The Sensitive Nature of Social Trust to Intelligence

Kodila-Tedika, Oasis and Asongu, Simplice and Azia-Dimbu, Florentin

February 2016

AFRICAN GOVERNANCE AND DEVELOPMENT INSTITUTE

<u>A G D I   Working Paper</u>

WP/16/005

The Sensitive Nature of Social Trust to Intelligence

Oasis Kodila-Tedika[1]
Universityof Kinshasa
Department of Economics, DRC
oasiskodila@yahoo.fr

Simplice A. Asongu
African Governance and Development Institute,
P.O Box 8413, Yaoundé, Cameroon,
asongusimplice@yahoo.com

Florentin Azia-Dimbu
Université Pédagogique Nationale
Department of Psychology

---

[1]Corresponding author.

AGDI Working Paper

The Sensitive Nature of Social Trust to Intelligence

Oasis Kodila-Tedika, Simplice A. Asongu & Florentin Azia-Dimbu

Abstract

This study investigates the relationship between social trust and intelligence. The extreme bound analysis of Levine and Renelt is employed to directly assess the strength of the nexus. The findings confirm the positive and robust nexus between social trust and intelligence. We have contributed to the literature by confirming that the previously established positive linkage between intelligence and trust is not statistically fragile. In fact the nexus withstands further empirical scrutiny with more robust empirical strategies.

1. Introduction

Trust has recently received increasing attention in the economic development literature. Scholars have paid particular attention to two broad dimensions of trust namely: its causes and consequences (see notably, Alesina & La Ferrara, 2002; Bjornskov, 2006; Wahl, 2012; Sturgis et al., 2010; Hooghe et al., 2012; Carl & Billari, 2014). In the underlying literature, emphasis has been placed on the consequences of human capital or its relationship with social trust (Coleman, 1988; Gradstein & Justman, 2000; Bassanini, & Scarpetta, 2002). Bjørnskov

(2009) is also consistent with this stream of the literature. Whereas the trust variable has been used by Bjørnskov (2009) in the conditioning information set as a control variable, we employ it in this study as the dependent variable of interest. This note complements this stream of the literature by employing Leamer's (1983, 1985) version of extreme bound analysis (EBA). Consistent with Levine and Renelt (1992), small changes in explaining variables are susceptible to affect the variable of interest.

The rest of the study is structured as follows. Section 2 outlines the methodology of EBA and describes corresponding data. The empirical results are presented in Section 3 while Section 4 concludes.

2. Extreme Bound Analysis

The EBA employed for the sensitivity test is in accordance with Leamer and Leonard (1983) and Leamer (1985). The central insight of the EBA method is that a coefficient of theoretical interest is *robust* to the extent that this coefficient exhibits a small range of variation in the presence or absence of other explanatory variables (Hafner-Burton, 2005).

The form of equation to estimate is as follows:

$$Trust_i = \propto X_i + \beta IQ_i + \gamma Z_i + \mu_i$$

where, $Trust_i$ is the variable of interest to be explained, X_i is a vector of standard explanatory variables, IQ_i representing the intelligence quotient (IQ) is the main independent variable of interest, and Z_i is a vector of potential additional explanatory variables or variables identified in past studies as important explanatory variables of Social trust.

In accordance with Levine and Renelt (1992, p. 944), this study computes the regression results for all feasible linear combinations of up to three Z-indicators and then identifies the lowest and highest values for the estimated coefficient of interest β, which cannot be rejected

at a 95% confidence level. The level of significance corresponding to the partial correlation between IQ and social trust can be examined from extreme bounds of the estimated coefficient of interest β. In the case where the estimated coefficient has the same sign at the extreme bounds and remains significant, a fair amount of confidence in the partial correlation can be maintained. Within this framework, robust findings can be inferred. Conversely, if the estimated coefficient changes in sign and losses its significance, then the confidence on a relationship between trust and IQ reduces because alterative control variables modify inferences that might be derived from the investigated nexus. Hence, the findings here are statistically fragile.

Sala-i-Martin (1997) has argued that Leamer's criterion is strong. Whereas the author has proposed another EBA version, we employ Leamer's approach because it has been documented to be a more robust criterion (see Levine & Renelt, 1992).

Following the underlying literature, we use the trust indicator from the World Values Survey (WVS) which surveys the proportion of a population that answers "yes" to the fundamental question: ''*in general, do you think that most people can be trusted, or can't you be too careful?*''. WVS data for a number of countries has been available since 1981 and is generally accepted as a reliable indicator of trust at the aggregate level. National social trust scores have proven to be fairly valid measures of honesty, trust and trustworthiness (Bjørnskov, 2006). Moreover, the indicator has been employed in a substantial bulk of the literature (Bjørnskov, 2006, 2009; Kodila-Tedika & Agbor, 2012; Kodila-Tedika. & Asongu, 2013).

The intelligence data is obtained from Meisenberg and Lynn (2011). Past versions of this dataset are available in Lynn and Vanhanen (2006). The dataset uses best practice methods to compile hundreds of national IQ average test scores during the 20th and 21st centuries. The average IQ is a general-purpose human capital indicator as well as a

measurement of a country's quality of labor (see Hanushek & Kimko, 2000; Jones & Schneider, 2006; Kodila-Tedika & Asongu, 2015ab). The data has been substantially employed in the intelligence literature (e.g. Weede & Kämpf, 2002 ; Jones & Schneider, 2006 ; Ram, 2007 ; Potrafke, 2012 ; Kodila-Tedika, 2014 ; Rindermann et al., 2014 ; Kodila-Tedika & Mustacu, 2014 ; Kodila-Tedika & Bolito-Losembe, 2014). This data from Hanushek on the one hand and Lynn and Vanhanen on the other hand is continuously being improved (see Meisenberg & Lynn, 2011; 2012).

In accordance with the trust literature (Bjornskov, 2006; Wahl, 2012), we control for democracy, settlement duration, temperature, GDP per capita, trade openness, Years since agricultural transition, institutions, and ethnic fractionalization. GDP per capita and trade openness are obtained from Penn World Tables. The measure of ethnic fractionalization is from Alesina et al. (2003). As geographical controls, the temperature (Ashraf & Galor, 2013) and latitude of a country in absolute degrees are used (Parker, 1997). Institutional data is from Kaufmann et al. (2010). The data on communism is obtained from Kodila-Tedika and Kanyama-Kalonda (2014) while variables on Settlement duration and Years since the agricultural transition are respectively from Ahlerup and Olsson (2012) and Putterman (2006). The variable on democracy is provided by Cheibub et al. (2010). The summary statistics of the variables is provided in Table 1. From the variations of variables, we can be confident that reasonable estimated linkages would emerge.

Table 1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Social trust	113	25.452	13.399	3.4	64.270
IQ	175	84.208	10.853	61.2	106.9
G	140	8.871	1.188	5.903	11.173
L	114	28.153	17.759	1	65
C	109	0.193	0.396	0	1
M	113	0.150	0.359	0	1
D	140	0.657	0.476	0	1
O	190	94.805	52.257	1.852	436.345
I	181	-0.140	2.207	-4.894	4.592
F	166	0.459	0.270	0	0.98
S	144	6.183	4.903	0.12	16
AT	165	4814.242	2453.842	362	10500
ME	114	20.726	6.919	-7.634	28.194

G : GDP per capita, L: lattitude, C: communist ; M: monarchy ; D: democracy ; O :Openness ; : institution ; F : ethnic fractionalization; ME : temperature ; AT : agricultural transition; S : Settlement duration. Obs: Observations. Std. Dev: Standard Deviation.

3. Empirical results

The extreme bounds for coefficients are reported in Table 2 along with their 95% confidence intervals. This table is presented in four parts. The estimations are based on Ordinary Least Squares (OLS) with two bounds on the independent variable of interest (high and low) and alternative specifications (as shown in the X and Z columns). The high beta (β) is the estimated coefficient from the regression with the extreme high bound (beta plus two standard deviations) while the low beta is the coefficient from the regression with the extreme lower bound.

Table 2. Main results

β		t	Obs	X	Z	Robust/fragile
High	0.758***	5.3986		**G, L, C**	**M, D, O**	**Robust**
Base	0.428*	1.70	**73**	**G, L, C**		
Low	0.455**	2.4810		**G, L, C**	**M, D, O**	
High	0.544***	3.2574		**G, L, C**	**M, I, F**	**Robust**
Base	0.428*	1.70	**73**	**G, L, C**		
Low	0.400**	2.1681		**G, L, C**	**M, I, F**	
High	0.508***	2.9045		**ME, AT, S**	**M, I, F**	**Robust**
Base	0.697**	2.45	**62**	**ME, AT, S**		
Low	0.3917***	2.7139		**ME, AT, S**	**M, I, F**	
High	0.669***	4.4466		**ME, AT, S**	**M, D, O**	**Robust**
Base	0.697**	2.45	**62**	**ME, AT, S**		
Low	0.4231**	2.4719		**ME, AT, S**	**M, D, O**	

G : GDP per capita, L: lattitude, C: communist ; M: monarchy ; D: democracy ; O: Openness ; I: institutions ; F: ethnic fractionalization; ME: temperature ; AT: agricultural transition; S : Settlement duration. ***; **, * denotes significance levels of 10%, 5% and 1% respectively. Obs: Observations.

As average, β of the intelligence variable varies between 0.4 and 0.7. We find that this coefficient is always significant and its sign does not change. Thus, it is statistically reasonable to infer that the relationship between trust and intelligence withstands empirical validity. In other word, the relationship is robust. In essence, high levels of intelligence are associated with substantial levels of social trust. In other words, countries endowed with high IQ also enjoy higher social trust levels.

4. Concluding implications and future directions

We have confirmed the findings of previous literature that has established a positive relation between the quality human resources and social trust. For example Bjørnskov (2009)

has found a positive correlation between social trust and IQ. Whereas the trust variable has been used by Bjørnskov (2009) in the conditioning information set as a control variable, we have employed it in this study as the dependent variable of interest. We have extended the study in the light of previous literature from Leamer (1983, 1985) and Levine and Renelt (1992), who had shown that classical regressions are highly sensitive to changes in the conditioning information set (or control variables). The extreme bound analysis (EBA) technique has been employed to assess the solidity of the relationship between social trust and human capital. More specifically, the nexus between IQ and social trust has been assessed and a robust relationship between the two variables established. We have contributed to the literature by confirming that the previously established positive linkage between intelligence and trust is not statistically fragile. In fact, the nexus withstands further empirical scrutiny with more robust empirical strategies.

Future studies devoted to improving the extant literature can focus on assessing the established linkage throughout the conditional distributions of trust. The motivation underlying this recommendation is that the established nexus may depend on initial levels of trust such that the sensitivity of the relationship differs in sign and magnitude across countries with low, intermediate and high levels of trust.

References

Ahlerup, Pelle, and Ola Olsson. 2012. .The Roots of Ethnic Diversity. *Journal of EconomicGrowth*, 17(2): 71.102.

Alesina, A. & La Ferrara, E. (2002). Who Trusts Others? *Journal of Public Economics*, 85 (2), 20-34.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., Wacziarg, R .(2003): Fractionalization. *Journal of Economic Growth* 8(2), pp. 155–194.

Ashraf, Q. & Galor, O. (2013) 'The "Out of Africa" Hypothesis, Human Genetic Diversity, and Comparative Economic Development', *American Economic Review* 103, 1-46.

Berggren, N., Elinder, M. & Jordahl, H. (2008). Trust and Growth: A Shaky Relationship. *Empirical Economics* 35, 251–274.

Bjørnskov, C. (2009). Social Trust and the Growth of Schooling. *Economics of Education Review* 28(2), pp. 249–257.

Bjørnskov, C. (2006). Determinants of Generalized Trust: A Cross-Country Comparison. *Public Choice*, 130, 1-21.

Carl, N., & Billari, F. C., 2014. Generalized Trust and Intelligence in the United States, *PLoS ONE* 9(3): e91786. doi:10.1371/journal.pone.0091786.

Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology* 98, S95-120.

Cheibub, J., Gandhi, J. and Vreeland, J.R. 2010. Democracy and dictatorship revisited, *Public Choice* 143(1-2), 67-101.

Gradstein, M., &Justman, M. (2000). Human capital, social capital, and public schooling. *European Economic Review* 44, 879-890.

Hafner-Burton, E. 2005, Right or Robust? The Sensitive Nature of Repression to Globalization,*Journal of Peace Research, vol. 42, no. 6, 2005, pp. 679–698*

Hanushek, E. A. and Kimko, D. D. (2000). Schooling, Labor-Force Quality, and the Growth of Nations. *American Economic Review*, 90, 1184-1208.

Hanushek, E. A. and Woessmann, L. (2008). The Role of Cognitive Skills in Economic Development. *Journal of Economic Literature*, 46(3), 607-668.

Hanushek, E.A. and Woessmann, L. (2009) Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation. IZA Discussion Papers No. 4575.

Hooghe, M., Marien, S., & de Vroome, T., 2012. The cognitive basis of trust. The relation between education, cognitive ability, and generalized and political trust, *Intelligence*, 40(6), pp. 604-613.

Jones, G. and Schneider, W. J. (2006). Intelligence, human capital, andeconomic growth: A Bayesian Averaging of Classical Estimates (BACE) approach. *Journal of Economic Growth*, 11, 71-93.

Kaufmann, D., Kraay, A., Mastruzzi, M., 2010. The worldwide governance indicators: methodology and analytical issues. *Policy Research Working Paper Series* 5430. The World Bank.

Kodila-Tedika, O. & Asongu, S. A. (2015a). The effect of intelligence on financial development: a cross-country comparison. *Intelligence,* 51, 1-9.

Kodila-Tedika, O. & Asongu, S. A. (2015b).Intelligence, Human Capital and HIV/AIDS: Fresh Exploration, *Intelligence,* 53, 154–159.

Kodila-Tedika, O. (2014), Governance and Intelligence: Empirical Analysis from African Data, *Journal of African Development*, 16(1), 83-97.

Kodila-Tedika, O. and Bolito-Losembe, R. (2014). Poverty and Intelligence: Evidence Using Quantile Regression, *Economiic Researrch Guarrdian*, (1): 25-32.

Kodila-Tedika, O. and Mutascu, M. (2014). Tax Revenues and Intelligence: A Cross-Sectional Evidence, MPRA Paper 57581, University Library of Munich, Germany.

Kodila-Tedika, O. & Asongu S. (2013). Trust and Prosperity: A Conditional Relationship, Working Papers 13/024, African Governance and Development Institute.

Kodila-Tedika, O. & Agbor Agbor, J. (2016). Does Trust Matter For Entrepreneurship: Evidence From A Cross-Section Of Countries, *Economies* .

Leamer, E. & Leonard, H. 1983. 'Reporting the Fragility of Regression Estimates', *Review of Economics and Statistics* 65(2): 306–317.

Leamer, E. (1983) Let's take the con out of econometrics, American Economic Review, 73, 31–43.

Leamer, E. (1985). Sensitivity Analyses Would Help', *American Economic Review* 75(3): 308–313.

Levine, R. and Renelt, D. (1992). A Sensitivity Analysis of Cross-Country Growth Regressions, *American Economic Review* 82(4): 942–963.

Lynn, R. and Vanhanen, T. (2006) *IQ and Global Inequality*. Augusta GA: Washington Summit.

Lynn, R. and Vanhanen, T. (2012) *Intelligence. A Unifying Construct for the Social Sciences*. London: Ulster Institute.

Meisenberg, G. & Lynn, R. (2011). Intelligence: A measure of human capital in nations. *Journal of Social, Political and Economic Studies*, 36(4), 421-454.

Meisenberg, G. & Lynn, R. (2012). Cognitive Human Capital and Economic Growth: Defining the Causal Paths. *Journal of Social, Political and Economic Studies*, 37(4), 141-179.

Parker, Philip M. (1997): *National Cultures of the World: A Statistical Reference*. Greenwood Press.

Potrafke, N. (2012). Intelligence and corruption. *Economics Letters*, 114,109-112.

Putterman, L. (2006) "Agricultural Transition Year Country Data Set." *Brown University*.

Ram, R. (2007). IQ and economic growth: Further augmentation of Mankiw-Romer-Weil model. *Economics Letters*, 94, 7-11.

Rindermann, H., Kodila-Tedika, O. and Christainsen, G. 2014. Cognitive capital, governance, and the wealth of nations, MPRA Paper 57563, University Library of Munich, Germany.

Sala-I-Martin, X., (1997). What Have We Learned from Recent Empirical Growth Research? I Just Ran Two Million Regressions, *American Economic Review* 87(2): 78–183.

Sturgis, P., Read, S., & Allum, N., 2010. Does intelligence foster generalized trust? An empirical test using the UK birth cohort studies, *Intelligence*, 38(1), pp. 45-54.

Wahl, F. (2012). Why it matters what people think: Beliefs, legal origins and the deep roots of trust, FZID Discussion Papers, No. 52-2012

Weede, E. and Kämpf, S. (2002). The impact of intelligence and institutional improvements on economic growth. *Kyklos*, 55, 361-380.