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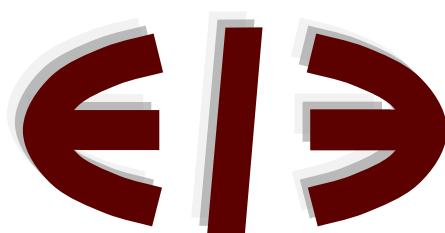
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## **Historical education levels and present-day non-cognitive skills**

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## Historical education levels and present-day non-cognitive skills

Eiji Yamamura<sup>\*</sup>

### ABSTRACT

I examined the extent to which education levels in the 19th century have shaped current norms, which influence individuals' present-day non-cognitive skills and perceptions of life. Cross-country, individual-level data were compared with each country's average years of schooling in 1870. After controlling for various country-level and individual characteristics, the key findings were as follows: (1) people in countries with high historical education levels place importance on hard work, ambition, and education; (2) people in countries with high historical education levels tend to show perseverance and have a sense of responsibility.

*JEL classification:* I25; D83; Z13; N30

*Keywords:* Historical education level, norms, non-cognitive skills

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## I. Introduction

The economic education literature assumes that cognitive skills play a critical role in the ability to achieve success in life (Hanushek and Woessmann 2008). Researchers have also paid much attention to non-cognitive skills related to successful lifetime outcomes (Heckman et al. 2006). The formation of both cognitive and non-cognitive skills is important for labor quality improvement and economic development, and the process of skill formation has been investigated by researchers (e.g., Chetty et al. 2011; Heckman et al. 2010a, 2010b, 2013). For example, the “Perry Preschool Program” was designed to promote social competency, planning, and organization in 3- and 4-year-old disadvantaged African-American youth. Heckman et al. (2010a, 2010b) have shown that the program can significantly and beneficially affect life outcomes. The program improved non-cognitive skills (reducing externalizing behavior such as aggressive, antisocial, and rule-breaking behaviors) and academic motivation (Heckman et al. 2013).<sup>1</sup> These findings indicate that early childhood environments substantially influence non-cognitive skills and learning effort.

In terms of other individual characteristics, women are less likely than men to consider hard work important for a better life, but women are more likely to have negative views of competition (Fisman and O’Neill 2009). One possible explanation for this is that women’s perceptions are influenced by their experience of barriers that prevent advancement to high-level positions in the workplace (Fisman and O’Neill 2009). In addition to being influenced by individual life experience, non-cognitive skills and perceptions of life depend on norms or national characteristics. According to the “industrious revolution” argument, an increase in demands for “market-supplied goods” during the Edo period in Japan caused people to be more industrious (De Vries 1994). Norms or national characteristics are thus thought to change in response to historical events and conditional changes. Therefore, it is

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<sup>1</sup> Education plays an important role in the formation of identity (Aspachs-Bracons et al. 2008) and attitude toward risk (Hryshko et al. 2011).

useful to investigate when and how norms or national characteristics are formed.

From a historical perspective, following the analogy of early childhood development, the spread of education in the early eras in modern nations is important in the formation of citizens' national characteristics and norms.<sup>1</sup> Shared characteristics such as cultures and norms are transmitted from generation to generation (Bisin and Verdier 2011). National characteristics and norms formed in past eras influence people's present-day perceptions and behaviors. For example, levels of education in the 19th century are linked to lower levels of corruption today (Uslaner and Rothstein 2015).<sup>2</sup> However, little is known about how historical levels of education are related to people's non-cognitive skills and perceptions of life.<sup>3</sup>

Based on these observations, we propose here a testable hypothesis that education levels in the early stages of modern nations have improved present-day non-cognitive skills. To test this hypothesis, we examined the effect of historical education levels on individuals' present-day views about factors important to life and on their attitudes to tasks. For this purpose, we used data on historical education levels in 1870 for 28 countries matched with individual-level data from the International Social Survey Program (ISSP).

The remainder of this paper is organized as follows. Section II describes the data and the empirical method. Section III presents the estimation results and their interpretation. The final section offers some conclusions.

## **II. Data and Methods**

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<sup>1</sup>In the United States of America, growing education increased citizens' attention to public affairs and politics (Milligan et al. 2004).

<sup>2</sup>Early land inequality has negative effects on math and science skills even a century later (Baten and Juif 2014).

<sup>3</sup> Compulsory schooling laws in the 1950s influence people's views of superstition (Mocan and Pogorelova 2014).

### *A. Data*

This study integrated individual-level ISSP data and country-level data, such as average years of schooling in 1870, levels of corruption in the residential country, number of conflicts, and GDP per capita. ISSP surveys have been conducted since 1985. The 2009 ISSP survey included 41 countries. The same questionnaire was used for each country and included questions about demographics, education level, economic condition, and subjective perceptions. The present study focuses on the subjective views of factors that are important to life given by respondents in the 41 countries. Other key variables in this study relate to non-cognitive skills, such as sense of responsibility and perseverance. However, questions about non-cognitive skills were only available for 15 countries and data on average years of schooling in 1870 were not available for several countries. Therefore, this study used data on subjective views from only 28 countries and data on non-cognitive skills from only nine countries. Table A1 in the Appendix shows the countries from which the data used here were drawn.

The ISSP 2009 data on subjective views were drawn from a sample of approximately 34,000 and the ISSP 2009 data on non-cognitive skills were drawn from a sample of approximately 12,000. The majority of respondents were aged 18 years and above.<sup>1</sup> The fieldwork that produced the data was conducted between 2008 and 2010.<sup>2</sup>

In comparison with other individual-level surveys, such as the World Value Survey, the ISSP has the advantage that it provides a range of information about respondents' wealth, including monetary wealth (savings, stocks, or bonds) and non-monetary wealth (home). One of the dependent variables was proxy for the importance of family wealth. Therefore, the

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<sup>1</sup> Respondents from Finland, Norway, and Sweden were aged 15–74, 19–0, and 17–79 years, respectively. Those from Japan were 16 years and above.

<sup>2</sup> Fieldwork in Italy was conducted between 2011 and 2012. Sampling procedures varied among individual countries: some were simple samples and others were multi-stage, stratified, random samples. The mode of interview also differed among countries: some used face-to-face interviews; others used paper-and-pencil or postal surveys.

measurement of economic conditions such as wealth should be included. It is thus necessary to take individuals' wealth into account. Furthermore, ISSP 2009 provides information about non-cognitive skills by recording respondents' views about tasks; previous ISSP surveys did not contain this information. Because of these advantages of ISSP 2009, this paper used the ISSP 2009 data.

The variables used in the regression estimations are shown in Table 1, which provides definitions and basic statistics (mean, standard deviation). One ISSP question about subjective views of factors important to life asked "Please show how important you think it is for getting ahead in life." Respondents answered in relation to 11 factors with five possible responses, ranging from 1 (not important at all) to 5 (essential). Table 1 contains definitions of these 11 factors. In this study, the factors were divided into three categories: individual effort and education (HARD\_WORK, AMBITION, I\_EDU, P\_EDU), social background (FAMILY\_WEALTH, GENDER, RACE, RELIGION), and political factors (KNOW\_PERSON, POLI\_CONNECT, BRIBE).

With respect to non-cognitive skills, respondents were asked "How would you describe yourself as a person?" Respondents selected one of three descriptions:

- (1) I work hard to complete my daily tasks, even if I am slightly sick or when there is another legitimate reason for taking a break.
- (2) I perform to the best of my ability even on a task that I do not like.
- (3) I work hard to maintain my performance on a task, even if the task takes a long time to start producing any results.

For each description, respondents could choose one of four responses, from 1 (strongly disagree) to 4 (strongly agree). These three descriptions are related to each other. However, in this paper, we broadly divided them into two groups. If a person does not feel a sense of responsibility, they may not complete their work. Hence, in this study, the first description

indicated a sense of responsibility (RESPONSIBILITY). If a person dislikes a task or the task does not provide an easy return, they might not persevere to complete the task. Accordingly, the second and third descriptions suggested perseverance (PERSEV\_1, PERSEV\_2).

To measure the economic condition of the country of residence, we used SCHOOL\_1870, UNCORRUPT, CONFLICT, GINI (Gini coefficient before tax and transfers), and GDP per capita. These were 2008 measures. The historical data on average schooling years in 1870 was drawn from Morrison and Murtin (2009).<sup>1</sup> As a proxy for institutional quality, we used the 2008 corruption index from the International Country Risk Guide (ICRG) produced by the Political Risk Service Group. The ICRG corruption index values range from 0 to 6; larger values indicate less corruption. According to the ICRG, the most common form of business corruption is financial corruption in the form of demands for special payments and bribes connected with licenses. Therefore, the ICRG corruption index was considered a good measure of financial corruption. Information about the occurrence of real conflict was sourced from the Uppsala Conflict Data Program/Peace Research Institute Oslo Armed Conflict Dataset v.4.<sup>2</sup> These data were used to calculate the number of conflicts between 1946 and 2008. The GINI data were sourced from World Bank data.<sup>3</sup> GDP information was collected from the University of Pennsylvania's Center for International Comparisons, Penn World Table 7.1.<sup>4</sup>

### ***B. Econometric Framework and Estimation Strategy***

This study attempted to examine the effect of historical education levels on both subjective

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<sup>1</sup> An email request for access to the data was sent to Fabrice Murtin. In response, he provided the dataset via an email attachment (February 12, 2015).

<sup>2</sup> Data sourced from Uppsala University, Department of Peace and Conflict research: [http://www.pcr.uu.se/research/ucdp/datasets/ucdp\\_prio\\_armed\\_conflict\\_dataset/](http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/) (accessed May 24, 2015).

<sup>3</sup> See <http://data.worldbank.org/indicator/SI.POV.GINI?page=1> (accessed June 12, 2013).

<sup>4</sup> The data are available at the Penn World Table website: [https://pwt.sas.upenn.edu/php\\_site/pwt71/pwt71\\_form.php](https://pwt.sas.upenn.edu/php_site/pwt71/pwt71_form.php) (accessed August 25, 2013).



views of factors that determine success in life and non-cognitive skills. For this purpose, the following estimated function of the baseline model was used:

$$Y_{ik} = \alpha_1 SCHOOL_{1870k} + \alpha_2 I\_SCHOOL_i + X'B + \varepsilon_i$$

*X*: Vector of country's and individual's characteristics

*B*: Vector of coefficients of country's and individual's characteristics

where  $Y_{ik}$  represents the dependent variable for individual  $i$  and country  $k$ . To estimate the determinants of success in life, 11 variables were used as  $Y_{ik}$ . As mentioned earlier, these 11 variables were categorized as individual effort and education (HARD\_WORK, AMBITION, I\_EDU, P\_EDU), social background (FAMILY\_WEALTH, GENDER, RACE, RELIGION), and political factors (KNOW\_PERSON, POLI\_CONNECT, BRIBE). To estimate non-cognitive skills, sense of responsibility (RESPONSIBILITY) and perseverance (PERSEV\_1, PERSEV\_2) were used as  $Y_{ik}$ . Values of  $Y_{ik}$  are ordinal numbers, and so an ordered probit model was used to conduct the estimations.

Regression parameters are represented by  $\alpha$ . The error term is represented by  $\varepsilon_i$ . It is reasonable to assume that the observations may be correlated within a country, as the country of one agent may well relate to the preference of another in the same country. To control such correlation in line with this assumption, z-statistics were calculated using robust standard errors clustered on a country. The advantage of this method is that the magnitude of correlation can be unique to each country.

Let us turn to the control variables included in  $X$ . In relation to country characteristics, people's perception seems to depend on both income level and income inequality. The logs of GDP and GINI were used to measure this. Conflict is related to economic inequality (e.g., De Luca and Sekeris 2012; Esteban and Ray 2011; Macours 2011) and has a persistent effect on society (Besley and Reynal-Querol 2014). Further, people's perception is influenced by political stability and degree of corruption, and so the variables CONFLICT and

UNCORRUPT were included (Yamamura 2015).

With respect to individuals' economic condition, respondents' years of schooling (I\_SCHOOL) were included to control for their educational background. In countries with widespread education, individuals are likely to have high levels of education. That is, individuals' educational backgrounds depend on the past educational condition of their residential country. The SCHOOL\_1870 and I\_SCHOOL variables measured both the effect of a country's historical education level and the effect of individual-level education.<sup>1</sup> Research shows a gender difference in perceptions of factors important to life (Fisman and O'Neill 2009); therefore, we included gender in the analysis. People tend to compare their income with the income of people around them, which influences their subjective perceptions (Luttmer 2005). Hence, the relative income levels in each country were considered and three dummy variables were constructed: HIGHINCOM (respondents belong to the 25th percentile income group), MIDINCOM (respondents belong to the income group between the 25th and 75th percentiles), and LOWINCOM (respondents belong to the 75th percentile income group). In addition to income level, to control for stock ownership as part of the wealth assessment, dummy variables to measure savings, stocks, and bonds were incorporated: DEBTSTOC and NOSTOC. To control for other types of wealth, dummy variables were included to measure ownership and debt related to homes or apartments: DEBTHOM and NOHOM. Following a previous study that controlled for individuals' work, religion, demographic, and social status characteristics (Yamamura 2015), this study included WOKGOV, WOKSELF, CATHOLIC, PROTEST, AGE, MARRI, and DIVO as independent variables. The data set includes information about respondents' residential areas within a country, which range from 5 (the most urbanized area) to 1 (the most rural areas). The characteristics of residential areas were controlled for by including dummy variables to capture these characteristics and to control for differences in time-invariant characteristics across residential country (in Asia, Europe, South America, and other areas). However, analyses of the characteristics of residential areas are not reported here.

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<sup>1</sup>The I\_SCHOOL data contained some outliers; to avoid any resultant bias, I\_SCHOOL scores above 30 were excluded from the sample used for estimations. However, even when outliers were included, estimation results were similar to those reported in Tables 2–5, suggesting that the outliers did not influence the results. Results of the analysis that included the outliers are available from the author on request.

### III. Estimation Results

#### A. Factors Considered Important to Life

The estimation results regarding factors perceived as important to life are shown in Tables 2, 3, and 4. We divided these variables into three categories. First, *HARD\_WORK*, *AMBITION*, *I\_EDUCA*, and *P\_EDUCA* represented the importance of individuals' effort and education in life. Table 2 shows the estimation results of the analysis with these variables as dependent variables. Second, *FAMILY\_WEALTH*, *GENDER*, *RACE*, and *RELIGION* represented the importance of social background in life. Table 3 shows the estimation results of the analysis with these variables as dependent variables. Third, *KNOW\_PERSON*, *POLI\_CONNECT*, and *BRIBE* represented the importance of political factors in life. Table 4 shows the estimation results of the analysis with these variables as dependent variables. Each table shows the coefficients of the independent variables. The coefficient values do not represent the marginal effects.<sup>1</sup> This analysis focused mainly on the coefficients' sign and statistical significance and on results from the key independent variables.

Table 2 shows that the coefficient of *SCHOOL\_1870* is positive across all dependent variables and is statistically significant in columns (1)–(3), but is not statistically significant in column (4). Overall, the average number of schooling years in 1870 is positively related to the belief that an individual's effort and education is important in life. However, the average number of schooling years in 1870 does not affect people's view about the importance of parental education. The perceived importance of parental education reflects circumstances and varies according to parents' educational level, which is not directly related to individual

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<sup>1</sup> The marginal effects of independent variables can be calculated for each value of the dependent variables (Greene 2008, pp. 831–835). For example, their marginal effect on the probability that *HARD\_WORK* is 5, their marginal effect on the probability that *HARD\_WORK* is 4, their marginal effect on the probability that *HARD\_WORK* is 3, their marginal effect on the probability that *HARD\_WORK* is 2, and their marginal effect on the probability that *HARD\_WORK* is 1. The results of the marginal effects are not reported here because of space limitations.

ability and performance. Therefore, the fact that the effect of SCHOOL\_1870 on I\_EDUCA differs from the effect of SCHOOL\_1870 on P\_EDUCA supports the argument that historical education level is related to subjective views about the importance of individual effort and education, rather than to the conditions provided by parents.

The I\_SCHOOL coefficient is positive in columns (1)–(4) and is statistically significant in columns (1)–(3), but not in column (4). Therefore, the results of I\_SCHOOL are similar to those of SCHOOL\_1870: even after controlling for individual educational background, the historical level of schooling in the residential country helps to shape individuals' views on the importance of individual effort and education in life. The variable WOMAN is not statistically significant in columns (1)–(3) but shows a significantly negative relationship in column (4). One possible interpretation is that highly educated parents' investment in their children's education differs according to the child's gender. If highly educated parents are more likely to invest in a son's education than in a daughter's education, daughters are less likely to benefit from education.

Table 3 shows no statistical significance for the SCHOOL\_1870 coefficient in any columns. Historical educational background in 1870 is not related to people's view about the importance of social background in life. The variable I\_SCHOOL shows a significant relationship in column (4), suggesting that highly educated persons are less likely to consider religion as important in life. This is consistent with the findings of Mocan and Pogorelova (2014). It is interesting to observe that GINI is positive and statistically significant at a 1% probability level in columns (1)–(4). Present-day income inequality means that people place importance on social background. The above results may suggest that people residing in countries characterized by income inequality believe that social background, rather than educational differences, is the largest cause of inequality. The WOMAN coefficient was negative and statistically significant in columns (1) and (3). Women do not perceive family

wealth and race to be large influences on life. One possible interpretation is that women are more likely to change their lives by marriage (they cannot change their origins). Therefore, women are influenced less by family wealth and race than are men. However, the WOMAN coefficient was positive and statistically significant in column (2), suggesting that women are more likely than men to consider gender as an important influence on life. This may reflect either differences in the importance of marriage to women and men or discrimination against women in the labor market (e.g., Biau and Kahn 2003; Kunze 2005, 2008).

The variable SCHOOL\_1870 is not statistically significant in any columns of Table 4, indicating that historical educational level of a country is unrelated to present-day perceptions of the importance of political factors. However, UNCORRUPT and CONFLICT showed negative and statistically significant relationships at the 1% probability level in columns (1)–(3). In terms of levels of corruption, this indicates that people living in countries with low levels of corruption are less likely to consider political factors as important in life. If corruption levels are low, political factors such as knowing the “right” people, political connections, and bribery are not considered important to success. Similarly, people living in countries in which conflict frequently occurs are less likely to consider political factors as important to life. Unstable political conditions reduce the importance of political factors. This might be because people’s influence and political connections are unstable under such conditions and so the future value of these factors is less certain, compared with conditions in politically stable countries. The WOMAN coefficient is negative and statistically significant in columns (1)–(3), suggesting that women are less likely than men to consider political factors as important in life. It follows from this that men tend to benefit more from knowing the “right” people, political connections, and bribery. This indicates that women are likely to be excluded from political networks.

Some respondents did not answer all questions so data for these respondents were

incomplete. Therefore, we were able to obtain more observations by excluding some of the control variables from the dependent variables. To check the robustness of the results in Tables 2–4, we conducted alternative estimations excluding some of the key variables. As shown in the Appendix (Tables A1–A3), the results for SCHOOL\_1870 are almost the same as in Tables 2–4, demonstrating their robustness to alternative specifications.

### ***B. Attitude Toward Work***

Table 5 shows that the SCHOOL\_1870 coefficient was positive and statistically significant at the 1% probability level in all columns. This suggests that average schooling years in 1870 were related to a greater sense of responsibility (RESPONSIBILITY) and perseverance (PERSEV\_1, PERSEV\_2) for tasks. However, the I\_SCHOOL variable was positive and statistically significant only in column (1), but not in columns (2) and (3), indicating that individual years of schooling relates to responsibility but not to perseverance for tasks. Considering jointly the results of SCHOOL\_1870 and I\_SCHOOL suggests that historical educational levels are more important than individual educational levels in the formation of non-cognitive skills for tasks. As explained in the previous subsection, the exclusion of some control dependent variables increased the observations. To check the robustness of Table 5, some of the key variables were excluded from the equation. As is shown in the Appendix (Tables A4 and A5), the estimation results are almost the same as Table 5 and so robust to alternative specifications.

The UNCORRUPT and CONFLICT variables showed positive and negative relationships, respectively and were statistically significant, with the exception of UNCORRUPT in column (1). These results indicate that people living in countries with low levels of corruption possess more non-cognitive skills for tasks. The results also suggest that people living in countries in which conflict frequently occurs possess less cognitive skills for tasks. The

WOMAN coefficient was positive and statistically significant in columns (1) and (2), indicating that women show more cognitive skills than men.

#### **IV. Conclusions**

Individuals' responses and behaviors under certain conditions vary according to their non-cognitive skills and their views of what determines success in life. The long-term effect of non-cognitive skills such as perseverance and a sense of responsibility play an important role in economic success in life (e.g., Chetty et al., 2011; Heckman et al., 2010a, 2010b, 2013). It is thus useful to investigate how non-cognitive skills such as perseverance and a sense of responsibility are formed.

This study focused on historical education levels in each country and their relationship with non-cognitive skills and subjective views of factors considered important to life. We matched each country's individual-level data with average years of schooling in 1870 and conducted empirical estimations. The key findings were: (1) people living in countries with high historical education levels place importance on individual effort and education; (2) people living in countries with high historical education levels tend to have a sense of responsibility and perseverance. This paper provides evidence that the spread of education in the 19th century led to an accumulation of human capital, measured by cognitive skills, and shaped future non-cognitive skills in the 21st century. This supports the argument that norms or national characteristics are formed following widespread education, which has a long-term effect on people's present-day non-cognitive skills and views of life. More attention should be paid to the long-term influence of historical developments in education on the formation of national characteristics.

Because of data limitations, the data set contained a restricted number of countries and major historical events between 1870 and 2009 were not taken into account. This resulted in a

lack of sufficient accuracy in the estimation results. To explore the patterns suggested by our analysis in more depth, further research using a larger number of countries, and a broader examination of historical events, is needed.



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**Table 1***Variable Definitions and Descriptive Statistics*

	Definitions	Mean	Standard deviation
Country characteristics			
SCHOOL_1870	Average years of schooling in 1870	2.50	1.85
UNCORRUPT	Level of corruption of residential country 1 (very corrupt) to 5 (not corrupt)	3.52	1.52
CONFLICT	Number of conflicts after World War II	8.76	17.7
GINI	Gini coefficients before taxes and transfers in 2008 (World Bank)	0.36	0.10
Ln(GDP)	Log of GDP (Millions of US dollars)	9.88	0.67
Individual characteristics: subjective views and demographic data			
HARD_WORK	Subjective view of importance of hard work 1 (not important at all) to 5 (essential)	4.01	0.87
AMBITION	Importance of having ambition 1 (not important at all) to 5 (essential)	3.89	0.93
I_EDU	Importance of having a good education yourself 1 (not important at all) to 5 (essential)	3.97	0.89
P_EDU	Importance of having well-educated parents 1 (not important at all) to 5 (essential)	3.24	0.86
FAMILY_WEALTH	Importance of coming from a wealthy family 1 (not important at all) to 5 (essential)	2.91	1.16
GENDER	Importance of being born a man or a woman 1 (not important at all) to 5 (essential)	2.21	1.16
RACE	Importance of a person's race 1 (not important at all) to 5 (essential)	2.21	1.15
RELIGION	Importance of a person's religion 1 (not important at all) to 5 (essential)	2.02	1.13
KNOW_PERSON	Importance of knowing the "right" people 1 (not important at all) to 5 (essential)	3.55	1.01
POLI_CONNECT	Importance of having political connections 1 (not important at all) 5 (essential)	2.65	1.20
BRIBE	Importance of giving bribes 1 (not important at all) to 5 (essential)	1.85	1.10
RESPONSIBILITY	Self-description: I work hard to complete my daily tasks, even if I am slightly sick or when there is another legitimate reason for taking a break. 1 (strongly disagree) to 4 (strongly agree)	3.22	0.70

PERSEV_1	Self-description: I perform to the best of my ability even on a task that I do not like. 1 (strongly disagree) to 4 (strongly agree)	3.18	0.69
PERSEV_2	Self-description: I work hard to maintain my performance on a task, even if the task takes a long time to start producing any results. 1 (strongly disagree) to 4 (strongly agree)	3.19	0.67
I_SCHOOL	Respondent's years of schooling	11.8	3.88
WOKGOV	Equals 1 if respondent works for government, otherwise 0	0.17	—
WOKSELF	Equals 1 if respondent is self-employed, otherwise 0	0.13	—
OTHER WORK	Equals 0 if WOKGOV or WOKSELF are 1, otherwise 1	0.70	—
CATHOLIC	Equals 1 if respondent is a Catholic, otherwise 0	0.29	—
PROTEST	Equals 1 if respondent is a Protestant, otherwise 0	0.19	—
OTHER RELIGION	Equals 1 if CATHOLIC or PROTEST are 0, otherwise 0	0.51	—
AGE	Respondent's age	46.6	17.1
AGESQ	Square of AGE	—	—
MIDINCOM	Equals 1 if respondent's household income is between 25th and 75th percentile of household income (25th percentile $\geq$ Group $\geq$ 75th percentile), otherwise 0	0.56	—
HIGINCOM	Equals 1 if respondent's household income is higher than 25th percentile (Group $>$ 25th percentile), otherwise 0	0.29	—
LOWINCOM	Equals 1 if respondent's household income is lower than 75th percentile (Group $<$ 75th percentile), otherwise 0	0.14	—
DEBTHOM	Equals 1 if respondent's wealth (house or apartment) is just debt, otherwise 0	0.04	—
NOHOM	Equals 1 if respondent has no wealth (house or apartment), otherwise 0	0.15	—
OTHER HOM	Equals 1 if DEBTHOM or NOHOM are 0, otherwise 0	0.81	—
DEBTSTOC	Equals 1 if respondent's wealth (savings, stocks, or bonds) is just debt, otherwise 0	0.05	—
NOSTOC	Equals 1 if respondent has no wealth (savings, stocks, or bonds), otherwise 0	0.19	—

OTHER STOC	Equals 1 if DEBTSTOC or NOSTOC are 0, otherwise 0	0.75	—
WOMAN	Equals 1 if respondent is a woman, otherwise 0	0.55	—
MARRI	Equals 1 if respondent is married, otherwise 0	0.55	—
DIVO	Equals 1 if respondent is divorced, otherwise 0	0.06	—

Note: GINI data were obtained from OECD

(<http://stats.oecd.org/Index.aspx?DataSetCode=IDD#>, accessed June 27, 2013).

GDP and POP data were from Penn World Table 7.1

(<http://www.rug.nl/research/ggdc/data/penn-world-table>, accessed June 27, 2013). Other variables were sourced from ISSP 2009. The data set contained some outliers of I\_SCHOOL; to avoid possible resulting bias, I\_SCHOOL scores over 30 were excluded from the sample used for estimations.

Apart from WK\_EFFORT, WK\_EFFORT2, and WK\_EFFORT3, the sample is equivalent to that used in column (1) of Table 2. The sample of WK\_EFFORT, WK\_EFFORT2, and WK\_EFFORT3 is equivalent to that used in column (1) of Table 5.

**Table 2***Estimation Results for Individual Effort and Education (Ordered Probit)*

Dependent variable	(1) HARD_WOR K	(2) AMBITION	(3) I_EDUCA	(4) P_EDUCA
Country characteristics				
SCHOOL_1870	0.07** (2.08)	0.15*** (3.73)	0.08** (2.43)	0.06 (1.60)
UNCORRUPT	-0.11 (-1.59)	-0.06 (-1.16)	0.02 (0.46)	-0.01 (-0.29)
CONFLICT	0.001 (0.18)	-0.003 (-1.03)	-0.002 (-0.91)	-0.01*** (-3.86)
GINI	0.01 (0.81)	0.003 (0.46)	0.02*** (3.39)	0.02*** (3.32)
Ln (GDP)	0.05 (0.29)	-0.30** (-2.06)	-0.43*** (-3.23)	-0.48*** (-4.45)
Individual characteristics				
I_SCHOOL	0.01** (2.49)	0.01** (2.53)	0.02*** (4.13)	0.01 (1.64)
OTHER WORK	<Reference group>			
WOKGOV	-0.04** (-1.99)	-0.06*** (-2.84)	0.03 (1.30)	-0.02 (-1.10)
WOKSELF	0.12*** (5.07)	0.08*** (3.99)	-0.03* (-1.75)	-0.01 (-0.24)
OTHER RELIGION	<Reference group>			
CATHOLIC	0.08 (1.42)	0.11* (1.88)	0.04 (0.69)	0.06 (0.98)
PROTEST	0.11 (1.39)	0.16*** (2.64)	-0.10* (-1.96)	-0.16*** (-2.94)
AGE	-0.01*** (-3.50)	-0.01 (-1.69)	-0.01*** (-3.53)	-0.002 (-0.74)
AGESQ	0.0001*** (3.77)	0.0003 (0.98)	0.0001*** (4.19)	0.0004 (1.51)
MIDINCOM	<Reference group>			
HIGINCOM	0.02 (0.80)	0.04 (1.13)	0.001 (0.03)	0.01 (0.35)
LOWINCOM	-0.02 (-0.49)	0.03 (0.63)	-0.04 (-1.26)	0.03 (1.16)

OTHER HOM		<Reference group>		
DEBTHOM	-0.02 (-0.46)	-0.02 (-0.41)	0.13*** (3.73)	0.13*** (4.08)
NOHOM	-0.05 (-1.34)	-0.09 (-1.58)	0.05 (1.48)	0.03 (0.80)
OTHER STOC		<Reference group>		
DEBTSTOC	0.01 (0.32)	0.01 (0.24)	-0.11* (-1.73)	-0.02 (-0.43)
NOSTOC	-0.05 (-1.27)	-0.06 (-1.34)	0.08 (1.57)	0.11** (2.45)
WOMAN	0.02 (1.04)	-0.02 (-1.21)	0.01 (1.13)	-0.04*** (-3.94)
MARRI	0.05*** (3.21)	0.01 (0.67)	0.06*** (2.91)	0.03* (1.71)
DIVO	0.06*** (2.72)	0.06** (2.39)	0.08** (2.14)	0.07 (1.60)
Log	-40.522	-41.911	-39.229	-46.333
pseudo-likelihood				
Observations	33,385	33,774	34,027	33,793

Note: Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

The degree of urbanization of residential areas was controlled for by including four dummy variables. Dummy variables for Asia, Europe, and South America were also included; however, these results are not reported.



**Table 3***Estimation Results for Social Background (Ordered Probit)*

Dependent variable	(1) FAMILY _WEALTH	(2) GENDER	(3) RACE	(4) RELIGION
Country characteristics				
SCHOOL_1870	−0.02 (−0.76)	−0.01 (−0.42)	0.03 (1.05)	0.02 (0.57)
UNCORRUPT	−0.15*** (−2.72)	0.01 (0.37)	0.03 (0.78)	−0.01 (−0.10)
CONFLICT	−0.01*** (−9.98)	−0.0001 (−0.06)	−0.01*** (−2.71)	0.004* (1.66)
GINI	0.01*** (5.07)	0.02*** (4.49)	0.02*** (4.25)	0.03*** (3.93)
Ln (GDP)	−0.19** (−2.23)	−0.24** (−2.00)	−0.48*** (−3.94)	−0.20 (−1.29)
Individual characteristics				
I_SCHOOL	−0.001 (−0.44)	0.01** (2.05)	0.005 (1.22)	−0.01** (−2.17)
OTHER WORK	<Reference group>			
WOKGOV	−0.05** (−2.32)	−0.03 (−1.35)	−0.02 (−1.05)	−0.03 (−1.50)
WOKSELF	−0.03 (−1.58)	−0.01 (−0.54)	−0.03 (−1.56)	0.04 (1.51)
OTHER RELIGION	<Reference group>			
CATHOLIC	0.02 (0.66)	0.05 (1.05)	0.03 (0.60)	0.13** (2.20)
PROTEST	0.02 (0.47)	0.15** (2.58)	0.10 (1.61)	0.34*** (4.37)
AGE	0.002 (0.82)	−0.0001 (−0.06)	−0.002 (−0.95)	−0.01*** (−2.85)
AGESQ	−0.0003 (−1.16)	0.00001 (0.70)	0.0002 (0.92)	0.0001*** (2.92)
MIDINCOM	<Reference group>			
HIGINCOM	−0.01 (−0.54)	0.03 (1.28)	0.004 (0.15)	0.07*** (3.30)
LOWINCOM	0.06 (1.53)	0.07** (2.38)	0.06*** (2.64)	0.16*** (4.96)

OTHER HOM		<Reference group>		
DEBTHOM	0.08** (1.97)	0.03 (0.63)	0.02 (0.63)	0.03 (0.59)
NOHOM	0.003 (0.13)	0.04* (1.66)	-0.001 (-0.05)	0.04* (1.85)
OTHER STOC		<Reference group>		
DEBTSTOC	0.08** (2.38)	0.03 (0.62)	0.04 (0.96)	-0.03 (-0.69)
NOSTOC	0.16*** (3.97)	-0.01 (-0.22)	0.03 (0.94)	-0.04 (-0.84)
WOMAN	-0.10*** (-5.01)	0.08*** (3.95)	-0.06*** (-2.98)	0.01 (0.35)
MARRI	-0.02 (-1.09)	-0.04* (-1.70)	-0.01 (-0.86)	0.01 (0.68)
DIVO	0.02 (0.80)	0.04* (1.73)	0.02 (0.86)	0.01 (0.31)
Log	-48.831	-45.486	-45.416	-42.220
pseudo-likelihood				
Observations	33,578	32,790	32,674	32,847

Note: Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

The degree of urbanization of residential areas was controlled for by including four dummy variables. Dummy variables for Asia, Europe, and South America were also included; however, these results are not reported.

**Table 4***Estimation Results for Political Factors (Ordered Probit)*

Dependent variable	(1) KNOW _PERSON	(2) POLI _CONNECT	(3) BRIBE
Country characteristics			
SCHOOL_1870	0.03 (0.83)	−0.01 (−0.53)	−0.06 (−1.57)
UNCORRUPT	−0.26*** (−4.86)	−0.24*** (−4.14)	−0.28*** (−3.32)
CONFLICT	−0.01*** (−8.68)	−0.01*** (−5.05)	−0.01*** (−3.15)
GINI	0.01* (1.93)	0.01** (2.17)	−0.002 (−0.44)
Ln (GDP)	−0.12 (−0.79)	−0.08 (−0.86)	−0.18 (−1.32)
Individual characteristics			
I_SCHOOL	−0.01*** (−2.59)	−0.003 (−0.79)	0.0003 (0.05)
OTHER WORK	<Reference group>		
WOKGOV	−0.04 (−1.36)	0.004 (0.17)	−0.03 (−0.93)
WOKSELF	0.05** (2.11)	−0.04* (−1.76)	−0.03 (−1.22)
OTHER RELIGION	<Reference group>		
CATHOLIC	0.01 (0.29)	0.08 (1.63)	−0.01 (−0.23)
PROTEST	0.07 (0.87)	0.01 (0.21)	−0.11* (−1.78)
AGE	−0.001 (−0.50)	−0.0003 (−0.18)	0.001 (0.62)
AGESQ	−0.00004 (−1.62)	−0.00003 (−1.22)	−0.0001 (1.63)
MIDINCOM	<Reference group>		
HIGINCOM	−0.004 (−0.16)	−0.05 (−1.54)	−0.07** (−2.06)
LOWINCOM	0.02 (1.00)	0.04* (1.68)	0.04 (1.06)

OTHER HOM	<Reference group>		
DEBTHOM	0.06 (1.43)	0.10** (2.27)	-0.02 (-0.48)
NOHOM	0.04** (2.43)	-0.01 (-0.68)	-0.02 (-0.97)
OTHER STOC	<Reference group>		
DEBTSTOC	0.03 (1.02)	0.02 (0.73)	0.06 (1.45)
NOSTOC	0.16*** (2.97)	0.16*** (3.16)	0.18*** (3.53)
WOMAN	-0.09*** (-4.91)	-0.09*** (-4.67)	-0.14*** (-6.37)
MARRI	-0.03 (-1.40)	-0.01 (-0.97)	-0.09*** (-3.53)
DIVO	0.01 (0.56)	0.01 (0.33)	-0.002 (-0.05)
Log	-45.465	-47.213	-33.223
pseudo-likelihood			
Observations	33,682	32,644	31,038

Note: Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

The degree of urbanization of residential areas was controlled for by including four dummy variables. Dummy variables for Asia, Europe, and South America were also included; however, these results are not reported.

**Table 5***Estimation Results for Attitude Toward Work (Ordered Probit)*

Dependent variable	(1) RESPONSIBILITY	(2) PERSEV_1	(3) PERSEV_2
Country characteristics			
SCHOOL_1870	0.22*** (10.6)	0.22*** (23.3)	0.10*** (12.5)
UNCORRUPT	0.03 (0.31)	0.06* (1.82)	0.23*** (3.56)
CONFLICT	-0.14** (-2.34)	-0.16*** (-8.59)	-0.23*** (-6.73)
GINI	0.04 (1.41)	0.02*** (2.82)	0.03** (2.14)
Ln (GDP)	0.34 (1.57)	-0.58*** (-7.85)	-1.03*** (-8.08)
Individual characteristics			
I_SCHOOL	0.01** (2.22)	0.01 (1.34)	0.01 (1.65)
OTHER WORK	<Reference group>		
WOKGOV	-0.04 (-1.29)	0.01 (0.16)	-0.04 (-1.01)
WOKSELF	0.14*** (3.68)	0.01 (0.46)	0.15** (2.40)
OTHER RELIGION	<Reference group>		
CATHOLIC	0.08 (1.11)	0.03 (0.50)	0.05 (0.63)
PROTEST	0.15** (2.57)	0.07 (1.38)	0.10 (1.58)
AGE	0.01** (2.41)	0.01** (2.54)	0.01 (0.87)
AGESQ	-0.0001** (-2.30)	-0.0001** (-2.37)	-0.0001 (-0.59)
MIDINCOM	<Reference group>		
HIGINCOM	0.04** (2.58)	0.01 (0.35)	0.01 (0.40)
LOWINCOM	0.01 (0.40)	0.03 (1.45)	0.01 (0.32)
OTHER HOM	<Reference group>		
DEBTHOM	0.11*** (2.87)	0.05* (1.67)	0.09** (2.49)

NOHOM	−0.004 (−0.09)	−0.01 (−0.49)	−0.01 (−0.35)
OTHER STOC	<Reference group>		
DEBTSTOC	0.01 (0.35)	0.04** (2.04)	0.02 (0.86)
NOSTOC	−0.04 (−0.78)	0.01 (0.20)	0.01 (0.34)
WOMAN	0.09** (2.59)	0.08*** (2.89)	0.01 (0.42)
MARRI	0.13*** (6.52)	0.13*** (3.94)	0.05** (2.03)
DIVO	0.11* (1.78)	0.08*** (2.62)	0.03 (0.65)
Log pseudo-likelihood	−11.950	−11.732	−11.487
Observations	11,931	11,951	11,616

Note: Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

The degree of urbanization of residential areas was controlled for by including four dummy variables. Dummy variables for Asia, Europe, and South America were also included; however, these results are not reported.

## APPENDIX

**Table A1**

*List of Countries Included in Analysis*

Name		Name	
1	Argentina	16	New Zealand
2	Australia	17	Norway
3	Austria*	18	Philippines
4	Belgium	19	Portugal
5	Bulgaria	20	Russia*
6	Chile	21	South Africa
7	China*	22	Spain
8	Denmark	23	Sweden
9	Finland*	24	Switzerland
10	France*	25	Turkey
11	Germany	26	United Kingdom
12	Hungary*	27	United States of America
13	Italy*	28	Venezuela
14	Japan*		
15	South Korea*		

Note: \* indicates countries included in the estimation results shown in Table 5.

**Table A2***Alternative Specifications for Tables 2–4**Estimation Results for Individual Effort and Education (Ordered Probit)*

	Alternative specification for Table 2				Alternative specification for Table 3				Alternative specification for Table 4		
	(1) HARD	(2) AMBIT	(3) I_EDUCA	(4) P_EDUC A	(5) WEALTH	(6) GENDER	(7) RACE	(8) RELIG	(9) KNOW	(10) POLI_C	(11) BRIBE
Country characteristics											
SCHOOL_1870	0.06* (1.92)	0.14*** (3.23)	0.09** (2.44)	0.07 (1.58)	−0.02 (−0.65)	−0.01 (−0.44)	0.03 (1.06)	0.01 (0.46)	0.03 (0.86)	−0.01 (−0.38)	−0.05 (−1.44)
Individual characteristics											
I_SCHOOL	0.01*** (2.62)	0.02** (2.57)	0.01*** (3.80)	0.01 (1.05)	−0.01* (−1.69)	0.01 (1.59)	0.003 (0.68)	−0.01** (−2.26)	−0.01*** (−3.23)	−0.01 (−1.59)	−0.01 (−0.79)
Log pseudo-likelihood	−40.575	−41.970	−39.273	−46.380	−48.917	−45.503	−45.429	−42.258	−45.541	−47.292	−33.292
Observations	33,885	33,774	34,027	33,793	33,578	32,790	32,674	32,847	33,682	32,644	31,038

Note: WOKGOV, WOKSELF, HIGINCOM, LOWINCOM, DEBTTHOM, NOHOM, DEBTSTOC, and NOSTOC were excluded from the set of variables used in the estimations of Tables 2–4. Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.



**Table A3***Alternative Specifications for Tables 2–4: Estimation Results for Individual Effort and Education (Ordered Probit)*

	Alternative specification for Table 2				Alternative specification for Table 3				Alternative specification for Table 4		
	(1) HARD	(2) AMBIT	(3) I_EDUCA	(4) P_EDUC A	(5) WEALTH	(6) GENDE R	(7) RACE	(8) RELIG	(9) KNOW	(10) POLI_C	(11) BRIBE
Country characteristi cs											
SCHOOL_1 870	0.07** (1.99)	0.14*** (3.18)	0.07* (1.94)	0.06 (1.22)	−0.02 (−0.58)	−0.01 (−0.35)	0.04 (1.18)	0.03 (0.81)	0.03 (0.87)	−0.02 (−0.67)	−0.06* (−1.69)
Log pseudo-likel ihood	−44.798	−46.363	−43.409	−51.072	−53.754	−50.214	−50.014	−46.770	−50.156	−52.020	−36.963
Observation s	37,307	37,142	37,445	37,176	36,954	36,071	35,910	36,096	37,055	35,848	34,093

Note: I\_SCHOOL, MARRI, DIVO, CATHOLIC, PROTEST, WOKGOV, WOKSELF, HIGINCOM, LOWINCOM, DEBTHOM, NOHOM, DEBTSTOC, and NOSTOC were excluded from the set of variables used in the estimations of Tables 2–4. Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

**Table A4**

*Alternative Specifications for Table 5: Estimation Results for Individual Effort and Education (Ordered Probit)*

	(1) WK_EFFORT1	(2) WK_EFFORT2	(3) WK_EFFORT3
Country characteristics			
SCHOOL_1870	0.22*** (10.8)	0.22*** (27.5)	0.10*** (13.2)
Individual characteristics			
I_SCHOOL	0.02** (2.00)	0.01 (1.30)	0.01 (1.42)
Log pseudo-likelihood	-11.970	-11.735	-11.504
Observations	11,931	11,951	11,616

Note: WOKGOV, WOKSELF, HIGINCOM, LOWINCOM, DEBTHOM, NOHOM, DEBTSTOC, and NOSTOC were excluded from the set of variables used in the Table 5 estimation. Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

**Table A5**

*Alternative Specification for Table 5: Estimation Results for Individual Effort and Education (Ordered Probit)*

	(1) WK Effort 1	(2) WK Effort 2	(3) WK Effort 3
Country characteristics			
SCHOOL_1870	0.22*** (8.00)	0.21*** (17.9)	0.09*** (8.85)
Log pseudo-likelihood	-13.585	-13.321	-12.985
Observations	13,341	13,434	13,709

Note: I\_SCHOOL, MARRI, DIVO, CATHOLIC, PROTEST, WOKGOV, WOKSELF, HIGINCOM, LOWINCOM, DEBTHOM, NOHOM, DEBTSTOC, and NOSTOC were excluded from the set of variables used in the Table 5 estimation. Values without parentheses are coefficients. Values in parentheses are z-statistics calculated using robust standard errors clustered for country.

\*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.