First, it considers the role of trust, both in the short and the long term, by estimating two different models. In the case of short-run, the dependent variable is growth, while in the long-term model, is income level. It is an interesting consideration, since the impact of trust differs, according to our results, depending on the time horizon considered. Secondly, it enlarges with 89 additional observations Dearmon and Grier’s (2009) sample, which is one of the widest in this particular context. And thirdly, the analysis is performed using quantile regression, showing that trust shows a non-linear impact across the conditional quantiles and, therefore, casting important doubts about the generalization of the trust effects.

As an starting point, we performed OLS estimations. Results suggested, on the one hand, that trust is not a relevant factor explaining differences in the short run—or growth rates. While this result is contrary to other previous findings such as Knack and Keefer (1997) and Zak and Knack (2001), when quantile regression is implemented, the analysis suggests that trust is only significant for those countries that have experienced high growing processes. This result is striking, due to precisely, those countries that have grown faster, are those where the index of trust is higher. That assertion would be in consonance with Zak and Knack (2001), and corroborates that the initial stock of trust of one country highly conditione its growth. Such a situation, known as the low-trust trap, may help us to understand why some countries in the Southeast of Asia, where trust levels are above the mean, have grown much more than African and Caribbean countries, characterized by extreme low levels of trust.

The long-run analysis, using GDP levels as a dependent variable, yields interesting insights. Only few studies such as Dearmon and Grier (2009), had previously based the analysis on income levels. The OLS estimation exhibits a positive and significant result, in concordance with them. Nevertheless, the quantile regression estimation manifests that trust is not relevant for the poorest countries. Results also show a parabolic convex pattern, predicting diminishing returns for trust. This intriguing result, suggests that trust is relevant to keep certain level of economic development in the long term, but also that its effects will decrease once a country becomes relatively rich. Yet, according to our results, trust plays a more important role in the long term than in fast growth experiences. That fact helps to corroborate some suggestions about the permanent and cumulative effects of trust (Putnam, 1993).
Summarizing, this study helps to understand the complex behavior showed by trust. Our findings indicate that, while trust effects on growth and long term development may be confirmed, the effects cannot be generalized for all countries, and also provides additional evidence on the existence of the low-trust trap. Nevertheless, while it sheds light on such an important and still unexplored questions on this issue, new evidence is needed in other fronts that are in the future research agenda. They comprise the understanding of what is behind the low-trust trap, what actually incentives the generation of trust, and which are actually the mechanisms in power of the governments that can reverse low trust situations.
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Table 1: Sample description

| Country              | Wave 1 (1981-1984) | Wave 2 (1989-1993) | Wave 3 (1994-1998) | Wave 4 (1999-2004) | Wave 5 (2005-2007) |
|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Albania*             | x                  | x                  |                    |                    |                    |
| Algeria              |                    |                    |                    |                    |                    |
| Argentina            | x                   | x                  |                    |                    |                    |
| Armenia*             |                    |                    |                    |                    |                    |
| Australia            | x                   |                    |                    |                    |                    |
| Austria              | x                   |                    |                    |                    |                    |
| Bangladesh           |                    | x                  |                    |                    |                    |
| Belgium              | x                   |                    |                    |                    |                    |
| Brazil               | x                   |                    |                    |                    |                    |
| Bulgaria*            | x                   | x                  |                    |                    |                    |
| Canada               | x                   | x                  |                    |                    |                    |
| Chile                | x                   |                    |                    |                    |                    |
| China                | x                   | x                  |                    |                    |                    |
| Colombia             | x                   |                    |                    |                    |                    |
| Croatia*             | x                   |                    |                    |                    |                    |
| Cyprus               | x                   |                    |                    |                    |                    |
| Czech Republic*      |                    |                     | x                  |                    |                    |
| Denmark              | x                   |                    |                    |                    |                    |
| Dominican Republic   |                    |                    |                    |                    |                    |
| Egypt                |                    |                    |                    |                    | x                  |
| El Salvador          |                    |                    |                    |                    | x                  |
| Estonia*             |                    | x                  |                    |                    |                    |
| Finland              | x                   | x                  |                    |                    |                    |
| France               | x                   |                    |                    |                    |                    |
| Germany*             | x                   |                    | x                  |                    |                    |
| Ghana*               | x                   |                    |                    |                    |                    |
| Greece               |                    |                    |                    |                    | x                  |
| Guatemala*           | x                   |                    |                    |                    |                    |
| Hungary              | x                   | x                  |                    |                    |                    |
| Iceland              | x                   |                    |                    |                    |                    |
| India                | x                   | x                  |                    |                    |                    |
| Indonesia            |                    |                    |                    |                    |                    |
| Iran                 | x                   | x                  |                    |                    |                    |
| Iraq*                | x                   |                    |                    |                    |                    |
| Ireland              | x                   |                    |                    |                    | x                  |
| Israel               |                    |                    |                    |                    | x                  |
| Italy                | x                   |                    |                    |                    | x                  |
| Japan                | x                   | x                  |                    |                    |                    |
| Jordan               |                    |                    |                    |                    | x                  |
| Korea, Republic of   | x                   |                    |                    |                    | x                  |
| Latvia*              | x                   | x                  |                    |                    |                    |
| Lithuania*           | x                   |                    |                    |                    |                    |
| Luxembourg*          |                    | x                  |                    |                    |                    |
| Malaysia*            |                    |                    |                    |                    | x                  |
| Mali                 | x                   |                    |                    |                    | x                  |
| Malawi*              |                    | x                  |                    |                    | x                  |
| Mexico               | x                   | x                  |                    |                    | x                  |
| Moldova*             |                    |                    |                    |                    |                    |
| Morocco*             |                    |                    |                    |                    | x                  |
| Netherlands          | x                   | x                  |                    |                    | x                  |
| New Zealand          | x                   |                    |                    |                    | x                  |
| Norway               | x                   |                    |                    |                    | x                  |
| Pakistan             | x                   |                    |                    |                    | x                  |
| Peru                 |                    | x                  |                    |                    | x                  |
| Philippines          | x                   |                    |                    |                    | x                  |
| Poland               | x                   |                    |                    |                    | x                  |
| Portugal             | x                   |                    |                    |                    | x                  |
| Romania*             | x                   | x                  |                    |                    | x                  |
| Russia*              | x                   |                    |                    |                    | x                  |
| Saudi Arabia*        |                    |                    |                    |                    | x                  |
| Singapore            | x                   |                    |                    |                    | x                  |
| Slovak Republic*     | x                   |                    |                    |                    | x                  |
| Slovenia*            | x                   | x                  |                    |                    | x                  |
| South Africa         | x                   |                    |                    | x                  |                    |
| Spain                | x                   |                    |                    | x                  |                    |
| Sweden               | x                   | x                  |                    |                    | x                  |
| Switzerland          | x                   |                    |                    |                    |                    |
| Tanzania             | x                   |                    |                    |                    |                    |
| Thailand*            | x                   |                    |                    |                    |                    |
| Trinidad and Tobago* | x                   |                    |                    |                    |                    |
| Turkey               | x                   |                    |                    |                    |                    |
| Uganda               | x                   |                    |                    |                    |                    |
| Ukraine*             | x                   | x                  |                    |                    |                    |
| United Kingdom       | x                   | x                  |                    |                    | x                  |
| United States        | x                   | x                  |                    | x                  | x                  |
| Uruguay              | x                   |                    |                    |                    | x                  |
| Venezuela            | x                   |                    |                    |                    | x                  |
| Vietnam*             | x                   |                    |                    |                    |                    |
| Zambia*              | x                   |                    |                    |                    |                    |
| Zimbabwe             |                    |                    |                    |                    | x                  |

# of countries  19  36  45   59   49

* Denotes countries not included in [Dearmon and Grier (2009)].
### Table 2: Variables and sources

| Variable | Description | Source |
|----------|-------------|--------|
| GDPPC | GDP per capita. Real $US of 2005 | Pen World Tables 6.3 |
| GGDPDC | Growth of GDP per capita | Pen World Tables 6.3 |
| GDPPC0 | Initial GDP per capita. Real $US of 2005 | Pen World Tables 6.3 |
| GWORK | Growth of working population plus 0.05 | World Development Indicators |
| IGDP | Investment share of real GDP per capita | Pen World Tables 6.3 |
| HK | Percentage of working population with secondary studies | Barro-Lee 2010 |
| TRUST | Percentage of people who responded “Most people can be trusted” | World Values Survey. Waves |

### Table 3: Descriptive statistics

| Variable | Observations | Mean | s.e. | Min. | 1st quartile | Median | 3rd quartile | Max. |
|----------|--------------|------|------|------|--------------|--------|--------------|------|
| GDPPC | 208 | 15,691.83 | 11,015.73 | 730.368 | 6,324.81 | 12,402.87 | 24,299.99 | 64,467.18 |
| GGDPDC | 208 | 0.025 | 0.032 | -0.136 | 0.013 | 0.025 | 0.041 | 0.120 |
| GDPPC0 | 208 | 15,090.47 | 10,607.03 | 662.21 | 6,140.73 | 11,685.41 | 23,521.00 | 59,291.99 |
| GWORK | 208 | 0.061 | 0.032 | 0.035 | 0.053 | 0.060 | 0.069 | 0.098 |
| IGDP | 208 | 0.244 | 0.079 | 0.044 | 0.188 | 0.247 | 0.298 | 0.493 |
| HK | 208 | 0.457 | 0.157 | 0.045 | 0.357 | 0.461 | 0.564 | 0.804 |
| TRUST | 208 | 0.305 | 0.157 | 0.028 | 0.188 | 0.277 | 0.411 | 0.742 |
### Table 4: OLS estimates, growth rates (GGDPPC)

| Covariates | Coefficient | s.e. | t-statistic | p-value |
|------------|-------------|------|-------------|---------|
| (Intercept) | 0.056       | 0.033| 1.720       | 0.087   |
| GDPPC₀     | -0.012      | 0.003| -4.108      | 0.000   |
| GWORK      | 0.278       | 0.219| 1.269       | 0.206   |
| IGDP       | 0.139       | 0.029| 4.740       | 0.000   |
| HK         | 0.030       | 0.015| 1.972       | 0.050   |
| TRUST      | 0.023       | 0.014| 1.650       | 0.101   |
| t²         | -0.009      | 0.008| -1.171      | 0.243   |
| t³         | 0.012       | 0.008| 1.502       | 0.135   |
| t⁴         | 0.011       | 0.008| 1.437       | 0.152   |
| t⁵         | 0.028       | 0.008| 3.529       | 0.001   |

\[ N = 208. \]
\[ R^{2} = 0.251. \]
\[ F\text{-statistic}=8.706 \text{ on 9 and 198 D.F; } p\text{-value}=0.000. \]

### Table 5: OLS estimates, income levels (GDPPC)

| Covariates | Coefficient | s.e. | t-statistic | p-value |
|------------|-------------|------|-------------|---------|
| (Intercept) | 8.605       | 0.472| 18.234      | 0.000   |
| GWORK      | -13.993     | 5.043| -2.775      | 0.006   |
| IGDP       | 4.194       | 0.626| 6.702       | 0.000   |
| HK         | 0.682       | 0.352| 1.940       | 0.054   |
| TRUST      | 1.375       | 0.310| 4.436       | 0.000   |
| t²         | -0.123      | 0.186| -0.664      | 0.508   |
| t³         | -0.303      | 0.184| -1.644      | 0.102   |
| t⁴         | -0.151      | 0.177| -0.852      | 0.395   |
| t⁵         | -0.090      | 0.183| -0.492      | 0.623   |

\[ N = 208. \]
\[ R^{2} = 0.422. \]
\[ F\text{-statistic}=19.86 \text{ on 8 and 199 D.F; } p\text{-value}=0.0000. \]
Table 6: Results by quantile, growth rates (GGDPPC)

| Covariates | $\tau = .10$ | $\tau = .20$ | $\tau = .30$ | $\tau = .40$ | $\tau = .50$ | $\tau = .60$ | $\tau = .70$ | $\tau = .80$ | $\tau = .90$ |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| (Intercept) | 0.030        | 0.011        | 0.065        | 0.095        | 0.118        | 0.125        | 0.136        | 0.146        | 0.180        |
| GDPPC0     | -0.010       | -0.007       | -0.010       | -0.013       | -0.015       | -0.016       | -0.017       | -0.018       | -0.019       |
| GWORK      | 0.249        | 0.369        | -0.084       | -0.262       | -0.123       | -0.142       | -0.257       | -0.378       |              |
| IGDP       | 0.081        | 0.092        | 0.093        | 0.122        | 0.136        | 0.136        | 0.145        | 0.154        |              |
| HK         | 0.023        | 0.031        | 0.027        | 0.030        | 0.038        | 0.034        | 0.053        | 0.032        |              |
| TRUST      | 0.022        | 0.010        | 0.007        | 0.014        | 0.015        | 0.015        | 0.021        | 0.024        | 0.020        |
| $t_2$      | -0.026       | -0.016       | -0.014       | -0.002       | 0.001        | -0.001       | 0.003        | 0.002        | 0.000        |
| $t_3$      | 0.012        | 0.009        | 0.011        | 0.012        | 0.015        | 0.016        | 0.017        | 0.014        | 0.015        |
| $t_4$      | 0.014        | 0.009        | 0.012        | 0.016        | 0.011        | 0.012        | 0.010        | 0.010        |              |
| $t_5$      | 0.029        | 0.018        | 0.017        | 0.019        | 0.025        | 0.026        | 0.026        | 0.026        | 0.043        |

Confidence intervals (90%) are in brackets.
Table 7: Results by quantile, income levels (GDPPC)

| Covariates | $\tau = .10$ | $\tau = .20$ | $\tau = .30$ | $\tau = .40$ | $\tau = .50$ | $\tau = .60$ | $\tau = .70$ | $\tau = .80$ | $\tau = .90$ |
|------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| (Intercept) | 8.619         | 8.516         | 8.411         | 8.285         | 8.550         | 8.126         | 8.074         | 8.294         | 8.542         |
| GWORK      | -23.493       | -18.066       | -14.257       | -13.411       | -15.534       | -8.179        | -0.503        | -4.053        | -4.109        |
| IGDP       | 4.236         | 4.589         | 4.230         | 4.524         | 4.692         | 4.936         | 4.485         | 3.976         | 4.107         |
| HK         | 0.227         | 0.472         | 0.822         | 0.469         | 0.686         | 0.647         | 0.641         | 0.965         | 0.927         |
| TRUST      | 0.521         | 1.438         | 1.508         | 2.009         | 1.805         | 1.764         | 1.239         | 1.292         | 0.821         |
| t2         | -0.183        | -0.110        | -0.137        | -0.005        | -0.090        | -0.067        | -0.021        | -0.005        | 0.027         |
| t3         | -0.161        | -0.504        | -0.404        | -0.214        | -0.374        | -0.284        | -0.113        | -0.095        | 0.040         |
| t4         | -1.456        | -0.870        | -0.827        | -0.537        | -0.506        | -0.540        | -0.546        | -0.225        | -0.291        |
| t5         | -0.109        | -0.358        | -0.424        | -0.159        | -0.275        | -0.100        | 0.010         | 0.134         | 0.108         |

Confidence intervals (90%) are in brackets.
Figure 1: Kernel density distributions of the dependent variables

(a) Growth rates (GGDPPC)

(b) Income levels (GDPPC)

Notes: Figures show densities estimated using kernel density estimation for the two dependent variables. We chose a Gaussian kernel, and the bandwidths were implemented using the plug-in methods of Sheather and Jones [1991].
Figure 2: Quantile slopes for TRUST

a) Growth rates (GGDPPC)

![Graph showing quantile slopes for TRUST growth rates.]

b) Income levels (GDPPC)

![Graph showing quantile slopes for TRUST income levels.]

Notes: The plots show scatterplots of the data on both GGDPPC and (ln) GDPPC vs TRUST. Superimposed on the plot are the {.10, .25, .75, .90} quantile regression lines in grey, the median fit in black, and the least squares estimation in dashed black. The above fits are based on the simple regressions where GGDPPC and (ln) GDPPC are the dependent variables, and TRUST the single regressor.
Figure 3: Quantile results for TRUST

a) Growth rates (GGDPPC)

b) Income levels (GDPPC)

Notes: the slopes corresponding to the covariates of the estimated linear quantile regression for the model are plotted as a function of $\tau$ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile ($\tau$) and the fixed red line shows OLS estimation.
Figure 4: Quantile results for the control variables: Growth rates (GGDPPC)

(a) $GDPPC_0$

(b) GWORK

(c) IGDP

(d) HK

Notes: the slopes corresponding to the covariates of the estimated linear quantile regression for the model are plotted as a function of $\tau$ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile ($\tau$) and the fixed red line shows OLS estimation.
**Figure 5:** Quantile results for the control variables: Income levels (GDPPC)

(a) GWORK  
(b) IGDP  
(c) HK

Notes: the slopes corresponding to the covariates of the estimated linear quantile regression for the model are plotted as a function of $\tau$ (i.e., the different quantiles), represented in the horizontal axis. The vertical axis represents the values of the slope coefficients for each quantile ($\tau$) and the fixed red line shows OLS estimation.