Does Education Lead to Higher Generalized Trust?

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1. Introduction: The Trust-Education Puzzle

Generalized trust has become a prominent concept at the nexus of several disciplines, and the wide differences in trust between different societies continue to puzzle the social science. Based on a large number of surveys, study after study reports huge differences in the proportion of people that state that they believe that "most other people can be trusted". Social trust can be defined as "a bet on the future contingent actions of others"[1]and is therefore also an important part of what has been conceptualized as social capital[2]. One reason for the great interest in the question of why trust varies to such a large extent is that there are by now considerable empirical support for the claim that a high level of social trust is beneficial for a number of outcomes that from most normative accounts are considered valuable. These are for example economic prosperity, life satisfaction, the quality of democratic institutions and most standard measures of population health[3]. This has of course spurred a huge debate about what generates (and destroys) social trust[4]. A number of studies have pointed to historical and cultural factors that sometimes go back several centuries[5]. This may very well be scientifically correct but from the perspective of making social science research policy relevant, this knowledge is of limited value for political leaders who - for the good reasons mentioned above - want to find ways how to increase the level of social trust in their societies. From a "relevance perspective", we believe there are good reasons for researching the possible impact of contemporary factors that can be changed by political means[6]. A number of such variables have also been put forward such as increasing the

[1] Sztompka 1998, 21

[2] Putnam, Leonardi, and Nanetti 1993

[3] Knack and Keefer 1997; Larsen 2013; Horváth 2012; Robbins 2012; Bjørnskov 2012; Rothstein 2011; Helliwell 2006

[4] Hooghe and Stolle 2003

[5] Putnam et al. 1993; Satyanath et al. 2013; Bergh and Bjørnskov 2011

[6] Rothstein 2015

participation in voluntary associations[7], reducing corruption[8] as well as expanding universal welfare state programs[9]. There is, however, one factor that has received especially strong support and that is education. For example, Uslaner states that "the single best predictor of social trust and virtually every type of participation is education"[10]. In this paper, we examine a hitherto neglected condition for education to work for increasing social trust which is the quality of government institutions. [11] Our main contribution is to show that it is only when universal education is combined with high institutional quality that we should expect to find education to increase social trust.[12] . Otherwise, the effect of education becomes negligible, which calls into question the view that just increasing the time children spend in school can serve as a panacea for low trust environments.

On the empirical side, this proposition is tested using unique and by the authors newly collected survey data, for a sample of roughly 85,000 people in 24 European countries. The effects are tested using a multilevel model: individuals nested in regions, nested in countries. The findings, controlling for many individual and country level factors, show that the effect of education on generalized trust is highly conditioned by country levels of QoG. For example, at low levels of QoG, the models show no statistical differences in social trust between respondents of any level of education, while the trust gap between people of various levels of education increases significantly when we take institutional quality into account. We find that while the conditional effects of institutional quality are consistent for both regional and country levels, the latter has a noticeably stronger impact for increases at all levels of education. We also show that our empirical evidence is highly robust to alternative model specifications, data sources and the removal of outliers.

2. Education and Social Trust: Theory and Evidence

[7] Putnam 2000

[8] Uslaner 2008

[9] Rothstein and Uslaner 2005

[10] Uslaner 1999,134, Putnam 2000, Helliwell and Putnam 2007

[11] Rothstein 2011

[12] Rothstein and Teorell 2008

With respect to the relationship between education and social trust, the literature has for the most party held an optimistic view[13]. Several theoretical reasons for why education should increase the level of social trust has been presented. At the individual level, it has been argued that education may make people better informed and improves skills for handling information which should increase their social trust[14]. Several studies argue that it increases one's contact with more diversity and cosmopolitanism and leads to more tolerance and less suspicion of others[15]. Another argument is that participation in higher education creates a "climate of trust" that creates a virtues circle for trust. The authors state that "If individuals know that higher education levels make others more likely to be trusting (…..), then they are in turn more likely to trust others"[16]. A similar argument is that college education increases the individuals social trust because it makes these individuals "open-minded to accept otherness from heterogeneous groups, and inspiring consensus on normative values".[17]

At the aggregate level it has been argued that better educated citizens are more likely to complain to government authorities about misconduct which will increase the quality of government operations, reduce corruption which in its turn have a positive effect on social trust[18]. Another, more historical argument is that the introduction of free universal education that started in the 19th century in most western countries lead to the growth of identification with the nation state[19]. Widespread public education created hitherto unknown "strong bonds to unknown co-nationals working in the wheat fields thousands of miles away…ties of loyalty to strangers who do not share one's attributes or milieu…"[20]. As one astute analysis of France puts it, mass public education made "peasants into Frenchmen"[21]. Education made subjects into citizens, thereby increasing the demands and expectations about honesty both in government and from other

[13] Huang et al 2011, 2012; Putnam 2000, Helliwell and Putnam

[14] Keefer and Knack 2005

[15] Sullivan et al. 1982

[16] Helliwell and Putnam 2007, 17

[17] Huang et. al. 2011, 306

[18] Botero et al. 2013

[19] Darden 2014

[20] Darden 2014

[21] Weber 1976

people in general[22]. In addition, universal education lead to increased social and economic equality and as Uslaner has argued, equality is a central factor behind social trust[23].

Empirical evidence has for the most part been supportive for these theoretical claims[24]. However, the relationship tends to vary depending on the country context[25] thus presenting us with an empirical puzzle – why does education have a positive impact on generalized trust in some socieities but not others In a meta-analysis of 154 estimated results from 28 empirical studies of the effect of education on social trust concluded that one additional years of education "increases individual social trust by 4,6% of its standard deviation" (Huang et al. 2011, 292). Results from countries like the UK, USA and Denmark confirm the results that education spurs social trust[26]. Another study found that find that while education has little effect on participation in voluntary organizations, it has a strong effect on trust in the U.K[27]. However, in a study based on data from 1999 and comparing seven countries (East-Germany, West-Germany, Hungary, Slovenia, South-Korea, Spain, Switzerland), Delhey and Newton found that education only had an effect on social trust in two countries in their study (West-Germany and Switzerland). Similarly, in a study using World Value Study survey data for sixty countries, these authors found that education became insignificant after controlling for Protestantism and ethnic diversity[28]. An analysis based on data from 2002 and 2007 for 21 European countries also shows that the positive effect of education on social trust is not universal[29].

Our argument is that the problem with results pointing in many different directions may be due to the fact that what is measured as "education" is only the time (years) children and young people are attending school, not what takes place in the schools during this time. It should be obvious that the quality and thereby impact of education can vary enormously in different schools and educational systems due to for example economic resources and the competence as

[22] Uslaner and Rothstein 2015

[23] Uslaner 2002

[24] Huang et al 2011, 2012; Putnam 2000, Helliwell and Putnam 2007

[25] Delhey and Newton 2005

[26] Brehm and Rahn 1997; Alesina and La Ferrara 2002

[27] Huang et al. 2011

[28] Delhey and Newton 2005

[29] Borgonovi 2012

well as the ambition of teachers and school leaders. The impact of education should also vary due to people's experience of the moral standard of the educational system. Because all educational systems entail considerable space for discretionary power in the implementation process, they are vulnerable to many forms of favoritism. This is where the QoG variables enter. In many countries, corruption and other forms of unethical behavior that deviates from the norm of impartiality in the exercise of public power turn out to be pervasive in the educational system[30]. According to the 2013 Global Corruption Barometer, 16 percent of respondents in the 96 countries surveyed answered "yes" to the question if they or anyone in their household had paid a bride in their contacts with the public education system during the last 12 months[31]. Another survey study shows that 59 percent of the population in Eastern Europe perceives education in their country as corrupt or extremely corrupt[32]. The 2013 Global Corruption report from Transparency International, which has the educational sector as its focus, produces a long list of the various forms corruption can take in education[33]. Among these are "shadow schools", teacher absenteeism and "ghost teachers", bribes for access to education, the buying of grades, nepotism in teacher appointments, fake diplomas, private tutoring in place of formal teaching, bribery for on-campus accommodation, misuse of funds and sexual exploitation in exchange for grades and exams. Since the implementation of any large scale public educational policy entails lots of administrative discretion, the sector seems to be a textbook case for spurring favoritism and corruption.

The importance of QoG for social trust is also supported by a study carried using immigration for constructing a "natural experiment". Dinesen (2011) has studied what happens with immigrants from very low trust countries when they immigrate to Denmark which has the record in high social trust. His findings, based on survey data is that after some years in Denmark, their trust levels increase substantially and comes closer to the very high Danish level than their country of origin. His central finding is that the most important factor behind the increased level of social trust among the immigrants is if they perceive that they have been even-handedly and fairly treated by the Danish authorities. This result holds when he extended the analysis to 18 Western European countries: "Immigrants who have migrated to countries with

[30] Botero et al. 2013; Borusiak 2013; Mungiu-Pippidi and Dusu 2011

[31] Transparency International, 2013

[32] Milovanovitch 2014

[33] Sweeney et al. 2013

lower levels of corruption tend to have higher levels of trust than immigrants who have migrated to more corrupt countries"[34]). In addition, Dinesen also shows that for second generation (14-16 years old) immigrant children in Denmark, having experienced teachers to be fair has a much stronger impact on social trust than parental socialization while for ethnic Danish children the experience of institutional fairness and parental socialization have almost equal effect on their social trust[35]). One explanation for this can be that many immigrants to Denmark come from countries where QoG is quite low and this experience is handed of from parents to children. Thus, when second generation immigrants experience "unexpected" levels of fairness from their school teachers and principals, this have a positive effect also for their social trust. Since several other analyses have pointed to the negative effect of corruption and other forms of favoritism for social trust[36], this gives us an argument for trying to theorize the causal mechanism(s) for why perceptions of institutional quality should condition the effect of education on social trust.

The starting point for this theory[37] is that people cannot really know if other people in general in their society "can be trusted". This implies that they have to use some sort of heuristics as short cuts when making up their mind on this issue. Our theory is built on the presumption that people's perception of the public officials they have direct contacts with, such as teachers and school leaders in public or publicly funded schools, works as such an important heuristic device for how they form their attitudes about general trust. This is based on the notion that public officials are supposed to act not in their self-interest but according to a set of ethical and professional standards such as impartiality, fair treatment, competence, honesty and legality. If the "default positon" is that teachers and school leaders in general are violating these standards by being engaged in systemic favoritism, nepotism, abuse of power and corruption, citizens that experience this are likely to make three inferences. 1) If teachers and school principals cannot be trusted, then neither can other people be trusted. 2) Most other people (parents and students) must, in order to get what they need from this system, engage themselves in unethical behavior and therefore they cannot be trusted. 3) As a parent or student, because the system is thoroughly corrupt, you yourself have to become engaged in various sorts of unethical practices and if you therefore cannot act as a trustworthy person, then probably you should not trust "other people in general" in such a society. One could add that universal education will only produce a strong bond between citizens and the nation-state if the educational system is relatively free from

[34] Dinesen 2011, 56

[35] Dinesen 2011, 57

[36] You 2012; Rothstein and Eek 2009

[37] This theory is adapted from Rothstein and Eek 2009.

corruption and other forms of favoritism. Given this presentation of the causal mechanisms for this interaction effect, we test the following hypothesis empirically.

H1: *the effect of increased education on social trust is conditioned on the context of QoG – only when QoG is sufficiently high, does education increase social trust.*

3. Research Design, Data and Measurement

To explore these central issues, we employ an observational design using multilevel statistical modeling with cross-level interactions between education and QoG. The study thus consists of a comparative analysis based on spatial data in 24 European countries[38]. For this, we take advantage of two original data sets based on two recent large surveys, organized by the authors (in 2010 and in 2013).

The 2010 sample consisted of about 34.000 citizen interviews and the more recent survey randomly sampled over 85,000 individuals. The respondents have been sampled by regions in European countries, in total 212 so called NUTS 1 and NUTS 2 regions for 25 European countries[39]. These surveys have focused on citizen perceptions *and* experiences of the quality of their regional government institutions and have also included questions about social trust[40]. Along with national level estimates, the data also allows us to test for sub-national variation within countries. This newly collected data thus constitutes a unique empirical resource for this type of research and represents a noteworthy improvement over past empirical studies.

[38] There are some shortcomings to a comprative study based on spatial data. Firstly, there is always the issue of endogeneity between our two primary individual level variables – education and trust. There is of course always the possibility that people who are most trusting have more trust in the system and thus become more educated. Secondly,, strong, untestable assumptions must be made in order to claim that we have identified causal effects with observational data, namely the "selection on observables" assumption (Keele and Minozzi (2013). We cannot directly control for these issues due to lack of data over time at the individual level. However, on the first point, we are less concerned due to the fact that countries with very low trust (Czech Republic, Slovakia, Hungary, France, etc.) tend to have only marginally different secondary education graduation rates from those of high trust on average. We might interpret this as the following: if only trusting people in low trust Eureopan states elected to become educated, we doubt we would observ such equality in secondary and tertiary education rates across Euroepan countries. Further our findings are certainly strengthened given the scope of our data (approximately 85,000 individuals in 24 countries).

[39] NUTS refer to 'Nomenclature of territorial units for statistics', and are EU statistical regions, for more information, see: http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction

[40] Reference conceiled for anoyminity.

Our measure of generalized trust, which serves as our dependent variables, is based on the standard question from the literature. At the individual level, a respondent is coded as '1' if they answer *"Most people can be trusted"* and '0' if *"Can't be too careful"*. While not without its limitations[41], this question is particularly apt for comparing trust within particular world regions, as the radius of a respondent's conception of 'most people' can vary from region to region, yet is conceived of as relatively wide in wealthy areas, such as Europe[42], which we argue is thus an appropriate metric of comparison in this study. The grand sample mean score for trust is 0.425, we also find noteworthy national-level variation, as many earlier studies have shown. At the country level, the vast majority of respondents in Sweden and Denmark, as well as in the United Kingdom, Finland, Austria, Ireland, and the Netherlands say that they trust others, yet social trust is extremely low in several other European states. For example, in Hungary, Greece, Bulgaria, and most regions in France, less than 30 percent of respondents say that they feel they can 'trust others'. In the Czech Republic, Slovakia, and Serbia, this number drops below 20 percent. For purposes of convergent validity[43] we compare these data with other recent empirical analyses, we find our country-level estimates to be highly consistent with those from alternative data sources.[44] Another possible concern is that of the validity of the measure across countries – in other words does the trust measure interpreted the same way across the countries in the sample?[45] While this question has raised an important debate, several studies have shown supportive evidence for the idea that the question used here is valid across countries, in particular in Europe as representing the same latent concept across countries[46] One experimental study shows that trust scores correlate highly with the number of wallets lost and returned in cities across the world[47]. It has also been shown that social trust correlates strongly with violent crime, thus many in the

[41] There is an active debate on the strengths and weakness of the trust question being measured in this way. Some argue that a binary measure is too limiting and argue in favor of a wider scale (Hooghe and Reeskens 2007; Zmerli and Newton 2008), while others see the concept as possibly being more multi-dimensional (Frietag and Traunmuller 2009). However, others critique the question's comparability across countries (Delhay, Newton and Welzel 2011; Torpe and Lolle 2011). However, Uslaner (2012), upon reviewing some of these critiques, argues convincingly for the standard, binary measure as used here.

[42] Delhey, Newton and Welzel 2011

[43] Adcook and Collier 2001

[44] For example, two recent studies employ a European, or largely European sample (Hooghe et al. 2009; Freitag and Buhlmann 2009). The Spearman rank coefficients between our common countries and theirs are 0.85 and 0.86, respectively.

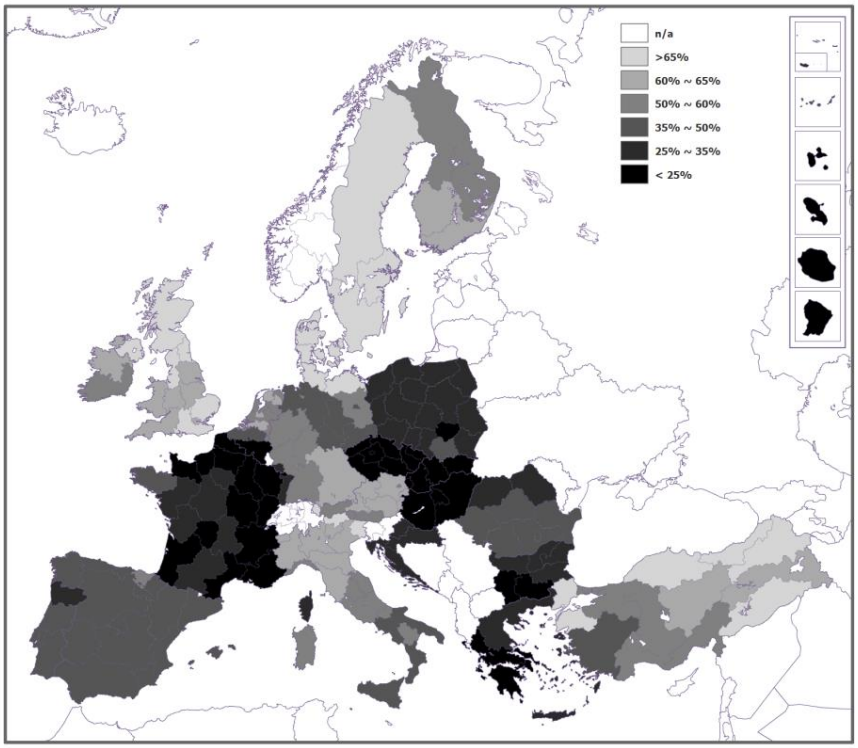
[45] We thank an anonymous reviewer at IJED for raising this point.

[46] Reeskens and Hooghe 2008

[47] Knack 2001

literature argue that the measure used here is in fact a valid indicator of one's opinion if others are likely to 'do the right thing'[48] (). Overall, while not without its potential pitfalls, the measure used here is a standard one used in the literature, and thus allows us a high degree of comparability of our results to previous findings. Figure 1 shows the variation of trust according to our estimates.

Figure 1: Generalized Trust in Europe by Region



We have two primary independent variables in the analysis. At the individual level, the first is education attainment, which is taken from the 2013 survey described above. Our variable is categorical and contains four ordered categories – less than secondary (27.8% of respondents), a secondary degree (33.4%), a tertiary degree (university, college, etc.) (27.9%), and post-tertiary (MA, PhD, JD, etc.) (9.9%), and thus allows for more variation than many previous studies that use only one threshold, such as secondary level[49], or university level[50]

At the macro level, we are interested in how institutional quality (QoG) conditions education's effect on generalized trust. At the country level, we capture institutional quality with data for the

[48] Lederman et. al. 2000, Bjørnskov 2007
[49] Bjonskøv 2007

[50] Botero et al 2013

World Governance Indicators[51]. We combine the measures 'control of corruption', 'government effectiveness', 'rule of law' and 'voice and accountability' for each country for the latest year available, using factor-weighted aggregation. In robustness checks, we employ the International Country Risk Guide's (ICRG's) measures of 'corruption', 'bureaucratic effectiveness' and 'rule of law'. In some models, we also account for institutional capacity at the regional (sub-national) level. For this we employ data from Charron, Lapuente and Rothstein (2013), the *European Quality of Government Index* (henceforth EQI). The EQI measure captures the extent to which regional public services are impartial, of high quality, and free from corruption, based on the experiences and perceptions of our citizen-respondents. To maximize the importance of the regional level, the data focus on services primarily administered or financed by sub-national actors, such as public education, public health services, and law enforcement. The survey also included questions about the extent to which regional elections were perceived as being free from corruption and the level of perceived political impartiality in the regional mass media. The EQI is a standardized measure with a sample mean of '0' and a standard deviation of '1'. For both the national level and regional level measures of QoG, higher scores imply better institutional quality. Summary statistics for both variables are found in the appendix as well as more information on the EQI measure.

In addition, we control for several confounding individual level factors based on previous empirical literature. First, standard demographic characteristics are included, such as gender, age, income, and whether the respondent has the mother tongue of the majority in her region. Second, we take into account the political ideology of the respondent on the standard left-right scale (self-placement), as respondents on the extreme ends of the ideological spectrum have systematically less trust on average. Third, whether the respondent is unemployed or not is expected to impact trust negatively. Finally, we control for whether direct experience and/or general perceptions with corruption drive individual level variation in social trust. Regarding corruption experience, we code 0/1 whether or not the respondent paid a bribe involving any public service in the past 12 months. With respect to general perceptions, we take the question 'In your opinion, how often do you believe other people in your area use bribery? (0-10, never to very frequently). All data is taken from the latest round of regional quality of government survey data in 2013[52]

[51] Kaufman et al 2011

[52] Reference conceiled for anomyinity

At the country level, the level of economic development has been shown in many studies to be correlated with levels of social trust[53], thus we control for this (PPP per capita, logged). We also take into account ethno-linguistic heterogeneity, which some have shown has a negative impact on trust, as well as economic inequality, and the years of consecutive democracy. For our hierarchical models with three levels, we keep the regional level as parsimonious as possible, controlling for population density and the EQI measure describe previously to account for quality institutions. Cross-level interactions between individual level education and either country or regional level QoG are included to explicitly test the hypothesis. A full description of the variables, summary statistics and sources is found in the appendix.

4. Empirical Methods

Our analysis proceeds in several parts. First, we highlight the bivariate relationship between education and trust is examined overall and for each country, taking into consideration the level of QoG by country. For this, simple bivariate logit regression is employed and predicted probabilities of trust levels by education for each country are reported to see if any initial trends emerge. Next, we take into account the hierarchical nature of the data vis-à-vis two and three level models, controlling for the factors outlined in the previous sectional and testing for cross level interactions between education and country/regional level QoG. In addition, we report several checks for robustness.

The dependent variable throughout the analyses is binary – whether an individual 'trusts others' or not, thus we elect to model the outcome with logistic regression. Results from an 'empty model' (constant only) reveal that 27% and 7% of the total variation is explained by the country and regional levels respectively and both are highly significant, which lends support for modelling these dynamics hierarchically – that the observations at the individual level are not independent from one another, which is seen quite clearly as well in Figure 1.

As individuals are embedded in regions, and regions are embedded in countries, we have three distinct possible levels in our model – we elect to run models with both two levels (individuals nested in countries) as well as with all three levels[54]. Ignoring the nested nature of the data would lead to an underestimation of standard errors and increase the likelihood of spurious inferences.

[53] Knack and Keefer 1997

[54] Three level hierarchical models with random country and regional slopes can take several days to converge in any statistical software program, for this reason, we elected to report most of the models with only two levels.

To avoid violating the assumption of independent observations[55], we elect to explain individual levels of trust in a hierarchical Logit model.[56] This model allows us to test explicitly whether the effect of education on trust varies across countries or regions within countries and if that variation can be explained by QoG. Another clear advantage in the multilevel design is that we are able to avoid problems of endogeneity between institutions and trust – the models elucidate the probability of two otherwise equal individuals will exhibit trust in different institutional environments.

We follow the recommendations of Aguinis et. al. (2013) and estimate the MLM stepwise – reporting Random Intercept and Fixed Slope Model (RIFSM), which assume 2nd and 3rd level variance in intercepts but that the individual level effects are constant. We then run Random Intercept and Random Slope Model (RIRSM), which tests the extent to which the slope of our key level 1 variable (education) varies by country or region. Given that we find evidence of the random slope, a cross-level interaction model (between education and QoG) is employed, testing whether QoG can significantly account for any of the random variation in the slopes of education across countries or regions.

When accounting for all three levels, the basic model used here is:

$$Trust_{ijk} = \beta_0 + \beta_1 x_{ijk} \dots \beta_n x_{ijk} \dots + \propto_1 c_{1j} + \dots \propto_n c_{nj} + \varphi_1 r_{1jk} + \dots \varphi_n r_{njk} + \omega(x_{education\,jk} * r_{QoGjk}) + u_{1jk} x_{ijk} + Z_{0k} + u_{0jk} + e_{0ijk}$$

Where $Trust_{ijk}$ is the log of the odds as a function of a set of fixed effects parameters at the individual level (x_{ijk}), the country level (c_j) and regional level (r_{jk}). The hypothesis is tested directly with the cross-level interaction between education and QoG ($x_{education\,jk} * r_{QoGjk}$).

The random effects of the individual parameter for education ($u_{1jk} x_{ijk}$) is used in the RIRSM (essentially to test for whether a cross-level interaction is justified), while Z_{0k} and u_{0jk} are the random level intercepts for the country and regional level respectively, and e_{0ijk} is the error term. Where we test only two levels, the regional fixed and random effects are removed and only country fixed and random effects are included. Where three levels are modeled however, in

[55] Hox 1995

[56] modelling the data with MLM has been shown to be a superior approach to estimates with clustered standard errors (Cheah 2009)

some cases, we test the levels of individual trust in all regions as well as 'politically relevant' regions only (with data explained in section 3), thus reducing the number of observations in the sample. To maximize the number of observations and for the broadest possible generalizability, we then run only QoG and regional controls on individuals in the 24 countries from section 3. The sample thus somewhat violates the so-called '30/30 rule' (which advocates at least 30 cases at each level[57], and therefore we check for the effects of outliers using country-wise jackknife in later robustness tests.

5.1 Empirical Results: What is the relationship between education and generalized trust?

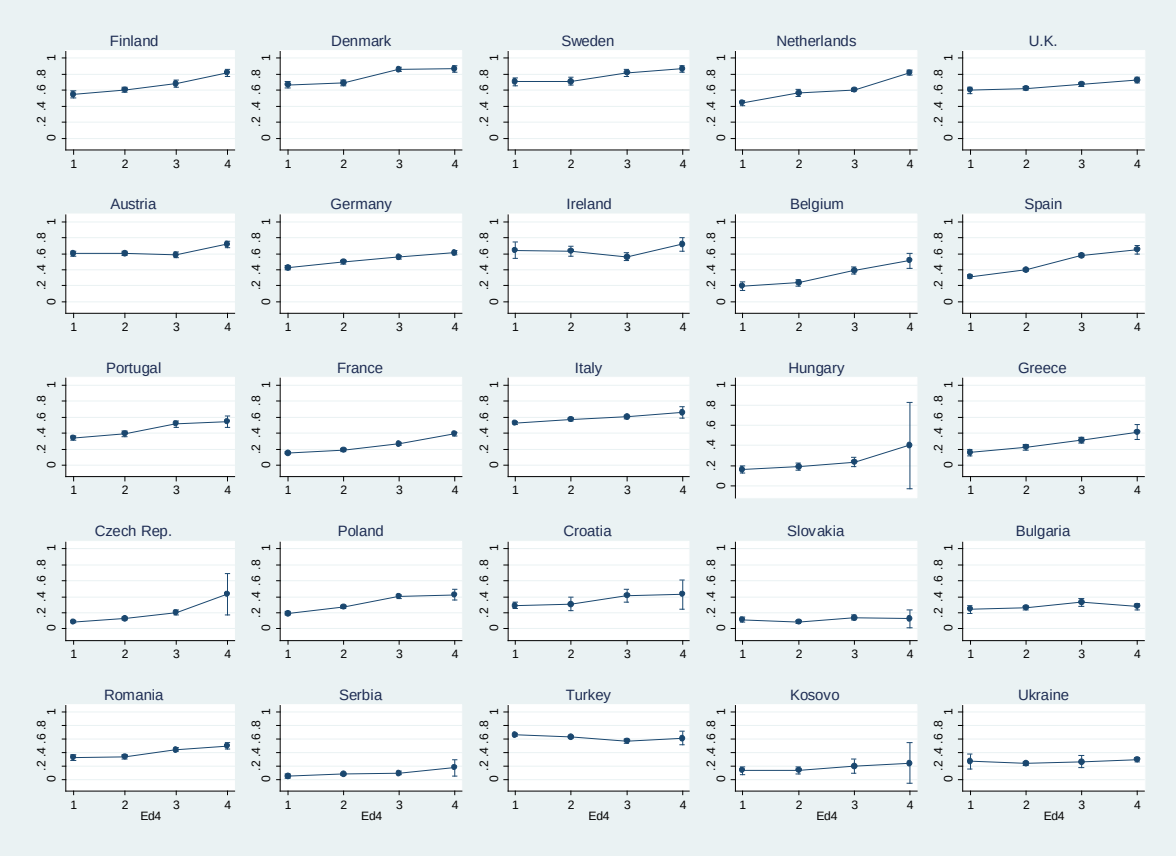
Bivariate Overview

Is there a basic relationship between education and trust? We begin with a simple look at the bivariate relationship between educational levels and generalized trust, first by reporting simple cross tabulation for the whole sample and then looking at predicted probabilities by country from bivariate logit regression. We find strong and statistically significant evidence that there is a positive effect of education on trust on whole, and the simple bivariate tests show the relationship to be non-random – people with higher education tend to have higher trust on average. Whereas only 36.4% of respondents without a secondary education answered that they could 'trust others', roughly 55% with a post tertiary education has generalized trust.

Yet given that the country context is highly relevant, what of the bivariate relationship in individual countries themselves? Figure 2 reports a summary of the predicted probabilities for trust by country based on bivariate logit regressions. To get a sense of how institutional quality might play a conditional role, countries are placed in rank order of institutional quality according to our WGI measure (top left to bottom right) and a 95% confidence interval is placed around each predicated probability for each level of education by country. We find in most cases, the effect is positive and significant as the respondent's education becomes higher than no secondary degree; and in most cases the strongest effect is between a high school degree and a university degree. We do see however that education does not have a uniform effect in all countries, which is of course the crux of the hypothesis. For example, it has a negligible (or even a slight negative) effect in several countries – Serbia, Turkey, Hungary, Slovakia, Bulgaria, Croatia, Kosovo, Ukraine and Ireland – with all but the latter ranking in the bottom half of our sample with respect to institutional quality.

[57] Maas and Hox 2005

Figure 2: Bivariate effect of education on trust by country (predicted probabilities)



Note: y-axis reports predicted probabilities of individual level trust from levels of education (x-axis). Dots represent predicted levels of trust at each education level, with the bars implying a 95% confidence interval of the estimate. Each country was regressed separately, based on logit estimates. Countries are ordered (from left to right, top to bottom) by their QoG sample rank (WGI).

5.2 Multivariate Results

I. Effect of education on trust: Two level Models

We now test the impact of education on trust conditioned by the institutional context, beginning with two level models in Table 1. First we run two RIFSM models with education and with all other individual level controls. In model 3, we run a RIRSM to test whether the cross-level interaction is justified by accounting for random sloped of individual level education across states. We find in both cases that the random slopes models confirm education's divergent effects across both countries and regions in Europe on trust. Our hypothesis is that this effect varies due to variations in institutional quality at the macro (and/or meso level), thus we explicitly model the random slope of education vis-à-vis an interaction with institutional quality, which is tested directly in model 4. In Tables 1 and 2, for purposes of intuitive interpretation, we keep

education in its 'raw' coding for easier interpretation, however in later robustness checks it is centered with group (country) mean centering.

Table 1: Results of Hierarchical Estimation

		1. baseline		2. + individual controls		3. + country controls & random slopes		4. + country controls & interaction	
I. Fixed Components		Beta(s.e.)	O.R.	Beta(s.e.)	O.R.	Beta(s.e.)	O.R.	Beta(s.e.)	O.R.
Level 1 (individual)									
	intercept	-0.78(.13)		-0.38(.17)		8.3(6.6)		8.1(3.9)	
Education									
< seconday = control	secondary	0.21(.02)	1.23	0.22(.02)	1.24	0.21(.04)	1.24	0.09(.05)	1.17
Group	tertiary	0.55(.02)	1.73	0.49(.02)	1.63	0.48(.07)	1.63	0.36(.06)	1.52
	>tertiary	0.91(.03)	2.47	0.82(.03)	2.27	0.83(.10)	2.32	0.41(.08)	1.82
Level 2 (country)									
	Inst. Quality (WGI)					0.16(.10)	1.28	0.17(.09)	1.68
Cross-level interactions									
	secondary*WGI							0.019(.008)	1.05
	tertiary*WGI							0.022(.008)	1.06
	>tertiary*WGI							0.063(.01)	1.20
II. Random Variance Components									
	Random intercept_$\sigma^2_{country}$	0.98(0.13)		0.74(0.21)		0.57(0.08)		0.51(0.07)	
	Random Slope (ed.)					0.16(0.02)			
Interclass Correlation (ICC)		0.23		0.18		0.16		0.11	
Wald model test Pr(χ^2)		0.000		0.000		0.000		0.000	
Log likelihood (iteration 0)		-50885.5		-46409.8		-46052.5		-46136.2	
Log likelihood		-50863.4		-46190.8		-44892.8		-46003.7	
LR Test		0.000		0.000		0.000		0.000	
ind. obs		84174		79205		78822		78822	
Regions									
Countries		25		25		24		24	

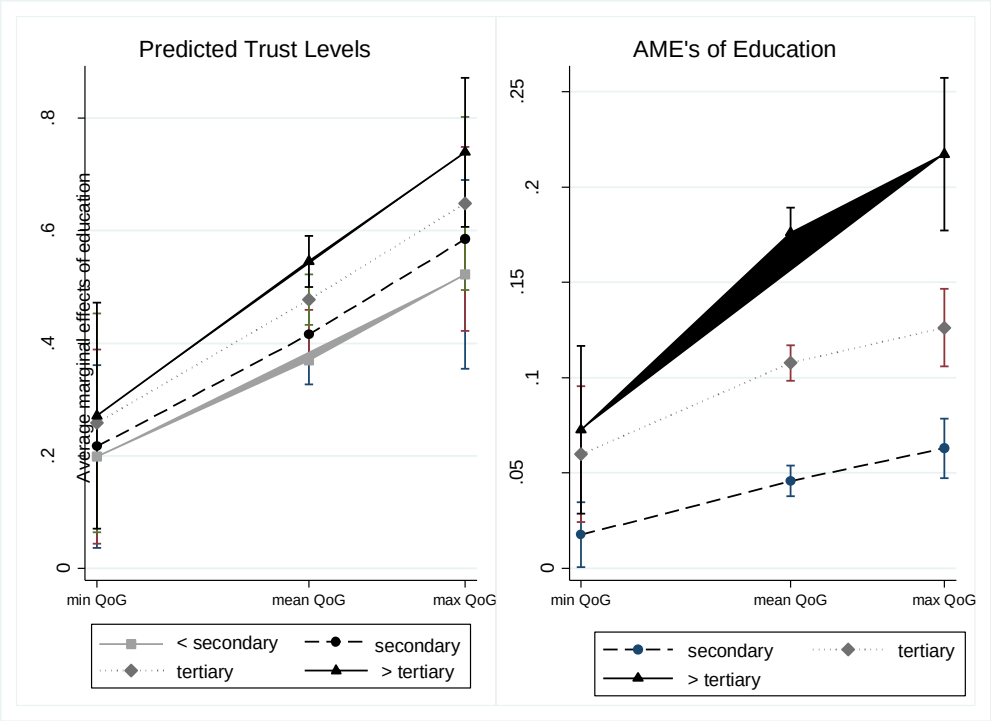
Note: models 2-4 contain the individual level control variables, while 3 and 4 contain country level controls. All models run with hierarchical logit estimation (xtmelogit) with unstandardized, logged odds coefficients reported (standard errors in parentheses), with corresponding odds ratios shown (O.R.). Education is scaled 0-3, with < secondary=0, secondary=1, tertiary=2 and >tertiary=3. Individual level controls are age, gender, income, population of residence, left-right self-placement, corruption perceptions and experience and unemployment. Country level controls are PPP per capita (log), population density (log), Gini index of income inequality, ethno-linguistic heterogeneity, and years of consecutive democracy. WGI is re-scaled (normalized) between 1-10, with higher scores indicating better governance. Interclass correlation (ICC) ranges from 0 to 1.

In model 1 we check for the baseline effect of education on social trust, only accounting for random country intercepts. The fixed effects of education show, compared with some who has

less than a secondary education, the odds of 'trust' increase by 22%, 73% and 147% for people with a high school, tertiary and post-tertiary education respectively. These fixed effects of education on whole are largely confirmed in Model 2 even when adding the individual level control variables.

Model 3 includes country level fixed effects controls, along with QoG as measured from the WGI and tests for the random slopes of education at the individual level. Although the positive impact of education remains, the random slope component is eight times its standard error, corroborating our bivariate findings from Figure 3 that education's impact on trust varies significantly by country, even when controlling for a host of individual and country level factors. This gives support for the cross-level interaction test in model 4.

Figure 3



Note: min score of WGI in our sample is -.96 (Ukraine), the mean is 1.02 and the high is 2.45 (Finland). Figure produce from results in model 4 in Table 2 with control variables held at their mean levels. The AME's are the average marginal effects of each education level on trust relative to the <secondary comparison group at the various levels of QoG.

In the final model in Table 1, the interaction of QoG at different levels of education provides strong support for our hypothesis. The simplest interpretation of the interaction coefficient in model 4 is that the effect of education on trust is significantly higher in countries with high QoG and significantly lower in countries with poor institutional quality. We also observe that compared with previous models, the gap in log odds coefficients between the levels of education narrows as the interaction is considered. We find that on average, the substantive impact of education on trust is in fact negligible, at very low levels of QoG, all things being equal, while the effect of education becomes significant at just below the sample mean and even more so at higher levels of QoG[58]. As logit coefficient estimates, in particular in MLM with interactions is difficult to interpret, and Figure 3 provides a visual to better shed light on the interaction effect[59]. For practical purposes, the figure highlights predicted levels of trust by education in low, mean and high levels of QoG. Because we are most interested in the *differences* in levels of trust by education across country contexts of QoG, we highlight both the average marginal effects ('AME's) and absolute predicted levels of trust based on a change in education from less than secondary to the other three levels in Figure 4. H1 implies that the AME's would increase as a function of QoG at the country/regional level[60].

The results demonstrate strong evidence for our hypothesis. We find that at low values of QoG, the probability of generalized trust is remarkably low irrespective of education level attained (less than 0.4 in all cases), while at high levels of QoG, even the lowest level of education (less than secondary) are greater than 50% likely to display social trust. First, in low-QoG settings, the model predicts the probability of someone with less than a secondary education is 0.20, while someone with a post-tertiary education is 0.28 to 'trust others', and while education has a positive effect on trust, the differences in attainment are statistically negligible. On the other hand, two otherwise similar respondents have probabilities of 0.52 and 0.74 in high QoG settings respectively[61]. Secondly, , we observe that the gap in the probability of trust among the low and

[58] The results for all individual and country level control variables from model 4 are found in the appendix

[59] For purposes of the producing the visual with confidence intervals, the graph takes into consideration only the fixed effects.

[60] Figure A1 in the appendix shows actual predicted levels of trust according to model 4.

[61] Predicted probabilities calculated by using the post-estimation command 'margins' in STATA (fixed portion only).

high education attainments is roughly three times greater in high QoG compared to low QoG countries – a gap of 0.22 from low to high education compared with 0.08 when QoG is fixed at low values. A similar effect is found with tertiary education, whereby the AME doubles from low to high QoG settings, from 0.065 to 0.13. Thirdly, relative to no secondary education, the average marginal effect of secondary education more than doubles when QoG is shifted from low to high – from 0.025 to 0.63. Thus we find that the country context of institutional quality is highly relevant both for absolute levels of trust, as well as for the individual level effect of education on generalized trust.

5.3 Effect of education on trust: Three level models

We now investigate this relationship further, taking into consideration spatial variation *within* countries. Table 3 reports the results of the three level MLM estimates, which add an additional test of whether spatial variation of QoG within countries significantly explains some of the random effects of education on trust. If the moderating effect of QoG is similar both across and within countries, stronger causal inferences can be drawn. As they were relevant in Table 1, we include the interaction between education and country level QoG in Table 3 as well. A post estimation LR test comparison also shows the model improves significantly when taking onto account regional variation in education.

In model 5 the regional level controls are added to the specification used in model 4 in Table 1. In addition, we test for random slopes for education within countries at the regional level while including the significant interaction between country level QoG and education. The regional level random effect is found to be significant, and thus we test directly the cross level interaction at the regional level in model 6. Interestingly, the results – while somewhat different – largely hold at the regional level as well. Primarily, we observe that any differences in trust between less than secondary and secondary education are constant across regions of all QoG levels, while trust for tertiary education and our comparison group begin to converge as QoG increases. However, the key findings that a high level of education (post tertiary) leads to significantly higher levels of trust in regions with higher QoG, *ceteris paribus*. Even within countries, where QoG is measured as higher, the effect of higher education on trust is positive. For example, we find that someone with a post-tertiary education in a low QoG region would only be roughly 42% likely to 'trust others', while an otherwise similar respondent with post-tertiary education in a high QoG region would be 66% likely. We find that the average marginal effects of a post-tertiary degree are very strong within countries. At low levels of QoG *within* countries, going from low to high levels of

education increases the probability of trust by 0.13, yet at high levels of regional QoG, the marginal effect of a min to max change increases the probability of trust by nearly double, 0.23.

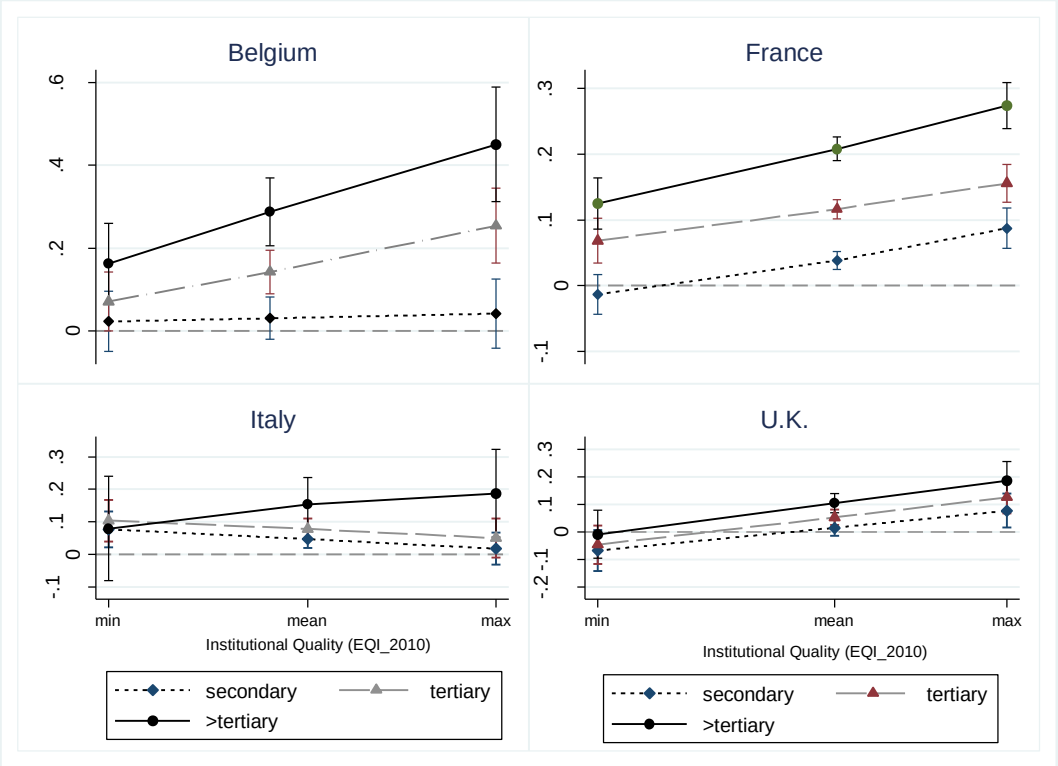
Table 2: The Effect of Education on Generalized Trust: Three Level MLM

		5. w/random regional slopes		6. reg level interactions & Controls	
		beta	s.e.	beta	s.e.
Level 1 (individual)					
	intercept	6.15	5.58	7.79	5.90
Education					
< seconday = control	secondary	0.18	0.03	0.25	0.02
group	tertiary	0.45	0.04	0.57	0.03
	>tertiary	0.62	0.06	0.85	0.04
Level 2 (region)					
	Inst. Quality (EQI)			0.14	0.04
Level 3 (country)					
	Inst. Quality (WGI)	0.32	0.33		
Cross-level interactions					
	secondary*EQI			-0.04	0.03
regional	tertiary*EQI			-0.08	0.03
	>tertiary*EQI			0.09	0.03
	secondary*WGI	0.04	0.03		
country	tertiary*WGI	0.05	0.03		
	>tertiary*WGI	0.18	0.04		
Random Variance Components					
	Random intercept_c	0.65	0.10	0.51	0.08
	Random intercept_r	0.20	0.02	0.18	0.01
	Random Slope (ed.)	0.08	0.01		
Interclass Correlation (ICC) – L2, L3		0.11, 0.14		0.9, 0.10	
Wald model test Pr(χ^2)		0.000		0.000	
Log likelihood (iteration 0)		-45846.4		-40191.3	
Log likelihood		-45292.7		-39949.1	
LR Test		0.000		0.000	
ind. obs		77264		69443	
regions		207		185	
countries		23		20	

Note: All models run with hierarchical logit estimation (xtmelogit) with unstandardized, logged odds coefficients reported, with corresponding standard errors shown. Regional models also include population density (log). See table 1 notes for all other control variables.

Figure 4 highlights the regional conditional effects of education on trust in four countries where we observe a relatively high degree of spatial variation for trust and QoG at the sub-national level[62]. For simplicity's sake, we show the range in the EQI over each country's own min, mean and max values. Showing the average marginal effects of education on trust over QoG, we find that the differences in the 'trust gap' between low and high levels of education increases significantly in all cases. For example, the difference between otherwise similar respondents between post tertiary and less than high school education in the low QoG region in Belgium (Wallonia) is 0.18, while in the high QoG region (Flanders), the gap in trust is more than double, at 0.42. A Similar effect is found in the regions of France and Italy as well with difference in trust between low and high education, while in the UK, the effect is more uniform – differences in trust between low levels of education and all others increases as regional QoG increases, all things being equal.

Figure 4: Average Marginal Effects of Education over Regional QoG on Trust in 4 Countries



6. Robustness checks

[62] Logit estimates with all individual controls were run for each country, along with regional QoG (EQI) and regional population density. In each case, we began with a multilevel model, with individual nested in regions, and the LR test in all cases rejected the null hypothesis, thus predicted probabilities from logit estimates are reported.

We check in several ways to check if our result holds to alternative specifications[63]. First, we re-run model 4 in Table 1 removing one country at a time to see if the results are driven by a single outlying case. Second, we test alternative measures of institutional quality at the country level, using the International Country Risk Guide's combined measures of rule of law, bureaucratic quality and corruption in the public sector. Third, we make several adjustments to our education variable – adjusting it for group-mean centering within countries, which can eliminate correlation between the variables on individual and country levels[64]. We also re-code the variable so that if is binary – a '1' if the respondent finished college/university and a '0' if their highest educational attainment is below this level. We also take into consideration weighting by two factors – the level of mean education, with countries closer to the grand mean receiving greater weights and country population weights. Finally, we re-run the full modes in Tables 1 and 2 using fixed effects estimation in lieu of hierarchical modeling. (Table A4 in the appendix). In sum, the alternative specifications do not change the key finding that the effect of education on trust is highly contingent on the context of institutional quality. All results of the robustness checks can be found in the appendix.

7. Testing for Alternative Channels

Finally, in this section we inquire about the interaction between education and other macro-level factors. In models 3 4 in Table 1 we find that years of consecutive democracy is a positive explanatory factor in trust, while income inequality and ethno-linguistic diversity are negative predictors. We test whether the interaction effects of QoG and education are 'unique' by re-running model 4 several times with cross-level interactions between education and economic inequality, ethnic fractionalization and years of consecutive democracy with full individual and country level controls (including QoG). Overall, we find that there are some interaction effects with these three macro level variables and education, yet their effects are much less pronounced and consistent than those with QoG. First, a key noticeable difference between these three interactions and that of QoG is that the average marginal effect of a secondary education is not impacted by any of these three mitigating variable. Secondly, only in the case of economic inequality do we observe a significant interaction with a university level education –the average

[63] Here we focus primarily on the two level models, with the cross-level interaction between individuals and national level QoG. This is primarily due to greater availability of alternative data sources for the key variables.

[64] Enders and Tofighi 2007

marginal effect of a tertiary education on trust drops from 0.14 to 0.045 from low to high inequality respectively[65].

In the context of age of democracy and diversity, we find that only the effects of high education (post tertiary) are impacted. Comparing two otherwise similar individuals, the AME of a post tertiary education on trust roughly doubles from the newest democracy to the oldest, while the AME of the same education level drops by 0.09 from the most homogeneous to the most diverse societies in the sample. Overall, while there are some interesting and noteworthy interaction effects with the three alternative channels, the results highlight the relatively unique contextual effect of QoG through which education impacts trust.

8. Discussion

In this study, we have developed a new theoretical perspective to understand variations in social trust patterns, a topic which is of interest at the nexus of several fields of social science research. The main theoretical contribution highlights a causal mechanism though which education affects social trust in individuals – institutional quality understood as impartiality/absence of favoritism. We hypothesize that increases in education will lead to higher social trust in individuals, given that the country (or region) in which they reside has a sufficiently impartial and non-corrupt institutional setting. Individuals living in countries (or regions within countries) with greater levels of corruption and favoritism toward certain, people are more inclined to view the system as 'rigged' as they become more educated, leading to a decline in the effect of education on trust. This interaction effect is tested using original survey data of 85,000 individuals in 24 European countries. Using multi-level modelling, we found that the impact of an individual's education on trust is substantially greater as the quality of public institutions increases. This effect even holds for regional variation of institutional quality within countries – with the strongest effects being higher education - yet the country effects of QoG are strongest. Our results thus highlight the salience of the interaction of micro and macro level factors in explaining variations in generalized trust patterns.

There are several noteworthy implications of this research. One, although several recent studies have highlighted the positive effects of education on social trust – both on individuals and aggregated at the country level – we elucidate a key causal mechanism though which this societal level factors impacts individual trust via QoG, that to our knowledge has not been discussed either theoretically or shown empirically. Two, our study shows that the effects of education are

[65] See figure A1 in the appendix for a visual of the results of the interaction.

limited in generating higher trust in individuals, and that broad claims of the benefits of education on trust should be re-evaluated. We explain why, given relatively low institutional quality and pervasive favoritism in a country or region, those individuals with university education (or higher) are not found to trust others at higher rates than individuals with less than a secondary education. Three, the causal inferences we can draw from our analyses are strengthened by the fact that we not only see the contextual effects of QoG at the country level, but we find that the effects of education on trust vary even within countries based on spatial differences of QoG at the regional level, in particular with the effects of post-university educationFinally, we highlight several potential avenues for future research. First, that education's effect on trust should be treated more critically by future scholars and that macro-level context should be considered, as our analysis reports. Future studies in this area should also be more inclined to test several possible measures of generalized trust – for example whereas ours is based on a binary question, other measures based on Likert scales, or more continuous ranges would be interesting to test the robustness of the results. Also, future survey research interested in this area could provide more indicators at the individual level, such as belong to social networks and family structure for example. Finally, ideally these dynamics should be track with data over time, as to better understand the dynamics of how macro-level institutional changes affect the relationship between education and social trust.

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