

Trust and Delegation: Theory and Evidence

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March 2, 2014

Abstract: Social trust is associated with good economic performance, but little is known about the transmission mechanisms connecting trust and performance. We explore the effect of trust on delegation decisions. In a theoretical framework, we note that delegation is a low-cost option when management decisions can be implemented without monitoring. This option is, however, risky and more likely to be profitable in higher-trust environments. In a set of cross-country regressions, we show a strong association between trust and delegation, which is increasing in economic sophistication.

Keywords: Social trust, economic development, delegation

JEL Codes: L22, O40, Z13,

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1. Introduction

Productivity is one of the key drivers of economic growth. As Bloom and Van Reenen (2010a) highlight, poor management practices reduces productivity. Therefore, if one considers productivity increases desirable, it seems well motivated to try to identify ways to reform such practices. Decentralized decision-making has been seen as an important way to make management better in firms, and thus increase firms' performance because (a) it reduces the cost of information transfer and communication, (b) it increases firms' speed of response to market changes, and (c) it increases job satisfaction (Bloom and Van Reenen, 2010b). Given the importance of delegation for productivity, it is natural to analyze the determinants of delegation. In this article, we investigate the role of social trust in delegation.

Following in the footsteps of the pioneering works of Banfield (1958), Putnam (1993) and Fukuyama (1995), a growing empirical literature shows that trust is positively related to long-run growth and development (Knack and Keefer, 1997; Zak and Knack, 2001, Algan and Cahuc, 2010, Horváth, 2013). Within this literature, a smaller number of more recent papers focus on the mechanisms through which trust affect growth and development. Some of the identified mechanisms are financial development (Guiso *et al.*, 2008a, 2008b), human capital (Bjørnskov, 2009; Papagapitos and Riley, 2009; Dearmon and Grier, 2011; Bjørnskov and Méon, 2013), public expenditures (Ponzetto and Troiano, 2012; Bergh and Bjørnskov, 2011), lighter regulatory burdens (Aghion *et al.* 2010; Pinotti, 2012) and inclusive economic and judicial institutions (La Porta *et al.*, 1997; Tabellini, 2008; Bjørnskov, 2010). In this paper, as a contribution to this literature, we instead investigate whether trust affects delegation.

A first question to ask is how trust might affect delegation? The literature shows that trust facilitates cooperation among anonymous persons and reduces the necessity of monitoring (Fukuyama, 1995; La Porta *et al.* 1997; Bjørnskov, 2009). As is well-known, principle-agent problems are harmful for corporate governance. High trust might be a remedy for these problems, and thus improve corporate governance, as monitoring becomes relatively cheaper (e.g. Zak and Knack, 2001). If the level of

trust is high, the shift of decision-making authority from superiors to subordinates might be also more likely. We therefore hypothesize that in high-trust societies, CEOs might give more responsibility to their managers and managers might be more open to give responsibility to their subordinates. On the other hand, delegation might be lower in low-trust societies.

Our paper is related to the newly emerging literature on trust and delegation. In particular, two recent studies deal with micro-level evidence of trust effects on delegation, which we briefly outline before turning to a macro-level theory of how trust might affect the use of delegation. Bloom et al. (2012) focus on the effect of trust on decentralized decision making process within firms. In their model, a CEO has two options to solve production problems. The CEO can address these problems directly or delegate decisions to a plant manager. But, choosing a delegation process requires trust. The CEO might not trust the plant manager's decisions because of misaligned incentives such as those arising from corruption. When the CEO does not trust plant managers, there will be less decentralization and more direct interventions from the CEO and she will become time constrained due to a large number of decisions. The theoretical model in Bloom et al. (2012) shows that firm size is thereby reduced when the CEO's trust in the plant manager is low because the CEO spends more time on solving problems instead of delegating decisions. Trust helps firms to become more decentralized, and decentralization in turn might improve productivity by supporting a large equilibrium firm size. Collecting data on the decentralization of investment, hiring, production, and sales decisions from corporate headquarters to local plant managers in almost 4000 firms in the United States, Europe, and Asia, Bloom et al. (2012) test their model's propositions. Their results show that trust is positively associated with decentralization and firm size.

In another recent paper, Cingano and Pinotti (2012) test these theoretical implications by following Rajan and Zingales's (1998) difference-in-difference methodology to estimate the effect of trust on the structure of production. Cingano and Pinotti (2012) argue that if trust solves principle-agent problems, and thus increases decentralization, it will affect high-delegation industries (such as manufacture of machinery and equipment) more than low-delegation industries

(such as leather, leather products and footwear). Using micro level data from both Italian regions and European countries, they test whether trust increases value added, export and firm size relatively more in delegation-intensive industries. Their results show that trust increases value added, exports and firm size more in high delegation-intensive industries relative to low delegation-intensive industries.

As a contribution to this literature, the aim of this paper is to test whether trust affects delegation by using a cross-country approach. In other words, we ask whether the recent findings generalize to a national setting. To do so, we first develop a simple model that yields directly testable implications. We follow the previous literature by measuring the level of trust as the share of respondents in each country answering yes to the following question: *“In general, do you think most people can be trusted?”* To test the relationship between trust and decentralization, we use a survey-based index of the willingness to delegate authority, which derives from the Global Competitiveness Report.

We employ these main data to test the predictions of this simple model by using a macro level dataset. In order to provide a causal relation, we run two-stage least-squares (2SLS) regressions with predetermined instruments to assess the impact of exogenous variations in trust. To the best of our knowledge, this is the first paper that investigates this topic at the macro level.

The rest of the paper is organized as follows: Section 2 outlines a simple model illustrating the relationship between trust and delegation to frame the empirical analysis. The data used in this paper and the estimation strategy are presented in section 3. Section 4 reports our findings. Finally, section 5 concludes.

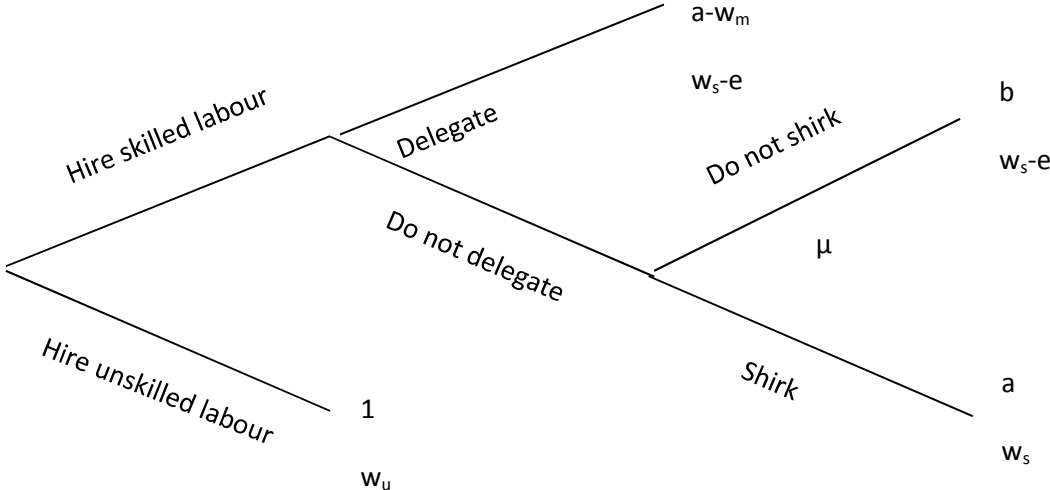
2. Theoretical Model

To model the choice of delegation, we rely on these insights and start with a standard principal-agent framework. A principal, for example a CEO, has the choice between either hiring unskilled labour or hiring skilled labour that is more productive but also difficult to monitor. If the principal hires skilled labour, he must decide between delegating responsibilities directly to a sub-unit, represented by the hired agent, or

not delegating directly but employing a supervisor to monitor the sub-unit. In the latter case, substantially less responsibility is delegated as an extra level of management is created. Figure 4 illustrates the trade-off faced by the principal.

This game provides the background for an optimization decision to be taken by the management: how many unskilled and skilled workers to employ, and how much to delegate directly to employees instead of high-paid supervisors. Unskilled workers earn w_u , skilled workers earn w_s and supervisors earn w_m . The productivity loss if skilled workers are not supervised is $a-b$, and the a priori risk of shirking is $1-\mu$. Shirking brings skilled labour a benefit e in case it is the shirking type.

Figure 4. A P-A game



As such, we introduce trust as one of two elements of the model. First, one might imagine that low-trust shirkers are more likely to benefit from shirking as they feel less shame by behaving dishonestly and their benefit e thus does not include a cognitive cost (e.g. Banfield, 1975; Bjørnskov, 2011). Second, a standard way of modelling trust is to assume that low-trust individuals are more likely to be potential shirkers such that the risk $1-\mu$ negatively reflects the overall trust level of society when firms cannot ex ante monitor the type of employees.

The firm optimizes a standard production function, including a management cost associated with supervisors monitoring employees. Wages are taken as given by each

firm and the interest rate r is set exogenously by a central bank. Profits, π , are maximized by setting employment l_u and l_s and the level of delegation (supervisors), ζ . This yields the management's decision problem:

$$\text{Max } \pi = \theta [n_u^\beta n_s^{1-\beta}]^\alpha k^{1-\alpha} - l_u w_u - l_s w_s - \zeta w_m - r k \quad (1)$$

Where

$$n_u = l_u \quad (2)$$

$$n_s = (\zeta a + (1-\zeta)(\mu a + (1-\mu)b)) l_s \quad (3)$$

This yields the following first-order conditions, where f is the production function in 1:

$$d\pi / dk = 0 \Leftrightarrow (1-\alpha) f = r k \quad (4)$$

$$d\pi / dl_u = 0 \Leftrightarrow \alpha \beta f = w_u l_u \quad (5)$$

$$d\pi / dl_s = 0 \Leftrightarrow \alpha (1-\beta) f = w_s l_s \quad (6)$$

$$d\pi / d\zeta = 0 \Leftrightarrow \alpha (1-\beta) (1-\mu) (a-b) f = w_m (\zeta a + (1-\zeta)(\mu a + (1-\mu)b)) \quad (7)$$

At the firm level, at which wages are taking as given, these four conditions yield an optimum skilled labour force of:

$$l_s = w_m \frac{\mu a + (1-\mu)b}{(1-\mu)(a-b)} \quad (8)$$

As such, it is easy to observe that skilled and unskilled labour is used more intensively if trust is high, i.e. if the shirking risk μ is low:

$$\frac{dl_s}{d\mu} = \frac{w_m}{w_s(1-\mu)} \left[2 - \frac{a}{(1-\mu)(a-b)} \right] > 0 \quad (9)$$

$$\frac{dl_u}{d\mu} = \frac{\beta}{1-\beta} \frac{w_s}{w_u} \frac{dl_s}{d\mu} > 0 \quad (10)$$

Since labour is a limited resource, the increased demand for 'regular' labour therefore implies a reduced demand for management. The positive trust effect on the

demand for regular skilled and unskilled labour thus implies a *lower* demand for management, ζ , and thus expanded use of delegation.

Even without providing a general equilibrium (with a mathematically ugly analytical solution) noting that management must intuitively be hired from the same educated pool as skilled labour provides us with additional insights. First, with less delegation, i.e. a higher management share ζ , a smaller share of the population will work in skilled jobs, l_s . Second, for any given w_u , the returns to management are decreasing in trust. Combined, this must necessarily decrease w_u and – given that $w_m > w_s$ such that there is an incentive to work in management, increase wage inequality. As such, the modelling framework generates a particular result well-known from the trust literature that trust and income inequality are negatively correlated (Uslaner, 2002; Bergh and Bjørnskov, 2013). Overall, the model leads us to two directly testable hypotheses:

H1: Delegation is increasing in trust

Proof: Note that the (9) and (10) imply that ζ must logically be decreasing in trust.

H2: Trust effects on delegation decisions are increasing in the level of technological sophistication hypotheses.

Proof: Note that β is a measure of technological simplicity and that the derivative of (10) is decreasing in β . The second derivate of ζ must thus be increasing in β .

3. Data

Our measure of delegation is from the Global Competitiveness Report, which is therefore a large-scale survey (Executive Opinion Survey) based index. The index is constructed from the answers of CEOs and other members of companies' senior management to the following question: "*In your country would you assess the willingness to delegate the authority to subordinates?*" and ranges from 1 to 7; higher values indicate high willingness to delegate among managers

Following the previous literature, trust is measured through to the standard question "In general, do you think most people can be trusted?" To maximize the number of observations, we follow Bjørnskov and Méon (2013) in compiling several

sources: the five waves of the World Values Survey between 1981 and 2005 (Inglehart *et al.* 2004), data from the 1995 and 2003 LatinoBarometro, the 2001–2004 Asian and East Asian Barometers, the 2001–2007 AfroBarometer, and the 2002–2004 Danish Social Capital Project.

A main challenge is the absence of a standard set of determinants of delegation decisions. We have therefore selected a set of different control variables from different sources, based on the two premises. First, we include variables that are known to be associated with social trust and thus could confound the relation between trust and delegation. Second, we include other variables relating to our theoretical considerations in section 2.

We first include a post-communist dummy variable (*Post-Communist*), as the formerly communist countries are known to have lower trust levels but a history of substantial centralization; this variable is from Bjørnskov and Méon (2013). The other major difference in most trust studies is the Nordic countries, which are the most trusting in the world and known to have a strong culture of delegation of decisions. We therefore include a dummy variable for these countries (*Nordic*).

As a first institutional variable, we use a democracy index (*Democracy*) from the Polity IV dataset, which is widely used in the literature (Marshall and Jaggers, 2010). The *Democracy* index reflects the regulation and competitiveness of political participation, competitiveness and openness of political executive recruitment, and constitutional constraints on the chief executive. The original democracy index ranges from -10 (full autocracy) to 10 (full democracy). To simplify the interpretation, we rescale the values to run from 1 to 10, with 10 being the most democratic. Following our theoretical considerations, we use the share of the population aged 25 and over that has completed secondary education (*SecEdu*) as a proxy for education. This variable is from Barro and Lee (2010), and comes to proxy for the skilled share of the population in the model framework, $I_s + \zeta$.

In order to ensure that such decisions are freely made, we include an index of freedom in life (*FreedomLife*) from the Gallup World Poll (2013). It is the percentage of respondents answering satisfied to the question, “Are you satisfied or dissatisfied with your freedom to choose what you do with your life?” As a second institutional

measure, we also include a standard index of business regulatory freedom obtained from the Fraser Institute's Economic Freedom of the World reports (Gwartney *et al.*, 2013). This index is valued between 0 and 10 where higher ratings indicate greater freedom from business regulations in credit, product and labor markets. This index is included for two separate reasons. First, Aghion *et al.* (2010) show that it is related to trust. Second, Young and Lawson (2014) demonstrate that heavier regulations in particular are associated with lower labor shares of national income (in the model, this would be the relative wage share pertaining to l_u and l_s). Similarly, we also include a measure of the overall quality of institutions, measured by the index of rule of law from the World Governance Indicators constructed by Kaufmann *et al.* (2009).

Oil and gas income (*OilGas*) denotes the value of a country's oil and gas production (constant 2000 US dollars) divided by its midyear population and is included since resource-rich nations often use different production technologies for a sizeable share of national income. These data are from Ross (2012) who calculates oil rents by taking the total value of each country's annual oil and natural gas production, and subtracting the country-specific extraction costs, including the cost of capital. Likewise, we use the standard measure of trade openness, as the sum of exports and imports of goods and services as a share of GDP from the World Bank Development Indicators. We use an index of state antiquity that shows the presence of state government, spanning 39 half centuries from 1 AD to 1950 AD. It is taken from Bockstette *et al.* (2002). This index was constructed by using the following questions: (1) Is there government above the tribal level?; (2) Is government foreign or locally based?; and (3) How much of the territory of the modern country was ruled by this government? This index of state history lies between 0 and 1. Higher values indicate high state antiquity.

To provide evidence suggesting the existence of a causal effect of trust, we follow a recent strand in the trust literature by using a particular set of instruments for social trust suggested in Tabellini (2008) and Bergh and Bjørnskov (2011). Following Bergh and Bjørnskov (2011), we instrument the level of trust by a dummy variable capturing whether the predominant language of a country exhibits the pronoun drop characteristic, the average temperature in the coldest month of the

year and a dummy for the existence of monarchical institutions, such as countries being ‘ruled’ by a king, emperor or other sovereign. We summarize our data in Table 1.

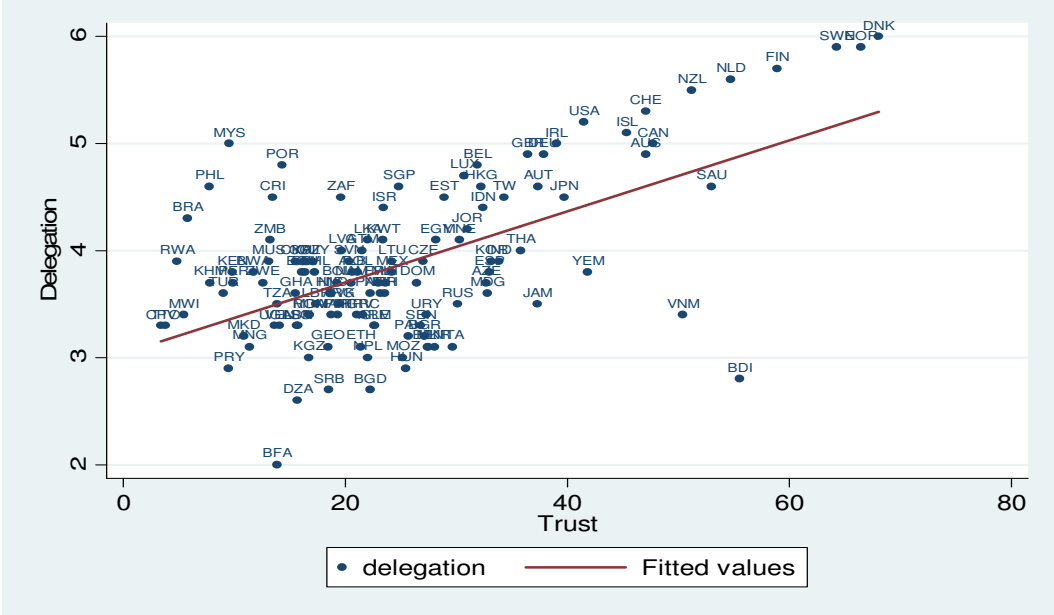
Table 1 Descriptive Statistics

	Observations	Mean	Standard Deviation
Delegation	122	3.82	0.74
Trust	122	25.15	13.44
Post-Com	122	0.20	0.40
Nordic	122	0.04	0.19
FreedomLife	118	67.01	16.68
Democracy	120	3.07	5.50
SecEdu	109	23.09	15.14
BusReg	115	5.79	1.14
Rule	122	0.11	0.97
StateAntq	112	0.46	0.23
OilGas	118	2.55	3.00
Open	118	92.43	58.91
Urban	122	57.37	23.29
GDPpc	119	8.83	1.28
Monarchy	122	0.15	0.36
Pronoundrop	122	1.27	0.45
Mintemp	122	10.69	10.42

4. A Descriptive Look

Our main hypothesis states that social trust positively affects delegation decisions. A first look in Figure 1 at the data we just outlined suggests that this might well be so. The figure clearly illustrates a strong, overall association between delegation and trust. However, it also shows a number of strong outliers, not least Vietnam and Burundi that appear to have either too little delegation or excessive trust scores. At the other end, delegation appears stronger than hypothesized in Malaysia and the Philippines that are low-trust societies.

Figure 1 Trust and Delegation (Full Sample)



Yet, our second hypothesis states that although we would expect that trust is positively correlated with delegation, the theoretical considerations lead us to expect a substantially stronger association in relatively more developed societies, and a correspondingly weak association in poor countries. Indeed, when we divide our sample into two halves (developed versus developing countries), there is no positive correlation between delegation and trust in developing countries (see Figure 2 and Figure 3).

The two figures are in line with the interpretation that high trust countries tend to have more decentralized decision-making processes and thus consistent with our theoretical priors. In the following, we therefore explore whether these simple associations are evidence of an actual, economically meaningful relation.

Figure 2 Trust and Delegation (Developed Countries)

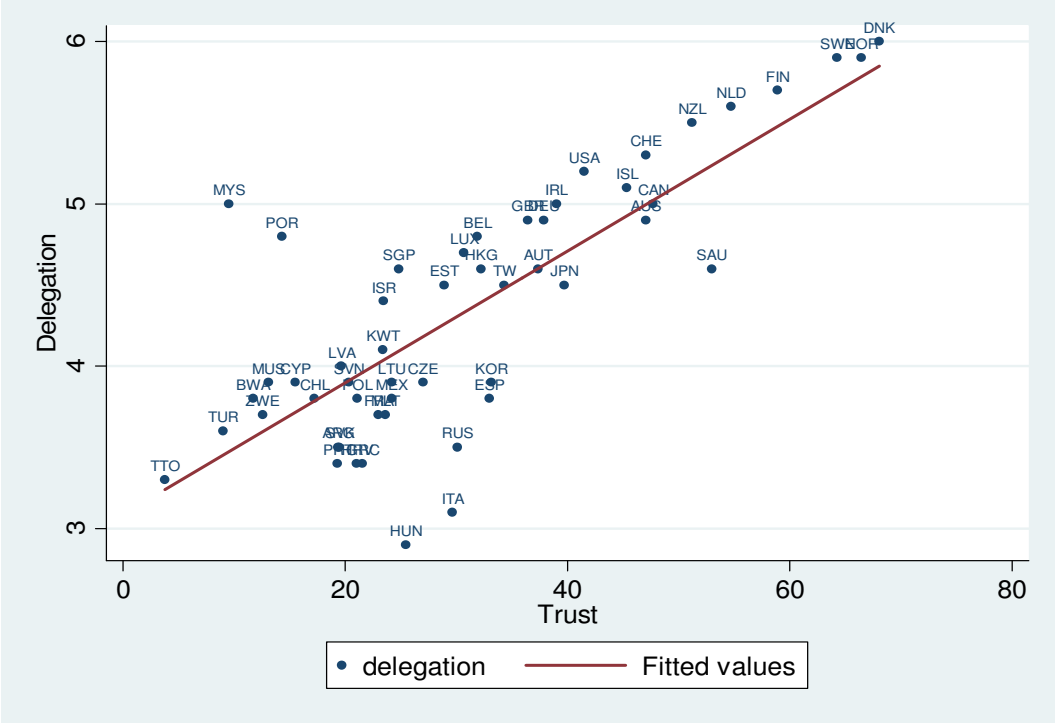
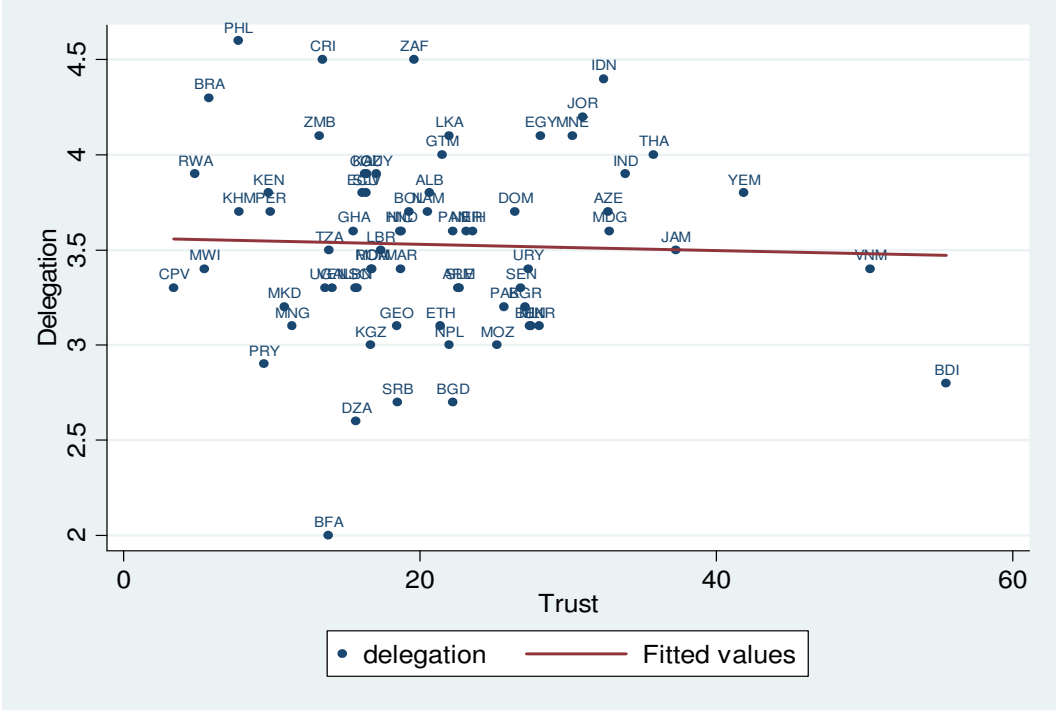


Figure 3 Delegation and Trust (Developing Countries)



5. Methodology and Results

In this section, we estimate the two types of linear regression models to investigate how trust is related to delegation:

$$Delegation_i = \pi + \gamma Trust_i + \theta Z_i + \delta X_i + \varepsilon_i \quad (11)$$

$$Delegation_i = \pi + \gamma Trust_i + \theta Z_i + \vartheta Trust_i Z_i + \delta X_i + \varepsilon_i \quad (12)$$

where Delegation is our index of delegation, Trust is the level of generalized trust, X is a vector of control variables, Z is a vector of potentially moderating control variables (testing H2), and ε is an unobserved error term. All standard errors are robust to heteroskedasticity.

Table 2 reports our OLS results testing our first hypothesis. As can be seen in column (1), the estimated coefficient of trust is positive and statistically significant at 1%. It is also economically significant, as a one standard deviation in trust is associated with approximately a 60 percent increase in delegation. In the next column, we include a post-communist dummy. As several papers highlight, socialist regimes are known to suffer from centralized rule, have a lack of voluntary cooperation, and low trust levels (Kornai, Rothstein and Rose-Ackerman, 2003). Given the persistence of institutions and culture, we would consequently expect the post-communist dummy to bear a negative coefficient. As expected, our post-communist dummy variable is negatively and significantly associated with delegation. As noted above, in contrast to socialist regimes, Nordic countries are known to have decentralized rule, substantial voluntary cooperation and very high trust levels. To take account of this, we add a dummy variable for Nordic countries. Doing so in column (3) shows that Nordic countries do indeed have higher delegation. However, social trust remains highly influential even after controlling for post-communist and Nordic countries.

Column (4) includes our measure of freedom in life. Freedom should increase individual responsibility, and may thus also affect decentralization. Allowing for the effect of freedom is important since it might be strongly correlated with both trust

and delegation. Consistent with such considerations, we find that freedom in life is positively associated with delegation, and statistically significant at 1%. One might also expect weakly democratic institutions to limit cooperation and thus delegation, as well as individuals' attitudes and corporate governance. To control for such effects, we add a measure of democracy, which in column (5) turns out to have a positive and statistically significant association with delegation. Lastly, we include human capital level because the decision to delegate might both be easier and more profitable when there is a significant stock of human capital in the working population. As seen in column (6), the estimated coefficient of human capital is positive and statistically significant. However, even though the coefficient on trust in column (6) is reduced by about 55%, perhaps suggesting that human capital is a transmission channel for some of the trust effect, it remains significant after including all of our control variables simultaneously.

Table 2 OLS Results

	(1)	(2)	(3)	(4)	(5)	(6)
Trust	0.033*** (0.005)	0.032*** (0.005)	0.024*** (0.006)	0.022*** (0.005)	0.020*** (0.005)	0.015*** (0.005)
Post-Com		-0.321*** (0.102)	-0.302*** (0.102)	0.121 (0.117)	0.114 (0.114)	-0.176 (0.165)
Nordic			0.964*** (0.269)	0.609*** (0.209)	0.550*** (0.191)	0.646*** (0.143)
FreedomLife				0.022*** (0.002)	0.019*** (0.002)	0.019*** (0.003)
Democracy					0.023** (0.010)	0.023** (0.010)
SecEdu						0.010*** (0.003)
No of Obs.	122	122	122	118	117	105
R²	0.355	0.385	0.431	0.592	0.619	0.653

Note: Robust (Heteroscedasticity-adjusted) standard errors are in parentheses. ***, ** and * denote statistically significant at the 1 percent, 5 percent and 10 percent, respectively.

Overall, our OLS results therefore suggest that there is positive and statistically significant relationship between trust and delegation. Our main finding

is robust even after controlling for a set of related control variables, and the results in Table 2 are also in line with our expectations with regard to most of the covariates. Yet, the OLS estimates in Table 2 may arguably suffer from endogeneity or simultaneity bias and thus not indicate a causal association.

First, skeptics might argue that OLS results suffer from endogeneity problems in the sense that delegation could cause higher trust through, e.g., reputation effects (e.g. Hardin, 1992). Second, there might be some omitted determinants of delegation that will be correlated with trust. Third, our estimates might suffer from a measurement error problem. Given the difficulties in collecting data on trust, there might be valid concerns about measurement error in trust (e.g. Holm and Danielson, 2005). We alleviate these three problems by using two-stage least square estimation (2SLS) with three different instrumental variables for trust.

Justifications for the variables being utilized as instruments are as follows. Tabellini (2008) argues that languages that allow the personal pronoun to be dropped tend to give less emphasis to individual rights, which in turn reflects a culture of mistrust. It has been argued that people are more dependent on strangers for survival in relatively colder climates, an idea that dates back to Aristotle and Hippocrates (Bjørnskov and Méon, 2013). Lastly, Bjørnskov (2007) finds and argues that people living in monarchies are more trusting because having a monarch family might provide social stability and represent a symbol of unity.

Using predetermined instruments for trust, we estimate the causal effect of trust on delegation. Our first-stage regression equation is:

$$Trust_i = \nu + \theta Monarchy_i + \lambda Pronoundrop_i + \eta Mintemp_i + \phi X_i + \xi_i \quad (13)$$

where *Monarchy* and *Pronoundrop* are dummies for monarchies and pronoun-drop characteristic and *Mintemp* is the average temperature in the coldest month. This strategy will be valid as long as our instruments are uncorrelated with the error term ε_i in equation (1) – that is, if our instrumental variables have no effect on delegation other than through their impact on trust. Our 2SLS results are shown

in Table 3. The first-stage F-statistics are above the critical value of 10, suggesting that we reject the hypothesis that our instruments are weak at the 1% significance level.¹ Sargan test results for the over-identifying restrictions indicate that the instruments meet the exclusion restrictions.

Table 3 2LS Results

	(1)	(2)	(3)	(4)	(5)	(6)
Trust	0.048*** (0.006)	0.050*** (0.006)	0.050*** (0.008)	0.038*** (0.007)	0.034*** (0.006)	0.031*** (0.008)
Post-Com		-0.244** (0.121)	-0.245*** (0.119)	0.146 (0.122)	0.134 (0.116)	-0.081 (0.164)
Nordic			-0.003 (0.269)	0.036 (0.224)	0.082 (0.213)	0.167 (0.254)
FreedomLife				0.021*** (0.003)	0.019*** (0.003)	0.019*** (0.003)
Democracy					0.019* (0.010)	0.010 (0.011)
SecEdu						0.007* (0.004)
No of Obs.	122	122	122	118	117	105
F-test (First-stage)	13.98	20.52	14.50	15.76	14.24	10.41
Sargan Test	0.282	0.390	0.388	0.411	0.831	0.897
R²	0.277	0.272	0.273	0.533	0.578	0.606

Note: Robust (Heteroscedasticity-adjusted) standard errors are in parentheses. ***, ** and * denote statistically significant at the 1 percent, 5 percent and 10 percent, respectively

The 2SLS results show that social trust still has a positive and highly significant impact on delegation. The coefficient of trust in column (1) implies that a one standard deviation in trust is associated with approximately an 87 percent increase in delegation. Our 2SLS estimate of trust is thus larger than our OLS estimate, as is often the case with instrumented estimates. Although the instrumented estimate is not significantly different from the OLS estimates, the

¹ The relevance of instruments is also confirmed by a high Shea R². Results are available upon request.

difference may suggest, as in other studies, that measurement bias in the trust variable creates a negative attenuation bias larger than any potentially positive biases from reverse causality and omitted variables. Columns (2) to (6) furthermore show that the effect of trust is robust to the inclusion of additional control variables.

As a next step we further test the strength and robustness of our results by including other potential determinants of delegation in Table 4. A major alternative explanation of delegation is the quality of institutions and regulations. First, including an index of business regulatory freedom, the positive parameter estimate for the business regulatory freedom in column (1) indicates that delegation is on average higher in countries with low burdens of business regulation. Second, when including a measure of rule of law known to be strongly associated with trust, results in column (2) show that the quality of legal institutions has a positive and statistically significant effect on delegation. Reassuringly, the effect of trust persists despite the inclusion of the institutional and regulatory environment. The emergence of early polities and state societies (state antiquity) is another important determinant of the quality of current institutions (Chanda and Putterman, 2007; Ang, 2013). State antiquity might also arguably affect corporate governance through affecting the quality of current institutions or proxying for remnants of colonial institutions. To control for this argument, we include an index of state antiquity in column (3). Yet, state antiquity has no significant effect on delegation while the effect of trust remains positive and statistically significant.

Natural resources empower rulers as they might use the resource revenues to entrench themselves and their supporters, camouflage public budgets, impose restrictions on press freedom and block democratic and institutions reforms (Aidt, 2003; Ross, 2012). In column (4), where we control for natural resources wealth, results show this inclusion nevertheless does not affect our main result. Second, countries' trade policy might also force firms to change their organization structure. Local firms in an open trade regime are more exposed to competitive pressures, which will force them to decentralize its organization structure in order to be more productive and reap comparative advantage. Therefore, we augment our specification by including trade openness. As seen in column (5), trade openness has

a positive effect on delegation, which becomes statistically significant at 10%. In the next column, we control for urbanization to check the strength of the effect of trust. Urbanization is often observed as a consequence of economic complexity and development. Technical and cultural changes that urbanization brings to our life might not only affect our political and institutional landscape, but also our ways of doing business. When we add the level of urbanization into our analysis, we find that its effect on delegation is positive and statistically significant at 1%, as one would expect if urbanization is a proxy for technological development.

Table 4 Further Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Trust	0.022*** (0.008)	0.023** (0.010)	0.031*** (0.000)	0.029*** (0.009)	0.034*** (0.008)	0.026*** (0.008)	0.026** (0.013)
BusReg	0.172*** (0.052)						
Rule		0.173* (0.88)					
StateAntq			-0.153 (0.239)				
OilGas				0.016 (0.017)			
Open					0.001* (0.000)		
Urban						0.006*** (0.002)	
Continents	No	No	No	No	No	No	Yes
All Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of Obs.	102	105	100	103	102	105	105
F-test (First-stage)	12.49	6.26	8.37	9.18	10.54	9.14	4.08
Sargan Test	0.880	0.817	0.879	0.898	0.744	0.255	0.629
R²	0.683	0.667	0.595	0.609	0.609	0.656	0.651

Note: Robust (Heteroscedasticity-adjusted) standard errors are in parentheses. ***, ** and * denote statistically significant at the 1 percent, 5 percent and 10 percent, respectively

Lastly, we take geography into account, as there is consensus that geography matters for the quality of institutions and culture. Therefore, one might argue that the effect of trust might just reflect geographical differences. In column (6), we therefore take account of this argument by adding continent dummies in to our analysis. Social trust nevertheless remains an important determinant of delegation even after controlling for geography. In sum, our results show that trust has a robust effect that is separate from institutions, regulation, trade openness, urbanization and geography.

As a final concern, our theoretical model shows that firms would not want to delegate authority in countries with non-complex economic structures where most production is undertaken with relatively simple techniques. In order to test the prediction in H2, we run a set of regression models with interaction terms as in equation (2). Our Z-vector of moderating variables proxying for level of economic complexity consists of GDP per capita, trade openness and the level of democracy.

Our first variable for economic complexity is GDP per capita (PPP), which is the most immediately intuitive measure for the level of economic complexity. Trade openness is our second variable for economic complexity, as openness increases economic complexity through not only increasing the size of the market, but also enabling countries to import more advanced intermediated goods. Democracy is our third variable that proxies for the level of economic complexity. Democracy is argued to protect property rights, reduce entry barriers and support free enterprises, and may also offer superior environments in which to exploit advantages of new technologies (Acemoglu, 2008). In empirical work, Aghion *et al.* (2007) for example find that democracy affects productivity growth in different sectors differently. While democracy is conducive to growth in more advanced sectors of an economy, it does not matter for growth in less advanced sector, suggesting that democratization or related institutional changes will make an economy more advanced and complex (e.g. Rode and Gwartney, 2012).

In Table 5, the full baseline specification from Table 2 is included although not shown. It is important to note that with interaction terms, the single terms cannot be

interpreted per se (cf. Brambor *et al.*, 2006). Instead, for interactions that turn out to imply significantly heterogeneous effects, we plot the relation against trust in subsequent graphs, including 95 % confidence intervals. We first of all note in column (1) that the effect of trust on delegation is highly heterogeneous in economic development. The solid sloping line in the corresponding Figure 4 shows how the effect of trust changes with GDP per capita; 95% confidence intervals around this line allow us to determine the conditions under which trust has statistically significant effect on delegation. As can be seen in the figure, at low levels of GDP per capita, trust may even lower delegation, although negative estimates are never significant. Conversely, beyond a GDP per capita level of approximately 1100 \$, the effect of trust becomes positive and significant above GDP per capita level of about 3300 \$.

Table 5 Interaction Effects

	(1)	(2)	(3)
Trust	-0.069*** (0.020)	0.017 (0.011)	0.009* (0.004)
GDPpc	-0.034 (0.071)		
Trust x GDPpc	0.010*** (0.002)		
Open		0.002 (0.003)	
Trust x Open		-0.000 (0.000)	
Democracy			-0.028 (0.017)
Trust x Open			0.002*** (0.000)
Controls	Yes	Yes	Yes
No. of Obs	103	102	105
R ²	0.74	0.67	0.67

Note: Robust (Heteroscedasticity-adjusted) standard errors are in parentheses. ***, ** and * denote statistically significant at the 1 percent, 5 percent and 10 percent, respectively. In each specification, dummies for post-communist and Nordic countries, freedom in life, democracy and education are included, but not shown.

Conversely, as shown in Figure 5, it is difficult to interpret the openness interaction, as any effects seem to be driven by the super-trading countries in our sample. Consistently with institutional arguments, the results in column (3) of Table 5 and Figure 6 instead show that the effect of trust on delegation increases with the level of democracy and become significant at relatively low levels of political freedom.

In summary, a set of relatively simple cross-sectional estimates, employing a new measure of delegation, show that social trust is a robust and statistically significant predictor of delegation. With the heterogeneity in mind, we therefore proceed to discuss these results in the final section.

Figure 4 Trust Interacted with GDP per capita

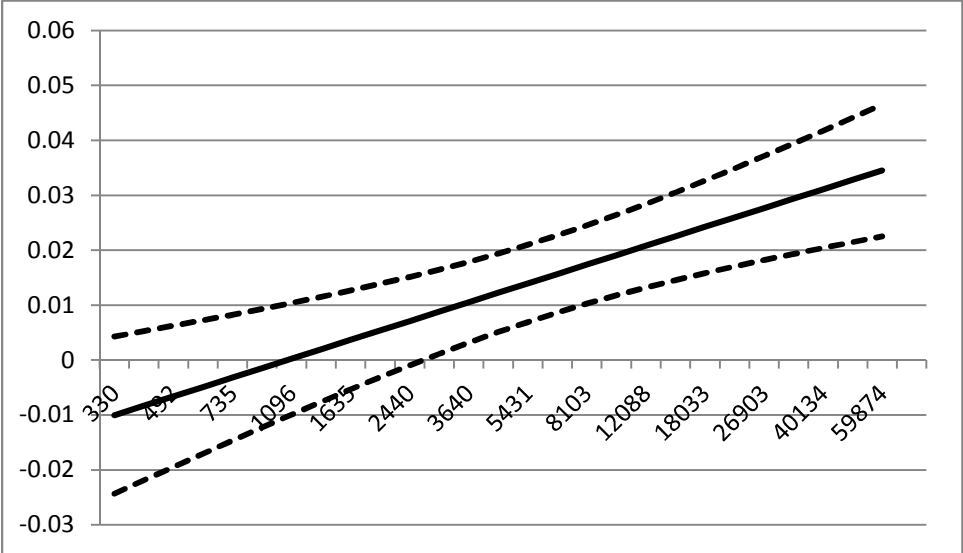


Figure 5 Trust Interacted with Openness

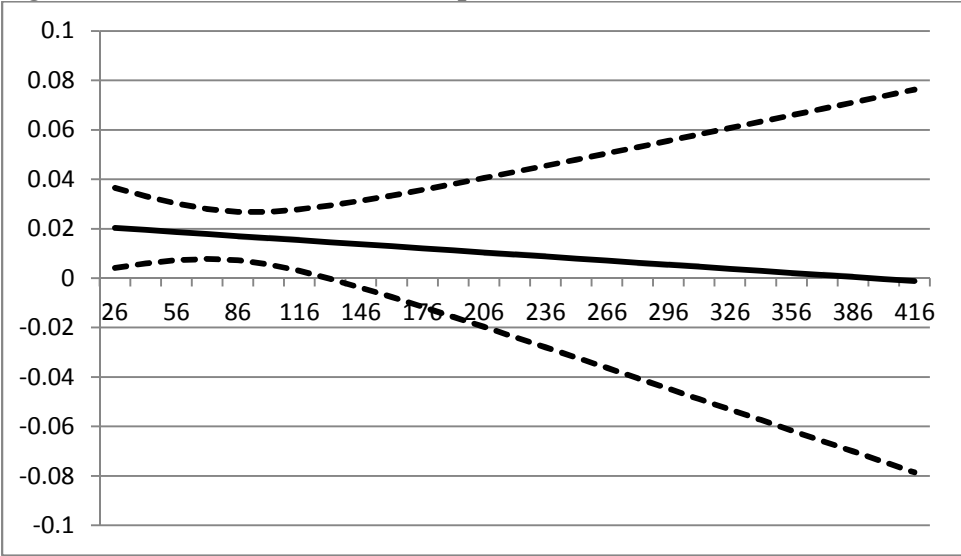
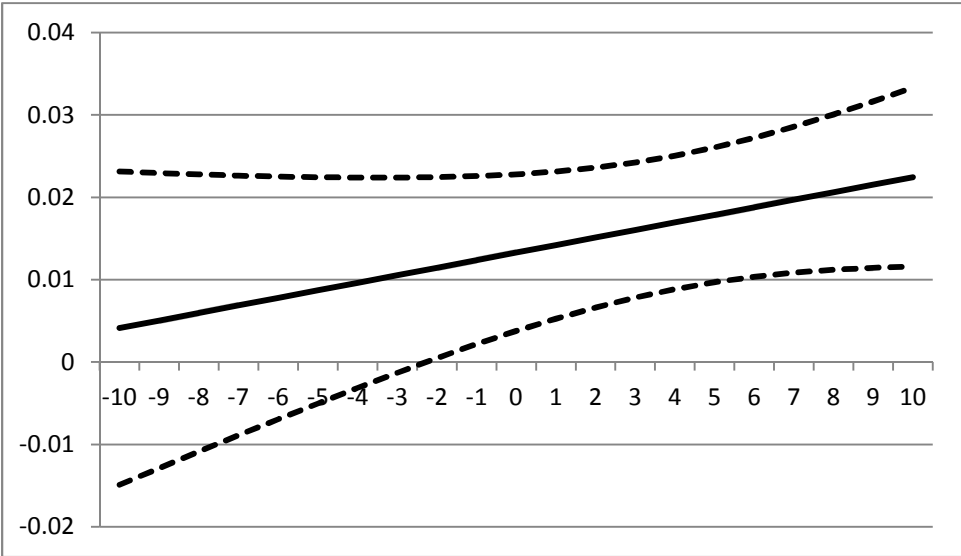


Figure 6 Trust Interacted with Democracy



6. Conclusions

The literature on social trust entered the mainstream of economics, political economy and political science following the seminal contributions of Putnam (1993), Fukuyama (1995), and perhaps particularly Knack and Keefer (1997). It is now considered a determinant of long-run growth rates, institutional quality, and education. Recent studies also indicate support for Knack and Keefer’s (1997) preliminary suggestion that high-trust countries are more productive, all other things

being equal. However, much is still unknown about the likely transmission mechanisms between a culture of trust and productivity and economic performance.

In this paper, we have revisited one of the original suggestions from the early literature: that social trust might affect the way work and production processes are organized. We outlined a simple model in which firms decide how much unskilled labor, skilled labor and management to hire. The decisions rest on the problem that monitoring needed to ensure that skilled labor makes a proper effort is costly. Each firm thus makes a trade-off between delegating decisions and risking that skilled labor does not make an optimal effort when not being closely monitored, or *not* delegating responsibility and thus incurring an additional management cost on the firm. We argue that in countries with higher trust levels, the monitoring problem is less important, implying that the optimal delegation choice is to delegate more responsibility than in low-trust countries. However, the theoretical section also outlines how this choice is more important in countries with a more sophisticated production technology, as it rewards skills.

In a large cross-section of countries, we find that countries exhibiting relatively higher trust levels indeed do delegate more responsibility and more decisions. As far as instrumental variables techniques can inform about causal relations, the association between delegation and social trust appears causal. We also find support for our second hypothesis that this association is substantially stronger in countries with more developed and sophisticated production technologies: the pay-off of trust in terms of delegation options is larger in more developed countries.

At the end of the day, delegation is likely to be an organizational option, which both allows firms to minimize their management costs and – in real life outside our simple modelling framework – allows firms to take advantage of local and ore tacit knowledge in production decisions. However, this option rests on the risk of shirking when labor is not monitored. Our results thus points to a transmission mechanism connecting social trust and overall productivity, as high-trust countries have more access to low-cost delegation.

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