NBER WORKING PAPER SERIES

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Working Paper 11204
http://www.nber.org/papers/w11204

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2005

Prepared for the American Economic Association Papers and Proceedings 2005. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 11204
March 2005
JEL No. P16, O10

ABSTRACT

The conventional wisdom views high levels of education as a prerequisite for democracy. This paper shows that existing evidence for this view is based on cross-sectional correlations, which disappear once we look at within-country variation. In other words, there is no evidence that countries that increase their education are more likely to become democratic.

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1 Introduction

The conventional wisdom, since at least the writings of John Dewey (1916), views high levels of educational attainment as a prerequisite for democracy. Education is argued to promote democracy both because it enables a "culture of democracy" to develop, and because it leads to greater prosperity, which is also thought to cause political development. The most celebrated version of this argument is modernization theory, popularized by Seymour Martin Lipset (1959), which emphasizes the role of education as well as economic growth in promoting political development in general and democracy in particular. Lipset, for example, argues that

> "Education presumably broadens men's outlooks, enables them to understand the need for norms of tolerance, restrains them from adhering to extremist and monistic doctrinies, and increases their capacity to make rational electoral choices." (p. 79),

and concludes

> "If we cannot say that a "high" level of education is a sufficient condition for democracy, the available evidence does suggest that it comes close to being a necessary condition" (p. 80).

Recent empirical work, for example, by Robert Barro (1999) and Adam Przeworski, Michael Alvarez, José A. Cheibub and Fernando Limongi (2000), provides evidence consistent with this view. Edward Glaeser, Rafael La Porta, Florencio Lopez-de-Silanes and Andrei Shleifer (2004) go further and argue that differences in schooling are a major causal factor explaining not only differences in democracy, but more generally in political institutions, and provide evidence consistent with this view.

The high correlation between schooling and democracy, depicted in Figure 1, is the cornerstone of this view. This figure shows the most common measure of democracy, the Freedom House index of political rights, against the average years of schooling of the population in the 1990s (see below for data details). Correlation does not establish causation, however.

Existing literature looks at the cross-sectional correlation between education and democracy rather than at the *within* variation. Hence existing inferences may be potentially driven by omitted factors influencing both education and democracy in the long run. A causal link between education and democracy suggests that we should also see a

relationship between changes in education and changes in democracy. In other words, we should ask whether a given country (with its other characteristics held constant) is more likely to become more democratic as its population becomes more educated. We show that the answer to this question is no. Figure 2 illustrates this by plotting the change in the Freedom House democracy score between 1970 and 1995 versus the change in average years of schooling during the same time period. Countries that become more educated show no greater tendency to become more democratic. In this light, the pattern in Figure 1 seems to be driven by some common omitted factors affecting both education and democracy.

We further investigate these issues econometrically. We show that the cross-sectional relationship between schooling and democracy disappears when country fixed effects are included in the regression. Although fixed effects regressions are not a panacea against all biases arising in pooled OLS regressions, they are very useful in removing the potential long-run determinants of both education and democracy. We also document that the lack of a relationship between education and democracy is highly robust to different econometric techniques, to estimation in various different samples, and to the inclusion of different sets of covariates.

The recent paper Glaeser, et al. (2004) also exploits the time-series variation in democracy and education, and presents evidence that changes in schooling predict changes in democracy and other political institutions. However, we document below that this result stems from their omission of time effects in the regressions, so it reflects the over-time increase in education and democracy at the world level over the past 35 years. Once we include year dummies in their regressions, the impact of education on democracy disappears entirely. Motivated by the Glaeser, et al. (2004) paper, we also show that there is no effect of education on other measures of political institutions.

In addition to the studies mentioned above, our paper is related to the large political economy literature on the creation and consolidation of democracy, which we do not have enough space to discuss here (see Daron Acemoglu and James A. Robinson, 2004, for a discussion of this literature). It is also related to our companion paper by Acemoglu, Simon Johnson, Robinson and Pierre Yared (2004), which investigates the other basic tenet of the modernization hypothesis, that income (and economic growth) causes democracy. In that paper, using both fixed effects OLS and instrumental variable regressions, we show that there is little evidence in favor of a causal effect from income to democracy either. We also offer a theory for the differences in long-run factors causing the joint evolution of education, income, and democracy, and we provide supporting evidence for this theory.

The rest of the paper is organized as follows. In Section 2 we briefly describe the data. In Section 3 we present our main results. Section 4 documents the robustness of these results. Section 5 shows that there is no evidence of a causal effect of education on other measures of political institutions. Section 6 concludes.

2 Data

We follow the existing literature in economics and measure democracy using the Freedom House Political Rights Index (see Freedom House, 2004). This index ranges from 1 to 7, with 7 representing the least amount of political freedom and 1 the most freedom. A country gets a score of 1 if political rights come closest to the ideals suggested by a checklist of questions, beginning with whether there are free and fair elections, whether those who are elected rule, whether there are competitive parties or other political groupings, whether the opposition plays an important role and has actual power, and whether minority groups have reasonable self-government or can participate in the government through informal consensus. Following Barro (1999), we supplement this index with the related variable from Kenneth Bollen (1990, 2001) for 1955, 1960, and 1965, and we transform both indices so that they lie between 0 and 1, with 1 corresponding to the most democratic set of institutions.

We also show that our results are robust to using the other two popular measures in the literature, the composite Polity index, and the dichotomous democracy index developed by Przeworski, et al. (2000) and extended by Carles Boix and Sebastian Rosato (2001) which are all normalized between 0 and 1 for comparison. Because of space restrictions, we do not describe these data here and refer the reader to Acemoglu et al. (2004) for details, and also for descriptive statistics on the key variables.

Our main right-hand side variable, average years of schooling in the total population of age 25 and above, is from Barro and Jong-Wha Lee (2000) and is available in five year intervals between 1960 and 2000. The value of this variable in our base sample ranges from 0.04 to 12.18 years of schooling with a mean of 4.65.

Our basic dataset is a five-yearly panel, where we take the democracy score for each country every fifth year. This results in an unbalanced panel of 108 countries spanning the period between 1965 and 2000, with a total of 765 observations with countries included if they have been independent for at least five years, where independence year is determined using the CIA World Factbook (2004). We prefer using the observations every fifth year to averaging the five-yearly data, since averaging introduces additional serial correlation

as we document below. Nevertheless, our results are robust to using five-year averages. We also report robustness checks using 10-year data between 1970 and 2000 and using subsamples that exclude former and current socialist countries, Sub-Saharan Africa, and predominantly Muslim countries.

3 Results

Table 1 provides our main results using the Freedom House data. Column 1 shows the pooled OLS relationship between education and democracy by estimating the following model:

$$d_{it} = \alpha d_{it-1} + \gamma s_{it-1} + \mu_t + v_{it} \tag{1}$$

where d_{it} is the democracy score of country i in period t. The lagged value of this variable is included on the right hand side to capture persistence in democracy and also potentially mean-reverting dynamics in democracy (i.e., the tendency of the democracy score to return to some equilibrium value for the country). The main variable of interest is s_{it-1}, the lagged value of average years of schooling. The parameter γ therefore measures whether education has an effect on democracy. μ_t denotes a full set of time effects, which capture common shocks to (common trends in) the democracy score of all countries, and v_{it} is an error term, capturing all other omitted factors.

Column 1 shows a statistically significant correlation between of education and democracy. The estimate of γ is 0.027 with a standard error of 0.004, which is significant at 1%.[1] If causal, this estimate would imply that an additional year of schooling increases the "steady-state" value of democracy by 0.093 ($\approx 0.027/(1-0.709)$, where the long-run effect is calculated as $\gamma/(1-\alpha)$). This is a reasonably large magnitude relative to the mean of democracy in the sample which is 0.57. Notice that this estimate includes both the direct and the indirect effect of education on democracy working through income (since greater education corresponds to greater income, which might also lead to more democracy). Below we also report models that estimate the separate effect of education and income.

Equation (1) is similar to the regressions in the existing literature in that it does not control for country fixed effects. Thus the entire long-run differences across countries are used to estimate the effect of education on democracy. As a result, omitted factors that influence both democracy and education in the long run will lead to spurious positive estimates of γ.

[1] All the standard errors are robust for arbitrary heteroscedasticity and clustering at the country level.

The alternative is to allow for the presence of such omitted factors (that are not time-varying) by including a country fixed effects, by estimating a model of the form

$$d_{it} = \alpha d_{it-1} + \gamma s_{it-1} + \mu_t + \delta_i + u_{it}, \tag{2}$$

which only differs from (1) because of the full set of country dummies, the δ_i's.

The rest of Table 1 reports estimates of γ from models similar to (2). Column 2 is identical to column 1 except for the fixed country effects, the δ_i's. The results are radically different, however. Now γ is estimated to be -0.005 with a standard error of 0.019, thus it is highly insignificant and has the opposite sign to that predicted by the modernization hypothesis (and to that found in the pooled OLS regression of column 1).

In the regression in column 2, because the regressor d_{it-1} is mechanically correlated with u_{is} for $s < t$, the standard fixed effect estimation is not consistent in panels with a short time dimension (e.g., Jeffery M. Wooldridge, 2002, chapter 11). Our first strategy to deal with this problem, adopted in column 3, is to use the methodology proposed by Theodore W. Anderson and Cheng Hsiao (1982). This involves time differencing equation (2) to eliminate the δ_i's, which yields $\Delta d_{it} = \alpha \Delta d_{it-1} + \gamma \Delta s_{it-1} + \Delta \mu_t + \Delta u_{it}$. In the absence of serial correlation in the original residual, u_{it} (i.e., no second order serial correlation in Δu_{it}), d_{it-2} is uncorrelated with Δu_{it}, so can be used as instrument for Δd_{it-1} to obtain consistent estimates. We find that this procedure leads to even more negative estimates, for example, in our basic specification, γ is now estimated to be -0.018 (standard error = 0.021), and shows no evidence of a positive effect of education on democracy.

Although the instrumental variable estimator of Anderson and Hsiao (1982) leads to consistent estimates, it is not efficient, since, under the assumption of no further serial correlation in u_{it}, not only d_{it-2}, but all further lags of d_{it} are uncorrelated with Δu_{it}, and can also be used as additional instruments. Manuel Arellano and Stephen R. Bond (1991) develop a Generalized Method-of-Moments Estimator (GMM) using all of these moment conditions. We use this GMM estimator in column 4. The estimate for γ is similar to that in column 3, -0.017 (standard error = 0.022). The presence of multiple instruments in the GMM procedure allows us to investigate whether the assumption of no serial correlation in u_{it} can be rejected and also to test for overidentifying restrictions. The AR(2) test and the Hansen J test, reported at the bottom of this column, indicate that there is no further serial correlation and the overidentifying restrictions are not rejected.

Columns 5 and 6 repeat the fixed effects OLS and GMM regressions from columns 2 and 4 using five-year averages of democracy, with very similar (and more negative) estimates. But now the AR(2) test shows residual serial correlation and the Hansen J

test rejects the overidentifying restrictions because of the additional serial correlation introduced by averaging. This motivates our focus on the dataset using the observations every fifth year rather than averaging the five-yearly observations.

Columns 7 and 8 repeat these regressions with ten-year data, again with very similar results (though now the estimate of γ is positive and insignificant with the fixed effects OLS).

These results therefore cast considerable doubt on the causal effect of education on democracy.

4 Robustness

Table 2 documents the robustness of these findings to alternative samples. We only report the fixed effects OLS and GMM regressions to save space.

One concern is whether the presence of socialist countries, where the persistence and the later collapse of non-democratic regimes might have very different causes, is driving these results. This may be a valid concern, since some of these former socialist countries already had high levels of education in the 1980s and did not experience any marked increase in education during or immediately prior to transition. Columns 1 and 2 exclude former and current socialist countries, and show that these countries had no effect on the results. The estimates of γ are very similar to those in Table 1. For example, the estimate with fixed effects OLS is -0.003 (standard error = 0 .019) and with GMM -0.015 (standard error =0.022).

Another concern is whether results are a due to the unstable political dynamics in sub-Saharan Africa, or potentially driven by Muslim countries, which have lower levels of schooling and have been slower to democratize. Columns 3 and 4 exclude Sub-Saharan African countries and columns 5 and 6 exclude countries where more than 40% of the population is Muslim. The results are very similar to the baseline in both cases.

Finally, another concern is whether the results are due to the use of the Freedom House data. To show that our results are robust across different datasets, columns 7 and 8 report our basic fixed effects OLS and GMM regressions using the Polity dataset, and columns 9 and 10 report our basic fixed effects OLS and GMM regressions using the Boix-Rosato dataset (which extends Przeworski et al.'s data to the present). The results are again similar.

In order to address the concern that the omission of certain variables are causing our result, Table 3 shows that controlling for a range of important covariates leaves these

basic pattern unchanged. We focus on the Freedom House data and report the basic fixed effects OLS and GMM regressions. Columns 1 and 2 control for the age structure and population by including the fractions of the population in five different age ranges, the median age of the population, and the logarithm of total population.[2] These variables are correlated with average educational attainment of the population, and might have a direct effect, making it impossible for us to identify the influence of education on democracy. We find that the age structure variables are jointly significant at 10% using fixed effects but not GMM, while log population is not significant. The effect of education on democracy continues to be highly insignificant in both cases.

Columns 3 and 4 control for the investment share of GDP, which is itself insignificant and has no effect on the sign or magnitude of the education variable. Columns 5 and 6 add income per capita. Education is still insignificant (and has a negative coefficient), and interestingly, income per capita itself is insignificant with a negative coefficient.[3] The causal effect of income on democracy, which is the other basic tenet of the modernization hypothesis, is therefore also not robust to controlling for country fixed effects. We investigate this issue in greater detail in Acemoglu, et al. (2004).

Finally, columns 7 and 8 control for all of these covariates simultaneously, again with similar results.

5 From Education to Institutions?

The recent paper by Glaeser, et al. (2004) argues that there is a causal effect of education on institutions. They substantiate this by reporting regressions similar to our model in (2), but with very different results, in particular showing a positive effect of education on democracy. Why are their results different from ours?

In Table 4 panel A, we replicate their results, which use the constraint on executive from Polity, the autocracy score from Polity, the democracy score from Polity, and the autocracy score from Przeworski et al.[4] These columns exactly match their regressions, but are different from our corresponding regressions, because they do not include time effects, the μ_t's in equations (1) and (2). In the absence of time effects, the parameter

[2]The ranges are 0 to 15, 15 to 30, 30 to 45, 45 to 60, and 60 and above. Age ranges and median age are from United Nations Population Division (2003) and population is from World Bank (2002).

[3]Investment Share of GDP and GDP per Capita are from the Penn World Tables dataset in Alan Heston, Robert Summers, and Bettina Aten (2002).

[4]The only difference from their results is that, instead of using autocracy scores like they do, we transform everything to democracy, so that all coefficients have the same sign. Note that for these results, the index of institutions is not normalized between 0 and 1.

γ is identified from the over-time variation, in this context, the world-level increase in education and democracy. This clearly does not correspond to any causal effect.

Panels B and C report estimates with and without income per capita, but including time effects as in our basic specifications. In all cases education is insignificant and has the *incorrect sign* as in our basic results. Moreover, in all columns except one, the time effects are jointly significant at 1% or less, and in that one case they are significant at 10% (and interestingly, in that case, as column 4 shows, education is insignificant even without time effects).

The evidence in Table 4 therefore shows that there seems to be no effect of education on democracy or on other political institutions.

6 Concluding Remarks

A common view clearly articulated by the modernization theory claims that high levels of schooling are both a prerequisite for democracy and a major cause of democratization. The evidence in favor of this view is largely based on cross-sectional or pooled cross-sectional regressions. This paper documents that this evidence is not robust to including fixed effects and exploiting the within-country variation. This strongly suggests that the cross-sectional relationship between education and democracy is driven by omitted factors influencing both education and democracy rather than a causal relationship.

This evidence poses two important questions:

1. Is there no long-run causal relationship between education and democracy? It is important to emphasize that our paper does not answer this question. We have exploited the five and ten yearly variation in the postwar era. It is possible that changes in education have very long run affects, say over 50 or 100 years, that do not manifest themselves in the shorter timeframe that we have looked at.

2. What are the omitted factors influencing both education and democracy, captured by the country fixed effects? We conjecture that these are related to the joint evolution of economic and political development ("the historical development paths"). In our companion paper, Acemoglu, et al. (2004) we provide evidence consistent with this conjecture. We document that the fixed effects for the former European colonies are very highly correlated with the historical, potentially-exogenous determinants of institutional development in this sample, in particular, the mortality rates faced by

the European settlers and the density of the indigenous populations (see, Acemoglu, Johnson and Robinson, 2001 and 2002) as well as early experiences with democracy.

7 Bibliography

Acemoglu, Daron, Simon Johnson and James A. Robinson (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, December, 91, 1369-1401.

Acemoglu, Daron, Simon Johnson and James A. Robinson (2002) "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, 118, 1231-1294.

Acemoglu, Daron, Simon Johnson, James A. Robinson and Pierre Yared (2004) "Income and Democracy," mimeo.

Acemoglu, Daron and James A. Robinson (2004) *Economic Origins of Dictatorship and Democracy*, Cambridge University Press, forthcoming.

Anderson, Theodore W. and Cheng Hsiao (1982) "Formulation and Estimation of Dynamic Models using Panel Data," *Journal of Econometrics*, 18, 67-82.

Arellano, Manuel and Stephen R. Bond (1991) "Some Specification tests for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58, 277-298.

Barro, Robert J. (1999) "The Determinants of Democracy," *Journal of Political Economy*, 107, S158-S183.

Barro, Robert J. and Jong-Wha Lee (2000) "International Data on Educational Attainment: Updates and Implications," CID Working Paper #42.

Boix, Carles and Sebastián Rosato (2001) "A Complete Data Set of Political Regimes, 1800-1999," Unpublished, Department of Political Science, University of Chicago.

Bollen, Kenneth A. (1990) "Political Democracy: Conceptual and Measurement Traps," *Studies in Comparative International Development*, 25, 7-24.

Bollen, Kenneth A. (2001) "Cross-National Indicators of Liberal Democracy, 1950-1990" [Computer file]. 2nd ICPSR version. Chapel Hill, NC: University of North Carolina [producer], 1998. Inter-university Consortium for Political and Social Research [distributor].

Central Intelligence Agency (2004) *CIA World Factbook,* Website and Book. Washington, DC.

Dewey, John (1916) *Democracy and Education*, New York; The Macmillan Company.

Freedom House (2004) *Freedom in the World,* Website and Book. Washington,

DC.

Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer (2004) "Do Institutions Cause Growth?" NBER Working Paper #10568.

Heston, Alan, Robert Summers, and Bettina Aten (2002) *Penn World Tables Version 6.1.* Center for International Comparisons at the University of Pennsylvania (CICUP).

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny (1999) "The Quality of Government," *Journal of Law Economics and Organization*, 15, 222-279.

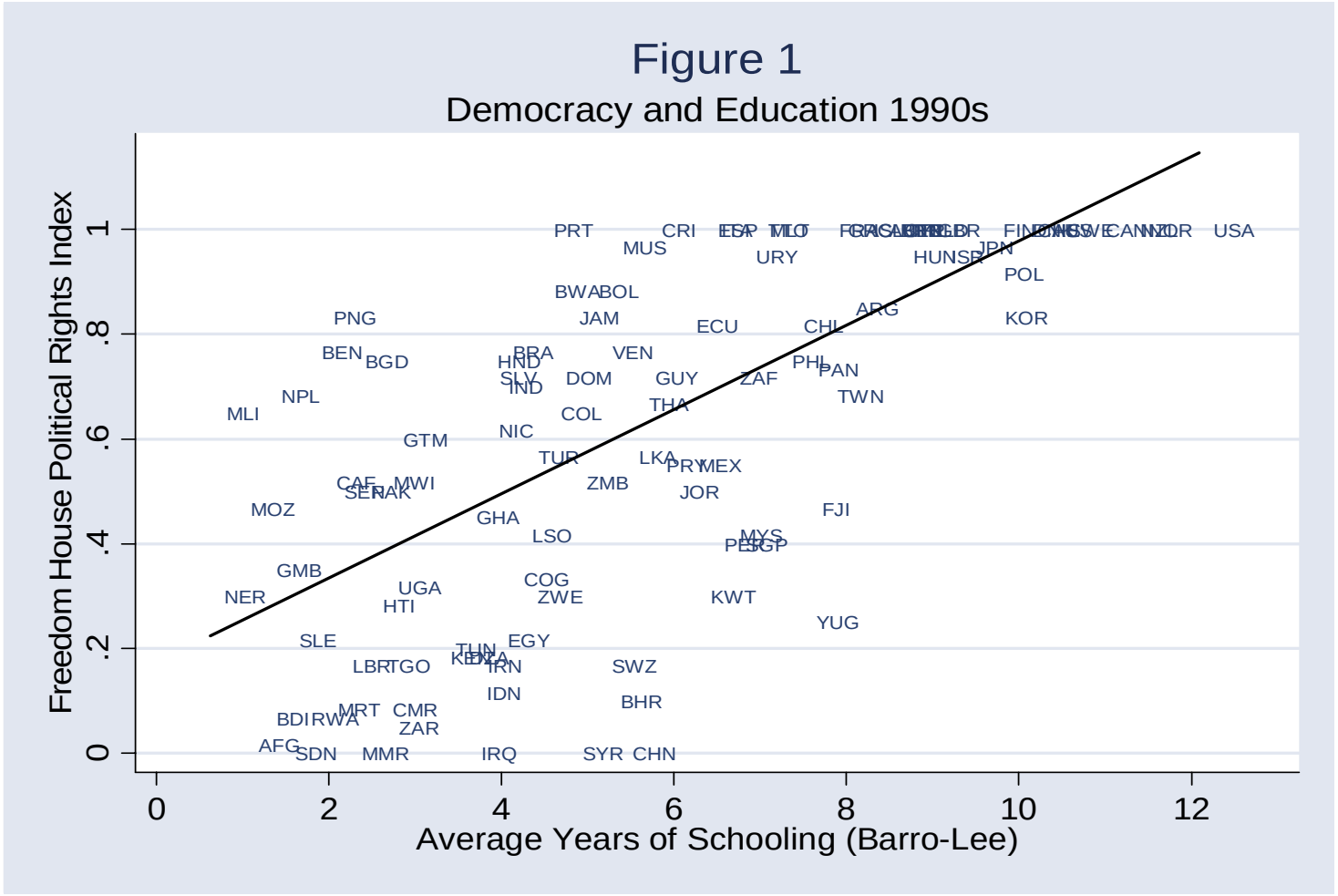
Lipset, Seymour Martin (1959) "Some Social Requisites of Democracy: Economic Development and Political Legitimacy," *American Political Science Review,* 53, 69-105.

Przeworski, Adam, Michael Alvarez, José A. Cheibub and Fernando Limongi (2000) *Democracy and Development: Political Institutions and material well-being in the world, 1950-1990*, Cambridge University Press, New York NY.

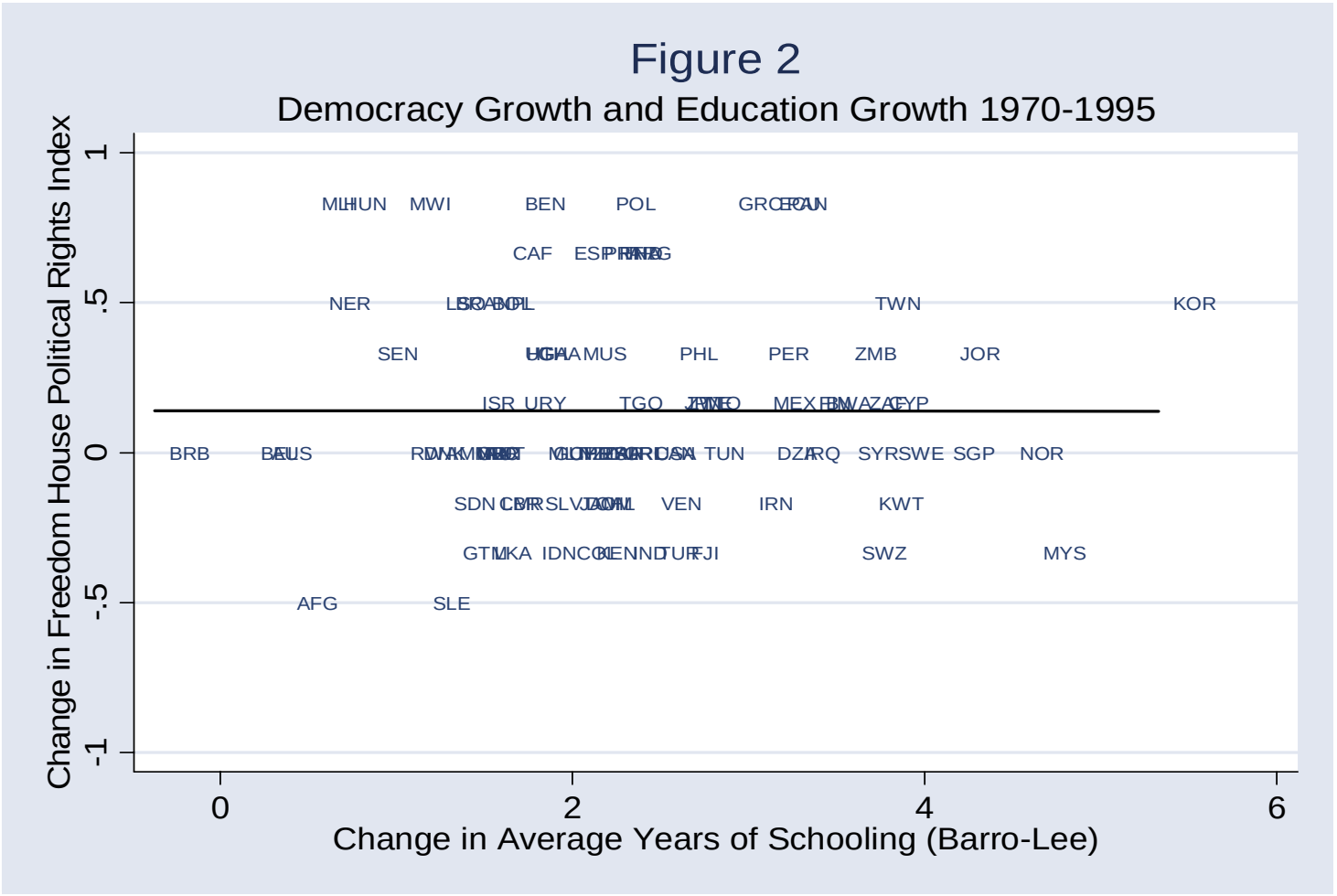
United Nations Population Division (2003) *World Population Prospects: The 2002 Revision,* Disk. New York.

Wooldridge, Jeffery M. (2002) *Econometric Analysis of Cross Section and Panel Data*, MIT Press; Cambridge.

World Bank (2002) *World Development Indicators*, CD-ROM and Book. Washington, DC.



Freedom House Political Rights Index is normalized from 0 to 1 and is from Freedom House (2004). Average years of schooling in the adult population (25 years of age and older) is from Barro and Lee (2000). Values are averaged by country from 1990 to 1999.



Freedom House Political Rights Index is normalized from 0 to 1 and is from Freedom House (2004). Average years of schooling in the adult population (25 years of age and older) is from Barro and Lee (2000). Changes are total differences between 1970 and 1995.

Table 1

Fixed Effects Results

	Base Sample, 1965-2000							
	5-year data				5-year data in averages		10-year data	
	Pooled OLS	Fixed Effects OLS	Anderson-Hsiao IV	Arellano-Bond GMM	Fixed Effects OLS	Arellano-Bond GMM	Fixed Effects OLS	Arellano-Bond GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dependent Variable is Democracy							
Democracy $_{t-1}$	0.709	0.385	0.525	0.507	0.540	0.717	-0.027	0.337
	(0.035)	(0.053)	(0.117)	(0.096)	(0.044)	(0.071)	(0.090)	(0.136)
Education $_{t-1}$	0.027	-0.005	-0.018	-0.017	-0.015	-0.038	0.013	-0.027
	(0.004)	(0.019)	(0.021)	(0.022)	(0.015)	(0.015)	(0.033)	(0.029)
Time Effects F-test	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.33]	[0.02]
Hansen J Test				[0.31]		[0.04]		[0.13]
AR(2) Test				[0.81]		[0.00]		[0.29]
Observations	765	765	667	667	765	667	373	275
Countries	108	108	104	104	108	104	106	104
R-squared	0.71	0.78			0.85		0.76	

Fixed effects OLS regressions in columns 2, 5, and 7 with country dummies and robust standard errors clustered by country in parentheses. Column 3 uses instrumental variables method of Anderson and Hsiao (1982), with clustered standard errors, and columns 4, 6, and 8 use GMM of Arellano and Bond (1991), with robust standard errors. Year dummies are included in all regressions, and the time effects F-test gives the p-value for their joint significance. Dependent variable is augmented Freedom House Political Rights Index. Base sample in columns 1,2,3, and 4 is an unbalanced panel, 1965-2000, with data at 5-year intervals in levels and the base sample in columns 5 and 6 is an unbalanced panel, 1965-2000, with data at 5-year intervals in averages; the start date of the panel refers to the dependent variable (i.e., t=1965, so t-1=1960). Base sample in columns 7 and 8 is an unbalanced panel, 1970-2000, with data at 10-year intervals in levels; the start date of the panel refers to the dependent variable (i.e., t=1970, so t-1=1960). Countries enter the panel if they are independent at t-1. See text for data definitions and sources.

Table 2

Fixed Effects Results: Alternative Samples

	Base Sample, 1965-2000, without Former and Current Socialist Countries		Base Sample, 1965-2000, without Sub-Saharan African Countries		Base Sample, 1965-2000, without Muslim Countries		Base Sample, 1965-2000, using Polity Composite Index		Base Sample, 1965-2000, using Przeworski Democracy Index	
	5-year data									
	Fixed Effects OLS (1)	Arellano-Bond GMM (2)	Fixed Effects OLS (3)	Arellano-Bond GMM (4)	Fixed Effects OLS (5)	Arellano-Bond GMM (6)	Fixed Effects OLS (7)	Arellano-Bond GMM (8)	Fixed Effects OLS (9)	Arellano-Bond GMM (10)
	Dependent Variable is Democracy									
Democracy $_{t-1}$	0.353	0.498	0.396	0.432	0.382	0.569	0.476	0.674	0.291	0.324
	(0.053)	(0.095)	(0.062)	(0.105)	(0.059)	(0.093)	(0.063)	(0.103)	(0.070)	(0.109)
Education $_{t-1}$	-0.003	-0.015	0.006	-0.005	0.007	-0.022	-0.015	-0.028	0.006	-0.015
	(0.019)	(0.022)	(0.019)	(0.019)	(0.018)	(0.024)	(0.019)	(0.025)	(0.039)	(0.036)
Time Effects F-test	[0.00]	[0.00]	[0.02]	[0.01]	[0.02]	[0.01]	[0.00]	[0.04]	[0.54]	[0.23]
Hansen J Test		[0.38]		[0.42]		[0.32]		[0.06]		[0.69]
AR(2) Test		[0.71]		[0.90]		[0.96]		[0.36]		[0.10]
Observations	732	639	586	513	622	545	718	603	674	589
Countries	103	99	80	78	85	84	105	102	108	105
R-squared	0.78		0.78		0.78		0.82		0.77	

Fixed effects OLS regressions in columns 1, 3, 5, 7 and 9 with country dummies and robust standard errors clustered by country in parentheses. Columns 2, 4, 6, 8 and 10 use GMM of Arellano and Bond (1991), with robust standard errors. Year dummies are included in all regressions, and the time effects F-test gives the p-value for their joint significance. Dependent variable is augmented Freedom House Political Rights Index in columns 1, 2, 3, 4, 5, and 6. Dependent variable is Polity Composite Index in columns 7 and 8 and dependent variable is Przeworski et al. Democracy Index in columns 9 and 10. Base sample in all columns is an unbalanced panel, 1965-2000, with data at 5-year intervals in levels where the start date of the panel refers to the dependent variable (i.e., t=1965, so t-1=1960). Columns 1 and 2 exclude Soviet block countries and countries with socialist legal origin. Columns 3 and 4 exclude sub-Saharan African countries. Columns 5 and 6 exclude countries where the percent of the population which is Muslim in 1980 exceeds 40 percent. Socialist legal origin and percent of the population which is Muslim in 1980 is from La Porta et al. (1999). Countries enter the panel if they are independent at t-1. See text for data definitions and sources.

Table 3

Fixed Effects Results: Alternative Covariates

	Base Sample, 1965-2000							
	5-year Data							
	Fixed Effects OLS (1)	Arellano-Bond GMM (2)	Fixed Effects OLS (3)	Arellano-Bond GMM (4)	Fixed Effects OLS (5)	Arellano-Bond GMM (6)	Fixed Effects OLS (7)	Arellano-Bond GMM (8)
	Dependent Variable is Democracy							
Democracy $_{t-1}$	0.362	0.493	0.373	0.549	0.369	0.510	0.350	0.492
	(0.053)	(0.101)	(0.055)	(0.093)	(0.054)	(0.094)	(0.055)	(0.098)
Education $_{t-1}$	0.005	-0.013	-0.014	-0.028	-0.012	-0.013	-0.007	-0.017
	(0.020)	(0.024)	(0.020)	(0.023)	(0.019)	(0.026)	(0.020)	(0.027)
Age Structure F-test	[0.08]	[0.31]					[0.21]	[0.32]
Log Population $_{t-1}$	-0.124	-0.023					-0.047	0.027
	(0.101)	(0.115)					(0.109)	(0.144)
Investment Share of GDP $_{t-1}$			0.026	0.145			0.088	0.291
			(0.191)	(0.208)			(0.195)	(0.251)
Log GDP per Capita $_{t-1}$					-0.012	-0.187	-0.006	-0.169
					(0.042)	(0.110)	(0.049)	(0.202)
Time Effects F-test	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Hansen J Test		[0.21]		[0.47]		[0.44]		[0.31]
AR(2) Test		[0.89]		[0.91]		[0.96]		[0.91]
Observations	746	652	688	599	684	595	676	589
Countries	104	101	97	93	97	93	95	92
R-squared	0.78		0.76		0.76		0.77	

Fixed effects OLS regressions in columns 1, 3, 5, and 7 with country dummies and robust standard errors clustered by country in parentheses. Columns 2, 4, 6, and 8 use GMM of Arellano and Bond (1991), with robust standard errors; columns 6 and 8 treat Log GDP per Capita $_{t-1}$ as predetermined and instrument its first difference with Log GDP per Capita $_{t-2}$. Year dummies are included in all regressions, and the time effects F-test gives the p-value for their joint significance. Dependent variable is augmented Freedom House Political Rights Index. Base sample in all columns is an unbalanced panel, 1965-2000, with data at 5-year intervals in levels where the start date of the panel refers to the dependent variable (i.e., t=1965, so t-1=1960). Columns 1, 2, 7, and 8 include but do not display the median age of the population at t-1 and 4 covariates corresponding to the percent of the population at t-1 in the following age groups: 0-15, 15-30, 30-45, and 45-60. The age structure F-test is gives the p-value for the joint significance of these variables. Countries enter the panel if they are independent at t-1. See text for data definitions and sources.

Table 4

Fixed Effects Results: Education, Democracy, and Political Institutions

	Glaeser et al. (2004) Sample, 1965-2000 5-year data			
	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS	Fixed Effects OLS
	(1)	(2)	(3)	(4)
Panel A: No Time Effects	*Dependent Variable is Change in Institutions*			
	Exec.	*Autocracy*	*Democracy*	*Autocracy*
Institutions $_{t-1}$	-0.572	-0.547	-0.515	-0.864
	(0.072)	(0.068)	(0.065)	(0.103)
Education $_{t-1}$	0.498	0.909	0.700	0.096
	(0.119)	(0.179)	(0.180)	(0.071)
Log GDP per Capita $_{t-1}$	0.038	-0.508	0.292	0.267
	(0.403)	(0.630)	(0.606)	(0.202)
R-squared	0.33	0.32	0.30	0.47
Panel B: Including Time Effects	*Dependent Variable is Change in Institutions*			
	Exec.	*Autocracy*	*Democracy*	*Autocracy*
Institutions $_{t-1}$	-0.618	-0.616	-0.580	-0.897
	(0.073)	(0.071)	(0.067)	(0.106)
Education $_{t-1}$	-0.163	-0.318	-0.432	-0.137
	(0.192)	(0.267)	(0.298)	(0.126)
Log GDP per Capita $_{t-1}$	0.168	-0.317	0.477	0.292
	(0.360)	(0.550)	(0.561)	(0.192)
Time Effects F-test	[0.01]	[0.00]	[0.00]	[0.08]
R-squared	0.39	0.40	0.37	0.50
Panel C: Including Time Effects	*Dependent Variable is Change in Institutions*			
	Exec.	*Autocracy*	*Democracy*	*Autocracy*
Institutions $_{t-1}$	-0.617	-0.615	-0.579	-0.891
	(0.073)	(0.071)	(0.068)	(0.107)
Education $_{t-1}$	-0.125	-0.389	-0.324	-0.088
	(0.182)	(0.229)	(0.289)	(0.125)
Time Effects F-test	[0.01]	[0.00]	[0.00]	[0.07]
R-squared	0.39	0.40	0.37	0.49
Observations	499	499	499	349

Fixed effects OLS regressions in all columns with country dummies and robust standard errors clustered by country in parentheses. Year dummies are included in panels B and C, and the time effects F-test gives the p-value for their joint significance. Dependent variable in column 1 is change in Constraint on the Executive from Polity. Dependent variable in column 2 is change in negative Autocracy Index from Polity. Dependent variable in column 3 is change in Democracy Index from Polity. Dependent variable in column 4 is change in negative Autocracy Index from Przeworski et al. (2000). Base sample in all columns is an unbalanced panel, 1965-2000, with data at 5-year intervals where the start date of the panel refers to the dependent variable (i.e., t=1965, so t-1=1960). See Glaeser et al. (2004) for data definitions and sources.