

# **Does Education Affect Trust? Evidence from Russia**

## **Abstract**

Using historical data on compulsory secondary school enrollment as an instrumental variable, we find that education is the strongest factor that affects trust level in regions across Russia. An increase of one standard deviation in the average education level in a region leads to an increase in trust of more than one standard deviation.

For individuals, education is the strongest predictor of trust and organizational participation. Controlling for unobservable individual characteristics, we estimate the marginal effect of education – every additional year of education increases the probability of a positive answer to the trust question by 5%. We also find that the likelihood of trust among less educated people depends only on the education level in their social environment.

JEL Classification: I2, O1, Z1, H4

Keywords: education, trust, social norms, social capital, externalities

*The great aim of education is not knowledge, but action.*

*Herbert Spencer*

## **1. Introduction**

It has been almost forty years since Kenneth Arrow wrote that "Virtually every commercial transaction has within itself an element of trust... It can be plausibly argued that much of the economic backwardness in the world can be explained by the lack of mutual confidence" (Arrow, 1972, p. 357). Since then, many empirical studies have confirmed that trust is indeed an important element in economic development. Mutual trust can help solve common problems and compensate for both market and government failures. For instance, a high level of trust allows economic agents to solve problems related to contract incompleteness, and strong social ties can reduce the costs of free riding in the provision of public goods.

However, it is not very clear why societies differ in terms of trust levels. Alesina and La Ferrara noted that "the theory of what determines trust is sketchy at best" (Alesina, La Ferrara, 2002). Empirical evidence shows that both individual and social characteristics are correlated with interpersonal trust. The most important factors are income, education, racial

composition at the society level and personal experiences of trauma or discrimination. These studies provide a good “road map,” which is especially important when coherent theory is lacking, but they do not prove causality.

This paper attempts to derive empirical evidence on the causal effect of education on trust and other measures of civic behavior in Russia. The study consists of two parts. The first part analyzes cross-regional variations in level of trust. Using data from a Georating sociological study, we found that average level of education has a strong and statistically significant effect on trust across Russian regions. This correlation holds even after controlling for other important determinants of trust, such as income, inequality, population density and ethnic composition. Next, we use historical data on secondary school attainment as an instrument for today’s level of education. In the 1920s and 1930s, the Soviet government established a compulsory education system for children and illiterate adults. Millions of individuals all over the country were enrolled in special literacy schools. By 1939, literacy rates and secondary school enrollment had risen significantly. These data provide an exogenous source of cross-regional variation in education level and allow for the estimation of the effect of education on trust. Using a two-stage least-squares strategy, we found that an increase of one standard deviation in the average education level in a region leads to an increase in the trust level of more than one standard deviation. This result is not driven by outliers.

The second part of the study is devoted to an individual-level analysis. We found that people with more education are more likely to answer positively to trust question. They are also more likely to participate in different associations (i.e., “Putnam groups”) and work for non-profit organizations. Using the personal discount rate as a control for unobservable individual characteristics, we apply a two-stage estimation strategy and confirm this result.

We also test the comparative influence of personal education and education level in person’s social environment. The likelihood of trust among less educated people depends only on the education level in their social environment. Conversely, for individuals with higher levels of education (13 years or more spent on education) the likelihood of trust depends both on their own education and their educational environment.

This paper is organized as follows. The next section reviews previous literature on the subject. Section 3 presents the data and some simple correlations. Section 4 provides a regional-level analysis using an IV regression approach. Section 5 presents individual-level probit regressions using personal discount rates as an instrument. Section 6 discusses some implications for further research. Section 7 concludes.

## 2. Previous Literature

Empirical studies show that trust and respect for civic norms positively affect the functioning of formal institutions and the quality of government (Putnam, 1993; La Porta et al., 1997; Tabellini, 2008), economic growth, investment and financial development (Knack, Keefer, 1997; Guiso, Sapienza, Zingales, 2004). The general conclusion to be drawn from these studies is that trust provides the “missing link” between distant political and economic history and the functioning of current institutions. In light of these results, it is important to understand the determinants of trust and civic norms. If trust and civic values are very slow-moving forces, what can be done to assist their accumulation in society? What factors most strongly affect trust, norms and civic engagement?

In a study on the dynamics of social capital in the US, Robert Putnam noted that “education is by far the strongest correlate that I have discovered of civic engagement in all its forms” (Putnam, 2001). Community organizations, the level of trust, perceptions of fairness and participation in nonprofit organizations are all dependent variables that are influenced more by an individual’s education level than by any other factor.

Starting with the work of Seymour Lipset (1960), social scientists have actively used the idea that education has non-economic spillover effects. According to Lipset, the most important result of a rising education level is not so much technological as social. The positive externalities of education reduce the level of violence in society; rather than using weapons to resolve conflicts, people with more education tend to use courts and legislatures. These changes contribute to a better protection of property rights and, finally, economic growth.

Recent empirical studies suggest that education is sometimes the most important factor for political and social engagement. Nee, Junn, Stehlik-Barry (1996) showed that an individual’s increased level of education has a positive effect on the probability of trust in strangers, tolerance, civic engagement and participation in elections. Helliwell, Putnam (2007) showed that many types of social interactions, including membership in various clubs and organizations, positively depend not only on the education of the individual but also on the average level of education in the region of residence.

Dee (2004) studied non-economic returns on education in the US and found that the relationship between education and civic activity is causal in nature. Using geographic proximity to and density of junior and community colleges as instrumental variables for

education, he showed that education is the strongest predictor of various indicators of civic engagement (e.g., voting in elections and participation in organizations). Furthermore, additional schooling appears to increase the quality of civic knowledge; more educated people tend to receive information from magazines and newspapers rather than exclusively through television and communication with friends.

In a similar study on the US and Britain, Milligan, Moretti, Oreopoulos (2004) used the adoption of compulsory schooling laws<sup>1</sup> as an instrumental variable and found that education attainment is related to several measures of political involvement in both countries. Oreopoulos, Salvanes (2009) showed that experiences and skills acquired in school reverberate in several ways throughout life, and not just through higher earnings. Schooling affects the degree to which one enjoys work and the likelihood of being unemployed. It leads individuals to make better decisions about health, marriage, and parenting, and it also improves trust and social interaction.

Our conclusion from these studies is that education generates positive externalities in the form of enhanced political behavior, increasing interpersonal trust and civic norms. Therefore, the effects of education extend beyond the economic sphere. Can we say that education's ability to create non-economic benefits are universal and can be found in all countries? The aim of this work is to test this hypothesis using data from Russia.

### **3. Data Description**

The main database used in this study is from a sociological survey called Georating conducted by a Public Opinion Foundation . The survey was conducted in 2005 in 68 regions of Russia. The total sample size is 34,000 respondents (i.e., 500 respondents in each region). The sample is divided according to region, allowing for analysis both at the regional and individual level. The Georating survey asks a standard question used in many social science surveys: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" We use the percentage of positive answers at the regional level as an indicator of the level of trust by region. At the individual level, the answers are coded as binary variables, with 1 indicating that a person answers

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<sup>1</sup> In various states, compulsory schooling laws were established at different times and required a different duration of secondary education. Legislative differences have led to a noticeable variation in the average level of education by state, but this had nothing to do with the indicators of civic engagement. This fact allows them to be used as an instrumental variable.

positively (i.e., most people can be trusted) and 0 indicating that a person answers negatively (i.e., need to be very careful). The Georating survey asks a number of questions that also can be interpreted as indicators of civic engagement. In addition to trust at the individual level, we use two other dependent variables that characterize social capital<sup>2</sup>:

- Social cohesion
- Participation in organizations

In addition to the Georating survey, we use the Rosstat<sup>3</sup> official database on regional differences in per capita income, inequality (i.e., the Gini coefficient), population density and ethnic fractionalization.

Descriptive statistics for dependent and explanatory variables are presented in **Table 1**.

**Table 1. Descriptive Statistics**

| Variable  | Mean  | Median | Std. deviation | Min  | Max     | N  |
|---|-------|--------|----------------|------|---------|----|
| Trust, %  | 18.4  | 17.5   | 4.8            | 10.0 | 35.0    | 68 |
| Social cohesion, %                              | 15.9  | 14.0   | 5.6            | 6.0  | 31.0    | 68 |
| Participation in organizations, num. pers. pers | 0.2   | 0.2    | 0.1            | 0.03 | 0.4     | 68 |
| Average level of education, years               | 11.8  | 11.8   | 0.4            | 11.1 | 12.86   | 68 |
| GRP per capita in 2005, thousand rubles         | 117.3 | 88.0   | 134.2          | 40.1 | 949.6   | 68 |
| Gini coefficient                                | 0.4   | 0.4    | 0.04           | 0.3  | 0.6     | 68 |
| Population density, per sq. km                  | 214.5 | 23.5   | 1 204.1        | 0.4  | 9 438.9 | 68 |
| Fractionalization index                         | 0.25  | 0.20   | 0.16           | 0.07 | 0.72    | 68 |

For detailed description and questions, see the Appendix.

The average level of trust (measured as the percent of people identifying themselves as trusting) across regions is 18.4% with a standard deviation of 4.8%. Regarding social cohesion and solidarity in current Russian society, only 16% of respondents answered positively with a standard deviation across regions of 5.6%. Only 2 individuals out of 10 said they participate in non-profit organizations or voluntary associations (i.e., “Putnam groups”).

<sup>2</sup> For detailed description and questions, see the Appendix.

<sup>3</sup> The Federal State Statistics Service is the official statistics agency in the Russian Federation; see [www.gks.ru](http://www.gks.ru).

According to the survey, about 9% of respondents worked for non-profit organizations during the last year. The average time worked was about 2.5 hours per month.

The main explanatory variable in our analysis is education level, which is measured by years of schooling. At the regional level of analysis, I consider the average level of education across regions, which is 11.8 years with a standard deviation of 0.4 years.

**Table 2** shows pair-wise correlations between the average level of education in the region (in years) and the indicators of social capital mentioned above. It is evident that education is positively correlated with all indicators of social capital. The strongest link is with trust level (0.5) and social cohesion (0.45). All coefficients are statistically significant at the 1% level.

**Table 2. Pair-wise Correlations Coefficients**

|                                | Average level of education (years) | Trust   | Social cohesion |
|--------------------------------|------------------------------------|---------|-----------------|
| Trust                          | 0.50***                            |         |                 |
| Social cohesion                | 0.45***                            | 0.74*** |                 |
| Participation in organizations | 0.33***                            | 0.19    | 0.09            |

\*\*\* indicates statistically significant at the 1% level.

The next section presents a more detailed analysis that takes into account the role of other factors.

#### 4. Determinants of Cross-Regional Variation in Trust

##### A. Ordinary least-squares regressions

**Table 3** presents the ordinary least-squares regressions of trust on average education level in years by region<sup>4</sup>. The linear regressions are for the following equation.

$$(1) \quad Trust_i = \beta_0 + \beta_1 Education_i + \beta_2 X_i + \varepsilon_i,$$

<sup>4</sup> Normalized to have the mean equal 0 and the standard deviation equal 1.

*Trust* is the percentage of respondents in a region  $i$  who answered positively to the question on trust; *Education* is the average education level in years in region  $i$  normalized to mean equal 0 and standard deviation 1;  $X$  is a vector of other covariates;  $\varepsilon$  is a random error term. The coefficient of interest  $\beta_1$  shows the effect of a change of one standard deviation in the average level of education on trust across regions in Russia.

Column (1) shows the results of the simple regression model. The coefficient on education is positive and statistically significant at the 1% level. This shows that an increase in one standard deviation in average education level is associated with a 2.4% increase in the level of trust. Considering that the standard deviation in trust across regions is 4.8%, a standard deviation increase in average education level is associated with a 0.5 standard deviation increase in trust ( $2.4/4.8=0.5$ ).

**Table 3. OLS**

**Regressions**

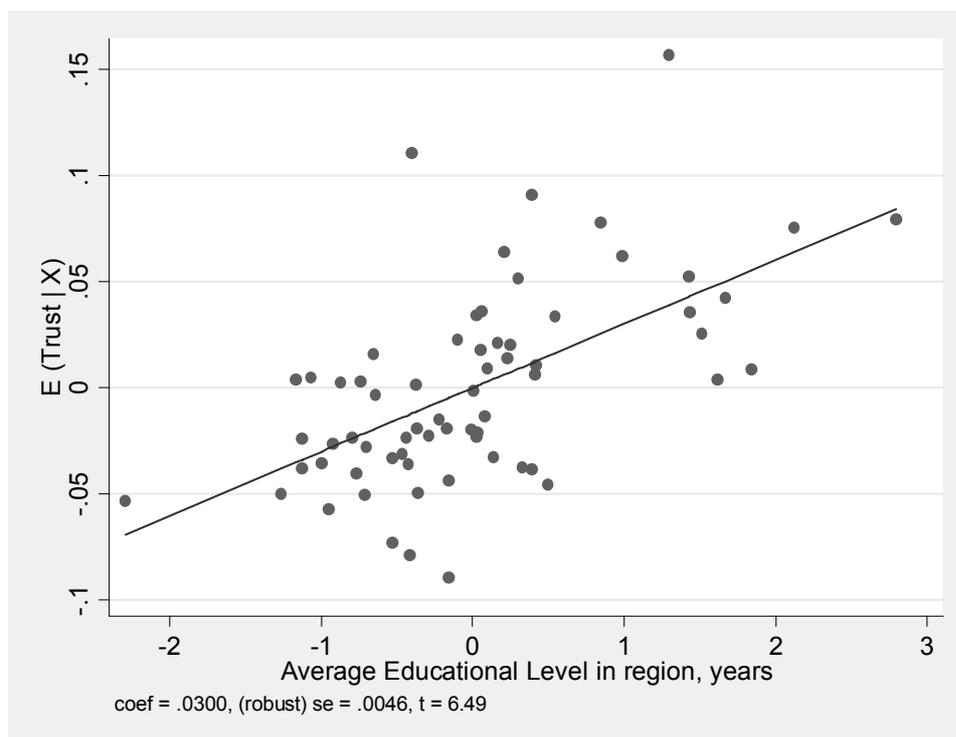
|   | Dependent variable is <i>Trust</i> , % |                       |                       |                            |                            |                       |
|---|--|-----------------------|-----------------------|----------------------------|----------------------------|-----------------------|
|   | (1)                                    | (2)                   | (3)                   | (4)                        | (5)                        | (6)                   |
| Average level of education, years       | 0.0242***<br>(0.0057)                  | 0.0247***<br>(0.0055) | 0.0256***<br>(0.0051) | 0.0299***<br>(0.0051)      | 0.0298***<br>(0.0052)      | 0.0300***<br>(0.0047) |
| GRP per capita in 2005, thousand rubles |  | -0.00372<br>(0.00985) | 0.00724<br>(0.0151)   | 0.00149<br>(0.0155)        | 0.00194<br>(0.0151)        | -0.00417<br>(0.0148)  |
| Gini coefficient                        |  |                       | -0.246<br>(0.205)     | 0.0409<br>(0.225)          | 0.0507<br>(0.239)          | 0.0239<br>(0.246)     |
| Population density, per sq. km          |  |                       |                       | -1.28e-05***<br>(4.24e-06) | -1.30e-05***<br>(4.49e-06) | -<br>(0.000474***)    |
| Fractionalization index                 |  |                       |                       |                            | -0.00881<br>(0.0301)       | -0.00538<br>(0.0298)  |
| Constant                                | 0.184***<br>(0.0050)                   | 0.227**<br>(0.112)    | 0.193<br>(0.126)      | 0.154<br>(0.129)           | 0.148<br>(0.126)           | 0.240*<br>(0.122)     |
| Observations                            | 68                                     | 68                    | 68                    | 68                         | 68                         | 66                    |
| R-squared                               | 0.260                                  | 0.262                 | 0.283                 | 0.334                      | 0.335                      | 0.392                 |

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Columns (2) through (5) add additional variables in the regression. We gradually take into account the impact of gross regional product per capita, income inequality (measured by

the Gini coefficient), population density and an index of ethno-linguistic fractionalization. The coefficient of interest is quite similar across the different specifications. It increases slightly as new additional variables are considered, and it stays statistically significant at the 1% level.

The last Column (6) presents the same regression as in Column (5). The only difference is the omission of two major cities in Russia: Moscow and St. Petersburg. These cities are treated by Russian laws as “federal cities”, that is, as separate regions. These “two capitals” of Russia are regions with the highest education levels, per capita income and population densities. We omit them in order to ensure that our results are not driven by outliers. The inclusion of additional control variables while omitting outliers increases the coefficient on education level and confirms its statistical significance. **Figure 1** shows the relationship between education and trust as the result of a multiple regression in column (6).



**Figure 1. OLS Relationship between Education and Trust**

Of course, this result does not prove that the relationship between education and trust is causal. There are at least two problems that need to be addressed to show causality. First is the problem of reverse causality. It is possible that some regions with high initial trust levels

enjoy high standards of living as a result and, therefore, have higher level of education. Second, and perhaps more importantly, there are many omitted determinants of trust differences that can be correlated with education. Omitting these possible determinants from the equation can lead to an upward bias in the estimated coefficient. To obtain an unbiased estimator, we use the instrumental variables strategy (i.e., IV regression).

## B. IV regression

We can think of variation in education across regions as comprised of two parts. One part is correlated with the random error term, i.e., with determinants of trust not included in equation (1). The second part is uncorrelated with  $\varepsilon$ . If we could isolate the second part and find a valid instrumental variable that is uncorrelated with the variables omitted in regression (1), then we could obtain an unbiased estimation of  $\beta_1$  (Stock and Watson, 2007). Such an instrumental variable must be an important factor accounting for variation in today's education level, but it must have no direct effect on trust. What could such a factor be? Perhaps history can provide a plausible instrument.

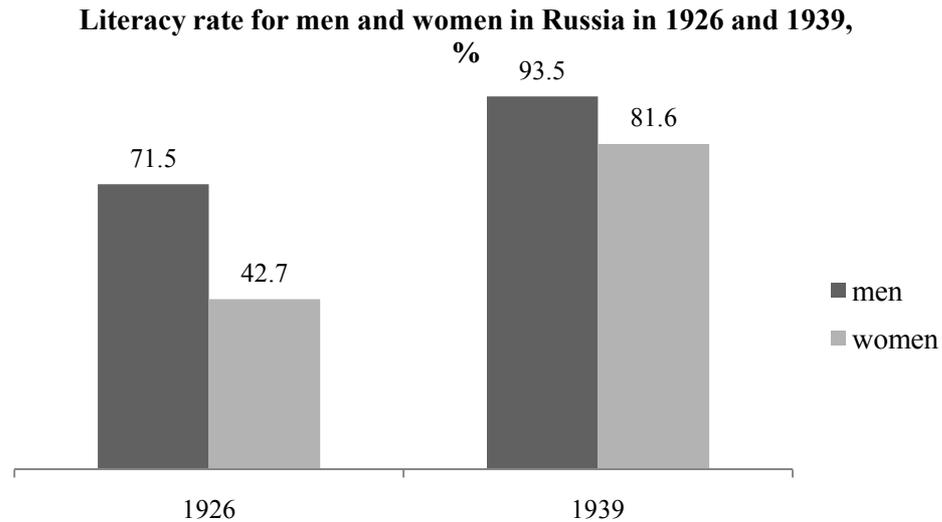
Many studies attempting to establish a causal effect of education on various outcomes (income, unemployment status, civic engagement, etc.) are usually use as an instrument indicators of geographic proximity to educational institutions, or historical events that influenced the formation of educational system (the adoption compulsory schooling laws, schooling age, etc.)<sup>5</sup>. In this paper we use historical data on the proportion of people with secondary education in the region based on 1939 census.

In the 1920s, Soviet government established a new policy of *likbez* ("liquidation of illiteracy"). The new system of universal compulsory education was introduced for children and illiterate adults. Millions of individuals all over the country, including residents of small towns and villages, were enrolled in special literacy schools. The most active phase of *likbez* lasted until 1939. During the period from 1923 to 1939 more than 50 million illiterates and 40 million low-literate people were trained. According to a population census in 1926, the literacy rate was 56.6% of the population. By 1939, the literacy rate was 93.5% for men and 81.6% for women, for a total literacy rate of 87%<sup>6</sup> (Figure 2).

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<sup>5</sup> See Card (1999) for overview.

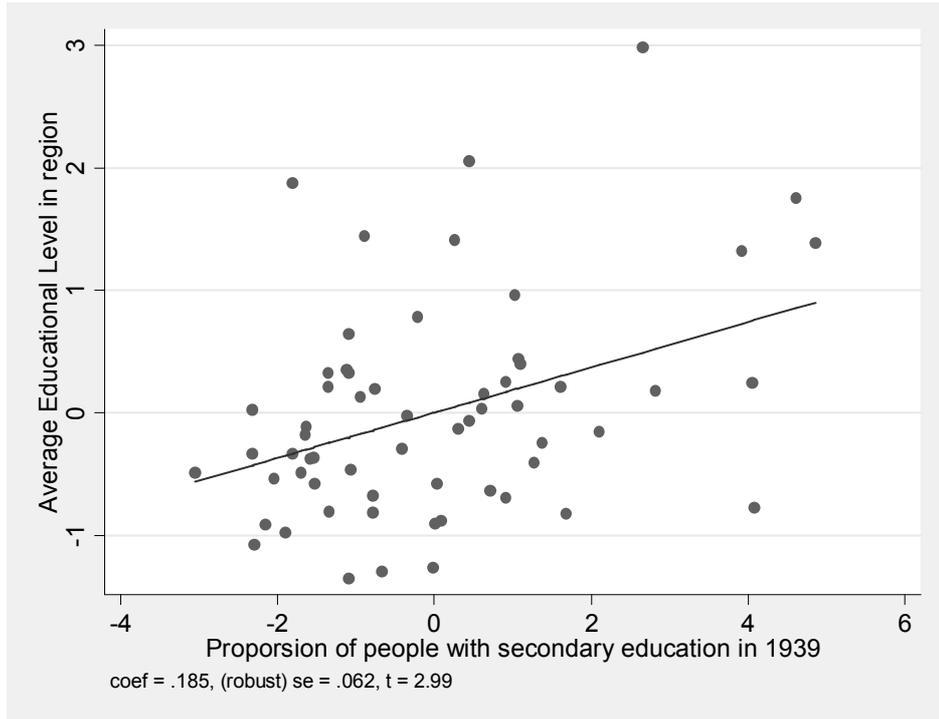
<sup>6</sup> Data is taken from Population Census in 1926 and 1939.



**Figure 2. Literacy rates for men and women in 1926 and 1939**

We found that the proportion of people with a secondary education in 1939 strongly correlated with the average years of education in 2005 across regions. At the same time, education in 1939 does not correlate with the level of trust or other determinants of trust. This fact allows us to isolate the portion of variation in education level in 2005 from other factors that influence trust level, and it also allows us to use historical data on education as an instrument for today's education level.

**Figure 3** shows the correlation between the percent of people with a secondary education in 1939 and the average education level in 2005. The regression coefficient is statistically significant at the 1% level, and it shows that a 1% increase in the proportion of people with a secondary education in 1939 results in a 0.19 standard deviation increase in the average education level in years in 2005.



**Figure 3. Education in 1939 and 2005**

An additional factor, which indicates the possibility of using education in 1939 as an instrument is that education in 1926 did not correlate with the today's level of education across regions. It means that Soviet government at least in part selected educational policy for particular region exogenously to its current level of education. The initial level of development of the region played a limited role in the establishment of “likbez” schools. The need for skilled workers was determined mostly by needs of growing industrial sector.

Taking into account these facts, we apply a two-stage least-squares method and estimate the parameters of the following system of equations:

- (1)  $Trust_i = \beta_0 + \beta_1 Education_i + \beta_2 X_i + \varepsilon_i,$
- (2)  $Education_i = \gamma_0 + \gamma_1 Education\ in\ 1939_i + \gamma_2 X + \epsilon,$

Education in 2005 is treated as endogenous, and it is modeled as a result of the education policy from the 1920 to 1930s and the other variables described above. Two-stage estimates are reported in **Table 4**. Panel A reports 2SLS estimates of the coefficient of interest  $\beta_1$  from equation (1), and Panel B presents the corresponding first stages. We exclude Moscow and St. Petersburg in all regressions.

**Table 4. Instrumental Variable Regressions of Trust**

| Panel A: Two-Stage Least-Squares. Dependent Variable       |                       |                     |                          |                               |                               |
|--|-----------------------|---------------------|--------------------------|-------------------------------|-------------------------------|
|  | <i>Trust</i>          |                     |                          |                               |                               |
|  | (1)                   | (2)                 | (3)                      | (4)                           | (5)                           |
| Average level of education, years                          | 0.053**<br>(0.0226)   | 0.051*<br>(0.0266)  | 0.053*<br>(0.0280)       | 0.055**<br>(0.0251)           | 0.055**<br>(0.0256)           |
| GRP per capita in 2005,<br>thousand rubles                 |                       | 0.0044<br>(0.0203)  | -<br>0.00011<br>(0.0276) | -0.0111<br>(0.0277)           | -0.0113<br>(0.0274)           |
| Gini coefficient   |                       |                     | 0.0975<br>(0.266)        | 0.109<br>(0.276)              | 0.107<br>(0.298)              |
| Population density, per sq. km                             |                       |                     |                          | -<br>0.000544**<br>(0.000213) | -<br>0.000544**<br>(0.000215) |
| Fractionalization index                                    |                       |                     |                          |                               | 0.00245<br>(0.0340)           |
| Constant   | 0.188***<br>(0.00620) | 0.138<br>(0.233)    | 0.153<br>(0.256)         | 0.290<br>(0.258)              | 0.292<br>(0.256)              |
| R-squared  | 0.16                  | 0.18                | 0.16                     | 0.20                          | 0.20                          |
| Panel B: First Stage: Average Level of Education by Region |                       |                     |                          |                               |                               |
| People with secondary education<br>in 1939, %              | 0.185***<br>(0.0618)  | 0.159**<br>(0.0608) | 0.156**<br>(0.0612)      | 0.156**<br>(0.0636)           | 0.157**<br>(0.0664)           |
| GRP per capita in 2005,<br>thousand rubles                 |                       | 0.481**<br>(0.227)  | 0.527*<br>(0.297)        | 0.517<br>(0.331)              | 0.516<br>(0.333)              |
| Gini coefficient   |                       |                     | -1.186<br>(4.066)        | -1.177<br>(4.104)             | -1.255<br>(4.279)             |
| Population density, per sq. km                             |                       |                     |                          | -0.000538<br>(0.00470)        | -0.000542<br>(0.00476)        |
| Fractionalization index                                    |                       |                     |                          |                               | 0.0680<br>(0.523)             |
| Constant   | -1.35***<br>(0.407)   | -6.62**<br>(2.491)  | -6.69**<br>(2.561)       | -6.57**<br>(2.926)            | -6.50**<br>(2.936)            |
| Observations   | 61                    | 61                  | 61                       | 61                            | 61                            |
| R-squared  | 0.15                  | 0.19                | 0.19                     | 0.19                          | 0.19                          |

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The results show a significant effect. An increase of one standard deviation in the average education level in region leads to a 5.5% increase in trust (a more than one standard deviation increase).

In **Table 5**, we provide a simple version of the overidentification test. We directly add to equation (1) Education in 1939 as an additional regressor. If it had a direct effect on trust level in 2005, we would expect this variable to be statistically significant with positive sign. In fact, in all cases, it is very small and statistically insignificant. As a result, we can reject the hypothesis that historical data on education have a direct effect on trust level or an effect working through a variable other than Education in 2005.

**Table 5. Overidentification Test**

|  | Dependent Variable <i>Trust</i> , % |                        |                        |                        |                               |
|--|-------------------------------------|------------------------|------------------------|------------------------|-------------------------------|
|  | (1)                                 | (2)                    | (3)                    | (4)                    | (5)                           |
| Average level of education, years          | 0.0269***<br>(0.00511)              | 0.0253***<br>(0.00505) | 0.0253***<br>(0.00504) | 0.0251***<br>(0.00420) | 0.0251***<br>(0.00421)        |
| People with secondary education in 1939, % | 0.00474<br>(0.00345)                | 0.00412<br>(0.00364)   | 0.00426<br>(0.00370)   | 0.00466<br>(0.00327)   | 0.00472<br>(0.00331)          |
| GRP per capita in 2005, thousand rubles    |                                     | 0.0169<br>(0.0132)     | 0.0143<br>(0.0179)     | 0.00433<br>(0.0176)    | 0.00425<br>(0.0175)           |
| Gini coefficient                           |                                     |                        | 0.0651<br>(0.234)      | 0.0740<br>(0.235)      | 0.0689<br>(0.256)             |
| Population density, per sq. km             |                                     |                        |                        | -0.00056<br>(0.000139) | -<br>0.00056***<br>(0.000140) |
| Fractionalization index                    |                                     |                        |                        |                        | 0.00450<br>(0.0295)           |
| Constant                                   | 0.153***<br>(0.0232)                | -0.0341<br>(0.147)     | -0.0298<br>(0.153)     | 0.0933<br>(0.148)      | 0.0946<br>(0.147)             |
| Observations                               | 61                                  | 61                     | 61                     | 61                     | 61                            |
| R-squared                                  | 0.35                                | 0.37                   | 0.37                   | 0.45                   | 0.45                          |

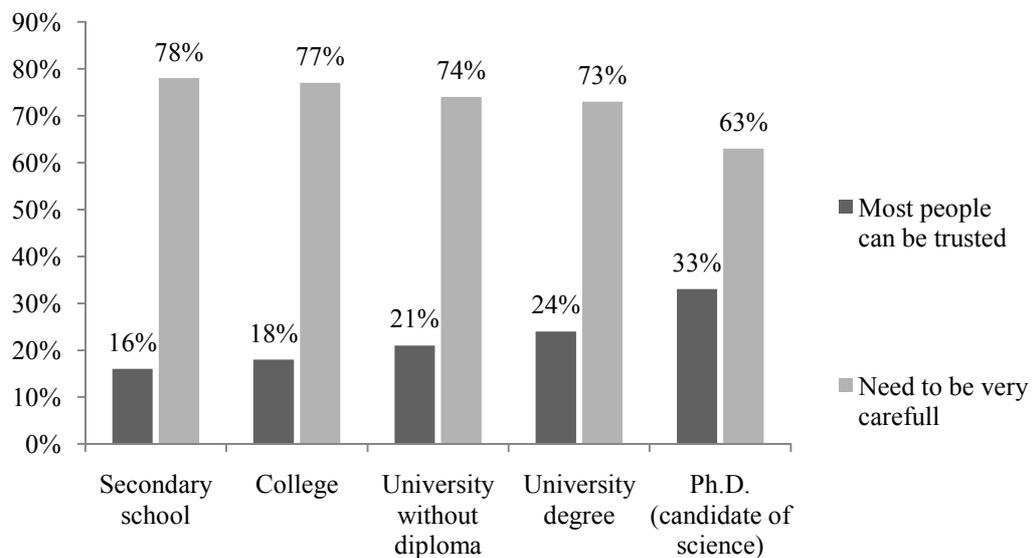
Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The evidence presented in this section is based on historical correlations. We cannot totally rule out the possibility that some omitted factor might be responsible for the association between education and trust. In next section we investigate the robustness of this result on individual level and find a strong similar pattern – more education lead to higher trust level.

## 5. Individual-level analysis

### A. Probit regressions

In this section we investigate the robustness of the relationships between education and trust on individual level. **Figure 4** shows that the link between education and trust is not only a result of the averaging effect, but it also appears stable at the individual level. The percentage of respondents answering positively to the “trust question” increases with the level of education.



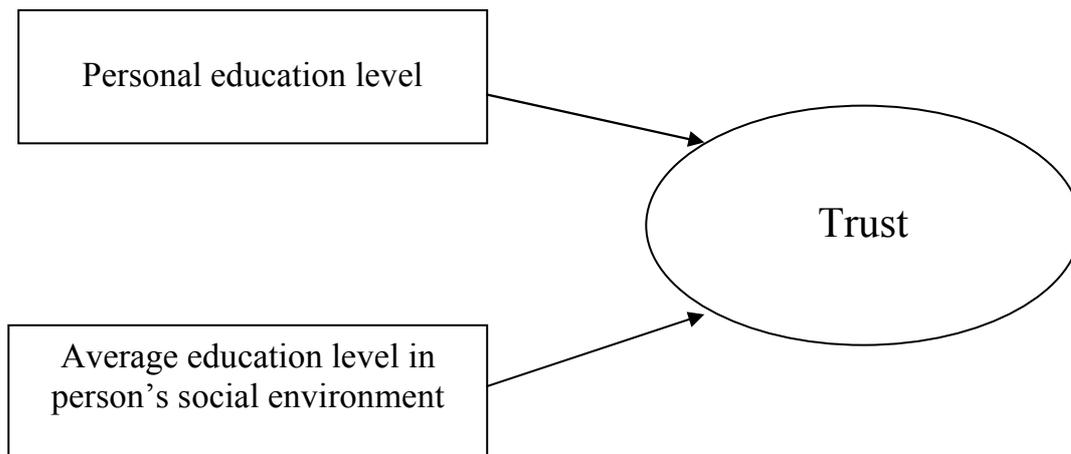
**Figure 4. Education and Trust on the Individual level**

Among people with higher levels of education, the share of positive answers is 50% higher than among people with only a secondary education (24% versus 16%, respectively). Among people with science degrees and multiple higher education degrees (we have 177 such persons in the sample), 30% tend to trust strangers rather than be very careful; this is two times higher than among people with only a secondary education. Can we conclude that a high level of education is a sufficient condition for cooperative behavior?

Game theory argues that all social interactions are strategic in nature. This means that particular choices depend on the decisions made by others (Aumann, 2008). In terms of the question posed above, this means that the probability of cooperative behavior will be determined not only by an individual’s own level of education but also by the level of education in her social environment. The key factor is the relative strength of these two

variables. As Helliwell and Putnam noted: “My behavior can be affected not only by my education, but also by that of others around me. The core issue is whether (holding constant my own education), I am more likely or less likely to participate politically and socially if those around me become more educated” (Helliwell, Putnam, 2007, p. 1).

The same issue can be traced for trust and civic activities. Schematically, the effect of education on trust is shown in **Figure 5**.



**Figure 5. How does Education Affect Trust?**

According to this scheme, there are three effects that determine the nature of the impact of education on trust and cooperative behavior: absolute, relative and cumulative effects (Nie, Junn, Stehlik-Barry, 1996). An absolute effect occurs when the probability of trust depends on the individual's own education but is independent of the average level of education in the individual's environment. A relative effect occurs when the probability of trust depends only on the average level of education in the individual's social environment. A cumulative effect occurs when the education characteristics of the social environment and those of the individual complement each other.

We test among these possibilities by defining separate variables for an individual's own education and for education level in an individual's environment. We define education level in the environment as the average education level in the region of residence<sup>7</sup>.

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<sup>7</sup> Various studies have provided different definitions of what can be considered the education level of an environment. Nie, Junn, Stehlik-Barry (1996) used the average level of education in the country as a whole. Helliwell and Putnam (2007) criticized this approach and instead used the average level of education in a Census region (i.e., a group of US states). In our study, we use regional data. Of course, this method is not

We estimate the regression parameters for equations of the following form:

$$(3) \quad P(y=1|x) = \beta_0 + \beta_1 E + \beta_2 C + \beta_3 x_3 + \dots + \beta_n x_n + \varepsilon,$$

$P$  – the probability of trust;

$E$  – personal education level in years;

$C$  – average education level in the region of residence;

$x_3 - x_n$  – controls for social-demographic and regional differences;

$\varepsilon$  – error term.

This equation is a probit model in which the dependent variable takes the value of 1 if the answer is positive and 0, otherwise. The dependent variables are:

- Trust
- Social cohesion
- Participation in organizations

Control variables in all equations are sex, age, family income and regional differences represented by GRP per capita, Gini coefficient, population density and ethnic fractionalization. **Table 6** presents the results of the analysis. It is worth noting that the interpretation of the coefficients is based on the following definitions (Campbell, 2006):

1. A positive and statistically significant coefficient on personal education level (E) and an insignificant coefficient on average education level in the region of residence (C) together indicate an absolute effect of education.
2. A statistically insignificant coefficient on personal education level (E) and a significant positive coefficient on average education level in the region of residence (C) together indicate a relative effect of education.
3. Positive and statistically significant coefficients both on personal education level (E) and average education level in the region of residence (C) together indicate a cumulative effect.

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without flaws, and localization can be even lower (i.e., by district or city). Ideally, the degree of localization must meet the breadth of the distribution of the externalities of education.

**Table 6. Absolute, relative and cumulative effects of education**

|  | <i>Trust</i>          | <i>Social cohesion</i> | <i>Participation in organizations</i> |
|--|-----------------------|------------------------|---------------------------------------|
| Personal education level, years          | 0.0333***<br>(0.0047) | 0.0051<br>(0.0050)     | 0.0970***<br>(0.0055)                 |
| Average education level in region, years | 0.2476***<br>(0.0319) | 0.3150***<br>(0.0326)  | 0.0315<br>(0.0349)                    |
| Age                                      |                       |                        | yes                                   |
| Sex                                      |                       |                        | yes                                   |
| Family income                            |                       |                        | yes                                   |
| Regional variables                       |                       |                        | yes                                   |
| N (not less than)                        |                       |                        | 23 864                                |

Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

These results demonstrate positive correlations of all dependent variables with educational level and follow the results of other international studies on this topic (Dee, 2004; Milligan, Moretti, Oreopoulos, 2004; Helliwell, Putnam, 2007). At the same time, different components of social capital respond differently to changes in education level.

Trust is closely connected to education via a cumulative effect. Increasing an individual's level of education even holding constant the average level of education in her environment will have a positive impact on the individual's propensity to trust strangers. The same dynamics occurs with respect to increasing the average level of education in the environment while holding constant individual level of education. Social cohesion is influenced via a relative effect; only the level of education in an individual's environment influences her perception of social cohesion. This question was worded in such a way that the answer implied an assessment of cohesion in society at the moment. Naturally, that individual's perception of these qualities will largely depend on the characteristics of the community in which she lives rather than on her personal characteristics. Participation in organizations is subject to an absolute effect; only the individual level of education significantly affects the probability of her participation in various non-profit organizations. Increasing the average level of education in the community has no impact on a person in terms of likelihood of participation.

What is the relative strength of the various effects of education? In other words, what is stronger, individual characteristics or environmental influence? To answer this question, we

divided the sample into two groups based on the median level of education. The first group consisted of respondents who had studied at least 13 years of education (i.e., primary school, secondary school, high school or two-year professional college). The second group consisted of respondents who had studied for 13 years or more (i.e., to obtain a bachelor's degree, master's degree or Ph.D.). For each of the groups, we estimated the parameters for regression equation (3) with the same set of dependent variables. Thus, we derive a comparative evaluation of the impact of an individual's education level and the education level of the social environment in groups of low-educated and high-educated respondents. Results are presented in **Table 7**.

**Table 7. Absolute, relative and cumulative effects of education for different groups**

|  | Group 1<br>Studied less than 13 years |                        |                                       | Group 2<br>Studied 13 years or more |                        |                                       |
|--|---------------------------------------|------------------------|---------------------------------------|-------------------------------------|------------------------|---------------------------------------|
|  | <i>Trust</i>                          | <i>Social cohesion</i> | <i>Participation in organizations</i> | <i>Trust</i>                        | <i>Social cohesion</i> | <i>Participation in organizations</i> |
| Personal education level, years          | 0.0154<br>(0.0124)                    | 0.0141<br>(0.0128)     | 0.0906***<br>(0.0151)                 | 0.0884***<br>(0.130)                | 0.0101<br>(0.0141)     | 0.1320***<br>(0.0133)                 |
| Average education level in region, years | 0.2032***<br>(0.0506)                 | 0.2214***<br>(0.0515)  | 0.0192<br>(0.0604)                    | 0.2847***<br>(0.0414)               | 0.3711***<br>(0.0425)  | 0.0486<br>(0.0430)                    |
| Age                                      |                                       |                        | yes                                   |                                     |                        | yes                                   |
| Sex                                      |                                       |                        | yes                                   |                                     |                        | yes                                   |
| Family income                            |                                       |                        | yes                                   |                                     |                        | yes                                   |
| Regional variables                       |                                       |                        | yes                                   |                                     |                        | yes                                   |
| N (not less than)                        |                                       |                        | <b>10 832</b>                         |                                     |                        | <b>13 032</b>                         |

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

The results for highly educated respondents are almost the same as the results for the sample as a whole. A significantly larger coefficient on "Personal education level" indicates a stronger effect of higher education on the likelihood of trust and civic behavior.

In our opinion, the most significant conclusion is that the average level of education in one's social environment is the only factor that matters for trust for less educated citizens. Living in a highly educated community increases the likelihood of trust for the people who studied less than 13 years. At the same time, for highly educated individuals,

their personal level of education is also a significant factor. For individuals with higher levels of education, their individual level of education compensates for the lack of education in their social environment.

#### B. Personal Discount Rate as an Instrument for Education

These results meet the same threat as in cross-regional study – omitted variable bias. It is possible that some unobservable individual characteristics influence both education level and trust. People with certain characteristics may choose higher education levels and trusting and civic behavior simultaneously. Therefore, the coefficients on education could be a result of a self-selection process. This self-selection can introduce a correlation between the error term and the regressor, which leads to bias in the probit estimator. To derive an unbiased estimator, we must find a plausible instrument.

Many studies show that individual measures of impatience predict a wide range of important personal outcomes. For example, cognitive abilities are closely connected with personal discount rates. The main finding is that people with lower cognitive ability are significantly more impatient and also more risk averse. This is true when controlling for personal characteristics, education attainment, income, and liquidity constraints (Dohmen et al., 2010). Thus, any measure of impatience or risk aversion could be a good proxy for individual unobservable characteristics.

Unfortunately, we do not have such measures in our database. Instead, we use the 2008 Georating survey, which includes question about family budget planning. The question asks: “Some people keep a permanent record of their income and expenses to plan their budget. Other people do not. Do you consider yourself as a part of those who plan their budget or those who do not?” There were four possible answers to this question. People who responded “Certainly, I’m one of those who planning their budget” and “I’m more of a planner than not” were coded as 1 (about 21,000 respondents, or 61% of the sample). People who responded “Certainly, I’m one of those who do not plan my budget” and “I’m less of a planner” were coded as 0 (about 11,000 respondents or 33.5% of the sample). We use this dummy variable as an instrument for personal education level. The results of the IV probit regression are reported in **Table 9**. Controls are included for age, sex, family income, and regional dummies, but they are not reported.

**Table 9. IV Regression for Trust**

| Panel A: Second Stage: <i>Trust</i>           |                      |
|---|----------------------|
| Education                                     | 0.130**<br>(0.0530)  |
| Pseudo Rsq                                    | 0.0275               |
| Panel B: First Stage: <i>Education, years</i> |                      |
| I plan my budget                              | 0.287***<br>(0.0223) |
| R sq  | 0.1295               |
| Observations                                  | 30 281               |

The results suggest that education has a strong positive and statistically significant effect on trust. The estimation of marginal effects show that holding other factors fixed, one additional year of education increases the likelihood of trust by 5%.

## 6. Discussion

The mechanism behind the effect of education on social capital has been widely discussed (see Campbell (2006) for the detailed review). Most authors agree that education affects trust through two channels. First, education increases the ability to analyze and interpret different information, thus reducing information costs. For an educated person, it is easier to give complex solutions across a wider range of issues. Second, education alters the balance of benefits and costs of engaging in collective action and complying with social norms.

Indeed, much of the learning process is the acquisition social skills. Education is not simply mastering a certain amount of information but also learning how to interact with classmates and teachers (i.e., learning cooperation). The process of socialization does not end at school; rather, it continues on to college and university. This largely explains the existence of the university community and alumni clubs. People support long-term relations precisely because the university was not only a place to acquire new knowledge but also a way to build connections and social networks.

The accumulation of social capital is the result of multiple interactions in relatively small groups. In this sense, one's years spent in education are the best means for socialization and the formation of shared mental models. Thus, education can be regarded not only as a private good (human capital accumulation), but also as a public good that forms shared values and competencies and improves the efficiency of communities. The empirical evaluation of the relative strength of each of these channels of influence should be the subject of future research in this area of economic analysis.

## **7. Conclusion**

In this study, we analyze the link between education and trust in Russia. The results show that average level of education in the region is the only variable that consistently correlated with trust. Using instrumental variables approach, we estimate the magnitude of this relationship – raising educational level of one standard deviation increases trust level of more than one standard deviation. There is some evidence that this relationship is causal.

At the individual level, education is the main predictor of trust, as well as participation in non-profit organizations and associations. Controlling for unobservable individual characteristics, we estimated the marginal effect of education – every additional year of education increases the probability of a positive answer to the trust question by 5%. We also find that level of education in the social environment influence low-educated individuals much stronger than well-educated.

We conclude that education produces significant positive externalities. Increasing the level of education of one individual positively affects the probability of trust from the other. Possible mechanisms for this link may include socialization during the learning process, network effects and formation of shared values and beliefs about the world.

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## Appendix

| Variables                      | Questions in Georating survey (2005)  |
|--------------------------------|---|
| Trust                          | Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? |
| Social cohesion                | Do you think that in our country today, there tends to be more harmony and unity or disagreement and disunity among people?   |
| Participation in organizations | Do you participate in public associations and other nonprofit organizations?  |