Social Trust and the Growth of Schooling

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Abstract:

The paper develops a simple model to exemplify how social trust might affect the growth of schooling through lowering transaction costs. It thereafter provides empirical evidence that trust has indeed lead to faster growth of schooling in the period 1960-2000 in a sample of 52 countries. The findings are robust to the inclusion of a set of control variables and being estimated using an instrumental variables approach.

JEL Codes: J24, O15, Z13

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Introduction

Sir Edward Coke remarked as early as the 16th century that "there is no jewel in the world comparable to learning". This jewel has in recent decades grown and been extended to many more people since the post-war period has witnessed an impressive improvement of schooling in much of the world. Average schooling rates of people in Western Europe and North America have increased dramatically and even more impressive increases have happened in the Asian tiger economies. This accumulation of education has had advantageous effects, first and foremost by leading to faster economic development as proposed by the endogenous growth literature (Barro, 1997; Bassanini and Scarpetta, 2002) although there is disagreement between whether it is the level or the growth of education that matters.[1] In addition, schooling is often considered an indispensable component of social and human development, as e.g. in the United Nations' Human Development Index (UNDP, 2003). Hence, the importance of accumulating education, one would think, would create a demand for research in the reasons for such differences, yet the literature is severely limited.

The standard explanation seems to be that countries with low schooling rates catch up, i.e. achieve faster growth of schooling. However, two supplementing explanations are offered by the recent surge in research on the concept of social capital, which is usually

[1] In models where research and development drives economic growth, the *level* of human capital is important as larger stocks facilitate faster technological development (see e.g. Romer, 1990). The alternative view holds human capital as a normal input in the production function, and hence focuses on the *growth* of human capital (e.g. Lucas, 1988). Whichever way reality works, faster accumulation of human capital leads to either faster or accelerating economic growth, all other things being equal. In addition, Castelló and Doménech (2002) point to an effect of human capital inequality.

defined as "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions" (Putnam, 1993: 167). Putnam argued that trust is created through repeat interactions in voluntary organisations, i.e. that individuals learn to trust each other by meeting and interacting on a voluntary basis, for example in schools.[2] Yet, subsequent studies have questioned this mechanism. Knack and Keefer (1997) note that the correlation between trust and network measures in a country sample disappears when controlling for education while Uslaner (2002) finds neither empirical evidence of this association nor proper theoretical arguments why specialised trust emerging in face-to-face interactions should carry over into trust towards strangers. In addition, recent studies find that trust and networks have substantially differing consequences. For example, Beugelsdijk et al. (2004) find that trust is robustly related to growth while Knack (2003) finds only mixed support for Putnam's notion that voluntary organisational activity (networks) affects growth. There is thus mounting evidence suggesting that social capital consists of diverse elements while virtually all studies find some association between one or more of these elements and education.

The original work on social capital by James Coleman (1988) indeed focused exclusively on the connection with educational outcomes. Entitled "Social Capital in the Creation of Human Capital", the study argued that communities rich in trust and social connections achieved low rates of high school drop outs. In Coleman's seminal work, he suggested that this association between social and human capital was first and

[2] Trust itself is defined as arising when "a community shares a set of moral values in such a way as to create regular expectations of regular and honest behavior" (Fukuyama, 1995: 153).

foremost an effect of family social capital, i.e. that children in families with strong bonds between children and adults have easy access to adults' human capital, a conclusion replicated by Teachman et al. (1997). Children in such environments would therefore be more likely to succeed in education. Coleman, however, also touched upon social capital outside the family in the form of children's access to the human capital of non-kin adults and found evidence of effects arising from both types of social capital on the likelihood of dropping out of high school. Social capital in this form thus has public goods aspects, but probably more so in communities where people trust that others will return favours such as helping their children. More recently, Putnam (2000: 301) stresses the overriding importance of trust in a sample of American communities, noting that "even communities with many material and cultural advantages do a poor job of educating their kids if the adults in those communities don't connect with one another". These findings extend to cross-country comparisons where la Porta et al. (1997) likewise find that the effect of trust on schooling outcomes is quite strong, showing that a one-standard deviation increase in social trust raises the percentage of a population graduating from high school by about one half of a standard deviation. This is one family of explanations that in the following will be referred to as the Coleman notion.

Conversely, a number of other studies have argued for the reverse causality. The work by Knack and Keefer (1997) notes the correlation between levels of social trust and schooling and interprets it as an effect going from human to social capital. Such effects are intuitively easy to interpret as noted by the authors. Higher learning implies that individuals become better informed and better at interpreting perceived information, as well as becoming more conscious of the consequences of actions taken by themselves

and others. Furthermore, schooling has a socialisation effect, which along the lines of Putnam could induce individuals to trust and engage in voluntary organisational activity. In addition, Zak and Knack (2001) also note that trust may proxy for subjective time preference rates, which would also influence decisions regarding investments in education. A number of other studies have found similar effects of schooling (e.g. Schneider et al., 1997; Knack and Zak, 2002; Berggren and Jordahl, 2004). In the following, this is referred to as the Knack and Keefer explanation.

These alternatives are not necessarily strict substitutes, but for policy purposes, it may be necessary to know the relative strength of each causal direction, as policy implications differ in the two extremes. If trust causes schooling growth, and not vice versa, the simple implication is that investments in education may be cheaper in high-trust societies. In the other extreme where schooling causes trust, investing in education is equally expensive in all countries, all other things being equal, and have the additional external effect of raising trust levels. In the first case, returns to investments in education may be equal but costs are lower in high-trust countries, while the latter case would imply that low-trust countries have higher returns to such investments, given that there are decreasing returns to social trust. The causal links are therefore of immediate policy relevance as well as being an unresolved research question. In order to explore this, the rest of the paper is structured as follows. Section 2 presents a theoretical link between social trust and the growth of schooling. Section 3 describes the data and uses them to test the theoretical explanations. Section 4 concludes and draws some implications of the findings.

2. An alternative link between social trust and schooling

In the above, two different views on the connection between social and human capital were introduced. An alternative third explanation of why social trust could lead to improved schooling builds on the potential effects of trust on search costs in labour markets. When interpersonal trust and honesty is low in society, employers will be highly exposed to cheating in the form of shirking and in presenting false credentials. Employees will therefore tend to put relatively more emphasis on direct information obtained from trustworthy sources on job applicants' 'moral stature' and relatively less emphasis on formal qualifications such as education, as a way of hedging the risk of getting a 'bad' employee. Such rational reactions to poor general quality of information benefits the employer but has the external effect that it tends to increase the transaction costs associated with employing educated labour and thereby the general level of education in society.

However, this paper does not focus on *levels* but the *improvements* of schooling during the last four decades. With respect to the theoretical explanations above, it is worth noting that only one of the three may entail a real association between social trust and the growth of schooling. Knack and Keefer's (1997) notion that human capital spurs the development of social capital suffers from an inability to explain the apparent persistence of social trust as well as specific outcomes related to trust. For example, if schooling growth led to increasing trust levels, one would also expect to see corruption levels converge over time, which is not the conclusion of most studies. In addition, trust levels as measured by the World Values Surveys since 1981 seem to be rather stable across time. Likewise, Coleman's (1988) account of the association would imply a

weak link between social capital and human capital growth, as rapidly increasing levels of education would render the education of adults less helpful. Conversely, the alternative search costs view proposed here also implies that as the demand for formal skills increases – as has certainly been the case with the post-war period move towards human capital-intensive production – high-trust societies will experience faster accumulation of education, all other things being equal, as the incentives to invest in schooling are stronger in such societies. This mechanism can be formalised in the following simple way.

Imagine an economy with many identical firms and individual workers who share their time between work and education. Assume that uneducated individuals receive the wage w_0 while educated individuals receive the wage w_1 that depends on the level of education, l.[3] Since firms use both types of workers, employers have two options: 1) employing non-educated young people on whom they have good information, i.e. only hiring those whom they personally know to be willing to work; 2) employing individuals with education, which involves risk, as not all individuals are trustworthy in the sense that they can be expected to do their job properly. Assume that each trustworthy educated individual produces bl^{α} units of the output while untrustworthy individuals are less productive and only produce the share σ of that of trustworthy individuals. Here, $b>1$ and $\sigma<1$ and the parameter b in the model thus measures the intensity with which human capital is used in production. Uneducated individuals produce 1 unit in what can be thought of as a parallel production facility. Firms thus have an incentive to acquire information on the trustworthiness of potential employees.

[3] Note that w_0 comes to work as a numeraire in the model.

Total production of a representative firm is given by equation (1) where m and n are the number of employees with and without education, respectively. Firms maximise the profits π where c is the cost of ascertaining the trustworthiness of any individual and θ is the share of all workers that are tested this way. I thus assume the existence of a technology or institution that at a fixed price can reveal the trustworthiness of agents and supply a trustworthy agent. Note that ω in (3) is the probability that an educated individual is trustworthy and therefore becomes the social trust parameter of the model as it measures the trust employers in general have in their fellow citizens. The term θmc thus represents a transaction cost associated with hiring new employees. Finally, i is an investment in new labour-augmenting technology that raises the value of the b-parameter and hence the content of education in production. Equation (4) is thus the equation of motion for technology.

$$y = \left[mbl^{\alpha} \left(\varphi^{\alpha} + (1-\varphi)\sigma \right) \right]^{\beta} n^{\delta} \tag{1}$$

$$\pi = y - w_1 m - w_0 n - \theta mc - i \tag{2}$$

$$\varphi = \omega + (1-\omega)\theta \tag{3}$$

$$b = b_{-1} + \mu i \tag{4}$$

Assume for simplicity that the relation between m and n need not be the same within firms as in society as a whole. The public and service sectors thus serve only two purposes in the long run: they swallow any potential unemployment and satisfy firms' demand for education. Solving firms' profit maximisation problem with respect to m, n, w_1, θ and i yields a set of first order conditions that determine e.g. the wage paid to

educated workers. Imposing the assumption that there is imperfect competition in the economy in the sense that all firms take a mark-up of γ and combining this with the system above yields the steady state level of schooling in (7). From this follows a set of implications of which the temporal properties of equation (9) comprises the main focus of the paper.

$$y = \frac{(1+r)}{\mu\beta} b \tag{5}$$

$$i^* = (1-\beta-\delta-\gamma)\, y \tag{6}$$

$$l = \left[\left(\frac{w_0}{\delta} \right)^{\frac{\delta}{\beta}} \left(\frac{1+r}{\mu\beta} b \right)^{\frac{1-\delta}{\beta}} \frac{1}{Q} \right]^{\frac{1}{\alpha}} \tag{7}$$

$$Q = \left[\frac{\mu\beta}{\delta} \frac{w_0}{1+r} - 1 \right] \left[\omega(1-\sigma) + \sigma \right] + \frac{(1-\omega)(1-\sigma)(1+r)}{\mu\beta\delta} b^2 \tag{8}$$

$$\frac{d\dot{l}}{d\omega} = 2(1-\sigma) \frac{li^* y}{\alpha Q \delta} \left[1 - \frac{(1-\omega)(1-\sigma)}{Q} \left[\frac{by}{\delta} + 1 - \frac{w_0}{\delta y} \right] \right] \tag{9}$$

The system of equations above thus has three main implications (all proofs are left to the appendix): 1) that income is proportional to the level of technology in production, i.e. that income growth depends on investments in technology; 2) that the investment ratio *i/y* is constant and dependent on market structure; and 3) that the level of schooling *l* depends positively on the level of trust, ω, and the intensity with which it is used in production, *b*. The latter finding also implies that the growth of schooling most likely depends positively on trust as in (9) given a condition derived in the appendix. This last

implication arises from the effect of social trust on the transaction costs associated with testing potential employees. It is this implication that is tested in the following.

3. Data and results

The aim of this section is to establish whether this implication holds when confronted with data. The data for estimating the relation between the growth of schooling and social trust are drawn from various sources; see Appendix Table A1. The variables of particular interest are four measures of schooling and a measure of social trust. Firstly, I use the average length of schooling for adults over 25 years of age and the same measure for females only to capture effects on total education. Secondly, I use the percentage of the population with a secondary education as a first measure of higher education since mandatory primary schooling requirements in some countries may obfuscate the effect of trust. Thirdly, I use the percentage of the population with a tertiary education, i.e. college undergraduate degrees and higher. As such, it should be possible to ascertain the effects of trust on various degrees of education. Finally, as the preferred measure of social trust I employ the generalized trust scores from the World Values Survey project since previous research has shown that this is a well-functioning measure of average trustworthiness and honesty (Glaeser et al., 2000; Knack, 2001). As such, this variable may provide a relatively accurate proxy for the ω in the model.

A first indication of the notion brought forward by this paper - the connection between social trust and the growth of schooling - can be seen in Figure 1 that plots trust levels against the growth of average schooling length adjusted for initial levels, i.e. taking the

convergence effect into account (see the introduction).[4] The negative correlation is evident in the figure, which thus suggests that the lagging performance of countries such as Turkey, Venezuela and Costa Rica may be ascribed to low trust levels. Conversely, the strong relative improvements in schooling in Scandinavia, Canada and New Zealand coincide with above-average levels of social trust. The figure also indicates that Pakistan and South Korea may be outliers.

INSERT FIGURE 1 ABOUT HERE

However, a simple correlation with a single indicator is no evidence of an effect. Table 1 therefore presents the results of regressing the growth of average length of schooling on initial levels of schooling, (the logarithm to) initial GDP per capita and social trust using ordinary least squares (OLS). Before discussing the results pertaining to trust, the effects of initial schooling and GDP per capita need mention. As expected, the findings show a strong convergence effect, as countries with low initial levels of schooling catch up by achieving faster accumulation of education. Initial GDP per capita also receives a negative and strongly significant sign, which can be interpreted as evidence of the effect of high initial costs of investing in education in relatively rich countries.[5]

[4] In terms of the model, the fact that low initial schooling levels lead to faster growth of schooling can be interpreted as a convergence effect towards the steady state.

[5] Costs consist of both agents' opportunity costs and firms' transaction costs. One of the costs is the foregone wage w_0. It can indeed easily be shown that this is consistent with the model predictions if the ratio y/w_0 is below $(1-\beta)/\delta$. This is virtually always satisfied, as y is total income while w_0 is the income of one individual unless firms are very small.

The main point of this paper receives strong support in Table 1, as social trust emerges as an important determinant of the growth of schooling in the period 1960-2000. The table also presents the results of using the growth of average schooling of female adults as the dependent variable, which shows the same pattern. Controlling for regional fixed effects reduces both coefficients as well as the significance of the coefficient on female schooling growth (columns 2 and 5) but does not affect the qualitative findings. Furthermore, to control for the possibility that the results are driven by a small group of outlier observations, columns 3 and 6 apply a robust regressions technique.[6] This alternative approach yields a slightly larger effect of social trust on average schooling growth and a substantially larger effect on the growth of female schooling. I must thus be concluded that the results obtained by simple OLS are not likely to be driven by outlier observations.

INSERT TABLE 1 ABOUT HERE

Table 2 repeats the exercise with the growth of the share of the population with a secondary schooling, i.e. a high school diploma, and the share of the population with a post-secondary education. The table shows that secondary schooling growth also seems to be caused by social trust with an effect comparable to that on average length of schooling. However, the growth of post-secondary schooling has not been influenced by social trust. The former result is also robust to the inclusion of regional effects and

[6] Robust regression takes the residuals of simple OLS and weights the influence of observations with large residuals down. Hence, if results were driven by a small group of outliers, this procedure should make the coefficients on trust appear small and insignificant.

weighting down potentially influential observations although the coefficient obtained from robust regressions is implausibly large.

INSERT TABLE 2 ABOUT HERE

The findings thus provide substantial support for the notion that social trust causes faster growth of average schooling and of secondary education, all other things being equal, i.e. the findings support the Coleman explanation. These results could nevertheless still be spurious due to two other factors. Firstly, they could be the result of omitted variables that trust comes to proxy for; and secondly, the findings could reflect the opposite casual direction, i.e. the Knack and Keefer explanation that the growth of schooling has caused the current cross-country trust differences. The latter problem may be particularly relevant as the growth of schooling is measured in the period 1960-2000 while social trust is only measured in the latter half of the period. These problems are taken into account in Tables 3 and 4.

Table 3 explores the robustness of the results to the inclusion of a set of control variables by performing a small extreme bounds analysis (EBA). The EBA consists of entering all combinations of one or two variables from a pool of ten control variables, which gives a total of 55 permutations. Following Levine and Renelt (1992), a result is deemed robust if the coefficient on the variable of interest retains its sign and is significant at the 5% level throughout. The pool from which variables are drawn includes the initial fertility rate, openness to trade, market distortions, income inequality, democratic tenure, population density, governments' share of the economy,

expenditure per student, GDP growth and average intelligence IQ; appendix Table A1 lists the definitions and sources.

The rationales for entering these variables are as follows. 1) High initial fertility could be expected to affect schooling growth negatively as families with many children may tend to invest less in education. 2) Increased international competition could create demand for skilled labour and investments in education as a way of increasing competitiveness, which would imply a positive association between the growth of schooling and openness to trade, captured by either openness or a direct measure of market distortions. 3) Income inequality could lead to lower investments in education, as particularly poor people may not invest as much due to credit constraints (e.g. Perotti, 1993; Barro, 2000). Inequality is also strongly associated with social trust (Uslaner, 2002), which thus could give rise to a spurious effect. 4) Democratic systems may invest more in education to the extent that voters demand so and may also be associated with higher trust (Uslaner, 1999); hence the number of years in the period that a country has been democratic enters the pool. 5) Population density may proxy for transaction costs that may be particularly high in scarcely populated countries where pupils need to travel a significant distance to get to school. 6) Governments' share of GDP proxies for the generosity of welfare, which may make it less risky to take an education. 7) Expenditure per student naturally measures actual investments in education. 8) Trust may proxy for growth, since a number of studies find that social trust is an important determinant of economic growth (Whiteley, 2000; Zak and Knack, 2001; Beugelsdijk et al., 2004). Growing wealth may in turn have affected the level of schooling. 9) Finally,

Weede and Kämpf (2002) argue that average IQ is a prerequisite for education, i.e. it could also be expected to influence the growth of schooling.

Performing an EBA with these control variables firstly shows that the association between social trust and the growth of average schooling length is robust in an extreme bounds sense, as reported in Table 3. The effect of social trust remains positive throughout and only fails the 1% level in one case. When turning to the growth of female average schooling length, the results are only slightly less precise, as social trust fails the 1% level in two cases. With respect to the third dependent variable, the growth of the share of the population that has a secondary education as their highest, this result is also robust in the strong sense, as social trust fails the 1% level in only four cases. Hence, it does not seem likely that the results are caused by omitted variables.[7]

INSERT TABLE 3 ABOUT HERE

Finally, Table 4 addresses the issue of potential reverse causation. To sort out the direction of causality, an instrumental variables (IV) approach is adopted in which I employ two different sets of instruments in two-stage least squares estimation. If it were the case that part of the significant association obtained from OLS is entirely due to the reverse causality, this procedure would reduce the size of the coefficient and render it insignificant. On the other hand, if there is a positive feedback effect, i.e. a two-way

[7] It is worth noting that with all three dependent variables, the lower bound coefficients derive from specifications that include the measure of market distortions. It is also worth noting that economic growth is always significantly negative at 10% when the growth of average female schooling is the dependent variable.

causation, it could be expected that the OLS estimates were downwards biased. In this case, the IV-estimates would be larger than the OLS estimates. The first choice of instrument is absence of corruption deriving from Transparency International (2003), as corruption has been shown to be significantly associated with social trust (Uslaner, 2002) while there are neither theoretical nor empirical associations with the growth of schooling. A potential problem with this instrument is nevertheless that it is not predetermined. I therefore adopt an alternative set of instruments consisting of a dummy for post-communist countries, ethnolinguistic fractionalization (ELF) and the share of Protestants in the population, all of which have been associated with trust in previous studies. These instruments are not as potent in explaining social trust as absence of corruption, but do have the benefit of being predetermined.[8]

INSERT TABLE 4 ABOUT HERE

The results of employing either instrument show that the effects of social trust are real, as trust remains significant at conventional levels. Furthermore, none of the IV estimates differ significantly from the simple OLS estimates. The results thus indicate that there probably is no reverse causal effect from the growth of schooling to social trust, thus supporting the theoretical presumption that social capital in the form of trust

[8] Both instruments are valid, as they do not correlate with the residual from a regression without social trust but are strongly associated with social trust. Absence of corruption explains 62% of the variation of social trust in the first stage regression. Although the variable is measured at the end of the period, this may not constitute a problem as corruption is often found to be remarkably stable over time (see e.g. Treisman, 2000). The alternative set of instruments explains 41% of the variation of social trust in the first stage regression.

has caused substantial improvements of education. The potential implications of this finding are outlined in the concluding section.

4. Conclusions

This paper has examined the association between social trust and the impressive improvements of schooling in most of the world since 1960. The paper shortly outlined two conflicting views on the connection between social trust and education before developing a simple theoretical model with endogenous investments in labour-augmenting technology. The model illustrated how firms' demand for schooling increases as countries move towards more human capital-intensive production. While this is a trivial insight, the model also illustrated how the response of schooling to changes in factor intensity may be stronger in high-trust societies.

The paper thereafter tested whether this proposition can be found in real-life data. In a sample of 52 countries, the growth of schooling was measured by the percentage improvements between 1960 and 2000 in average schooling, average female schooling, the share of the population receiving a secondary education, and the share of the population receiving a post-secondary education. The results of regressing schooling growth on social trust, initial schooling and initial GDP per capita provided support for the proposition that trust is positively associated with improvements in education. The finding that social trust has caused the growth of average and secondary (but not post-secondary) schooling proved to be robust to controlling for potential omitted variables and to the exclusion of potentially confounding outliers. Using an instrumental variables approach moreover rejected that the findings are the result of reverse causality. Indeed,

the OLS estimates seem unbiased, suggesting that there is no effect of schooling growth on social trust. The results are also of economic significance, for example indicating that a positive shock to social trust of about 15 percentage points (one standard deviation) would have led to 30% additional growth of average schooling during the 40-year period considered in this paper.

Although this paper does not argue for any form of cultural determinism, the findings point to the conclusion that specific cultural traits can be beneficial to overall development. The empirical results suggest that investments in education are relatively cheaper in high-trust than in low-trust societies, which have led to faster growth of schooling in the former countries. The substantial difference in social trust between Finland and France thus explains the bulk of the difference in improvements in schooling between these otherwise rather similar countries that was noted in the introduction. The results also point to the possibility that part of the effect of social trust on economic growth identified in recent studies may be due to its effects on the accumulation of education. These findings could have implications for policy priorities, as low-trust countries may need to reconsider the balance between investing in schooling versus e.g. physical capital or infrastructure when trying to further their social and economic development. However, the findings also provide a negative implication by rejecting that education has caused social trust. The possibilities to invest in trust identified in the recent literature thus remain limited. As a final remark, it must be stressed that this is a first foray into the topic and the paper therefore asks as well as answers questions. Future research could for example investigate whether social trust actually affects search costs in the labour market as assumed in the model, as well as re-

examine the perhaps controversial conclusion that investments in education do not affect the levels of social trust.

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Appendix

INSERT TABLE A1 ABOUT HERE

Of the three main implications, the former two follow directly from solving firms' maximization problem. The derivative of (7) with respect to ω is nevertheless not obviously positive. To see this, note that *l* can be written as (A1); the time derivative thus becomes (A2)

$$l = \left[\left[\frac{\mu\beta}{\delta} \frac{w_0}{1+r} - 1 \right] \frac{\omega(1-\sigma)+\sigma}{K} + \frac{(1-\omega)(1-\sigma)(1+r)}{\mu\beta\delta K} b^2 \right]^{\frac{-1}{\alpha}} \tag{A1}$$

$$\dot{l} = \frac{l}{\alpha} \left[\frac{1-\delta}{\beta b} - \frac{2(1-\omega)(1-\sigma)(1+r)}{Q\mu\beta\delta} b \right] i^* \tag{A2}$$

It can easily be shown that equation (A2) is positive for values of *y* that are below the limit set out in (A3). This is readily interpretable as a condition stating that the overall wage level of uneducated individuals needs to be below a certain bound in order to make it individually rational to invest in education. It follows that the derivative of the temporal development of *l* with respect to *ω* in (10) is positive under the condition in (A5) that can be interpreted in a similar way.

$$y < -X + \sqrt{X^2 + \frac{w_0(1-\delta)\left[\omega(1-\sigma)+\sigma\right]}{b(1+\delta)(1-\omega)(1-\sigma)\delta}} \tag{A3}$$

$$X = \frac{(1-\delta)\left[\omega(1-\sigma)+\sigma\right]}{2b(1+\delta)(1-\omega)(1-\sigma)} \tag{A4}$$

$$y < \frac{1+(1-\omega)(1-\sigma)}{\left(\delta + {bw_0}/{\delta}\right)(1-\omega)(1-\sigma)} w_0 \tag{A5}$$

Table 1. Social trust and growth of average schooling

Growth variable	Average schooling length			Female average schooling length		
	1	2	3	4	5	6
Estimation method	OLS	OLS	Robust	OLS	OLS	Robust
Initial schooling	-0.696***	-0.643***	-0.880***	-0.492***	-0.450***	-0.912***
	(-5.296)	(-5.108)	(-13.992)	(-3.365)	(-3.109)	(-6.933)
Initial GDP per capita	-0.375***	-0.331**	-0.367***	-0.567***	-0.485***	-0.589***
	(-3.015)	(-2.532)	(-6.789)	(-4.076)	(-3.197)	(-6.094)
Social trust	0.373***	0.283***	0.430***	0.379***	0.212*	0.657***
	(3.975)	(2.838)	(8.568)	(3.788)	(1.931)	(6.446)
Regional dummies	No	Yes	No	No	Yes	No
Observations	52	52	51	50	50	50
Adjusted R square	0.710	0.784	0.923	0.689	0.751	0.887
F statistic	42.694	27.381	20.4568	37.115	22.111	128.927

Note: all regressions include a constant term; coefficients are standardised; t-statistics in parentheses; *** denotes significance at p<0.01; ** at p<0.05; * at p<0.10.

Table 2. Social trust and growth of additional schooling

Growth variable	Secondary schooling			Post-secondary education		
	1	2	3	4	5	6
Estimation method	OLS	OLS	Robust	OLS	OLS	Robust
Initial schooling	-0.608***	-0.572***	-0.665***	-0.648***	-0.595***	-0.786***
	(-4.731)	(-4.869)	(-9.433)	(4.613)	(-4.479)	(-7.436)
Initial GDP per capita	-0.395***	-0.527***	-0.634***	0.065	-0.186	0.130
	(-3.019)	(-3.242)	(-9.417)	(0.415)	(-0.889)	(1.001)
Social trust	0.430***	0.461***	0.510***	0.130	0.307*	0.122
	(3.420)	(3.450)	(8.078)	(0.834)	(1.805)	(0.927)
Regional dummies	No	Yes	No	No	Yes	No
Observations	50	50	50	48	48	48
Adjusted R square	0.500	0.591	0.886	0.296	0.402	0.528
F statistic	17.353	11.130	127.880	7.958	5.507	18.509

Note: all regressions include a constant term; coefficients are standardised; t-statistics in parentheses; *** denotes significance at p<0.01; ** at p<0.05; * at p<0.10.

Table 3. Social trust and growth of schooling, robustness

	Average schooling length		Female average schooling length		Secondary schooling	
	Lower bound	Upper bound	Lower bound	Upper bound	Lower bound	Upper bound
Initial schooling	-0.607***	-0.960***	-0.422***	-0.745***	-0.542***	-0.802***
	(-4.253)	(-8.991)	(-2.832)	(-4.985)	(-3.982)	(-6.166)
Initial GDP per capita	-0.107	-0.625***	-0.276*	-0.803***	-0.094	-0.611***
	(-1.007)	(-3.739)	(-1.917)	(-4.644)	(-0.528)	(-4.149)
Social trust	0.314**	0.506***	0.289***	0.544***	0.335**	0.614***
	(2.362)	(4.464)	(2.761)	(5.032)	(2.369)	(4.165)

Note: all regressions include a constant term; coefficients are standardised; t-statistics in parentheses; *** denotes significance at p<0.01; ** at p<0.05; * at p<0.10.

Table 4. Social trust and growth of schooling, IV estimates

Growth variable	Average schooling length		Female average schooling length		Secondary schooling		Post-secondary education	
	1	2	3	4	5	6	7	8
Estimation method	IV	IV ^{alt}	IV	IV ^{alt}	IV	IV ^{alt}	IV	IV ^{alt}
Initial schooling	-0.676***	-0.621***	-0.453***	-0.850***	-0.619***	-0.708***	-0.659***	-0.622***
	(-4.750)	(-3.740)	(2.867)	(7.206)	(-4.512)	(-5.448)	(-4.582)	(-4.574)
Initial GDP per capita	-0.366***	-0.485***	-0.559***	-0.273**	-0.401***	-0.320**	0.131	-0.033
	(2.865)	(-3.423)	(3.872)	(-2.650)	(-2.765)	(-2.027)	(0.728)	(-0.160)
Social trust	0.325**	0.416**	0.301*	0.353**	0.465**	0.412*	0.055	0.078
	(2.289)	(2.047)	(1.962)	(2.412)	(2.364)	(1.700)	(0.244)	(0.285)
Observations	50	45	48	47	48	44	46	43
Adjusted R square	0.688	0.654	0.661	0.787	0.465	0.533	0.309	0.324
F statistic	37.806	29.383	32.256	58.994	14.883	17.716	7.855	7.867

Note: all regressions include a constant term; coefficients are standardised; t-statistics in parentheses; *** denotes significance at p<0.01; ** at p<0.05; * at p<0.10. The instrument for social trust in IV-estimation is absence of corruption; alternative instruments in columns marked 'alt' are Protestant share of population, ethnolinguistic fractionalisation and a dummy for post-communist countries.

Table A1. Variable sources and definitions

Name	Source	Definition
Average schooling length	Barro and Lee (2001)	Average number of years adults over age 25 attended school; initial level is 1960
Average female schooling length	Barro and Lee (2001)	Average number of years female adults over age 25 attended school; initial level is 1960
Secondary schooling as highest	Barro and Lee (2001)	Share of population with secondary schooling as highest level; initial level is 1960
Schooling growth	Barro and Lee (2001)	Percentage growth of one of three schooling measures, 1960-2000
GDP per capita	Heston et al. (2002)	GDP per capita, purchasing power adjusted
Social trust	Inglehart et al. (1998)	Percentage of population saying yes to "In general, do you think most people can be trusted?"
Fertility rate	World Bank (2003)	Number of children born per woman, 1960
Openness	Heston et al. (2002)	Export plus imports as percent of GDP, purchasing power adjusted
Market distortions	Heston et al. (2002)	Price of investments relative to the US, purchasing power adjusted
Inequality	Deininger and Squire (1996)	Income inequality measured by Gini coefficient
Democratic tenure	Gwartney and Lawson (2002)	Number of years country has been democratic in period 1960-2000
Population density	World Bank (2003)	Average number of inhabitants per square kilometre
Government share of economy	Heston et al. (2002)	Share of government activities in GDP
Expenditure per student	World Bank (2004)	Average expenditure per student enrolled in primary school
GDP growth	Heston et al. (2002)	Average yearly percentage growth of GDP, purchasing power adjusted
Average IQ	Lynn and Vanhanen (2002)	Average intelligence

Note: The social trust data are supplemented in two cases (Costa Rica and Ecuador) with data from the ongoing Danish Social Capital project. Trust data are averages of all available observations. For a description of the approach in Heston et al. (2002), see Summers and Heston (1991).

Figur 1. Social trust and growth of average schooling