Financial literacy, education, and voter turnout

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Abstract

This work studies the long-run association between political participation and different levels and types of education across countries, with a special focus on financial literacy. In a sample of advanced and developing countries observed over the period 1990-2014, financial literacy increases citizens' participation to political life. The results hold applying linear and instrumental variables techniques, and in panel regressions that characterize the medium-term determinants of voter turnout. The nexus between education at school and voter turnout is not as robust both in the long-term and in the medium-term. One interpretation is that school education is arguably related to the development of civic skills. However, these skills alone might not be as powerful to spur civic engagement, and in turn electoral participation, as those skills needed to gauge the contents of policies and policy agendas that indicators of financial literacy capture.

Keywords: financial literacy; education; voter turnout; elections; civic engagement.

JEL Classification: A20, D72.

1. Introduction

An extensive literature agrees on the relevance of education to electoral participation, and finds that typically citizens who spend more time at school are more likely to turn out and vote (Dee, 2004; Milligan et al., 2004; Tenn, 2007). This empirical regularity may be explained in different theoretical frameworks. One possible mechanism relates education to the accumulation of civic skills: education is a process whereby people develop civic behaviors, and awareness about what they vote for. It is the development of a sense of sharing a collective civic identity (McNamara and Musgrave, 2020) that, in turn, spurs political and civic engagement (Wolfinger and Rosenstone, 1980; Rosenstone and Hansen, 1993; Putnam, 2001; Persson, 2015).

Despite the great effort to study the nexus between education and political participation, there are a number of questions left unanswered. For instance, if most of the literature focuses on the effect of education on voter turnout at the individual level, only a few studies consider this nexus at the macro level. Political scientists note that, differently from the empirical evidence at the micro level cited above, the level of education in the population and average voter turnout do not seem related across countries. They impute this so-called paradox to the influence of other societal changes: education may work through and indirect channel, and affect electoral participation via social status and trends (Delli Carpini, 1997; Persson, 2013a). In macroeconomics, a measure of education generally appears among the regressors in models explaining voter turnout, to control for the possibility that turnout is higher on average in countries with more educated people (Mueller and Stratman, 2003; Fumagalli and Narciso, 2012). Yet, there is no systematic study of the association between education and voter turnout *per se*.

Moreover, in most analyses on the nexus between education and political participation, the focus is on education length. Education is usually considered as a process of accumulation of generic human capital. The more time spent at school, the higher the individual or aggregate level of human capital. The reality is, of course, more diverse. Recent research documents that differences in the type of education matter, too. For instance, using data on Danish municipal and regional elections, Bhatti (2017) shows that turnout is higher for individuals who enrolled in a political bachelor degree program with a high civic education content, differently from general education types at the BA-level which do not seem to matter. Hillygus (2005), analyzing college education in the USA, finds that political participation is higher for students in social sciences and humanities than for students in biology, chemistry, and engineering.

The present study contributes to the literature in two respects. First, it provides an empirical characterization of the nexus between education and voter turnout across a large sample of countries. Second, it considers not only education length, measured by indicators of education at school at

different levels, but also how different types of education are related to voter turnout. In this respect, it compares in the role of indicators of education, measures of education at school and of financial literacy.

There is a case for financial literacy, - the specific type of literacy which refers to a set of basic economic and financial skills needed to take well-informed financial decisions, - as a determinant of voter turnout, that this study first advocates. Empirically, recent studies in the literature document that financial literacy has peculiar features with respect to other types of education. In individual data, it helps explain differences in stock market participation and in planning for retirement behavior in individual data (see, e.g., Lusardi and Mitchell, 2007; van Rooij et al., 2011). In aggregate data, it is associated to decreasing income inequality, in contexts where people's ability to understand economic and financial concepts helps them to use financial instruments (Lo Prete, 2013 and 2018).

In this study, the focus of the analysis shifts from considering the behavior of individuals as investors, to considering the behavior of individuals as citizens of democratic societies. In this context, financial literacy can proxy for people's ability to understand the content of economic and social policies. This was the case in a work on the electoral cost of major pension reforms (Fornero and Lo Prete, 2019), where the probability of a government to be re-elected in the aftermath of a reform was higher in countries where the level of financial literacy is higher. If financial literacy accounts for the set of skills that enable people to take more informed political choices (see also Murtinu et al., 2017), it may arguably represent a relevant determinant of political participation, too.

The focus of the present analysis is primarily on long-term variation in voter turnout across countries. The availability of a new indicator of financial literacy, based on the Standard & Poor's Ratings Service Global Financial Literacy Survey, allows for a rich cross-country analysis of the relevance of this specific form of education to voter turnout in comparison with indicators of general education at the primary, secondary, and tertiary level.

The results from a sample of 90 developed and developing countries, observed over the period 1990-2014, indicate that electoral participation increases in countries where a larger share of the population is financially literate. This result is robust to the inclusion of socio-economic, institutional, historical, and geographical determinants of voter turnout. It holds applying linear and instrumental variables techniques, as well as in panel regressions that exploit the limited information available on time variation in financial literacy.

While the results for financial literacy are robust in all specifications, some activity of experimenting with different models is in order to detect a positive nexus between education at school and voter turnout. The study of the long-term association between voter turnout and education at school indicates that secondary education and years of schooling are the only dimensions of schooling

that matter, and only in models where geographical location is considered. In the medium-term, secondary education, and years of schooling are positively associated to voter turnout when the full sample is considered - although, the nexus turns negative when the model includes country fixed effects.

The paper proceeds as follows. Section **2** describes the key variables used in the empirical analysis, and the empirical strategy. Section **3** presents cross-sectional estimates of the association between voter turnout, financial literacy, and education at school at different levels. Section **4** discusses a variety of robustness checks. It follows the literature on the macroeconomic determinants of voter turnout, to test the robustness of the results to the inclusion of institutional, geographical, and historical characteristics. In addition, it discusses causality issues, and the information content of the indicators of financial literacy. Section **5** presents results from panel estimation, to characterize the medium-term determinants of voter turnout. Section **6** concludes.

2. Data and empirical strategy

The dataset for this study includes information on education and electoral participation for a sample of 90 advanced and developing countries, over the period 1990-2014.[1]

Electoral participation. The dependent variable in all regressions is a measure of electoral participation: namely, voter turnout. It measures the percentage of eligible voters casting a vote at the elections. Data on parliamentary elections, electoral rules, and forms of government are drawn from the most recent 2020 version of the Voter Turnout Database compiled by the International Institute for Democracy and Electoral Assistance (IDEA, 2018). One issue in dealing with political participation is to distinguish between countries where the basic standards of political rights and liberties apply, and countries where people do not enjoy them. Since the analysis focuses on political participation, the study uses an international ranking which helps identify liberal democratic societies. More specifically, the sample includes countries that can be classified as "democracies" on the basis of the Freedom House average indicator of political rights and civil liberties. Following previous studies in the literature (Persson and Tabellini, 2004; Fumagalli and Narciso, 2012), a country is considered a (free or partially free) democracy if the index, that ranges between one (free) and seven (not free), is less or equal to five.

Financial literacy. Financial literacy refers to a set of basic economic and financial competences relevant to manage personal financial matters over the life cycle, and make political decisions as

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[1] The time coverage reflects the availability of information on education. The results would not change if the last value of these indicators was kept constant, and empirical models were run over the longer period 1990-2018, for which information on electoral participation and socio-economic conditions is available.

citizens (see, e.g., the survey by Fornero et al., 2021). Indicators of financial literacy measure individual skills on the basis of three main questions about compound interest, inflation, and risk diversification, and other questions that consider related skills (Lusardi and Mitchell, 2007). Data on financial literacy are available at the microeconomic level, mainly. At the macroeconomic level, the first indicators of ''economic literacy'' and "education in finance" were compiled by the IMD World Competitiveness Yearbook for 55 countries, over the period 1995–2008, based on interviews to senior representatives of the national business community. More recently, the OECD assessed the financial literacy of 15-year-old students, introducing specific items to the Programme on International Student Assessment (see OECD, 2020). The indicator of financial literacy used in the present study exploits information provided by the most recent and large survey on financial literacy across countries: namely, the Standard & Poor's Ratings Services Global Financial Literacy Survey (2014).

The Standard & Poor's survey gathers information through 150.000 interviews and includes four questions over the concepts of basic numeracy, interest compounding, inflation, and risk diversification. A person is defined financially literate if she correctly answered to three out of four questions, and the financial literacy index considers the percentage of financially literate people in a country. With respect to the other measures of financial literacy available for cross-country comparisons, the Standard & Poor's survey, administered in 2014, has the great advantage to provide information on a large sample of 140 advanced and developing countries. Figure 1, from Klapper et al. (2015), is a global map of the values of financial literacy around the world. On average, only one third of people globally are defined financially literate. Financial literacy is higher in advanced countries, where the darker blue areas appear, and significant disparities can be detected even within the group of richer and more developed countries. These data allow for the largest cross-country comparison ever. They will be used in the main specifications of the cross-country analysis, and complemented by other indicators having at least a limited time variation in the last section of the paper.

General education. To measure general education, the dataset includes the international measures of schooling years and quality available in the Education Attainment Dataset compiled by Barro and Lee (see Barro and Lee, 2013). They include school attainment figures for the population aged 15 and above at the primary, secondary, and tertiary level - that account for the percentage of people for whom the highest grade of education attended falls in one of the available categories. The level of education attainment is a good proxy for the stock of human capital, and an important determinant of socio-economic outcomes. Barro and Lee (2013) also estimated measures of school completion, such

as the number of years of schooling achieved by the average person at all levels of schooling combined.[2]

Other determinants of voter turnout. The dataset includes information on socio-economic, institutional, historical, and geographical variables. They will control for determinants of voter turnout that are not related to education or political participation. Definition and sources are described when introducing these variables (in sections **3**-**5**).

2.1. Empirical strategy and timing

The primary interest of the study is to analyze the role of education as a long-term determinant of voter turnout. The association of interest is analyzed in empirical models that read

$$VT_j = \alpha_0 + \alpha_1 EDU_j + \boldsymbol{X_j'}\boldsymbol{\beta} + \varepsilon_j. \tag{1}$$

Voter turnout (VT) in country j is regressed on the level of education (EDU), and on a vector of socio-economic and institutional determinants ($\boldsymbol{X}$). To study long-run associations, the observations are in average values over the period 1990-2014, and model (1) is estimated using OLS estimators and IV techniques in sections **3** and **4**. Education measures are available for a large sample of countries, but have little (school attainment and completion) or no time variation (S&P indicator of financial literacy).[3] To consider time variation in financial literacy across countries, a panel analysis is run in section **5**, using indicators compiled by the IMD World Competitiveness Yearbook, available with a smaller country and period coverage.

3. Voter turnout, financial literacy, and education at school

The present study documents that different levels and kinds of education play a different role in explaining people participation to parliamentary elections across countries. This section presents evidence on the simple relationships between voter turnout and education measures, and then from estimating model (1). The first part of the analysis shows that there is a clear association between voter turnout and financial literacy. It also discusses what we can learn from data on education at school at different grades, as determinant of electoral participation. Descriptive statistics for the variables that this section introduces are in table A1 of the Appendix to this study.

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[2] The Education Attainment Dataset includes completion rates, too. They measure the ratio of people who completed a level of schooling but did not enter the next level to people who entered that school, thus accounting for school drop-out rates. The results from specifications including completion rates as indicators of education, mainly not significant and not reported in the paper, are available upon request.

[3] Values of school education are available for 1990, 1995, 2000, 2005, 2010. Data are interpolated when missing, and the last value kept constant up to 2014. The results do not change significantly if the data are assumed constant over five-year intervals.

Figure 2 shows the bivariate association between voter turnout and financial literacy. In the sample of 90 countries under analysis, the percentage of adults financially literate ranges from 14 percent in Albania and Afghanistan, to 71 percent in Denmark, Norway, and Sweden. Electoral participation is high on average (69 percent), and records the minimum value in Gabon (34 percent), and the maximum value in Malta (95 percent). From the figure, where there are no outliers, a clear relationship emerges. Basic knowledge of economic and financial concepts, that the Standard & Poor's indicator of financial literacy measures on the horizontal axis, is positively and significantly associated to electoral participation, measured on the vertical axis.

Financial literacy, as discussed in the previous sections, represents a specific type of education. It accounts for the skills and knowledge that enable people to master basic economic and financial subjects in order to take personal financing decisions. Previous studies document that it captures a dimension of human capital that helps explain differences in inequality across countries, a feature it has not in common with other indicators of education (Lo Prete, 2018). Yet, this might not be the case when studying electoral participation. For instance, one may argue that the same skills that financial literacy measures, can be related to education at school, where pupils learn numeracy, reading, accounting, and civic values.

To explore this possibility, let start considering the correlations between financial literacy and education at school (in table A2 of the Appendix). They convey a less straightforward message. Financial literacy is negatively correlated to education at the primary level, and positively correlated to indicators of education at the secondary and tertiary level, as well as to years of schooling. The correlations between financial literacy and education at school are low on average, and differences can also be found in the correlations between measures of education at school. For instance, school attainment at the primary level, which is mandatory in all countries, is negatively correlated to school attainment at higher levels.

A closer look at the data uncovers interesting differences between financial literacy and education at school as explanatory variables for political participation, too. Figure 3 compares bivariate associations of voter turnout with school attainment rates at different grades. It shows that education at the primary school (upper-left panel) and tertiary education (upper-right panel) are mildly and positively associated to voter turnout, but, as discussed below, do not help explain it at conventional levels. Instead, electoral participation is significantly higher in countries where the population has attended at least the secondary school (lower-left panel), and where the number of years of schooling achieved (lower-right panel), that in the sample averages to 8 and is highly correlated to secondary education, is higher.

The coefficients and standard errors of these bivariate associations are in panel A of table 1. In the data, not only different levels of education are differently related to voter turnout. If school attainment at the secondary level and years of schooling seem to capture a level of reading, writing, logical and mathematical skills that is associated to political participation, so does the indicator of financial literacy, that measures a different (and more specific to economic and financial skills) kind of human capital. And the association between financial literacy and voter turnout is stronger with respect to other measures of education at school.

Moreover, by looking at the table, panel B shows that financial literacy is the only dimension of education that is robustly associated to voter turnout in empirical models that include socio-economic and institutional variables. Electoral participation, that in the sample averages to 69 percent over the period 1990-2014, depends on several factors. The empirical models in panel B of table 1 include a set of control variables for various aspects of economic, social, and institutional heterogeneity across countries. In the sample of 90 advanced and developing countries, electoral participation may be different in countries with different economic conditions, that the (logs of) level of GDP per capita and openness to international trade want to capture. The (log) size of the population is a proxy for the weight of a single vote in a country and, thus, for the probability of a voter to be pivotal. And dependency ratios provide information on the age structure of the population. Data on socio-economic conditions are from the Penn World Table 9.0 (see Feenstra et al., 2015). Finally, the empirical models in table 1 consider if voting is compulsory by law, which is the case in 20 countries in the sample (data from IDEA, 2018), and if a country is a member of the OECD.

The results from the empirical exercises in panel B tell and interesting story. In column 1, voter turnout is significantly higher in countries where a larger share of the population is financially literate, confirming the findings in figure 2 and in panel A of table 1. The similarities with the previous results, however, end there. The remaining columns of table 1 indicate that, across advanced and developing countries observed over the period 1990-2014, electoral participation is not robustly associated to general schooling at the primary, secondary, and tertiary level, nor to the average number of years of schooling.

These somehow challenging findings deserve further qualifications. What they tell right now is that education at school is not a robust determinant of electoral participation in regressions that control for socio-economic and institutional characteristics. This is true even for education at secondary school and years of schooling, that in figure 3 were positively and significantly associated to voter turnout. In table 1, financial literacy is the only measure of education that stands out as a significant determinant of voter turnout.

One possible explanation is that financial literacy does account for a dimension of human capital that is associated to higher electoral participation, and that is not directly related to general education at school. This will be consistent with findings from recent studies on financial literacy. Differently from general education, it is the ability to understand and use financial instruments that matters when people access financial markets to improve their economic status (Lo Prete, 2018). And it is people's understanding of the economic content of policies, that financial literacy is the best proxy for, not general schooling, to be associated to the probability of a government to be re-elected in the aftermath of a pension reform (Fornero and Lo Prete, 2019). To explore if this is the case in the data, the next section runs a set of robustness checks.

4. Robustness tests

The study of the determinants of electoral participation at the macroeconomic level, is an area of research that is receiving increasing attention. In addition to the determinants of voter turnout considered in the previous section, there could be other factors that differ across countries in ways that may matter to cross-country differences in electoral participation. The first part of this section considers institutional, geographical, and historical characteristics, in comparison with previous studies in the literature. The second and last part of this section discusses causality issues, and the information content of the indicator of financial literacy.

4.1. Other explanatory variables

Table 2 reports the result from a battery of empirical models that add, to the set of control variables in table 1, information on other country-specific characteristics. To include as much information as possible on the variables of interest, table 2 is set up as follows. It reports estimates (coefficients and standard errors) for the indicators of education, only. For instance, in the first column it presents the coefficient and standard errors of education, when it is measured by financial literacy. In column 2, the table reports the values for education when it is measured by primary school attainments; and so on. The sixth column, instead, tells the reader what variable model (1) includes, along with the control variables introduced in the previous section. Thus, each row corresponds to empirical specifications including the same set of control variables, and different measures of education.

Let start considering the role of the additional explanatory variables, whose coefficients are discussed in the text but not reported, before looking at the education variables which are the principal focus of the analysis.

The specifications in rows 1 and 2 of table 2 study the relevance of education in models that include indicators of political institutions. Electoral participation may differ across countries that have

different forms of government and electoral rules (Persson and Tabellini, 2004; Fumagalli and Narciso, 2012). In the sample, 57 countries have a presidential form of government. The coefficient of the dichotomous variable that measure this dimension, not reported, is negative and significant in all models. Electoral participation is lower in presidential regimes, consistently with what found, among others, by Lijphart (2001) and Fumagalli and Narciso (2012). The specifications in the second row include a "majoritarian" system dummy, which takes value 1 in the 23 countries where electoral rules are based on the majority principle. Its coefficient, not reported, is positive but not significant in all specifications.

In the third row of table 2, model (1) includes a variable, "ethnic fragmentation", to account for the possibility that people participation is lower in more ethnically fragmented societies, as suggested by Alesina et al. (2003). The sample includes countries where this index is close to zero, such as South Korea and Japan, and countries where the population is highly fragmented, as in Kenya, Uganda, and other African countries. Acemoglu et al. (2001) suggest that colonial history can be a relevant determinant of citizens' engagement in political life, too. Thus, in the fourth row of table 2, the models include a dummy variable that takes value 1 if the country was ever a colony, and zero otherwise. These two control variables, ethnic fragmentation and colonial history, related to a country's story and historical characteristics, are negatively but not significantly related to voter turnout in the sample.

The last two rows of table 2 turn to characteristics related to geography and civil liberties. The results from specifications including geographic dummy variables for World Bank's continental location are in the fifth row of table 2. In the data, the countries located in Latin American and the Caribbean, and the ex-socialist European countries, record a lower level of voter turnout with respect to the sample average. Instead, the index of civil liberties, namely the "freedom of expression" indicator from the IDEA's database on the Global State of Democracy (see Skaaning, 2020), included in the specification of the last row of table 2, is not significantly related to voter turnout.

It is time to discuss findings about education. The results from models that include indicators of political institutions, historical characteristics, geographical location, and civil liberties, all confirm that financial literacy is significantly (and positively) associated to voter turnout. This is the only robust empirical findings in all specifications.

Experimenting with these and other specifications, the inclusion of information on geographical location is crucial to detect a significant relationship between voter turnout, secondary education, and years of schooling. These associations are not as strong and robust as the one between financial literacy and voter turnout. However, there is something in the data. For this reason, the specifications to follow will include geographical controls, besides the presidential system dummy that was

significant in all specifications in the first row of table 2, and try to seize the maximum amount of information on the role of education at school from the data.

4.2. Causality issues

The specifications of the previous sections did not address causality issues. It is possible that some historical, geographical, or socio-economic variable influences both education and voter turnout. To relax the conditional independence assumptions behind the cross-country regressions in tables 1 and 2, this section applies instrumental variables (IV) methods.

It is not easy to find good instruments for financial literacy and education at school as determinants of voter turnout. Among the geographical variables experimented, and discarded, were the Frankel and Romer (1999)'s indicator of natural openness, and information on the intensity of ultraviolet radiation – the latter captures higher exposure to sunlight, which is related to a range of diseases and, thereby, to the quality of institutions, to economic activity, and to education (Ang et al., 2018, Barnebeck Andersen et al., 2016).

In table 3, to identify the causal effect of financial literacy on voter turnout, financial literacy is instrumented using legal origin dummies, as coded by La Porta et al. (1999). The original legal institutional set-up is arguably associated to financial literacy, a country-specific characteristic that does not vary much over time (Lo Prete, 2018), but not directly relevant to voter turnout in recent parliamentary elections. The results in column 1, from the first the stage regression, show that financial literacy if higher in countries that have an Anglo-Saxon or a Scandinavian legal origin.

Second-stage estimates, in column 2, indicate that financial literacy has a positive and significant effect on voter turnout. Other indicators of education at school, instead, has no causal effect on voter turnout (columns 4, 6, 8, and 10). The test statistics at the bottom of the table indicate that the exclusion restrictions are valid in all regressions, and that education, whatever the indicator used, is not endogenous. As mentioned above, it was not easy to find good instruments. Indeed, they are strong enough to foster confidence on the precision of the estimates in regressions including financial literacy (column 2), ad years of schooling (column 10). Their power is admittedly much lower in models that include indicators of education at the primary (column 4), secondary (column 6), and tertiary school (column 8).

Legal origins help explain the percentage of adults financially literate, in ways that are not related to electoral participation, and the average number of years of schooling across countries, but are not good predictors of school attainment at different grades. Nevertheless, this empirical exercise is meaningful and supportive of the insight from the previous analyses. Financial literacy is a robust

and causal determinant of voter turnout. While the association between electoral participation with education at school it is confirmed to be weaker.

4.3. *Information on financial literacy*

The Standard & Poor's indicator of financial literacy used in the analysis measures the percentage of adults who are financially literate by country. Since the primary interest of the present work is to study the long-run association between political participation and different levels and types of education across countries, the Standard & Poor's indicator has the notable advantage to be available for a large sample of countries. Admittedly, it has limits, too.

First of all, it would be interesting to understand what type of financial literacy matters, by disaggregating the Standard & Poor's measure used in the paper. Unfortunately, information on its four categories, that distinguish between understanding the concepts on basic numeracy, interest compounding, inflation, and risk diversification, is not publicly available. The same is true for information on gender and age differences among the survey's respondents.

The second limit of the indicator is its cross-sectional nature. The Standard & Poor's survey was administered for the first time in 2014. At the time of writing, these are the only data available. For the empirical analyses, the level of financial literacy was assumed constant over the period 1990-2014, and equal to its value in the last year of the sample. This assumption should not affect the results, and is arguably reasonable to the extent that the relative position of countries along this dimension does not change over time. Previous studies in the literature do document that financial literacy does not vary a lot over time, possibly due to the lack, over the past decades, of policies specifically targeted to increase the stock of knowledge of economic and financial subjects (Lo Prete, 2018). The next section offers a test of the reliability of this assumption, by using the financial literacy indicators compiled by the IMD World Competitiveness Yearbook. They will be used, along with the time-invariant Standard & Poor's indicator of financial literacy, to characterize medium-term variations in electoral participation, although on a smaller country and period sample.

5. Panel estimates

The last section of the study turns to a panel approach to analyze the medium-term determinants of voter turnout. The panel contains non-overlapping 5-year averages of the variables of interest.

Information on time variation for the measures of education at school, and financial literacy is quite scarce. The Barro-Lee Educational Attainment Dataset has records on school education at 5-year intervals from 1950 to 2010. The Standard & Poor's indicator of financial literacy has no time variation. The IMD World Competitiveness Yearbook compiled information on ''economic literacy''

from 1995 to 2008, and for "education in finance" for the shorter period 1999-2008, for 55 countries, of which 51 belong to the sample under analysis. Given data availability, the analysis is run on the period 1995-2010 for which data on financial literacy from the IMD World Competitiveness Yearbook are available.[4]

Table 4 reports the results from specifications including different indicators of financial literacy. The first two specifications use the time-invariant Standard & Poor's indicator of financial literacy. The results from OLS regressions with regional controls (in column 1), and OLS regressions with regional controls and time effects (in column 2), document a strong and positive association between financial literacy and voter turnout. Given the cross-sectional nature of the Standard & Poor's indicator, the model assumes implicitly that cross-country heterogeneity in voter turnout is explained by differences in financial literacy. To relax this assumption, the next specifications include time varying indicators of financial literacy.

In the smaller 51 country sample, education in finance and economic literacy are positively and significantly associated to voter turnout in OLS panel regression including regional control variables, in columns 3 and 6 of table 4.[5] The results hold when time effects are included, in columns 4 and 7, where the precision of the estimates is slightly lower than conventional levels for the indicator of economic literacy only (p-value=0.11). In the small sample under analysis, fixed effects capture all the variation of interest in regressions that include the indicator of education in finance (column 5). While the results for economic literacy hold and are robust also in column 8.

The findings of a positive nexus between financial literacy and voter turnout, are surprisingly and reasonably robust, considering the scarcity of information on time variation in financial literacy, and the size of the sample available to run panel analyses.

The strength of the results in table 4 is more striking when compared to the results from regressions where indicators of education at school are used, in table 5. Indicators of education at primary, secondary, tertiary school, and of years of schooling do not help to capture the variation of interest in voter turnout in the small panel of 51 countries observed over the 15-year period 1995-2009.

To find a significant association between indicators of education at school and voter turnout, the full 90 country sample should be considered. The results from the same empirical exercise of table 5, run on the full sample, are in table 6. Secondary education and years of schooling are positively and

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[4] The financial literacy score by the OECD-PISA covers a small number of countries and economies (15 in the 2015 assessment, 20 in the 2018 assessment, 26 in the 2000 assessment). It is not used in this study due to the scarce cross-sectional information available, and the time coverage – which falls out of the period under analysis.

[5] Table A3 in the Appendix to this paper reports the correlations between the three indicators of financial literacy used in this section.

significantly associated to voter turnout, when controls for geographical location and time effects are included in OLS panel regressions. Interestingly, these associations change sign in regressions that include fixed country effects (in columns 6 and 12).

Based on this evidence, the results on education at school are sensitive to the inclusion of a larger number of developing countries, where arguably the returns from secondary education, and from the time spent at school are higher. Moreover, for country-specific characteristics that geographical location control variables do not capture, education at school is associated with lower electoral participation. In line with political science studies, electoral participation does not necessarily increase in the average level of education of the population, that can be a proxy for diverse socialization factors (Nie et al., 1996; Persson 2013b). As regard financial literacy, instead, the results consistently point to a positive and significant association between electoral participation and basic knowledge of economic and financial concepts.[6]

6. Concluding remarks

This study provides insights on the importance of more or less specific types of education to citizens' engagement in political life. It explores the long- and medium-term association between education and electoral participation in a macroeconomic perspective, and shows that voter turnout is differently related to financial literacy and education at school.

The cross-sectional results indicate that, in a sample of developed and developing countries observed over the period 1990-2014, financial literacy has a positive effect on electoral participation. Education at school, instead, is not robustly associated to voter turnout, unless regressions control for continental location, and, even then, this is the case for secondary education and average years of schooling only.

The medium-term panel analysis confirms the positive association between financial literacy and voter turnout, in specification that account for country and time fixed effects, for the smaller sample for which information on financial literacy time variation is available. Again, the nexus between voter turnout and education at school is less straightforward to detect. Secondary education and years of schooling are positively associated to electoral participation only when the full sample is considered, while the nexus turns negative in models that control for unobserved country heterogeneity.

One explanation is that school education at the secondary level and education length are somehow related to people's civic skills and responsibility, but may not be enough to spur civic engagement,

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[6] This is the case for the smaller sample that include 51 developed and developing countries, for which some information on time variation in financial literacy is available. As well as for the full sample, when the time invariant Standard & Poor's indicator of financial literacy is used (results not reported).

and in turn electoral participation. Arguably, there is more than civic values that matters to civic and political engagement, such as the skills needed to gauge the contents of policies and policy agendas that indicators of financial literacy may capture.

This study relates to a literature that links electoral participation and civic engagement, to the very idea of people participation to political life, and to the wellness of a democracy. This is the case when education, by raising the benefits of civic engagement, can increase public support for democratic policies and regimes (Glaser et at., 2007). Deferring to a companion paper the analysis of the implications of financial literacy for civic engagement and democracy (Lo Prete, 2021), the present study first documents that in countries where more people are financially literate, electoral participation is higher, and a larger portion of the society participates in the political process.

Finding that basic knowledge of economic and financial concepts helps explain voting behavior in modern economies, has important policy implications. It represents an important element to understand the complex process whereby people choose to express a preference at polls or to abstain from voting in modern societies, and to design policies that, by investing in financial literacy education programs, can foster citizens' participation to political life.

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Data Appendix

Table A.1. Descriptive statistics

Variable name	N.	Mean	Std. Dev.	Min	Max
Voter turnout	90	69.2	12.8	34.3	95.1
Financial literacy	90	40	14.6	14	71
Primary education	90	27.7	14.6	3.5	65.0
Secondary education	90	45.7	17.7	4.7	79.2
Tertiary education	90	14.2	10.0	0.3	48.7
Years of schooling	90	8.5	2.5	1.5	12.8
GDP per capita	90	16298	19312	345	91500
Trade	90	83.7	50.9	22.4	361.3
Population (millions)	90	30.6	49.9	0.3	287.1
Dependency ratio	90	36.9	5.8	27.7	51.7
Compulsory	90	0.2	0.4	0	1
OECD	90	0.4	0.2	0	1
Presidential	90	0.6	0.5	0	1
Majoritarian	72	0.3	0.5	0	1
Ethnic fragmentation	90	0.4	0.2	0	0.9
Ever colony	72	0.8	0.4	0	1
Freedom of expression	87	0.7	0.1	0.4	1
Education in finance	51	5.7	1.2	3.8	8.0
Economic literacy	51	4.8	1.4	2.0	7.6

Note. The table reports information on the variables not transformed.

Table A.2. Correlation between measures of education.

	Financial Literacy	Primary education	Secondary education	Tertiary education
Primary education	-0.34			
Secondary education	0.35	-0.68		
Tertiary education	0.52	-0.47	0.36	
Years of schooling	0.58	-0.54	0.82	0.74

Notes: Correlations are computed on the sample of 90 countries. All correlations are significant at the 1 percent level.

Table A.3. Correlation between measures of financial literacy.

	Financial Literacy	Education in finance
Education in finance	0.65	
Economic literacy	0.65	0.91

Notes: Correlations are computed on the sample of 51 countries using the most recent value available.

Figure 1. Percentage of adults who are financially literate.
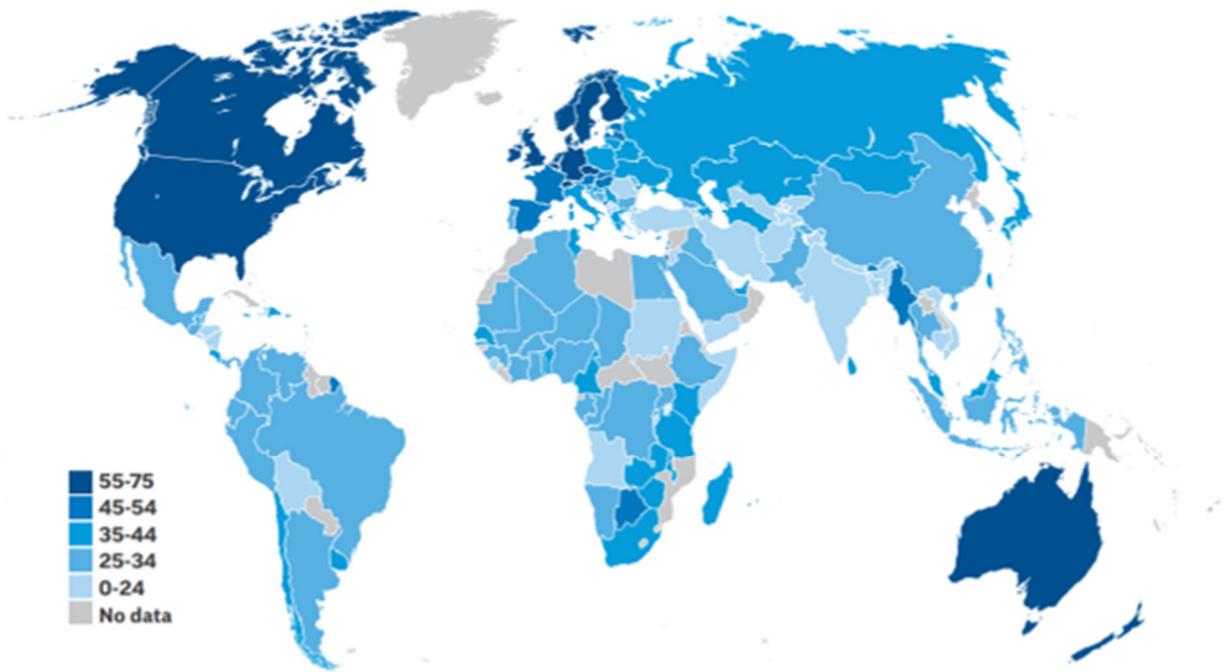
Source: Klapper et al. (2015, map 1, page 7).

Figure 2. Financial literacy and voter turnout across countries.
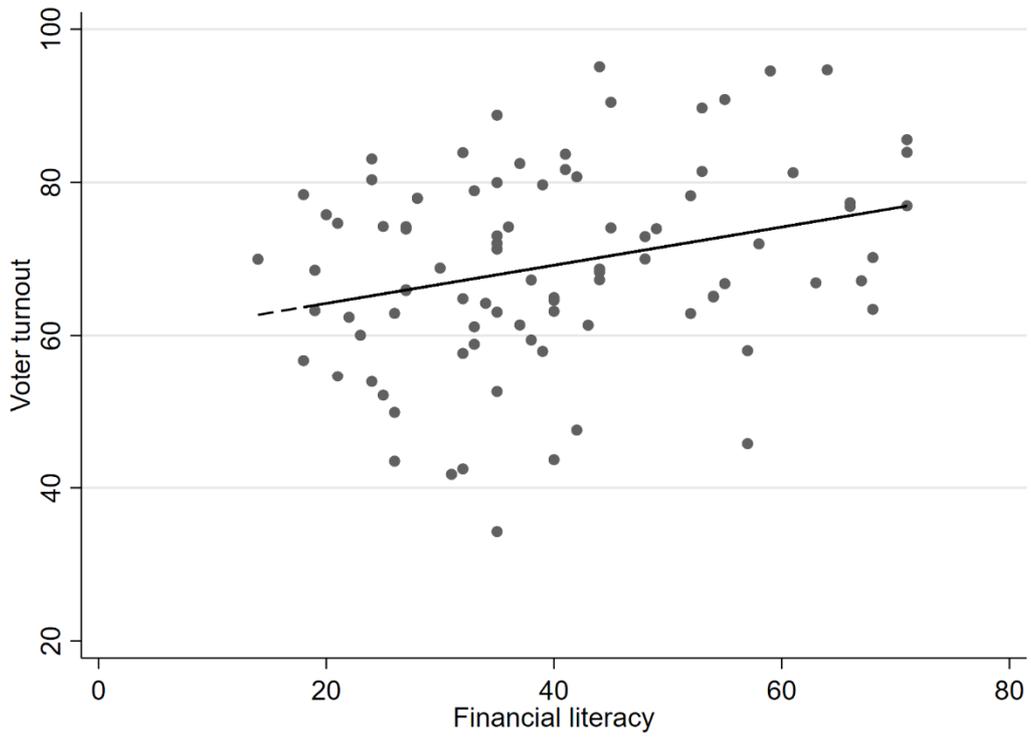
Figure 3. Education at school and voter turnout across countries.
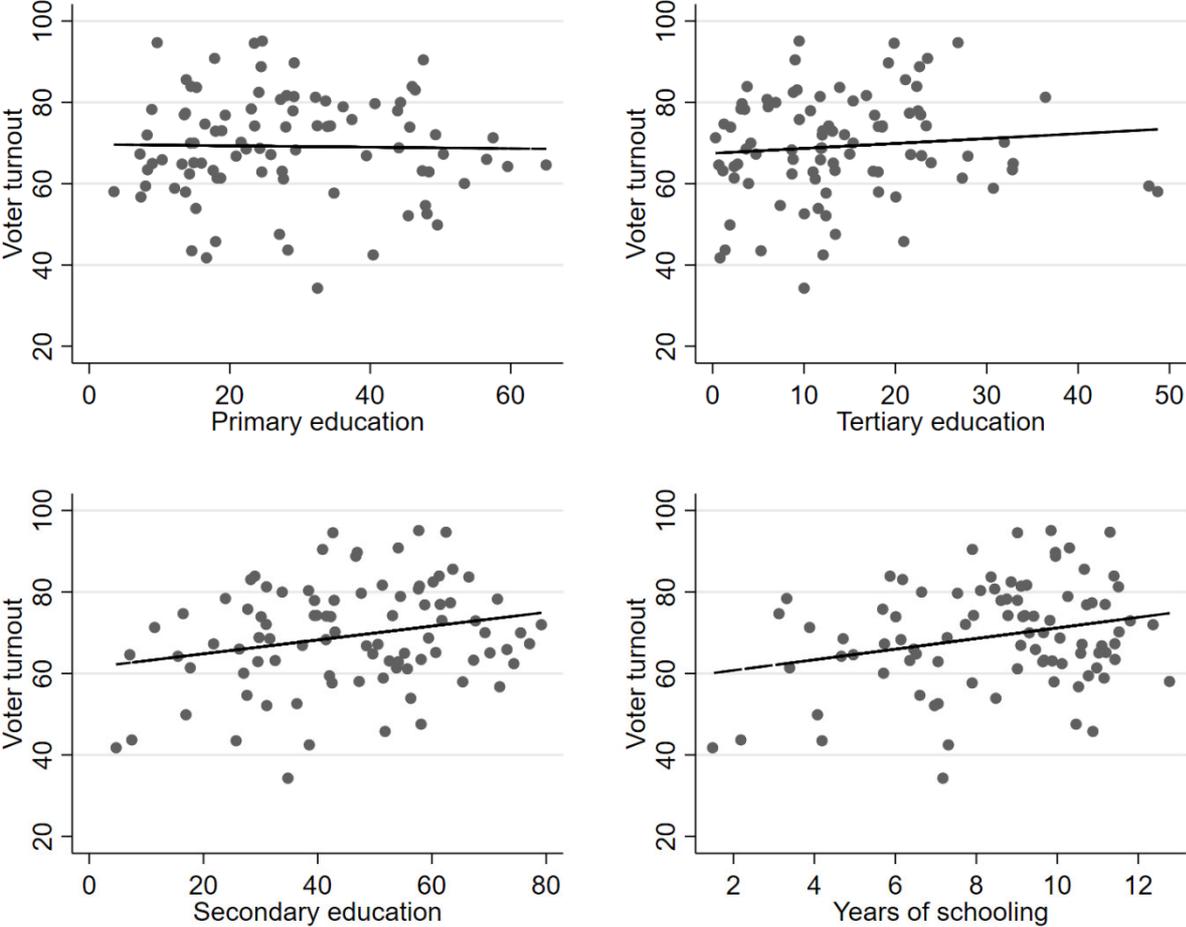
Table 1. Education and voter turnout.

Dependent variable: Voter turnout

Panel A – Bivariate associations

Education measure (regressor):	[1] Financial literacy	[2] Primary education	[3] Secondary education	[4] Tertiary education	[5] Years of schooling
Education	0.25***	-0.02	0.17**	0.12	1.30**
	(0.08)	(0.08)	(0.07)	(0.14)	(0.54)

Panel B – OLS estimation with control variables

Education measure (regressor):	[1] Financial literacy	[2] Primary education	[3] Secondary education	[4] Tertiary education	[5] Years of schooling
Education	0.35***	0.05	0.07	-0.16	0.18
	(0.12)	(0.11)	(0.10)	(0.13)	(0.75)
GDP p.c.	-4.52	-1.44	-1.25	-0.89	-1.42
	(2.99)	(2.80)	(2.82)	(2.75)	(2.72)
Trade	0.39	1.72	1.61	1.60	1.66
	(3.06)	(3.39)	(3.39)	(3.36)	(3.35)
Population	-1.47	-1.43	-1.20	-1.25	-1.36
	(1.17)	(1.18)	(1.21)	(1.24)	(1.18)
Dep. ratio	-0.92**	-0.67	-0.46	-0.69	-0.58
	(0.46)	(0.51)	(0.54)	(0.46)	(0.50)
Compulsory	11.50***	8.97**	10.15***	9.48***	9.59***
	(2.91)	(3.56)	(3.36)	(3.10)	(3.17)
OECD	-0.36	4.20	3.79	4.50	3.73
	(3.76)	(3.67)	(3.65)	(3.60)	(3.77)
R-squared	0.28	0.22	0.22	0.22	0.22
Observations	90	90	90	90	90

Notes: OLS estimation. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 2. Other explanatory variables.

Education measure (regressor):	[1] Financial literacy	[2] Primary education	[3] Secondary education	[4] Tertiary education	[5] Years of schooling	*Specification controlling for:*	Obs. Nr.
Education estimates							
	0.32**	0.09	0.04	-0.12	0.20	Presidential	90
	0.12	0.11	0.10	0.13	0.73		
	0.35***	0.01	0.15	-0.14	0.55	Majoritarian	72
	0.13	0.11	0.10	0.14	0.94		
	0.38***	0.05	0.07	-0.16	0.16	Ethnic fragmentation	90
	0.12	0.11	0.10	0.13	0.76		
	0.38***	-0.03	0.18	-0.07	0.87	Colonial history	72
	0.11	0.12	0.11	0.15	1.06		
	0.35**	-0.00	0.27***	-0.14	1.79**	Regional controls	90
	0.14	0.11	0.09	0.14	0.78		
	0.38***	0.03	0.08	-0.14	0.04	Freedom of expression	87
	(0.13)	(0.11)	(0.10)	(0.13)	(0.81)		

Notes: OLS estimation. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. Other regressors not shown in the table: GDP per capita, trade, population, dependency ratio, compulsory voting dummy, OECD dummy.

Table 3. Instrumental variables regressions. Determinants of voter turnout.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
	1st stage Financial literacy	2nd stage Voter Turnout	1st stage Primary education	2nd stage Voter Turnout	1st stage Secondary education	2nd stage Voter Turnout	1st stage Tertiary education	2nd stage Voter Turnout	1st stage Years of schooling	2nd stage Voter Turnout
Education		0.67**		0.42		0.38		0.92		2.60
		(0.29)		(1.02)		(0.49)		(0.61)		(1.67)
GDP p.c.	8.21***	-11.74**	-1.94	-4.58	3.40	-6.96	2.58	-8.09	0.80**	-7.76
	(2.01)	(4.78)	(3.29)	(4.64)	(2.87)	(5.03)	(1.95)	(5.24)	(0.37)	(4.95)
Trade	4.40	-4.61	-1.25	-2.37	3.56	-3.49	-1.14	-1.34	0.36	-3.21
	(3.56)	(2.83)	(4.02)	(3.92)	(3.94)	(3.70)	(2.81)	(4.59)	(0.41)	(3.64)
Population	1.44	-3.46***	-0.33	-3.05**	-0.29	-2.80**	0.89	-3.76**	0.05	-3.08**
	(1.22)	(1.02)	(1.41)	(1.37)	(1.60)	(1.36)	(1.24)	(1.47)	(0.13)	(1.22)
Dep. ratio	0.34	-1.66***	0.10	-1.36**	-0.85*	-0.98*	-0.08	-1.26*	-0.08	-1.10*
	(0.31)	(0.57)	(0.52)	(0.65)	(0.48)	(0.58)	(0.29)	(0.67)	(0.07)	(0.56)
Compulsory	-0.59	12.51***	1.80	9.24*	-1.76	12.02***	1.36	10.31**	0.10	11.33***
	(2.81)	(3.70)	(3.72)	(5.20)	(3.26)	(3.54)	(2.16)	(4.41)	(0.46)	(3.83)
OECD	12.00***	-5.76	-2.69	3.37	0.77	1.45	1.52	0.55	0.98**	-0.77
	(3.28)	(4.70)	(3.79)	(5.12)	(4.24)	(3.80)	(3.80)	(5.58)	(0.40)	(4.25)
Presidential	-3.10	-2.08	4.42	-6.22	-7.63**	-1.45	2.69	-6.24*	-0.24	-3.34
	(2.43)	(2.79)	(3.31)	(5.20)	(3.18)	(4.07)	(1.94)	(3.74)	(0.38)	(2.52)
Anglo-Saxon legal origin	7.11***		-1.09		4.52		6.68***		1.87***	
	(2.63)		(4.34)		(3.29)		(2.19)		(0.41)	
German legal origin	1.39		-6.49		8.73*		2.58		1.42**	
	(5.03)		(4.83)		(4.41)		(4.37)		(0.61)	
Scandinavian legal origin	18.69***		-4.71		8.75		4.42		1.35**	
	(3.55)		(6.63)		(6.05)		(3.07)		(0.63)	
Regional controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Over-ident. restrictions		1.78		3.95		3.51		1.66		2.58
		[0.41]		[0.14]		[0.17]		[0.44]		[0.28]
Specification test		0.47		0.09		0.61		2.81		0.23
		[0.49]		[0.76]		[0.43]		[0.09]		[0.63]
Weak identification test		13.63		0.61		1.54		3.42		7.09
Observations	90	90	90	90	90	90	90	90	90	90

Notes: 2SLS estimation. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. Test of over-identifying restrictions, under the null that all instrumental variables are orthogonal to the second-stage error term. Specification test, under the null: estimates from OLS and IV are both consistent. Weak identification test: Kleibergen–Paap Wald rk F statistic, robust to non-i.i.d. error.

Table 4. Panel estimation: financial literacy and voter turnout.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	S&P Financial Literacy	S&P Financial literacy	IMD Education in finance	IMD Education in finance	IMD Education in finance	IMD Economic literacy	IMD Economic literacy	IMD Economic literacy
Education	0.44***	0.43***	2.77***	2.65***	0.03	1.71*	1.60	3.26*
	(0.10)	(0.10)	(0.99)	(1.00)	(1.62)	(0.99)	(1.00)	(1.86)
GDP p.c.	-8.18***	-7.78***	-3.33	-2.80	-1.56	-3.60	-3.01	-2.08
	(2.79)	(2.92)	(2.50)	(2.55)	(6.94)	(2.62)	(2.67)	(7.04)
Trade	0.50	0.94	-0.22	0.57	6.76	1.40	2.19	8.92
	(2.27)	(2.29)	(2.46)	(2.53)	(8.14)	(2.63)	(2.67)	(7.84)
Population	-1.31	-1.15	-0.81	-0.55	21.71	-0.81	-0.53	21.00
	(0.97)	(0.99)	(0.95)	(0.98)	(21.30)	(0.99)	(1.02)	(20.41)
Dep. ratio	0.26	0.22	0.33	0.26	1.12	0.44	0.36	1.07
	(0.41)	(0.42)	(0.43)	(0.44)	(1.00)	(0.44)	(0.45)	(0.90)
Compulsory	21.10***	20.96***	18.81***	18.67***		19.02***	18.86***	
	(2.35)	(2.38)	(2.40)	(2.40)		(2.43)	(2.42)	
Presidential	1.12	1.09	-1.69	-1.63		-1.47	-1.42	
	(2.19)	(2.22)	(2.05)	(2.05)		(2.01)	(2.02)	
OECD	1.88	1.78	3.71	3.45		3.64	3.39	
	(2.92)	(2.93)	(3.08)	(3.04)		(3.19)	(3.17)	
Regional contr.	yes	yes	yes	yes	no	yes	yes	no
Time effects	no	yes	no	yes	yes	no	yes	yes
Fixed effects	no	no	no	no	yes	no	no	yes
R-squared	0.52	0.52	0.48	0.48	0.14	0.46	0.46	0.17
Observations	153	153	153	153	153	153	153	153

Notes: Panel estimation: OLS specification in columns 1, 3, and 6; OLS specification with time effects in columns 2, 4, and 7; fixed effects specification with time effects in columns 5, and 8. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 5. Panel estimation: school education and voter turnout.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
	Primary education	Primary education	Primary education	Secondary education	Secondary education	Secondary education	Tertiary education	Tertiary education	Tertiary education	Years of schooling	Years of schooling	Years of schooling
Education	-0.11	-0.14	0.16	0.15	0.17*	-0.24	0.01	0.03	0.47	0.96	1.34	-0.22
	(0.09)	(0.09)	(0.23)	(0.09)	(0.09)	(0.17)	(0.10)	(0.09)	(0.28)	(0.85)	(0.86)	(2.28)
GDP p.c.	-3.70	-3.31	-3.37	-3.76	-3.25	-6.38	-2.27	-1.76	-7.66	-3.97	-3.87	-1.54
	(2.86)	(2.88)	(6.94)	(2.85)	(2.88)	(7.19)	(2.65)	(2.66)	(8.05)	(2.95)	(2.92)	(7.02)
Trade	0.61	1.53	7.97	0.37	1.31	8.81	1.36	2.34	7.76	1.37	2.56	6.79
	(2.75)	(2.81)	(8.25)	(2.74)	(2.80)	(8.32)	(2.68)	(2.71)	(8.32)	(2.66)	(2.69)	(8.17)
Population	-1.67	-1.34	15.27	-1.56	-1.18	15.53	-1.24	-0.91	19.35	-1.40	-1.00	21.67
	(1.11)	(1.13)	(23.82)	(1.06)	(1.09)	(21.92)	(1.04)	(1.06)	(20.98)	(1.02)	(1.03)	(21.30)
Dep. ratio	0.41	0.28	0.97	0.35	0.22	0.77	0.47	0.38	0.93	0.43	0.29	1.11
	(0.45)	(0.46)	(0.91)	(0.45)	(0.46)	(0.86)	(0.45)	(0.45)	(0.94)	(0.45)	(0.45)	(0.95)
Compulsory	19.35***	19.24***		19.45***	19.31***		18.92***	18.79***		19.48***	19.48***	
	(2.53)	(2.49)		(2.54)	(2.50)		(2.61)	(2.58)		(2.62)	(2.57)	
Presidential	-1.26	-1.07		-0.90	-0.71		-1.70	-1.64		-1.18	-0.88	
	(2.03)	(2.04)		(2.04)	(2.04)		(2.00)	(2.02)		(2.11)	(2.14)	
OECD	4.47	3.93		3.78	3.19		4.84	4.46		3.86	2.98	
	(3.30)	(3.21)		(3.45)	(3.35)		(3.33)	(3.25)		(3.26)	(3.15)	
Regional c.	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
Time effects	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Fixed effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
R-squared	0.45	0.46	0.14	0.46	0.47	0.16	0.45	0.45	0.16	0.45	0.46	0.14
Observations	153	153	153	153	153	153	153	153	153	153	153	153

Notes: Panel estimation: OLS specification in columns 1, 4, 7, and 10; OLS specification with time effects in columns 2, 5, 8, and 11; fixed effects specification with time effects in columns 3, 6, 9, and 12. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 6. Panel estimation: school education and voter turnout. Full sample (90 countries).

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
	Primary education	Primary education	Primary education	Secondary education	Secondary education	Secondary education	Tertiary education	Tertiary education	Tertiary education	Years of schooling	Years of schooling	Years of schooling
Education	0.03	0.01	-0.05	0.19***	0.22***	-0.33**	-0.05	-0.02	0.43	1.73***	2.05***	-4.55*
	(0.06)	(0.06)	(0.18)	(0.06)	(0.06)	(0.15)	(0.09)	(0.09)	(0.28)	(0.58)	(0.57)	(2.56)
GDP p.c.	-2.37	-2.43	2.17	-2.99*	-3.09*	0.29	-2.31	-2.41	0.04	-3.88**	-4.17**	1.92
	(1.68)	(1.67)	(8.99)	(1.69)	(1.67)	(8.47)	(1.70)	(1.68)	(9.27)	(1.73)	(1.70)	(8.30)
Trade	-0.77	0.29	9.28	-1.38	-0.15	10.52	-0.83	0.27	9.61	-1.36	-0.05	9.87
	(2.15)	(2.11)	(6.47)	(2.13)	(2.11)	(6.39)	(2.14)	(2.11)	(6.45)	(2.14)	(2.10)	(6.27)
Population	-2.96***	-2.63***	19.81	-2.76***	-2.35***	17.58	-2.90***	-2.61***	22.59*	-2.99***	-2.60**	15.56
	(0.73)	(0.71)	(12.60)	(0.75)	(0.74)	(12.78)	(0.74)	(0.73)	(12.64)	(0.70)	(0.68)	(12.81)
Dep. ratio	-0.69**	-0.80***	0.66	-0.49*	-0.60**	0.49	-0.69**	-0.79***	0.56	-0.55**	-0.67***	0.61
	(0.27)	(0.27)	(0.51)	(0.26)	(0.26)	(0.52)	(0.27)	(0.27)	(0.53)	(0.25)	(0.25)	(0.51)
Compulsory	13.97***	13.71***		15.01***	14.70***		14.08***	13.75***		14.81***	14.49***	
	(2.24)	(2.24)		(2.18)	(2.18)		(2.21)	(2.22)		(2.18)	(2.18)	
Presidential	-2.62	-2.39		-0.87	-0.51		-2.40	-2.32		-1.52	-1.17	
	(1.74)	(1.71)		(1.62)	(1.58)		(1.67)	(1.65)		(1.65)	(1.62)	
OECD	0.44	0.04		0.23	-0.16		0.41	0.04		-1.48	-2.22	
	(2.88)	(2.75)		(2.87)	(2.72)		(2.87)	(2.75)		(2.95)	(2.82)	
Regional c.	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes	no
Time effects	no	yes	yes	no	yes	yes	no	yes	yes	no	yes	yes
Fixed effects	no	no	yes	no	no	yes	no	no	yes	no	no	yes
R-squared	0.34	0.35	0.10	0.36	0.38	0.13	0.34	0.35	0.11	0.36	0.39	0.12
Observations	262	262	262	262	262	262	262	262	262	262	262	262

Notes: Panel estimation: OLS specification in columns 1, 4, 7, and 10; OLS specification with time effects in columns 2, 5, 8, and 11; fixed effects specification with time effects in columns 3, 6, 9, and 12. Robust standard errors in parenthesis. The symbols *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.