

Democracy, Education and the Quality of Government*

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Abstract

This paper looks at how the interaction between democracy and education affects the quality of government. Using cross-country and panel data regressions we show that the success of democratic institutions is closely related to the educational attainment of the population. Democratic elections do not foster the quality of government in countries with low average levels of education. Education, in turn, has a positive effect on the quality of government only in consolidated democracies.

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You know the way in which dyers first prepare the white ground and then lay on the dye of purple or of any other colour. Colours dyed in this way become fixed, and no soap or lye will ever wash them out. Now the ground is education, and the laws are the colours; and if the ground is properly laid, neither the soap of pleasure nor the lye of pain or fear will ever wash them out. (Benjamin Jowett, summary analysis of Plato, The Republic, Book IV)

1 Introduction

The concluding sentence of Abraham Lincoln’s Gettysburg address contains one of the most widely cited definition of democracy: “government of the people, by the people, and for the people.” By empowering the people, periodic, free, fair, participatory, and genuinely contested elections should ensure the implementation of policies that favor the population as a whole rather than specific (political or economic) constituencies. In fact, the standard efficiency argument in favor of democratic institutions suggests that democracy gives the right incentives to elected officials because free elections allow ousting inept and corrupt individuals from power (Sen, 2000, and Rivera-Batiz, 2002). However, there is limited empirical evidence that, by itself, the extension of democratic liberties leads to improvements in the quality of government.

In this paper, we suggest that the performance of democratic institutions depends on the level of education of the electorate. Our hypothesis is that education enhances political engagement and participation and increases citizens’ ability to make good (*ex ante*) electoral choices and to evaluate (*ex post*) the actions of elected officials.¹

We take this idea to the data and show that the correlation between democracy and the quality of government is not statistically significant in countries with low levels of education and is positive and statistically sig-

¹According to Almond and Verba (1989 [1963], p 316): “the uneducated man or the man with limited education is a different political actor from the man who has achieved a higher level of education.” An earlier version of this paper develops a theoretical model that formalizes this idea (Fortunato and Panizza, 2011).

nificant in countries with high levels of education. We also find a positive and statistically significant marginal effect of education on the quality of government in democratic countries and no significant effect of education in non-democratic countries. This ancillary result suggests that democracy is of critical importance to channel the political benefits of education into government performance.

In discussing our findings, we acknowledge that we cannot make any claim of causality because our explanatory variables are likely to be endogenous, and we do not have good instruments for education and democracy. We deal with this issue by running a set of Monte Carlo simulations aimed at testing the robustness of our results and show that even the presence of extreme endogeneity would not reverse our results.

By showing that education and democracy complement each other in promoting good governance, our paper reconciles the results of the literature on the relative merits of democracy and education. In particular, our results are consistent with the work of Acemoglu et al. (2001 and 2008), Persson and Tabellini (2006, 2008 and 2009), and Besley and Persson (2011) who emphasize the importance of inclusive political institutions in explaining cross-country differences in income per capita.² However, our findings are also consistent with the literature that looks at human capital accumulation as a basic source of economic growth (Glaeser et al., 2004).

Given that a measure of institutional quality similar to our quality of government variable has been shown to be associated with economic development (Hall and Jones, 1999), our results can also explain why studies that do not allow for heterogeneity do not find evidence of an impact of democracy on development (Barro, 2000, and Przeworski et al., 2000).

²Empirical papers that find that transitions to democracy are positively correlated with economic growth include Rodrik and Wacziarg (2005) and Papaioannou and Siourounis (2008). Cervellati et al. (2011), instead, distinguish peaceful from violent democratizations and find that the level of violence during the transition has persistent effects on the quality of emerging democracies. In related contributions Cervellati et al. (2008) and Sunde et al. (2008) predict and document that in unequal societies democracy is negatively correlated with the rule of law. In the political science literature, the effects of democratization on development are still debated (Carbone, 2009).

The paper is organized as follows. Section 2 discusses the economic and political science literatures on the links between democratic institutions and governance. Section 3 presents our empirical investigation. Section 4 discusses endogeneity. Section 5 concludes.

2 Democratic Governance and Education

There is no clear correlation between democratization and the quality of government. The last 30 years were characterized by a process of rapid democratization. The cross-country average of a commonly used index of democracy that ranges between 0 and 10 went from 4.7 in the mid 1980s to 6.7 in 2008 (this is the solid line in Figure 1). Over the same period, however, a commonly used index of the quality of government did not show a clear trend and remained more or less constant, oscillating between 5 and 5.7 (this is the dashed line of Figure 1).³ In this paper we ask why the rapid diffusion of democratic institutions documented in Figure 1 did not lead to improvements in the quality of government.

Almond and Verba's (1963) seminal study on *civic culture* attributed cross-country variations in the performance of democratically elected governments to differences in political engagement and participation. Building on this work, Putnam (1993) showed that the regional governments introduced in Italy in the early 1970s were successful only in regions which had preexisting vibrant networks and norms of civic engagement. Regions with a fragmented social life and a diffuse culture of distrust, in turn, developed executive bodies which were less responsive to public demands and more subject to political patronage. Putnam concluded that an active and public-spirited citizenry populated by trustful (and trustworthy) individuals willing to cooperate with each other is instrumental for the correct function-

³For the details on the indexes of democracy and quality of government, see Section 3 below. The index of quality of government used in this paper ranges between 0 and 100, in Figure 1, we rescaled it to 0-10 and used moving averages of the two indexes to smooth annual fluctuations.

ing of democratic institutions.⁴ Putnam's finding that democracy requires social capital is consistent with Banfield's (1958) idea of *amoral familism*. In his study of a poor small town in southern Italy, Banfield (1959) suggested that backwardness was the outcome of a social equilibrium in which people care exclusively about their nuclear family and, by disregarding common goods, prevent the development of well-functioning political institutions.^{5,6}

While the political science literature emphasizes the interaction between democracy and social capital, the economic literature has traditionally examined democratic governance by focusing on the distortions brought about by the presence of asymmetric information and the resulting moral hazard and rent-seeking problems (Barro, 1973, and Ferejohn, 1986). In this setup, self-interested elected officials have strong incentives to appropriate rents if voters cannot monitor their behavior.⁷ Another strand of the economic literature concentrates on adverse selection problems in the recruitment of politicians and studies how the quality of government is affected by politicians' talent and preferences (Besley and Coate, 1997, and Poutvarra and Takalo, 2007). This literature concludes that the likelihood of selecting bad politicians is greater when formal returns to politics are low and information is limited (Caselli and Morelli, 2002 and Besley et al., 2005).

Although the political science and the economic literatures provide different explanations for the success or failure of democratic institutions (the former focuses on social capital and the latter on the availability of informa-

⁴Rice and Sumber (1997) and John et al. (2010) corroborates Putnam's findings by using more recent and disaggregated data.

⁵In other words, backwardness comes from the fact that individuals behave like the selfish utility maximizers of most economic models.

⁶More recently also the economic literature has recognized the importance of social norms and civic culture and its effects on economic performance (see, e.g., Tabellini, 2010).

⁷This view is consistent with empirical studies showing that rent-seeking declines when information on the actions of policymakers increases (Adsera et al., 2003). Along similar lines, there is evidence on the role of the media as a source of discovery and dissemination of information, suggesting that increased media presence improves electoral accountability (e.g., Besley and Burgess, 2002, Djankov et al. 2003, and Besley and Prat, 2006). Also, Djankov et al. (2010) find a negative association between corruption and public access to information about politicians' finances and business activities.

tion), both explanations are likely to be correlated with the same underlying factor: education. Education is essential for social capital because, by promoting social interaction and reducing uncertainty about the behavior of others, it strengthens trust and civic norms. Education also trains people to behave cooperatively, emphasizes the benefits of social and political participation (Knack and Keefer, 1997, and Glaeser et al., 2006), and is the strongest predictor of political engagement (e.g., Shields and Goidel 1997; Verba et al., 1996; Wolfinger and Rosenstone 1980).⁸

Education is also necessary for increasing information flows and developing the cognitive skills that are necessary to effectively participate in a representative democracy. As more educated citizens are more likely to understand the issues upon which they vote and recognize corrupted public officials, they are also more likely to select good politicians (Milligan et al., 2004, and Ostrom, 2006).

In synthesis, education is “the best proxy for both information and civic virtues” (Alesina and Giuliano, 2011, p.8), and it can improve the functioning of democratic institutions by both fostering social capital and reducing informational asymmetries.

In this paper we take this hypothesis to the data. In particular, we test for heterogeneity by looking at the how democracy, education, and their interaction affect the quality of government.

3 Data and Empirical Analysis

In this section we check whether the partial correlations between the quality of government and each of education and democracy are consistent with our hypothesis, without making any claim on the causality of these partial correlations. In the next section, we investigate the endogeneity problem and show that our results are robust to allowing for some endogeneity.

⁸Chong and Gradstein (2009) use micro data from the World Values Surveys and find a positive association between education and pro-democracy attitudes, even after controlling for a variety of personal characteristics. Education is also generally associated with low levels of clientelism (Huntington and Nelson, 1976, and Finan and Schecter, 2009)

3.1 The Data

As it is standard in the literature, we measure the quality of government with an aggregate index that jointly considers corruption and competency indicators. In particular, our quality of government index (*QOG*) is the simple average of the International Country Risk Guide (ICRG) variables “Control of Corruption,” “Law and Order,” and “Bureaucratic Quality” (corruption and bureaucratic quality are highly correlated in the data).⁹

Hall and Jones (1999) show that an index of anti-diversion policies which includes the three variables used in our *QOG* index is the key driver of cross-country differences in productivity.¹⁰

QOG ranges between 0 and 100, with higher values being associated with higher quality of government. The average value of the index was approximately 52 in the 1980s, 58 in the 1990s, and 55 in the 2000s (Table 1). The index is fairly stable over time, and most of its variance comes from cross-country variations (the “between,” standard deviation of the index is about 20 and the “within,” standard deviation is approximately 7, Table 2).

We measure democracy (*DEMOC*) using an average of the Polity and Freedom House indexes of democracy. Our measure of democracy ranges between 0 and 10 (again, with higher values associated with greater levels of democracy). The average value of the index increased from 4.8 in the 1980s to 7.1 in the 2000s and the dispersion of the index decreased markedly with the cross-country standard deviation going from 3.5 in the 1980s to 2.8 in the 2000s (Table 1). Also in this case, the cross-country variance of the index is much larger than the within-country variance (the “between,” standard deviation of the index is about 1.2 and the “within,” standard deviation is approximately 0.25, Table 2).

For our third variable of interest we rely on the Barro and Lee (2010)

⁹The correlation between the ICRG index of bureaucratic quality and that of control of corruption is 0.63 (the coefficient is statistically significant at the one percent confidence level). A regression of the index of control of corruption over that of bureaucratic quality yields a coefficient of 0.8 and a t-statistics of 11.8.

¹⁰Besides the variables included in *QOG*, Hall and Jones’s (1999) anti-diversion index also includes a measure of expropriation risk and a measure of government repudiation of contracts.

dataset on educational attainment. We measure education (*EDUC*) with the average number of years of education attained by the adult population. In the data, this variable ranges between 2.8 and 13. Its average value increased from 5.2 in the 1980s to 7.5 in the 2000s. Its standard deviation, instead, remained constant at approximately 2.8. Also in this case, the cross-country variance is larger than the within-country variance (the “between,” standard deviation is about 2.9 and the “within,” standard deviation is approximately 0.9, Table 2).

In estimating the relationship between quality of government and our explanatory variables, we follow La Porta et al. (1999) and control for the log of GDP per capita, legal origin, religion, ethno-linguistic fractionalization, and latitude. Following Ales and Di Tella (1999), we also control for trade openness.¹¹

3.2 Cross-country estimates

We start by studying the cross-country correlation between the quality of government (*QOG*) and each of democracy and education, and run separate regressions for the 1980s, 1990s, and 2000s. Columns 1, 3 and 5 of Table 3 show that education (*EDUC*) is never significantly correlated with *QOG* and that democracy (*DEMOC*) is positively but not always significantly correlated with *QOG*.

These preliminary estimates assume that the effects of democracy and education on the quality of government are independent of each other. Our working hypothesis, instead, suggests a positive interaction between these variables. We should therefore expect a positive correlation between democracy and quality of government only in countries with high average levels of education.

We test for the presence of an interaction between education and democracy by estimating the following model:

¹¹Our control variables and their sources are described in Table 11.

$$\begin{aligned}
QOG_i &= \alpha + \beta(DEMOC_i - \overline{DEMOC}) + \gamma(EDUC_i - \overline{EDUC}) + \\
&+ \delta(DEMOC_i - \overline{DEMOC})(EDUC_i - \overline{EDUC}) + X_i\lambda + \varepsilon_i
\end{aligned}$$

Within this set up, $\frac{\partial QOG}{\partial \overline{DEMOC}} = \beta + \delta(EDUC_i - \overline{EDUC})$, with β measuring the relationship between democracy and the quality of government for the country with average level of education and δ measuring how the level of education affects the relationship between democracy and the quality of government. Similarly, $\frac{\partial QOG}{\partial \overline{EDUC}} = \gamma + \delta(DEMOC_i - \overline{DEMOC})$, with γ measuring the relationship between education and the quality of government for the country with average level of democracy and δ measuring how the level of democracy affects the relationship between education and the quality of government ($\delta = \partial \left(\frac{\partial QOG}{\partial \overline{EDUC}} \right) / \partial \overline{DEMOC} = \partial \left(\frac{\partial QOG}{\partial \overline{DEMOC}} \right) / \partial \overline{EDUC}$).

Columns 2, 4, and 6 of Table 3 show that β is always positive and statistically significant, indicating that there is a positive relationship between democracy and the quality of government for the country with the average level of education (in the year 2000 the group of countries with a level of education around the cross-country average of 7.5 included Ecuador, South Africa, Mexico, and Jordan). They also show that γ is never statistically significant, indicating that there is no robust relationship between education and the quality of government for the country with the average level of democracy (in the year 2000, the group of countries with a level of democracy around the cross-country average of 7.1 included Thailand, Colombia, and Turkey). Finally, Table 3 shows that δ is always positive and statistically significant, supporting the idea of a positive interaction between democracy and education for the quality of government.

Figure 2 plots the partial correlation between $DEM * EDUC$ and QOG for each of the three sub-periods studied in Table 3, and for all the sub-periods pooled together. It suggests that the the point estimates of Table 3 are not driven by outliers.

The bottom panel of Table 3 evaluates the relationship between democracy and the quality of government for countries with a level of education

which is one standard deviation below the cross-country average (examples of such countries are Uganda, Pakistan, and Laos) and for countries with a level of education which is one standard deviation above the cross-country average (e.g., Russia, Latvia, and Switzerland). We find no significant relationship between democracy and the quality of government for countries with low levels of education and a strong and statistically significant correlation between democracy and the quality of government for countries with high levels of education.

We also look at the relationship between the quality of government and education for different levels of democracy (countries which in the year 2000 had a level of democracy one standard deviation below the cross-country average include Morocco, Kuwait, and Mauritania and countries that in the year 2000 had a level of democracy one standard deviation above the cross-country average include Japan, Chile, and Italy). In all cases, we find a negative correlation for low levels of democracy and a positive correlation for high levels of democracy.

For the 1990s and 2000s, we find that the correlation between education and the quality of government is positive and statistically significant in countries with high levels of democracy and negative and insignificant for countries with low levels of democracy. If we focus on the 1980s, instead, we find that the negative correlation for low levels of democracy is statistically significant at the 5 percent confidence level but the positive correlation for high levels of democracy is not statistically significant.

Figure 3 uses the results of the 2000s regression to plot the correlation between quality of government and democracy at different levels of education. It shows that this correlation is negative and statistically significant for countries with extremely low levels of education (below one year of average schooling) and is positive and statistically significant for all countries in which average education is above 7 years.¹² The results are thus fully consistent with our hypothesis.

¹²In the 2000s there was only one country with average education below one year (Mozambique) and there were 73 countries with average education above 7 years.

Figure 4 uses the results of the 2000s regression to plot the marginal effect of education at different levels of democracy. It shows that the relationship is negative and statistically significant for countries where the democracy index is below 2.5 and positive and statistically significant for countries where the democracy index is above 9.¹³

In the first two columns of Table 4 we check whether our results are robust to using an alternative measure of education. In particular, we substitute the Barro and Lee (2010) measure of average years of education with the Vanhanen (2003a, 2003b) index of knowledge distribution (*EDUC1*) computed as the simple average of literates as a percentage of adult population and the number of students at higher education institutions per 100,000 inhabitants (the index is rescaled to range between 0 and 100).¹⁴ While this index is not available for the 2000s and is less commonly used than the Barro and Lee measure of the stock of education, it has the advantage of being available at annual frequency (the Barro and Lee measure of education is only available at a 5-year frequency).¹⁵ We find that substituting *EDUC* with *EDUC1* does not affect our results (this is not surprising since the correlation between the two variables is 0.87).

In the last three columns of Table 4, we re-estimate the models of columns 2, 4, and 6 of Table 3 by using a robust regression method which puts less weight on outliers (in particular, we use the `rreg` command of

¹³There are 28 countries that in the 2000s had a democracy index below 2.5 (Saudi Arabia; North Korea; Iraq; Turkmenistan; Uzbekistan; Myanmar; Libya; Afghanistan; Cuba; Syria; Qatar; Laos; China; Sudan; Swaziland; Eritrea; Belarus; Vietnam; United Arab Emirates; Equatorial Guinea; Oman; Bhutan; Azerbaijan; Bahrain; Zimbabwe; Cameroon; Kazakhstan; Egypt) and 39 countries that in the 2000s had a democracy index above 9 (Bulgaria; Latvia; South Africa; Panama; Israel; Taiwan; Greece; Estonia; Japan; Chile; Czech Republic; Slovakia; France; Mauritius; Lithuania; Poland; Belgium; Costa Rica; Hungary; Italy; United Kingdom; Slovenia; Germany; Spain; Ireland; New Zealand; Cyprus; Portugal; Uruguay; Austria; Australia; Finland; Sweden; Norway; Netherlands; United States; Switzerland; Denmark; Canada).

¹⁴In the 1980s the average value of the index was 43, in the 1990s the average value had increased to 51. The cross-country standard deviation of the index is approximately 21 and the within-country standard deviation is about 4

¹⁵Moreover, by focusing on both the top (tertiary enrollment) and bottom (basic literacy) parts of the distribution of education outcomes, this index may do a better job at capturing inequalities in the distribution of education.

Stata) and find results which are basically identical to those of Table 3. This confirms that our findings are not driven by outliers.

3.3 Panel regressions

In Table 5, we use ten year averages to estimate random and fixed effects models by pooling the data for the three decades of the regressions of Table 3. We start with a random effects model without the interaction between democracy and education (column 1) and, again, we find a positive and significant effect of democracy and a positive but insignificant effect of education. We find similar results when we control for the interaction between democracy and education and estimate the effect of democracy and education at their respective mean value (column 2). As in Table 3, we find that the interactive term is positive and statistically significant, indicating that democracy and education complement each other.

In column 3, we estimate the model without interaction but with country fixed effects (a specification that does not allow to include time-invariant controls) and find that neither education nor democracy are statistically significant. However, when we allow for an interactive effect (column 4), we find that democracy is statistically significant (indicating that for the country with the average level of education democracy is positively correlated with the quality of government) and so is the interactive term capturing complementarities between democracy and education. This is a remarkable result if one considers that in the fixed effects model the limited within-country variance of democracy and education amplifies the downward bias brought about by the presence of measurement error.

Figure 5 uses the results of the fixed effects regression to plot the relationship between the quality of government and democracy at different levels of education.¹⁶ It shows that, in line with our hypothesis, the relationship is negative (but not statistically significant) for countries with low levels of education (less than 4 years) and becomes positive and statistically

¹⁶We use the fixed effects regression because a Hausman test rejects the null that the random effects model is consistent ($\chi(6) = 10.75, p = 0.09$).

significant when average education reaches 8 years. When we plot the relationship between the quality of government and education at different levels of democracy (Figure 6), we find that the relationship is insignificant for low and intermediate levels of democracy but it becomes positive and significant when the democracy index surpasses 9.

We also consider a quadratic specification in per capita GDP. The coefficient for the interaction term between democracy and education remains positive and significant both in cross-country and panel regressions (Table 6).

In Table 7, we estimate panel regressions using 5 year averages instead of 10 year averages and find that the results are qualitatively similar to those of Table 5. As before, we find that the relationship between democracy and the quality of government is positive and statistically significant only for high levels of education and negative (but not statistically significant) when the average level of education is below 3 (Figure 7). We also find that the relationship between education and the quality of government is positive and statistically significant for high level of democracy and negative and significant for extremely low values of democracy (Figure 8).¹⁷

In Table 8 we repeat the experiment using annual data and the Vanhanen (2003a, 2003b) index of knowledge distribution (*EDUC1*). We find that both education and democracy are positively correlated with *QOG* when they are evaluated at their mean value and, as before, we find a positive and statistically significant coefficient for the interactive term. Figure 9 shows that the relationship between democracy and the quality of government is negative but insignificant for countries with low level of education and positive and significant for countries with intermediate and high levels of education. The relationship between education and the quality of government is always positive and becomes statistically significant for countries with intermediate and high levels of democracy (Figure 10).

While many of our explanatory variables are likely to be endogenous,

¹⁷The graph is based on the results of the fixed effects regressions because a Hausman test show that the random effects regression is not consistent ($\chi^2(5) = 13.08, p = 0.02$).

one variable we are particularly worried about is the log of GDP per capita, as there is strong evidence that institutional quality has a causal effect on the level of development (Hall and Jones, 1999, and Acemoglu et al., 2001). While we do not have a good instrument for the level of GDP, we do have a good instrument for GDP growth. Recognizing that with fixed effects and annual data the level of GDP and GDP growth are related concepts, in Table 9 we replace the log of GDP per capita with GDP growth (*GROWTH*) and then instrument GDP growth with the real external shock first used by Jaimovich and Panizza (2006). We find that the results of the IV regressions are essentially identical to those of the standard regressions which, in turn, are similar to those of the regressions in which we control for the log of GDP instead of GDP growth.

Finally, we recognize that the quality of government is likely to be persistent and we estimate the relationship between *QOG* and each of education and democracy by using a dynamic panel estimator. Column 1 of Table 10 reports the results of the GMM difference estimator originally proposed by Arellano and Bond (1991).¹⁸ The results of the dynamic panel estimations show strong persistence (with the first and second lag being highly significant) and confirm our previous result of a positive and significant effect of democracy, education, and of the interaction between these two variables. The model also passes the standard specification tests. The residuals exhibit first order autocorrelation but no second order autocorrelation and the Sargan test does not reject the null on the appropriateness of our exclusion restrictions. We also experimented with the system GMM estimator proposed by Arellano and Bover (1995) and Blundell and Bond (1998) because, under certain conditions, this model allows to make casual statements, but the Sargan test always rejected our exclusion restrictions (Columns 2 and 3 of Table 10).

¹⁸We use all available lags as instrument and adjust the standard errors using Windmeijer (2005) finite sample correction. We consider a model with two lags because in the model with one lag we could not reject the null of no second order autocorrelation of the residuals.

4 Non-Robustness Analysis

The main issue with the estimations of Section 3 relates to the endogeneity of our variables of interest and of some of our controls. The quality of government is likely to have a direct effect on education and GDP per capita and also have an either direct or indirect effect on democracy and trade openness. Although, we tried to deal with the endogeneity problem by using panel data and different GMM estimators, we are not convinced to have fully dealt with the problem.¹⁹

In the absence of proper instruments there is no solution to the endogeneity problem. Therefore, we follow Bourguignon et al. (2007) and explore the magnitude of the potential bias in the estimation of our parameters of interest. In a sense, we check how "non-robust" our results are under different assumptions on the severity of the endogeneity problem.

Our objective is to estimate the following model:

$$Q_i = \alpha + X_i\beta + W_i\lambda + u_i$$

Where Q is the quality of government, X is a matrix of endogenous variables (democracy, education, the interaction between democracy and education, GDP per capita, and openness) and W is a matrix of exogenous variables (Ethno-linguistic fractionalization, legal origin, religion, and latitude). Because of endogeneity, X and u are not orthogonal and the vector $\hat{\beta}$ will be a biased estimator of β (possibly also causing a bias in $\hat{\lambda}$).

If we had a set of valid instruments (i.e., a set of variables correlated with X but uncorrelated with u), we could use an IV estimator and obtain an unbiased estimator of the vector β . In the absence of such a set of instruments, we can compute how the correlation between u and X affects the bias of $\hat{\beta}$.

To see how this can be done let us start by assuming, without loss of generality, that all variables are endogenous and have mean zero.²⁰ The

¹⁹We experimented with an instrument for Democracy (trade-weighted democracy, as in Acemoglu et al., 2008), but we could not find a good instrument for education.

²⁰The following discussion is close to that in Bourguignon et al. (2007). We repeat it

expected value of the OLS estimator will then be:

$$E(\widehat{\beta}) = (X'X)^{-1} X'Q = \beta + (X'X)^{-1} E(X'u) \quad (1)$$

As $E(X'u) = \text{cov}(Xu)N$ (where N is the number of observations), we can write the bias of the OLS estimator as $B = E(\widehat{\beta}) - \beta = (X'X)^{-1} \text{cov}(Xu)N$. By recalling that $\rho_{Xu} = \text{cov}(Xu)/(\sigma_x\sigma_u)$, we have,

$$B = N (X'X)^{-1} (\underline{\rho_{Xu}\sigma_x}) \sigma_u \quad (2)$$

Where σ_u is the standard deviation of u and $\underline{\rho_{Xu}\sigma_x}$ is a $k \times 1$ vector in which each element is the product between the standard deviation of the k^{th} variable in X and the correlation between u and the k^{th} variable in X .²¹ In order to evaluate the bias we need a guess about σ_u (which can only be estimated if we have an unbiased estimate of β) and ρ_{Xu} . We can instead estimate σ_x .

Bourguignon et al. (2007) start by observing that:

$$\sigma_u^2 = \frac{E(u'u)}{N} + \frac{E}{N} \left[(\widehat{\beta} - \beta)' (X'X) (\widehat{\beta} - \beta) \right]$$

and suggest that σ_u^2 can be proxied by:

$$\sigma_u^2 \cong \widehat{\sigma}_u^2 + \frac{B'X'XB}{N} \quad (3)$$

By plugging (2) into (3), we can obtain the following estimator for σ_u^2 :

$$\sigma_u^2 \cong \frac{\widehat{\sigma}_u^2}{1 - N (\rho_{Xu}\sigma_x)' (X'X)^{-1} (\rho_{Xu}\sigma_x)} \quad (4)$$

We can now substitute (4) in (2) and have the following expression for the bias:

here for ease of reference.

²¹The typical element in this vector is $\rho_{x_k u} \sigma_{x_k}$.

$$B \cong \frac{N (X'X)^{-1} \left(\rho_{Xu} \sigma_x \right) \hat{\sigma}_u}{\left(1 - N \left(\rho_{Xu} \sigma_x \right)' (X'X)^{-1} \left(\rho_{Xu} \sigma_x \right) \right)^{\frac{1}{2}}} \quad (5)$$

Equation (5) allows us to compute the bias of the OLS estimator for any vector of correlation coefficients ρ_{Xu} .

Although the correlation coefficients are unknown, they need to range between -1 and 1 . We can thus build bounds for the coefficients of our variables of interest by randomly drawing a large number of correlation coefficients and applying them to equation (5).

In particular, we start with the cross-sectional OLS model of Table 3 column 6 and associate each of our endogenous variables (education, democracy, the interaction between education and democracy, GDP per capita, and trade openness) to a random draw from uniform distribution defined over $(0, c)$, substitute these correlations into Equation (5), and use B to recover β . We replicate this exercise 10,000 times for each value of c allowing c to range between -1 and 1 , with increments of 0.1 (for a total of 200,000 simulations). As in Bourguignon et al. (2007), we also impose some restrictions on the values of β . In particular, we drop all draws for which the impact of GDP per capita, Common law, German law, and latitude is non-positive.²² We then use the remaining observations to look at how the correlation between the endogenous variables and the error term affects the estimation of our variables of interest.

Figure 11 shows how different assumptions about the possible correlation between the error term and each of the endogenous variables affect the coefficient associated with the interaction between democracy and education (the solid line plots the average value and the dashed lines plot the values at the 5th and 95th percentile of the distribution). When we set $\text{corr}=0$

²²The restrictions are never binding when c ranges between -0.2 and 0.2 , but they exclude most observation when we allow c to take larger values. For instance, when $c = 1$, only 175 draws (out of 10,000) are retained. We think that these restrictions are reasonable and well grounded in the existing literature. However, the results are basically identical if we do not include these restrictions.

we obtain the same value (0.564) that we obtained with the OLS estimates of Column 6, Table 3. This is not surprising because the OLS estimator assumes $\rho_{Xu} = 0$. The figure also shows that with correlation equal to 0, the whole distribution of the bias collapses to one point.²³

The figure also shows that allowing for a negative correlation would strengthen our result of a positive interactive effect between education and democracy. However, we do not think that this is the likely direction of the bias. It is in fact more likely that our endogenous variables are positively correlated with the error term. The graph shows that the average value of the coefficient for the interaction between democracy and education remains positive if the correlation coefficient is lower than 0.4 and that the coefficient at the bottom 5th percentile of the distribution remains positive if the correlation coefficient is lower than 0.25. Therefore, our results are robust to allowing for a fairly severe endogeneity problem. Moreover, Figure 11 shows that the coefficient at the 95th percentile of the distribution is always positive, indicating that the relationship between the quality of government and the interaction between democracy and education is non-negative, even if we assume that our estimation suffer from an extreme endogeneity problem.

We can now look at the marginal effect of democracy on the quality of government. Figure 3, showed that the OLS regressions found a positive effect when average education surpasses 5 years, and a positive and statistically significant effect when average education surpasses 7 years (this is also the mean of the average level of education in our sample). The effect of democracy was instead negative and statistically significant only for countries in which average education is below one year (and in the sample there is only one country with such low level of average education). We find results which are qualitatively and quantitatively similar to those of the OLS regressions if we allow for correlation coefficients which range between -1 and 0.2 (Figure 12). However, we find that that the slopes of the marginal effects become negative and the coefficients are never significant if the correlation

²³This should clarify the fact that Figure 11 plots the distribution of the corrected estimators obtained with the Monte Carlo simulation and not the sum of the distributions of each corrected estimator.

between the error term and the endogenous variables is 0.4 or greater.

Next, we look at the marginal effect of education on the quality of government. In Section 3.2, we found that the marginal effect is positive when the index of democracy is above 6 and positive and statically significant when the index of democracy is above 7. The marginal effect of education is instead negative when the index of democracy is below 6 and negative and statistically significant when the index of democracy is below 3. Figure 13 plots the marginal effect of education for different values of the democracy index and different assumptions on the correlation between the error term and the endogenous variables. The figure shows that the results are (again) similar to the OLS estimates when the correlations coefficient ranges between -1 and 0.2 .

Summing up, we find that endogeneity would never reverse our results. In the worst case scenario, severe endogeneity would lead to statistically insignificant estimates of our parameters of interest.

5 Conclusions

This paper looks at how democracy, education, and their interaction affect the quality of government. In doing so, we synthesize recent research that highlights the importance of political institutions as a fundamental factor explaining cross-country differences in income per capita with work that argues that institutional improvements and development are ultimately driven by social and human capital.

Our results show that: (i) the interaction between democracy and education is always a positively and significantly correlated with the quality of government; (ii) the correlation between democracy and quality of government is statistically significant only in countries with high levels of education; and (iii) the marginal effect of education is positive and statistically significant in countries with high levels of democracy. We also run a set of Monte Carlo simulations which show that our results are robust to mild forms of endogeneity.

Overall, our results support the idea that democratic institutions per se

do not guarantee effective government and that democracy is more likely to flourish when education is spread through the entire population. We are unable, however, to decompose the effect of education on the quality of government into problems of civic culture, selection, or incentives. As the relative importance of these factors is likely to vary across countries, in future research it would be interesting to go deeper into the exploration of the heterogenous effect of democracy on the quality of government.

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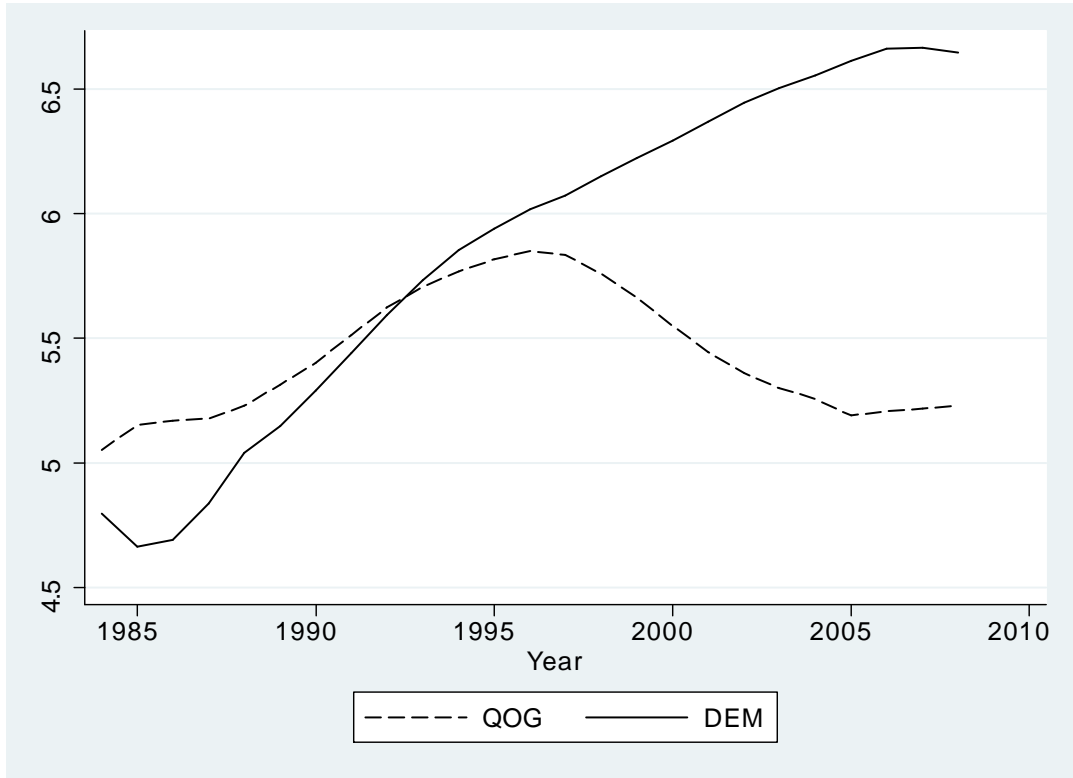


Figure 1. Democracy and Quality of Government.

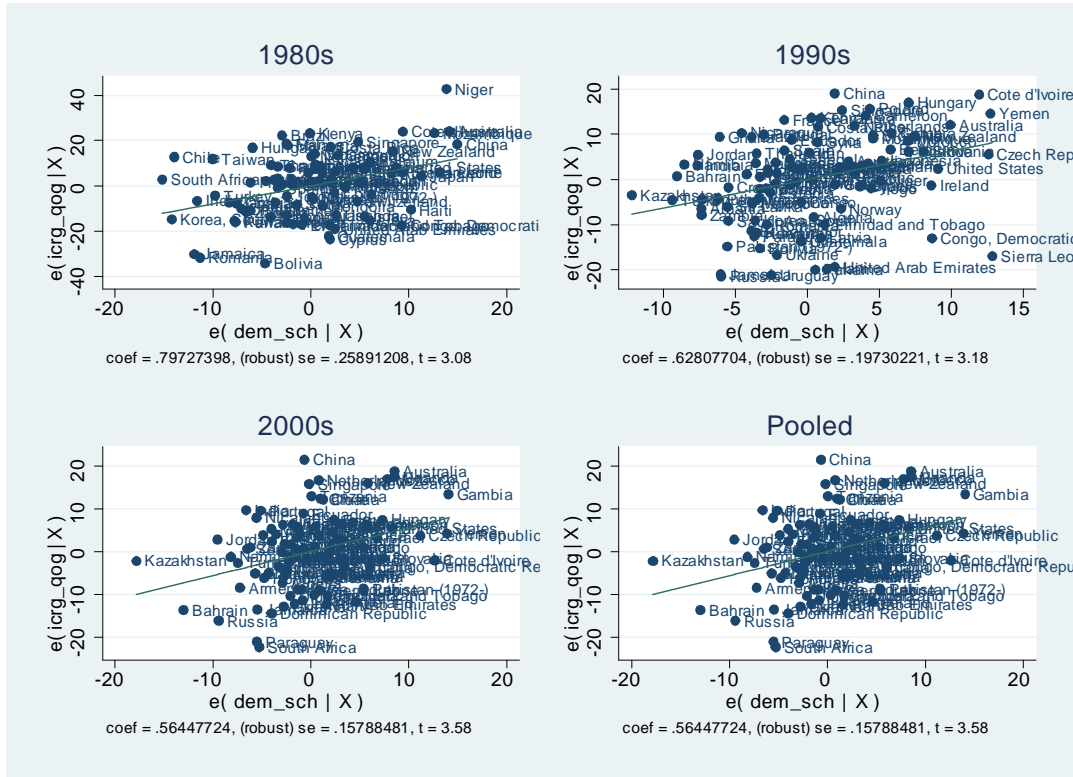


Figure 2. Partial correlation plots.

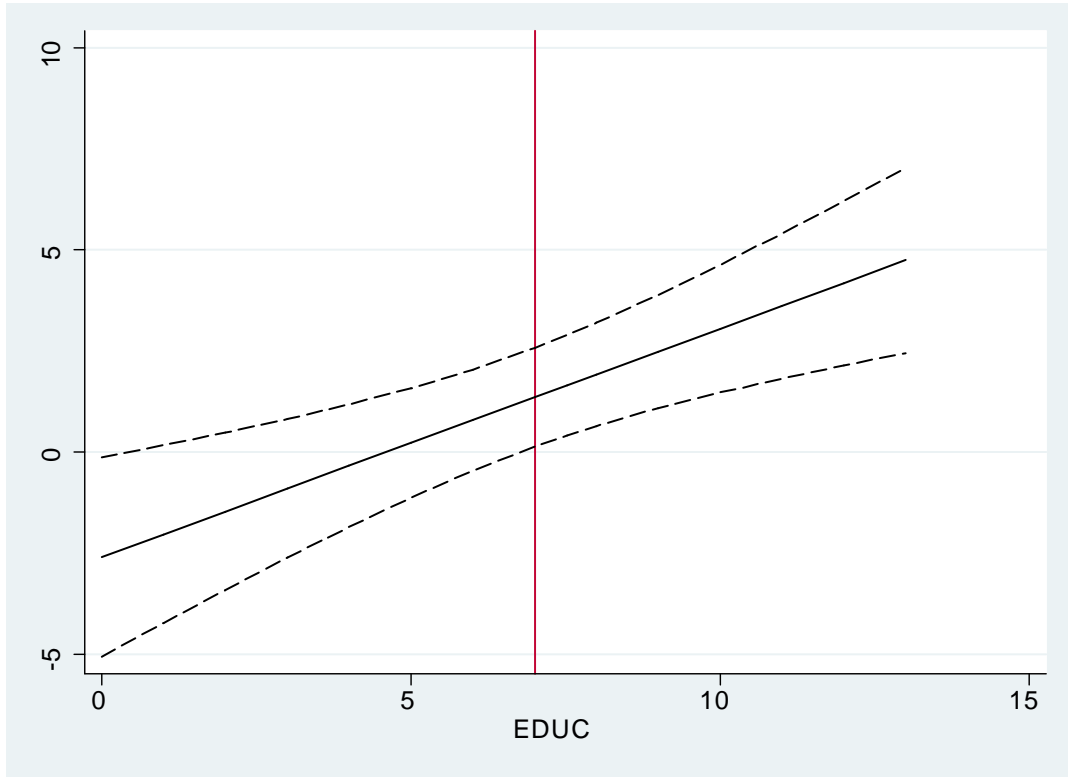


Figure 3. $\partial QOG/\partial DEM$, cross country regressions, year 2000.

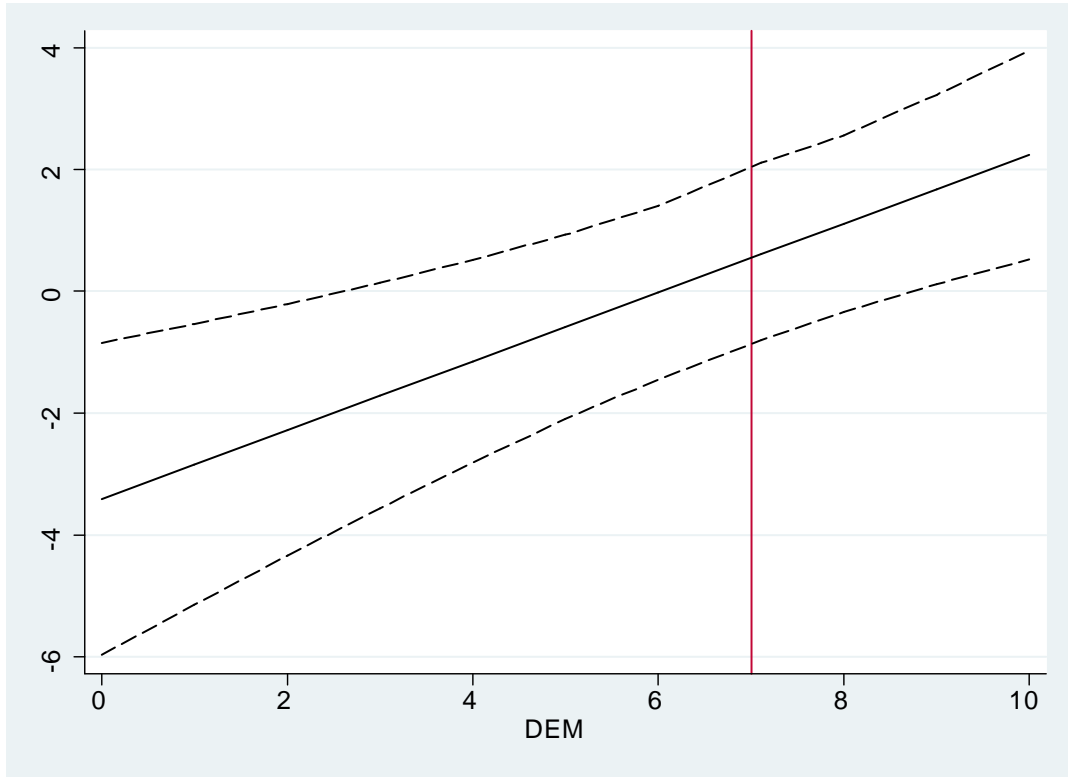


Figure 4. $\partial QOG/\partial EDUC$, cross country regressions, year 2000.

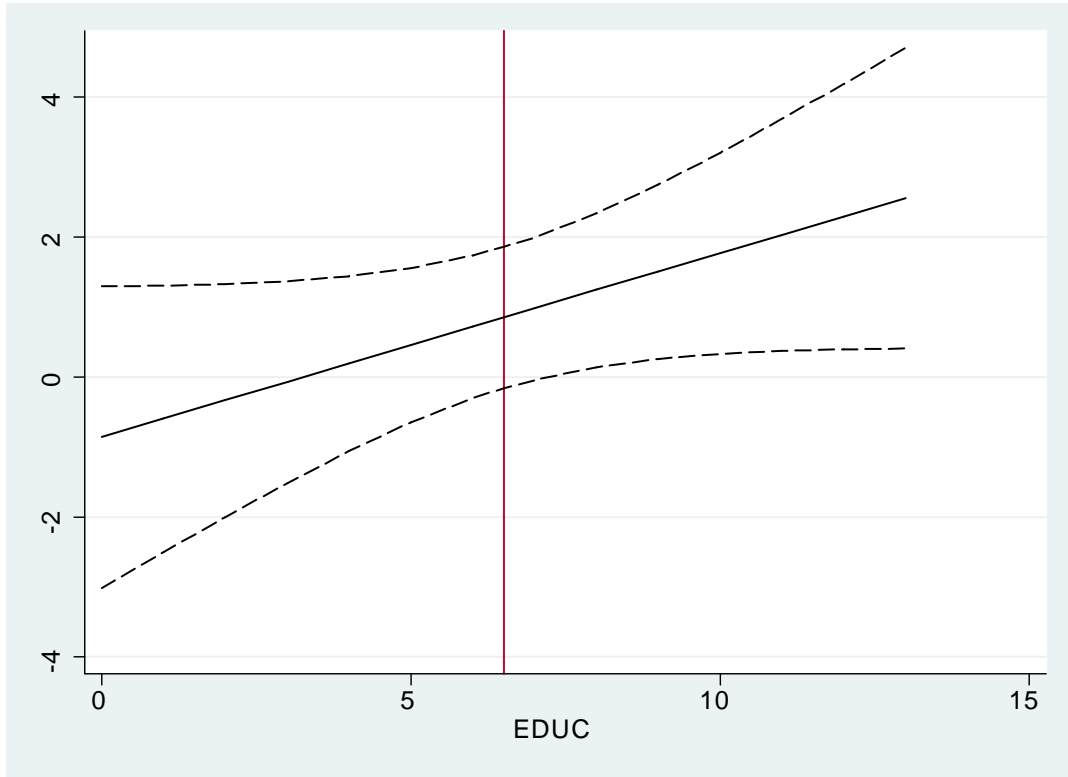


Figure 5. $\partial QOG/\partial DEM$, Fixed effects panel regression, 10-year.

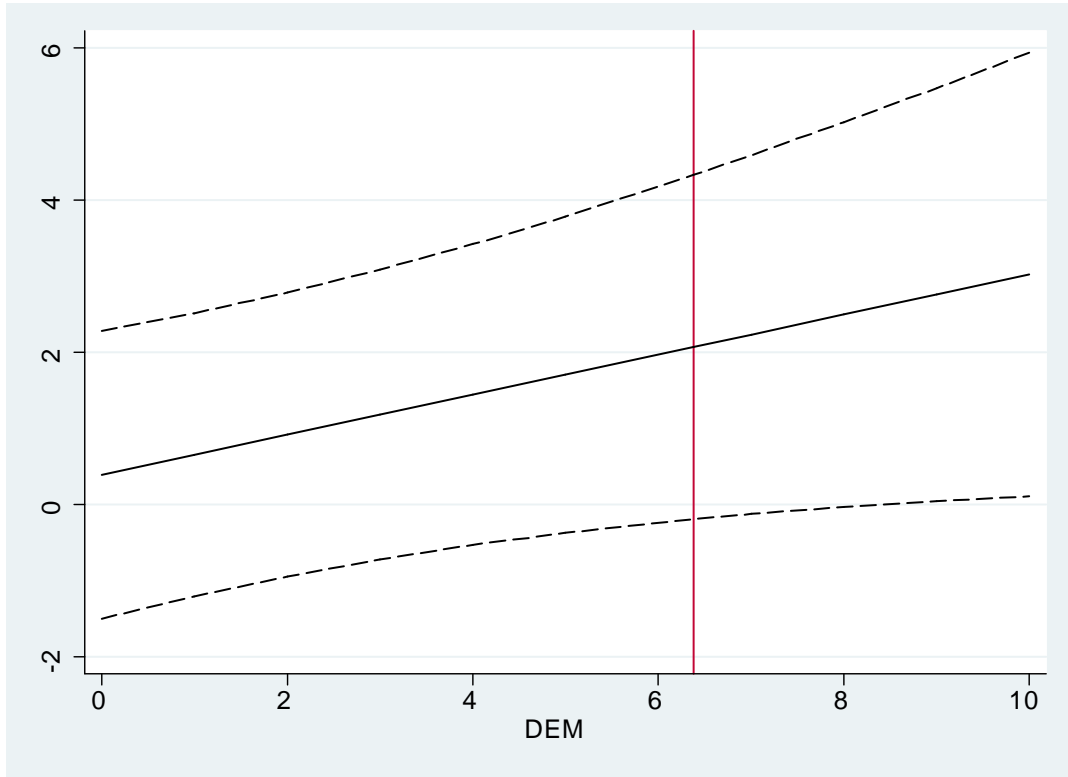


Figure 6. $\partial QOG/\partial EDUC$, Fixed effects panel regression, 10-year.

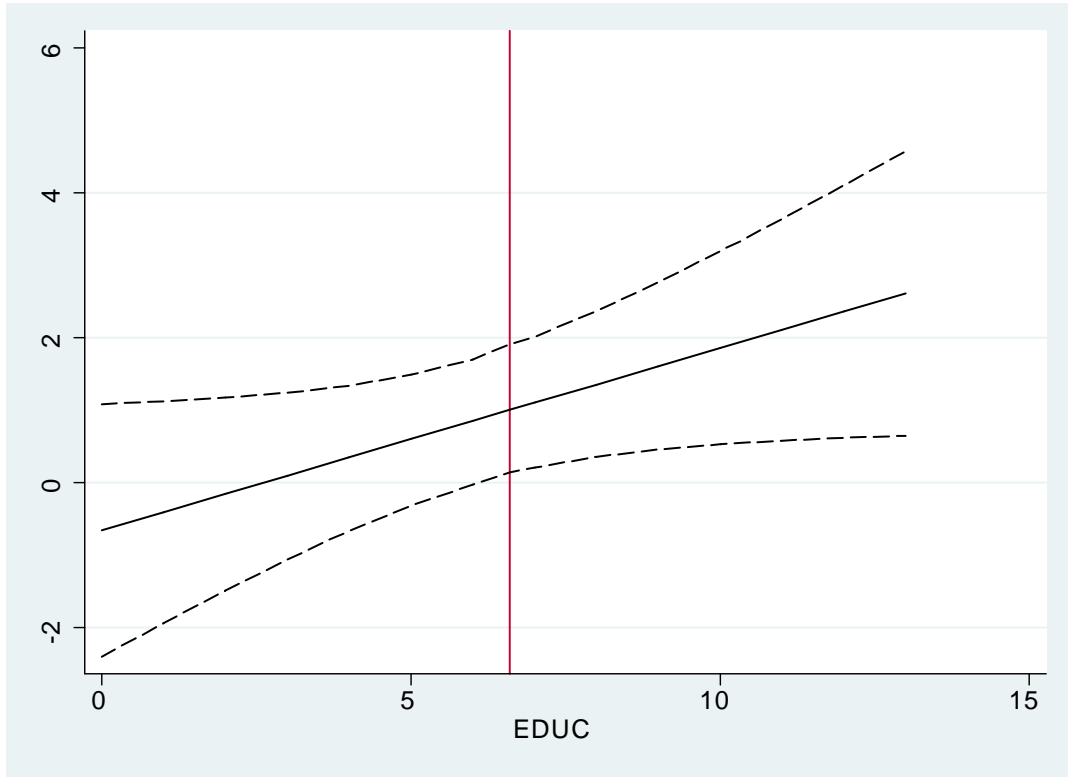


Figure 7. $\partial QOG/\partial DEM$, Fixed effects panel regression, 5-year.

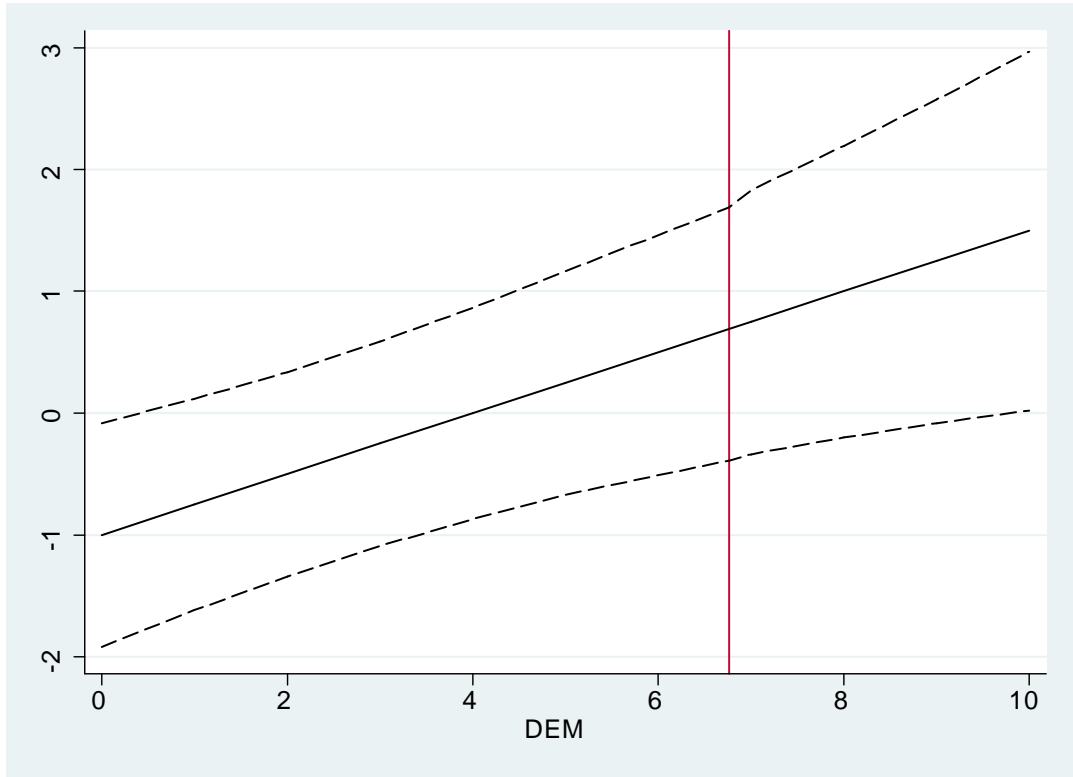


Figure 8. $\partial QOG/\partial EDUC$, Fixed effects panel regression, 5-year.

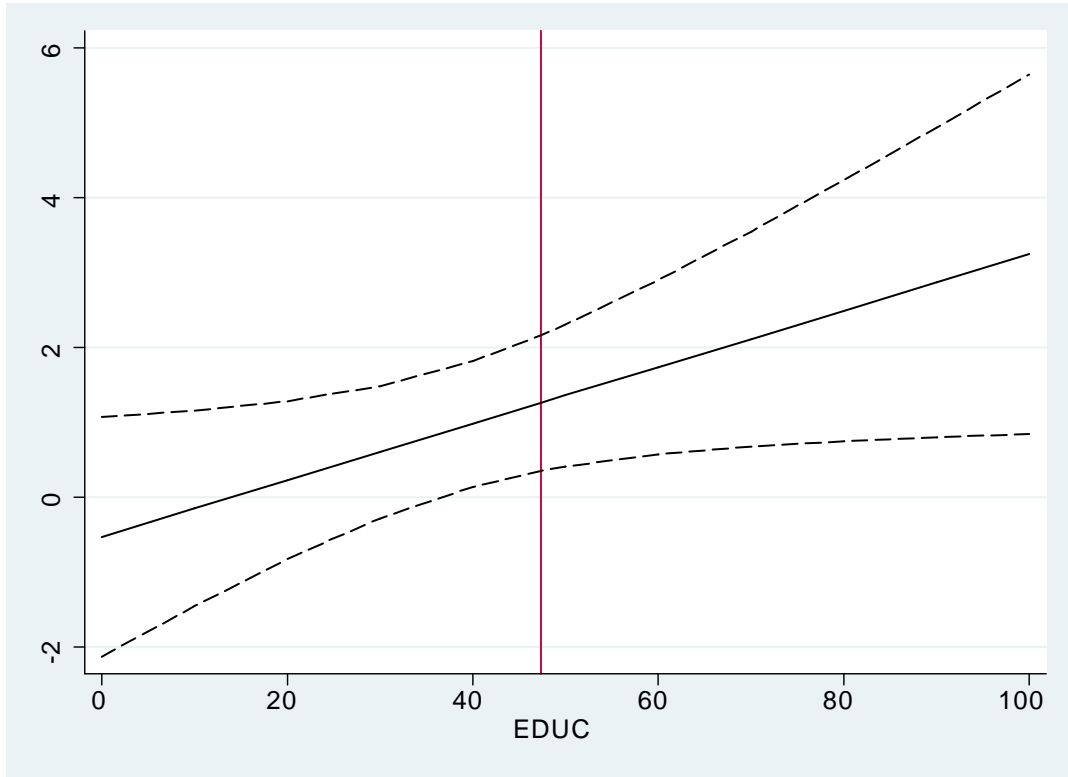


Figure 9. $\partial QOG/\partial DEM$, Fixed effects panel regression, 1-year.

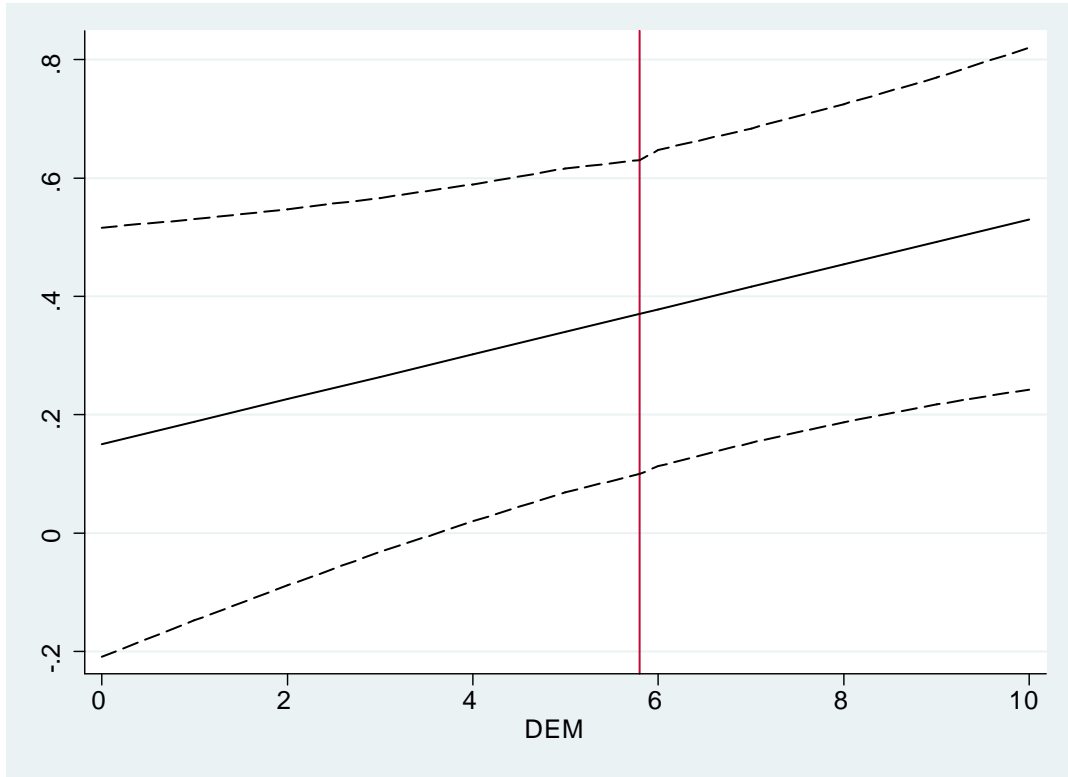


Figure 10. $\partial QOG/\partial EDUC$, Fixed effects panel regression, 1-year.

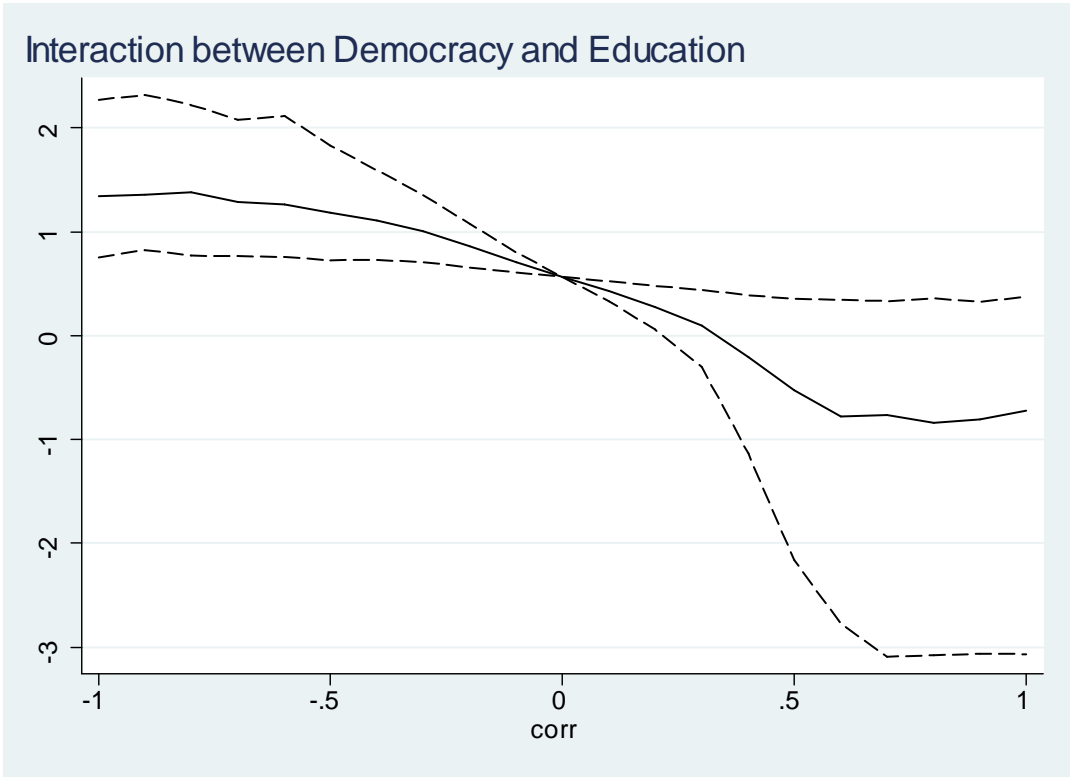


Figure 11. $\frac{\partial(\frac{\partial Q}{\partial D})}{\partial E} = \frac{\partial(\frac{\partial Q}{\partial E})}{\partial D}$ for different levels of ρ_{Xu}

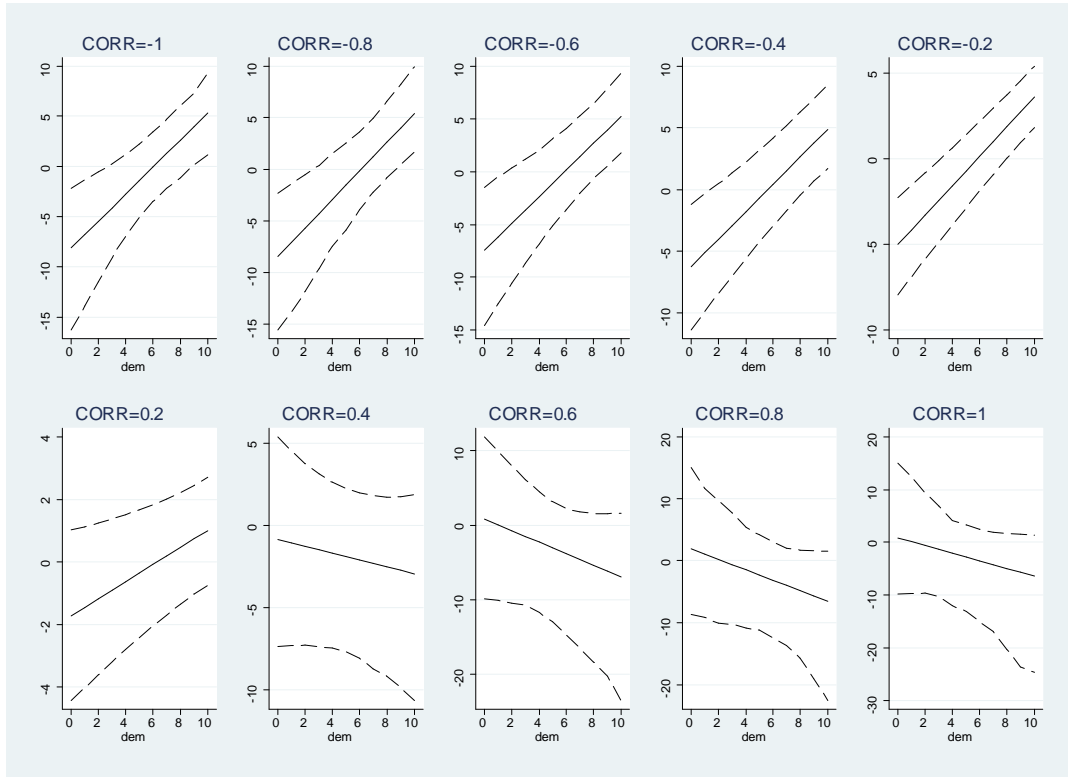


Figure 12. $\frac{\partial Q}{\partial E}$ for different levels of D and ρ_{Xu}

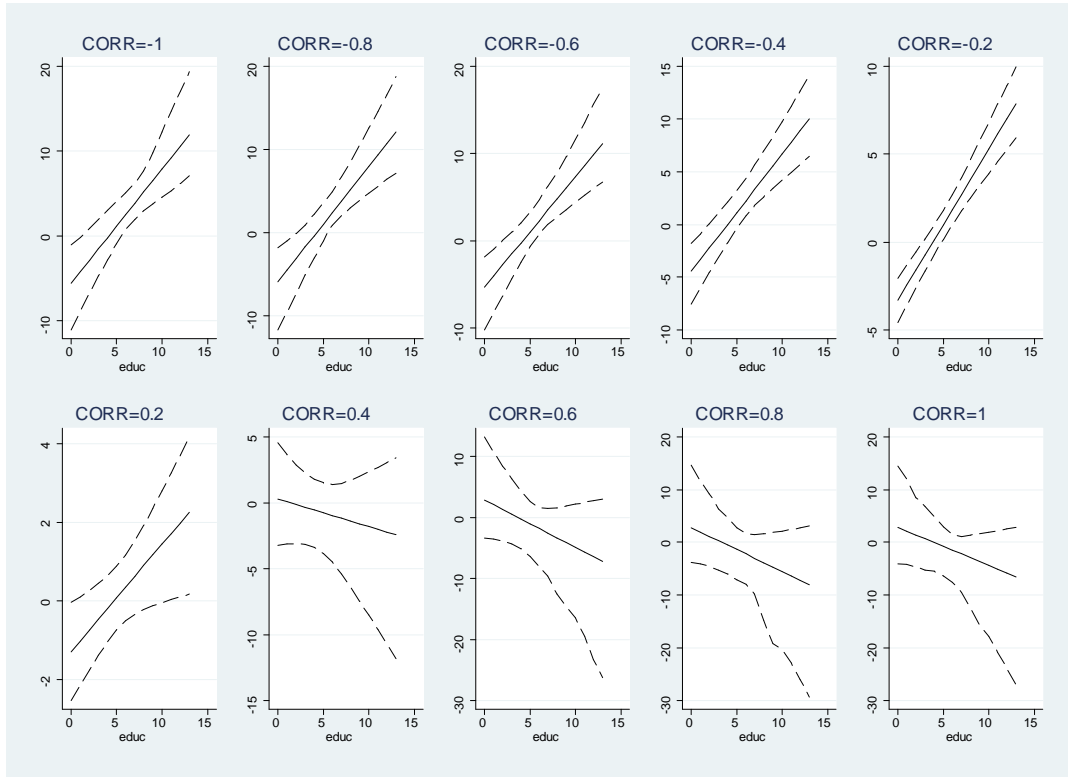


Figure 13. $\frac{\partial Q}{\partial D}$ for different levels of E and ρ_{Xu}

Table 1: **Summary statistics for cross-country estimates**

	Obs	Mean	Std. Dev.	Min	Max
1980s					
QOG	109	51.65	25.02	5.56	100
DEMOC	109	4.79	3.49	0.25	10
EDUC	88	5.15	2.85	0.5	12.04
EDUC1	109	42.81	21.6	3.5	99.5
OPEN	109	64.77	44.57	13.11	359.98
ln(GDP PC)	109	8.54	1.1	6.34	10.85
1990s					
QOG	127	57.9	20.96	10.65	100
DEMOC	127	6.07	3.03	0.08	10
EDUC	106	7.53	2.83	0.98	12.73
EDUC1	127	50.81	21.14	9.5	99.5
OPEN	127	72.4	41.5	2.95	337.88
ln(GDP PC)	127	8.62	1.15	5.73	10.59
2000s					
QOG	106	55.48	20.28	11.11	100
DEMOC	106	7.11	2.83	0.19	10
EDUC	106	7.53	2.83	0.98	12.73
OPEN	106	86.24	47.39	25.14	407.64
ln(GDP PC)	106	8.98	1.15	5.89	10.7
Variables with no time variation					
ELF	127	0.47	0.27	0	1
COMMON LAW	127	0.3	0.46	0	1
FRENCH LAW	127	0.45	0.5	0	1
GERMAN LAW	127	0.05	0.21	0	1
SCAND. LAW	127	0.03	0.18	0	1
CATHOLIC	127	31.25	36.1	0	96.9
PROTESTANT	127	11.69	20.31	0	97.8
MUSLIM	127	24.17	36.56	0	99.8
abs(Latitude)	127	0.3	0.19	0	0.71

Table 2: Summary statistics for panel data

Variable		Mean	Std. Dev.	Min	Max	Observations
10-year panel						
QOG	overall	57.36	21.8	9.1	100	N = 304
	between		20.38	12.13	99.85	n = 109
	within		7.29	35.52	83.44	T-bar = 2.79
DEMOC	overall	6.38	3.17	0.08	10	N = 304
	between		2.85	0.24	10	n = 109
	within		1.29	1.15	9.68	T-bar = 2.79
EDUC	overall	6.5	2.97	0.44	12.73	N = 304
	between		2.87	0.82	12.38	n = 109
	within		0.91	4.37	8.72	T-bar = 2.79
OPEN	overall	75.63	44.92	13.11	407.64	N = 304
	between		42.54	19.98	368.5	n = 109
	within		12.34	22.24	120.2	T-bar = 2.79
ln(GDP PC)	overall	8.88	1.1	5.89	11.13	N = 304
	between		1.09	6.02	10.94	n = 109
	within		0.19	8.2	9.56	T-bar = 2.79
5-year panel						
QOG	overall	58.13	21.61	9.81	100	N = 496
	between		20.02	12.5	99.82	n = 109
	within		7.27	34.99	89.38	T-bar = 4.55
DEMOC	overall	6.6	3.11	0	10	N = 496
	between		2.87	0.2	10	n = 109
	within		1.17	0.31	10.15	T-bar = 4.55
EDUC	overall	6.76	2.94	0.28	13.09	N = 496
	between		2.87	0.88	12.47	n = 109
	within		0.79	4.56	8.95	T-bar = 4.55
OPEN	overall	76.75	45.69	12.63	443.23	N = 496
	between		42.87	20.27	369.47	n = 109
	within		13.34	15.55	150.52	T-bar = 4.55
ln(GDP PC)	overall	8.9	1.12	5.87	11.03	N = 496
	between		1.1	6	10.82	n = 109
	within		0.18	8.18	9.63	T-bar = 4.55
Annual panel						
QOG	overall	55.76	23.59	4.17	100	N = 1943
	between		21.15	12.83	100	n = 129
	within		9.1	25.15	89.44	T-bar = 15.06
DEMOC	overall	5.58	3.43	0	10	N = 1943
	between		3.09	0.22	10	n = 129
	within		1.45	-0.14	10.87	T-bar = 15.06
EDUC1	overall	47.39	21.63	3.5	99.5	N = 1943
	between		20.96	8.19	99.5	n = 129
	within		4.31	34.15	56.65	T-bar = 15.06
OPEN	overall	67.89	44.26	1.98	376.3	N = 1943
	between		40.76	9.97	338.39	n = 129
	within		16.12	-68.6	246.59	T-bar = 15.06
ln(GDP PC)	overall	8.61	1.16	5.03	11.01	N = 1943
	between		1.13	6.29	10.75	n = 129
	within		0.16	7.35	9.64	T-bar = 15.06

Table 3: Cross-Country OLS Regressions This table reports the results of a set of cross-country regressions. The dependent variable is the ten-year average of quality of government and the explanatory variables are ten-year averages of: democracy (*DEMOC*), education (*EDUC*), trade openness (*OPEN*), the log of GDP per capita ($\ln(GDPPC)$). The regressions also include the following time-invariant controls: ethnolinguistic fractionalization (*ELF*), 4 dummy variable measuring the origin of the legal code (Socialist law is the excluded dummy), 3 variables measuring the religious composition of the population, and the absolute value of latitude ($abs(latitude)$). Columns 1 and 2 estimate the model for the 1980s, columns 3 and 4 for the 1990s, and columns 5 and 6 for the 2000s.

	(1)	(2)	(3)	(4)	(5)	(6)
	1980s		1990s		2000s	
DEMOC	2.832*** (0.78)	3.260*** (0.79)	1.188 (0.76)	1.661** (0.70)	1.245* (0.63)	1.652*** (0.63)
EDUC	-0.46 (1.41)	-1.684 (1.35)	0.577 (0.89)	0.00494 (0.94)	0.834 (0.71)	0.606 (0.71)
DEM*EDUC		0.797*** (0.26)		0.628*** (0.20)		0.564*** (0.16)
OPEN	0.0637 (0.05)	0.0777* (0.04)	0.0241 (0.03)	0.0362 (0.03)	0.0575* (0.03)	0.0592** (0.03)
$\ln(GDP\ PC)$	7.972** (3.08)	8.854*** (3.01)	6.389*** (2.00)	7.271*** (2.06)	5.274*** (1.58)	6.294*** (1.62)
ELF	22.01** (9.36)	19.39** (8.35)	0.742 (6.43)	1.221 (5.68)	3.895 (4.99)	5.279 (4.68)
COMMON LAW	-3.017 (11.61)	-18.78* (11.26)	14.11*** (4.43)	10.02** (4.26)	22.89*** (4.05)	19.77*** (4.15)
FRENCH LAW	-3.673 (11.30)	-21.28* (11.01)	7.145 (5.51)	2.642 (5.33)	11.90*** (4.27)	9.029** (4.24)
GERMAN LAW	9.037 (12.29)	-4.954 (11.47)	16.58*** (5.39)	12.58** (4.83)	23.14*** (4.52)	19.17*** (4.45)
SCAND. LAW	-6.176 (20.20)	-11.55 (18.07)	10.55 (8.10)	8.476 (7.20)	30.80*** (7.49)	30.47*** (7.29)
CATHOLIC	-0.129* (0.07)	-0.0925 (0.06)	-0.0371 (0.04)	-0.0253 (0.04)	0.0467 (0.04)	0.0395 (0.04)
PROTESTANT	0.144 (0.19)	-0.0207 (0.18)	0.0779 (0.08)	0.0289 (0.08)	-0.00877 (0.07)	-0.0568 (0.07)
MUSLIM	-0.0662 (0.08)	-0.0702 (0.07)	-0.00809 (0.07)	-0.0222 (0.06)	0.0549 (0.06)	0.0427 (0.05)
abs(Latitude)	42.24*** (14.92)	31.91** (13.77)	37.82*** (9.84)	32.18*** (9.24)	44.88*** (8.72)	36.91*** (8.97)
Constant	-46.68** (21.04)	-27.44 (23.98)	-28.47** (13.81)	-23.54 (15.56)	-44.91*** (11.13)	-36.29*** (11.82)
Observations	88	88	104	104	106	106
R-squared	0.683	0.728	0.77	0.797	0.823	0.844
DEMO+1SD*SCH		5.652		3.545		3.346
p value		0.00	41	0.00		0.00
DEMO-1SD*SCH		0.868		-0.223		-0.041
p value		0.361		0.81		0.954
SCH+1SDEMOC		0.708		1.889		2.30
p value		0.586		0.036		0.01
SCH-1SDEMOC		-4.076		-1.879		-1.087
p value		0.025		0.151		0.192

Table 4: **Cross-country regressions: Sensitivity Analysis.** The first two columns of this table estimate the same models of columns 2 and 4 of Table 3 by replacing the Barro and Lee (2010) measure of education with that of Vanhanen (2003, 2003b). Columns 3-5 estimate the specifications of columns 2, 4, and 6 of Table 3 using Stata's robust regression routine (rreg).

	(1)	(2)	(3)	(4)	(5)
	Alternative measure of education		Robust regressions		
	1980s	1990s	1980s	1990s	2000s
DEMOC	3.058*** (0.66)	1.270** (0.61)	3.410*** (0.89)	1.641** (0.70)	2.019*** (0.55)
EDUC1	-0.178 (0.12)	0.0267 (0.09)			
DEM*EDUC1	0.103*** (0.02)	0.0490** (0.02)			
EDUC			-1.878 (1.47)	-0.818 (0.88)	0.821 (0.73)
DEM*EDUC1			0.762*** (0.26)	0.764*** (0.19)	0.531*** (0.17)
OPEN	0.0649 (0.05)	0.0106 (0.03)	0.0785* (0.05)	0.0383 (0.03)	0.0536** (0.02)
ln(GDP PC)	8.707*** (2.19)	9.276*** (1.71)	9.515*** (3.02)	8.304*** (1.87)	5.612*** (1.62)
ELF	18.27** (8.26)	0.0596 (5.51)	19.61** (9.06)	0.602 (5.20)	7.179 (4.47)
COMMON LAW	-22.51*** (7.60)	4.608 (4.28)	-19.64 (12.51)	9.313* (5.19)	21.07*** (4.32)
FRENCH LAW	-22.03*** (7.22)	0.826 (4.75)	-22.49* (12.33)	0.28 (5.39)	10.09** (4.47)
GERMAN LAW	-13.26* (6.81)	7.521 (4.85)	-7.76 (12.71)	10.36 (6.30)	20.76*** (5.31)
SCAND. LAW	-22.83* (13.55)	0.445 (7.46)	-15.34 (19.14)	6.246 (9.20)	31.70*** (8.08)
CATHOLIC	-0.106* (0.06)	-0.0655* (0.04)	-0.0954 (0.08)	-0.0224 (0.04)	0.0559 (0.04)
PROTESTANT	0.0818 (0.14)	0.111 (0.08)	0.00408 (0.17)	0.0321 (0.08)	-0.0504 (0.07)
MUSLIM	-0.0801 (0.07)	-0.0452 (0.05)	-0.0795 (0.09)	-0.0451 (0.06)	0.0771 (0.05)
abs(Latitude)	28.46** (12.82)	20.18* (10.69)	31.63* (17.35)	31.51*** (11.03)	38.88*** (9.56)
Constant	-23.88 (16.97)	-31.19** (13.66)	-31.61 (24.80)	-30.25** (14.44)	-33.57*** (12.66)
Observations	109	127	88	104	106
R-squared	0.708	0.773	0.684	0.775	0.834

Table 5: **Panel data regressions: 10-year periods.** This table reports the results of a set of panel regressions (random effects in columns 1 and 2 and fixed effects in columns 3 and 4) where the dependent variable is the ten year average of quality of government and the explanatory variables are the same as in Table 3.

	(1)	(2)	(3)	(4)
	Random effects		Fixed effects	
DEMOC	1.121** (0.45)	1.337*** (0.42)	0.708 (0.57)	0.846* (0.51)
EDUC	0.935 (0.71)	0.932 (0.71)	1.871 (1.52)	2.068 (1.47)
DEM*EDUC		0.288** (0.13)		0.263* (0.15)
OPEN	0.0342 (0.03)	0.0371 (0.04)	-0.0217 (0.06)	-0.0257 (0.06)
ln(GDP PC)	6.037*** (1.55)	5.743*** (1.56)	3.781 (3.29)	0.44 (3.35)
ELF	6.061 (5.80)	5.813 (5.45)		
COMMON LAW	18.14*** (4.18)	17.06*** (4.11)		
FRENCH LAW	10.54** (4.97)	9.172* (4.73)		
GERMAN LAW	21.78*** (5.32)	20.61*** (4.94)		
SCAND. LAW	21.24*** (7.93)	22.32*** (7.62)		
CATHOLIC	-0.0128 (0.04)	-0.0073 (0.04)		
PROTESTANT	0.0466 (0.08)	0.00824 (0.08)		
MUSLIM	0.0052 (0.05)	0.00705 (0.05)		
abs(Latitude)	40.55*** (8.92)	37.72*** (8.73)		
Constant	-44.38*** (11.40)	-28.25** (11.80)	8.899 (30.73)	53.42* (28.31)
Observations	298	298	304	304
R-squared			0.189	0.212
Number of countries	106	106	109	109

Table 6: **Quadratic specification in GDP per capita.** This table checks whether the results of Tables 3 and 5 are robust to controlling for the square of the log of GDP per capita ($\ln(\text{GDP PC})^2$).

	(1)	(2)	(3)	(4)	(5)
	1980s	1990s	2000s	Random effects	Fixed effects
DEMOC	3.257*** (0.79)	1.677** (0.70)	1.109* (0.61)	1.243*** (0.368)	1.015** (0.435)
EDUC	-1.776 (1.33)	0.00432 (0.94)	0.301 (0.71)	0.601 (0.672)	0.627 (1.33)
DEM*EDUC	0.839*** (0.25)	0.582** (0.24)	0.547*** (0.17)	0.301*** (0.111)	0.279** (0.127)
OPEN	0.0776* (0.04)	0.0339 (0.03)	0.058*** (0.029)	0.019 (0.034)	-0.045 (0.048)
$\ln(\text{GDP PC})$	21.899 (31.95)	-2.12 (24.02)	2.46 (13.36)	12.26 (10.43)	32.56 (22.72)
$\ln(\text{GDP PC})^2$	-0.751 (1.85)	0.549 (1.40)	0.225 (0.77)	-0.34 (0.64)	-1.708 (1.305)
ELF	20.34** (8.87)	0.78 (5.67)	5.0 (4.86)	4.25 (5.33)	
COMMON LAW	-18.97* (11.30)	9.2* (4.64)	19.3*** (4.41)	17.08*** (4.26)	
FRENCH LAW	-22.22** (10.97)	2.27 (5.33)	8.75** (4.32)	7.62 (4.66)	
GERMAN LAW	-4.942 (11.18)	11.396** (5.49)	18.58*** (4.83)	19.45*** (5.23)	
SCAND. LAW	-11.18 (18.35)	7.33 (7.83)	29.83*** (7.48)	21.37*** (7.76)	
CATHOLIC	-0.0882 (0.064)	-0.028 (0.037)	0.039 (0.04)	0.009 (0.036)	
PROTESTANT	-0.0245 (0.18)	0.031 (0.08)	-0.0557 (0.07)	0.018 (0.075)	
MUSLIM	-0.0672 (0.07)	-0.02 (0.06)	0.0438 (0.05)	0.009 (0.046)	
abs(Latitude)	32.81** (13.96)	30.88*** (9.52)	36.25*** (9.43)	37.20*** (9.17)	
Constant	-83.87 (138.93)	17.52 (103.9)	-20.71 (59.26)	-52.32 (46.04)	-95.2 (100.1)
Observations	88	104	106	488	496
R-squared	0.728	0.797	0.844		0.217
Number of countries	88	104	106	106	109

Table 7: **Panel data regressions: 5-year periods.** This table reports the results of a set of panel regressions (random effects in columns 1 and 2 and fixed effects in columns 3 and 4) where the dependent variable is the five year average of quality of government and the explanatory variables are the five year averages of the variables used in Table 3.

	(1)	(2)	(3)	(4)
	Random effects		Fixed effects	
DEMOC	0.871** (0.436)	1.247*** (0.368)	0.694 (0.512)	1.024** (0.445)
EDUC	0.585 (0.678)	0.601 (0.671)	0.649 (1.378)	0.646 (1.332)
DEM*EDUC		0.292*** (0.109)		0.250* (0.126)
OPEN	0.0135 (0.033)	0.0177 (0.034)	-0.0459 (0.048)	-0.0481 (0.047)
ln(GDP PC)	6.891*** (1.419)	6.503*** (1.416)	5.979* (3.021)	3.729 (2.945)
ELF	3.971 (5.533)	3.93 (5.146)		
COMMON LAW	17.75*** (3.933)	16.41*** (3.837)		
FRENCH LAW	8.755* (4.670)	7.257 (4.468)		
GERMAN LAW	19.82*** (4.850)	18.58*** (4.564)		
SCAND. LAW	19.76*** (7.579)	20.52*** (7.351)		
CATHOLIC	0.00309 (0.037)	0.00778 (0.035)		
PROTESTANT	0.0537 (0.077)	0.0187 (0.074)		
MUSLIM	0.000656 (0.048)	0.00917 (0.045)		
abs(Latitude)	39.65*** (8.710)	36.20*** (8.475)		
Constant	-40.59*** (11.010)	-27.29** (11.590)	-2.276 (28.130)	24.93 (25.210)
Observations	488	488	496	496
R-squared			0.19	0.209
Number of countries	106	106	109	109

Table 8: **Panel data regressions: annual data.** This table reports the results of a set of panel regressions (random effects in columns 1 and 2 and fixed effects in columns 3 and 4) where the dependent variable is the quality of government and the explanatory variables are the same as those of the first two columns of Table 4.

	(1)	(2)	(3)	(4)
	Random effects		Fixed effects	
DEMOC	1.120*** (0.430)	1.384*** (0.429)	1.006** (0.452)	1.256*** (0.459)
EDUC	0.233** (0.115)	0.261** (0.109)	0.329** (0.141)	0.365*** (0.136)
DEM*EDUC		0.0413** (0.017)		0.0378** (0.018)
OPEN	0.0457** (0.020)	0.0420** (0.020)	0.0584** (0.025)	0.0523** (0.023)
ln(GDP PC)	7.340*** (1.834)	6.498*** (1.755)	7.285** (3.033)	5.998** (2.913)
ELF	7.341 (6.183)	6.226 (5.991)		
COMMON LAW	7.594* (4.569)	4.244 (4.690)		
FRENCH LAW	4.289 (4.437)	0.871 (4.516)		
GERMAN LAW	12.33** (5.578)	8.737 (5.315)		
SCAND. LAW	5.795 (8.118)	1.769 (8.383)		
CATHOLIC	-0.0742* (0.040)	-0.0752* (0.040)		
PROTESTANT	0.133 (0.086)	0.13 (0.091)		
MUSLIM	-0.0171 (0.049)	0.00251 (0.049)		
abs(Latitude)	24.52** (10.750)	18.10* (10.800)		
Constant	-42.29*** (13.560)	-14.56 (14.080)	-32.1 (25.920)	-1.247 (24.710)
Observations	1925	1925	1943	1943
R-squared			0.11	0.128
Number of countries	127	127	129	129

Table 9: **Panel data regressions, instrumenting GDP growth.** This table uses panel data and a specification similar to that of Table 8, but substitutes GDP per capita with the growth rate of GDP per capita. Columns 3 and 4 instrument GDP per capita with trading partners' growth.

	(1)	(2)	(3)	(4)
	RE	RE, IV	FE	FE, IV
DEMOC	1.587*** (0.156)	1.721*** (0.293)	1.480*** (0.161)	1.669*** (0.310)
EDUC	0.451*** (0.047)	0.411*** (0.080)	0.518*** (0.052)	0.481*** (0.078)
DEM*EDUC	0.0412*** (0.006)	0.0443*** (0.008)	0.0359*** (0.007)	0.0397*** (0.009)
OPEN	0.0525*** (0.015)	0.0224 (0.058)	0.0599*** (0.018)	0.0136 (0.064)
GROWTH	9.601** (4.330)	17.4 (205.800)	8.829** (4.308)	14.7 (137.400)
ELF	4.661 (5.715)	7.476 (8.016)		
COMMON LAW	11.28** (4.762)	10.80** (4.986)		
FRENCH LAW	4.721 (4.858)	4.89 (5.056)		
GERMAN LAW	18.86*** (6.700)	17.71** (7.144)		
SCAND. LAW	12.01 (10.700)	10.37 (11.310)		
CATHOLIC	-0.0366 (0.050)	-0.0323 (0.053)		
PROTESTANT	0.0916 (0.101)	0.117 (0.116)		
MUSLIM	0.0584 (0.052)	0.0599 (0.055)		
abs(Latitude)	29.93*** (9.753)	29.25*** (10.510)		
Constant	31.18*** (6.680)	30.50*** (7.087)	50.99*** (1.229)	52.72*** (2.675)
Observations	1667	1667	1683	1683
Number of countries	116	116	118	118
R-squared			0.153	

Table 10: **Panel data regressions, dynamic panel.** This table estimates the model of Table 8 using the difference estimator of Arellano and Bond (column 1) and the System estimator of Arellano and Bover and Blundell and Bond (columns 2 and 3).

	(1)	(2)	(3)
	DIF-GMM	SYS-GMM	SYS-GMM
L.QOG	1.142*** (0.029)	1.152*** (0.029)	1.145*** (0.030)
L2.QOG	-0.323*** (0.026)	-0.312*** (0.025)	-0.313*** (0.025)
DEMOC	0.318** (0.126)	0.403*** (0.115)	0.392*** (0.133)
DEM*EDUC	0.00703* (0.004)	0.00354 (0.004)	0.0038 (0.004)
EDUC	0.0779** (0.032)	0.0786*** (0.021)	0.0648** (0.028)
OPEN	-0.00143 (0.011)	0.0033 (0.008)	-1.76E-05 (0.010)
ln(GDP PC)	1.045 (0.851)	0.269* (0.143)	0.972 (0.683)
ELF			-0.618 (4.519)
COMMON LAW			0.177 (4.286)
FRENCH LAW			0.0592 (4.306)
GERMAN LAW			-6.057 (5.937)
SCAND. LAW			-3.501 (10.790)
CATHOLIC			-0.0491 (0.032)
PROTESTANT			-0.0148 (0.098)
MUSLIM			-0.0633* (0.034)
abs(Latitude)			-2.498 (9.048)
Observations	1455	1574	1561
Number of countries	118	118	117
AR1 test (pvalue)	0.00	0.00	0.00
AR2 test (pvalue)	0.16	0.13	0.12
Sargan test (pvalue)	0.12	0.02	0.02

Table 11: **Description of variables**

Variable	Description and Sources
QOG	ICRG indicator of Quality of Government obtained as the mean value of the ICRG variables “Corruption”, “Law and Order” and “Bureaucracy Quality”, scaled 0-1. Higher values indicate higher quality of government. Downloaded from www.qog.pol.gu.se (the name of the variable in the QOG dataset is QOG)
DEMOC	Index of democracy obtained as an average of the Polity and Freedom House indexes of democracy. Downloaded from www.qog.pol.gu.se (the name of the variable in the QOG dataset is fh polity2)
EDUC	Average numbers of years of education. Source: Barro and Lee (2010)
EDUC1	Index of Knowledge Distribution (Vanhanen 2003a; 2003b). Downloaded from www.qog.pol.gu.se (the name of the variable in the QOG dataset is van knowdist)
OPEN	Trade openness (source: Penn World tables)
ln(GDP PC)	Log GDP real per capita in PPP (source: Penn World Tables)
ELF	Ethnic Fractionalization from Fearon (2003). Downloaded from www.qog.pol.gu.se (the name of the variable in the QOG dataset is fe etfra)
COMMON LAW	Dummy variable that takes a value of one for countries with a common law legal origin. Source La Porta et al. (1998)
FRENCH LAW	Dummy variable that takes a value of one for countries with a French legal origin. Source La Porta et al. (1998)
GERMAN LAW	Dummy variable that takes a value of one for countries with a German legal origin. Source La Porta et al. (1998)
SCAND. LAW	Dummy variable that takes a value of one for countries with a Scandinavian legal origin. Source La Porta et al. (1998)
SOC. LAW	Dummy variable that takes a value of one for countries with a socialist legal origin. Source La Porta et al. (1998)
CATHOLIC	Share of Catholics in the population. Source La Porta et al. (1998)
PROTESTANT	Share of Protestant in the population. Source La Porta et al. (1998)
MUSLIM	Share of Muslim in the population. Source La Porta et al. (1998)
abs(Latitude)	Absolute value of the latitude of the capital city, divided by 90 (to take values between 0 and 1). Source: La Porta et al. (1998)
RSHOCK	Real external shock. Source: Jaimovich and Panizza (2006)