The *Political* Economy of Growth: Democracy and Human Capital

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Democracy is more than just another brake or booster for the economy. We argue that there are significant indirect effects of democracy on growth through public health and education. Where economists use life expectancy and education as proxies for human capital, we expect democracy will be an important determinant of the level of public services manifested in these indicators. In addition to whatever direct effect democracy may have on growth, we predict an important indirect effect through public policies that condition the level of human capital in different societies. We conduct statistical investigations into the direct and indirect effects of democracy on growth using a data set consisting of a 30-year panel of 128 countries. We find that democracy has no statistically significant direct effect on growth. Rather, we discover that the effect of democracy is largely indirect through increased life expectancy in poor countries and increased secondary education in nonpoor countries.

The relationship between democracy and economic growth has received considerable attention in recent years. As yet, however, there is no consensus among analysts on the relationship between these two widely studied variables. Sound theoretical positions have been advanced suggesting that democracy is both an impediment and facilitator of growth. Careful quantitative tests of the relationship have produced contradictory results.

In our view, existing studies fail to develop an adequate political theory of growth and as a result their empirical models are typically misspecified. With competing arguments on both sides of the question, many analysts merely add a variable for democracy to existing economic models and then look at the sign of the coefficient and its significance. This is inadequate.

Democracy is more than just another brake or booster for the economy. We argue that there are important indirect effects of democracy on growth that are manifested through public health and education. Where economists typically use life expectancy and secondary school enrollment as proxies for human capital, we expect that democracy will itself be an important determinant of the level of public services captured in these indicators. Thus, in addition to whatever direct effect democracy may or may not have on growth, we predict there will be an important indirect effect through public policies that condition the level of human capital in different societies.

As do many existing studies, we find that democracy has no statistically significant direct effect on growth. Rather, as we predict, the effect of democracy is largely indirect through increased life expectancy in poor countries and increased secondary education in nonpoor countries. In poor countries, a maximum increase in democracy increases growth through increased life expectancy by .68 percentage points per year. In nonpoor countries, a comparable increase in democracy increases growth via increased secondary enrollment by .26 percentage points. In both cases, these are substantively important effects, representing 69 and 11%, respectively, of the average growth rate in each class.

The article proceeds in three principal sections. First, we briefly review existing studies of economic growth and the role of democracy. Second, we outline a theory of the relationship between democracy and public services, including our principal hypothesis on the indirect effects of democracy on growth. Third, we present our results and discuss their implications.

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Growth and Democracy: The Good, the Bad, and the Indifferent

Nearly all theoretically informed empirical studies of economic growth begin with the neoclassical model, originally proposed by Solow (1956) and extended by Mankiw, Romer, and Weil (1992) to include human capital. This model takes the general form:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} (A(t)L(t))^{1-\alpha-\beta}$$

where Y is the level of real output, H is the stock of human capital, L is the stock of labor (growing at rate n), K is the stock of physical capital (depreciating at rate δ), and A is the level of technology (growing at the constant rate g).[1] With s_k the fraction of output invested in physical capital and s_h the fraction invested in human capital, then the log of output per capita (the growth rate) is:

$$\begin{aligned}\ln[Y(t)/L(t)] = \ln A(0) + gt - ((\alpha-\beta)/(1-\alpha-\beta)) \\ \times \ln(n+g+\delta) \\ + (\alpha/(1-\alpha-\beta))\ln(s_k) \\ + (\beta/(1-\alpha-\beta))\ln(s_h).\end{aligned}$$

Two points are noteworthy about this model. First, as g and δ are normally assumed to be exogenous and fixed across countries, differences in growth rates are strictly dependent upon prior levels of technology, growth of the labor force (n), and investments in physical (s_k) and human capital (s_h). Second, and more important for our purposes, "politics," or government policy, does not enter the model directly. Rather, assuming that the level of technology is prior and therefore exogenous to the actions of any particular government, the effects of various policies are captured indirectly, at best, through labor force and investment levels.

This theory implies the following variables in an empirical model of economic growth:

- Prior level of technology, typically measured by prior level of income per capita;
- Population growth rate, typically measured by the fertility rate or growth in the labor force;
- Investment in physical capital (as a proportion of income);
- Investment in human capital (as a proportion of income).

Investments in human capital are usually measured by secondary school enrollment ratios and life expectancy. In existing empirical models, both variables are normally included and are treated in an undifferentiated manner. This implies that they are capturing different dimensions of human capital (otherwise, they would suffer from redundancy and collinearity). When the coefficients on all variables are constrained to accord with known facts, these empirical models capture a large proportion of the variance in cross-national growth rates (see Mankiw, Romer, and Weil 1992).

At the same time, few robust results are reported in the empirical literature. Various sensitivity tests indicate that model specification is crucial (Levine and Renelt 1992; Sala-i-Martin 1997a, 1997b; Ley and Steel 1999; Doppelhofer, Miller, and Sala-i-Martin 2000). Based on changes in income levels over a 25-year period, these cross-sectional studies test various combinations of up to 62 different independent variables or indicators and find few consistent results. In the absence of good theory, then, it is not clear what controls should or should not be included in any test of a growth model. We return to this issue in the discussion of our results below.

Democracy in Economic Models

There are two distinct theoretical expectations on the effect of democracy on growth and only inconsistent empirical results. The theoretical positions have been outlined by others.[2] Briefly, the "compatibility school" sees democracy as an effective tool for safeguarding the private sphere, maximizing economic freedom, stimulating investment, and allowing for the most efficient use of resources. By limiting the state's power to intervene in the economy, democracy enhances the functioning of a market economy and, thus, growth. The "conflict perspective" argues that at least some ability to resist populist pressure is necessary for growth. In this view, the broader the electorate, the more likely the median voter is to be poor. Lower income individuals, it is supposed, have a higher demand for immediate consumption and will use their political power to raise wages, tax capital, and engage in other redistributive policies that inhibit profits and therefore investment. Democracy enables societal groups to make greater demands on the state for particularistic benefits that are detrimental to growth. Autocrats are both better able to resist such demands and, indeed, to suppress labor unions, wages, and consumer demands. This is especially true for autocrats with secure tenure in office and low discount factors, as they can then expect

[1] The notation is from Mankiw, Romer, and Weil (1992).

[2] For helpful summaries, see Sirowy and Inkeles (1991), Przeworski and Limongi (1997), Gasiorowski (2000), Nelson and Singh (1998), and Durham (1999). The labels "compatibility" and "conflict" schools are from Sirowy and Inkeles (1991).

to remain in power long enough to reap the rewards of growth (Olson 1993, 2000). More positively, conflict theorists posit that various "development traps" exist that can only be overcome through active state intervention in the economy.

The empirical literature on democracy and growth is also split, with some studies finding that democracy is positively related to growth, others finding democracy is negatively related, and still others finding no significant difference across regimes (for reviews, see Przeworski and Limongi 1993; Sirowy and Inkeles 1991). The most widely accepted of the current findings appears to be that of Barro, who reports a curvilinear effect of democracy on growth. According to his model, "growth is increasing in democracy at low levels of democracy, but the relation turns negative once a moderate amount of political freedom is attained. The estimated turning point. . .corresponds to the levels of democracy in 1994 for Malaysia and Mexico" (1997, 58). Przeworski et al. (2000) conclude that democracy has no effect on economic growth but does positively influence the growth of per capita income by reducing population growth. Several sensitivity tests nonetheless find that various measures of political and civil rights probably should be included in empirical growth models (Sala-i-Martin 1997a, 1997b; Doppelhofer, Miller, and Sala-i-Martin 2000).

As with any vibrant research program, there have been vigorous criticisms leveled at existing studies (for reviews, see Brunetti and Weder 1995; Brunetti 1997; Sala-i-Martin 2002). Our concern here focuses on the lack of integration between the theories of democracy and growth summarized above and the empirical models employed. Specifically, nearly all studies begin from the neoclassical growth equation and simply add a measure for democracy to the empirical model. As Leblang notes, the "generic" regression equation usually takes the form of

$$Growth_i = \alpha + \beta\, Economic + \gamma\, Political + \mu_i$$

where *economic* "represents a battery of economic variables usually including the initial level of per capita gross domestic product and some variables measuring human and physical capital investment" (1997, 454–5) and *political* is a set of regime characteristics.

Both the conflict and compatibility approaches imply a relationship between democracy and incentives to invest in either physical or human capital, but such relationships are typically not investigated. The generic model, quite simply, is grossly misspecified. At the very least, we would expect a high degree of collinearity between the proxies for democracy and various forms of investment. As a result, this standard model is likely to underestimate the total effect of democracy on growth—perhaps accounting for the weak or negative findings in the literature and the failure of democracy to perform well in the various sensitivity tests.

More positively, a more explicitly political theory would allow us to trace the process whereby democracy affects growth and assess better the possible relationships. Several studies hint at such processes, but are largely inductive in nature. In some ways similar to our results below, Helliwell (1994) reports that democracy exerts a small negative effect on growth but a (larger) positive indirect effect through education and investment. Gasiorowski (2000, 341–42) looks at a variety of indirect effects of democracy on growth, but finds a significant path only through the money supply and inflation and concludes that the overall effect in developing countries is weakly negative. Although not presented in this way, the findings of Przeworski et al. (2000) can also be understood as an indirect effect, as democracy works through its effect on population growth. It is precisely this kind of indirect effect that we think is most important—but which also needs to be analyzed carefully.

Democracy, Public Services, and Investments in Human Capital

Democracy is intimately bound up with the economic sources of growth. The causal roots are tangled and difficult to unravel, as we shall see, but democracy is not simply an added measure of efficiency or inefficiency in an otherwise economic story. Rather, as implied in the conflicting theoretical approaches but not adequately reflected in the empirical models, democracy is itself an important determinant of patterns of investment. Its direct effect, if any, and its indirect effects through investment in human capital must be explicated and incorporated into empirical models to assess the true effect of democracy on growth.

In previous work, we have shown that the level of democracy is an important determinant of public health and education (Lake and Baum 2001), two common determinants and proxies for human capital. More democratic states tend to provide higher levels of public health, as measured by a variety of output indicators including infant mortality, life expectancy, and immunizations, and higher levels of education, also measured by a variety of indicators such as primary, secondary, and tertiary enrollment ratios and adult literacy. Although data limitations preclude a definitive test, the causal arrow appears to run from democracy to public health and education rather than the reverse. (That is to say, Granger causality tests indicate democracy Granger causes higher levels of

public health and education, but public health and education do not Granger cause democracy.) Investments in human capital are influenced in important ways by the type of regime in power.

The Business of the State

Throughout the developed and developing worlds, governments are typically responsible for public health and education. Even in cases where they are not direct providers of the service—as in the United States, for instance, where health care is largely private—governments take responsibility for the overall level of public health and regulate private providers to ensure that outcomes fall within politically acceptable limits. Although neither public health nor education is a pure public good, both have large externalities that open up and justify this role for the state.

As local monopolists, states seek to exploit their market power to produce rents that can be redistributed to either the holders of state power (rulers, bureaucrats, politicians) or their support coalitions.[3] Like all monopolists, when states exploit their monopoly power they must restrict the quantity of the service or output produced in order to inflate prices. States maximize their returns (and rents) by producing where their marginal costs equal their marginal returns. Assuming permanent deficits are impossible, social welfare is improved by producing where average returns (demand) equal average cost—the same point where a benevolent social planner, prohibited from using public subsidies, would set quantity and price for a perfectly regulated private monopoly. Since marginal returns must be less than average returns, this implies that the state's preferred quantity is less than the society's preferred output. It follows that states that earn rents produce less of any public service than those that do not.

We focus on the output of public services and test all of our models below with indicators of various policy outputs rather than expenditures for important analytic reasons. In modern states where rulers are not residual claimants on "public" revenues, rents are inherently unobservable. Expenditure levels or government consumption figures can be quite distorted by patterns of "hidden" rents, disguised as higher salaries or cushy jobs for regime supporters. A politically corrupt state that is capturing larger rents and distributing them to its supporters through inflated or unnecessary expenditures, for instance, may appear to be spending more on education than a politically efficient regime, but the level of actual services delivered to citizens will be much lower in the first than in the second case.[4] In turn, the price "paid" for public services may not be fully reflected in tax revenues, but can include graft, queuing, political favors, and such indivisibilities from office such as respect and adulation. In this instance, revenue figures would appear to be artificially low. For these reasons, output indicators provide a much "cleaner" test of our theory; conversely, controlling for government expenditures or consumption would mask much of the very effect we are trying to isolate.

The Role of Democracy

Even though they are local monopolists, and have incentives to extract monopoly rents, states nonetheless produce within a contestable market.[5] That is, even though only one state exists within a given territory, it (or its management, the senior politicians) can be displaced more or less easily depending upon the barriers to exit for potential competitors, and thus the intensity of competition for political office, and the costs of political participation to citizens. When barriers to exit and costs of participation are low, as in a full democracy, the state will produce as a regulated monopoly, providing a relatively larger quantity of goods at relatively lower prices—contingent upon social demand for those services. When barriers to exit and costs of political participation are high, as in a complete autocracy, the state will exercise its monopoly power, provide fewer public services, and earn greater rents. The more democratic the country, the lower the level of rents and the larger the quantity of public services provided, and vice versa.[6] Although they focus less on the monopoly power of the state, this prediction is compatible with and can also be deduced from other models by McGuire and Olson (1996; also, Olson 1993, 2000) and Bueno de Mesquita et al. (1999, forthcoming).

As we demonstrate elsewhere (Lake and Baum 2001), democracies do enjoy higher levels of public health and education—and this effect is increasing in the level of democracy. In other words, more democratic countries typically invest more in human capital than less democratic countries.

Democracy and Growth

Coupling our prediction of a positive relationship between democracy and human capital with the neoclassical

[3] On the economic theory of the state, see Lake and Baum (2001) and the sources cited therein.

[4] In this way, our model differs substantially from Niskanen's (1971) notion of a budget-maximizing bureaucrat.

[5] On the concept of contestable economic markets, see Baumol et al. (1982).

[6] For a formal model of democracy that contains this result, see Hiscox and Lake (2002).

model's expectation of a positive relationship between human capital and growth, we predict a positive indirect effect of democracy on growth through human capital. In addition to whatever direct effect democracy might have on economic growth—and we are agnostic on the direction of this direct effect—there should be an important indirect effect that operates through higher levels of human capital. This implies:

H1: Democracy will exert a positive, indirect effect on economic growth through life expectancy and secondary education.

As implied in current empirical models of growth, we also expect life expectancy and secondary educational attainment to reflect different facets of human capital and, moreover, to vary in their effects by income levels. Life expectancy is an indicator of overall health and thus reflects labor's ability to work and utilize skills. As democracy expands in developing countries, newly empowered workers are likely to demand better living conditions, health care, access to clean water, and so on—all conditions that contribute to increased life expectancy and, in turn, to increased productivity. In countries with inadequate living standards, Przeworski et al. (2000, 257) conclude, individuals invest in more children (labor) rather than physical or human capital. Only later, perhaps once daily living conditions have improved, are citizens likely to demand expanded educational opportunities. This implies that increased democracy promotes growth in developing countries primarily through enhanced life expectancy, not education. It follows that:

H2: Democracy will have a larger indirect effect on growth through life expectancy in poor countries than in nonpoor countries.

Conversely, secondary educational attainment captures a more "advanced" form of human capital, especially those skills necessary in a modern, manufacturing economy. All else constant, we would expect wealthier countries to have higher levels of educational attainment. Indeed, it is precisely the skills possessed by workers that enhance productivity and, along with greater physical capital, make higher levels of wealth possible. In turn, we would expect increased democracy in comparatively wealthy countries to affect growth primarily through increased social demands for expanded educational opportunities. Thus, we expect the indirect effect through education to be larger in developed than in developing economies, implying that:

H3: Democracy will have a larger indirect effect on growth through secondary education in nonpoor countries than in poor countries.

Our view combines the compatibility and conflict perspectives summarized above but draws different conclusions. With the conflict school, we agree that the state plays an important role in the process of economic growth. Because many forms of human capital appear to possess substantial externalities and would, therefore, be underprovided by strictly voluntary contributions, state intervention is important for resolving potential market failures. Unconstrained, however, the state would not produce an appropriate level of investment in human capital but, in the quest for monopoly rents, would restrict the necessary services for its own benefit. Conversely, we agree with the compatibility school that democracy is important as a constraint on state behavior. Because it is easier to replace politicians in more democratic than autocratic regimes, the political system is more responsive to popular demands. Democracy is not a perfect constraint, of course, and there is considerable agency slack even in the best of circumstances. Nonetheless, we can expect more democratic countries to produce greater quantities of public services and, therefore, to stimulate greater investments in human capital and, indirectly, economic growth.

Empirical Results

In this section, we conduct a set of time-series cross-sectional (TSCS) statistical investigations into the direct and indirect effects of democracy on growth. We posit that the level of democracy affects a country's output of public services and, thus, the incentives of individuals to acquire human capital. Following the existing literature on growth, we focus on average life expectancy and secondary school attainment. Our goal is to determine if, beyond any direct effect it may or may not have, democracy exerts a positive, indirect effect on economic growth via its effect on human capital and how this effect differs by income level.

Our data set consists of a 30-year panel of 128 countries, in five-year increments, from 1967 to 1997.[7] Unfortunately, annual data are not available for some of our variables. Hence, following the procedure employed by Barro (1997), each observation is based on the average

[7]Due to occasional missing data on one or more variables, the precise number of countries varies, in different models, from 118 to 128.

values of variable k during the five-year period beginning with year t. An observation for period t is thus based on the value of variable k, averaged over years t, $t+1$, $t+2$, $t+3$, and $t+4$. So, the value for our 1987 observation on, say, life expectancy in country x, represents the average of all available observations on life expectancy in country x from 1987 to 1991. All lagged variables, in turn, are created not by lagging the observation by an entire period but by shifting this five-year window backwards by one year. For example, the one-year lagged value of the 1987 observation is the average of the years 1986–1990. Except where otherwise noted, all data are taken from the World Bank's *World Development Indicators* (2001), and the World Bank's variable names are provided in the text.[8]

Dependent Variables

We employ a two-equation recursive system of regressions, estimating first the effects of democracy on life expectancy and secondary education and then the effects of democracy and these human capital indicators on growth. Thus, we have two "sets" of dependent variables.

In the first set of equations, life expectancy is measured as the average life expectancy of the female population from age zero (World Bank variable SP.DYN.LE00.FE.IN). Secondary education, in turn, is measured by the gross female secondary enrollment ratio, defined as the ratio of total enrollment, regardless of age, to the female population of the appropriate age for secondary school (World Bank variable SE.SEC.ENRR.FE). We focus on *female* human capital indicators because we anticipate they will be more sensitive to variations in regime type than male health and education. Even in autocracies, men may receive some health care and education, and typically more than women, reducing the aggregate disparity between different regime types. As the base of political participation expands, however, and especially once women are allowed to vote, citizens often demand improved health care and education for all members of society. Regimes differences are, thus, likely to be revealed more starkly in the provision of public services for women than for men. This expectation was substantiated in statistical testing (not shown).[9] For the education models, we employ secondary education because there is far less variance in primary education, while tertiary education remains the exception rather than the rule even in many advanced industrial nations.[10] In the second set of equations, growth is measured by the annual growth rate in real GDP, based on 1995 international prices (created by authors from World Bank variable NY.GDP.MKTP.KD).

Democracy

As discussed above, central to the contestability of the political market is, first, the competition among alternative leaders for office and, second, the costs of removing existing rulers from power. High competition and low costs of participation are commonly associated with the concept of democracy. At the same time, there are many different paths to competition and political removal. To focus on only a narrow indicator of democracy, such as periodic elections, would prejudice our analysis and possibly mask important variations in how citizens control their states.

Of the existing indicators of democracy, that developed for the Polity 98 dataset appears best suited to measure the contestability of the political market. The Polity 98 dataset includes eight factors, ranging from the degree of competitiveness of political participation to the degree of constraints on the chief executive, which are used to derive two weighted summary indicators, AUTOC and DEMOC.[11] The former employs five factors to estimate a country's level of autocracy, while the latter employs six factors to determine a country's level of democracy. The component indicators and, more important, the summary measures were designed to reflect the idea that there are many paths to democracy (or autocracy).[12] Rather than measure separately the effects of autocracy and democracy, we adopt the growing convention of combining the two scales into a single index, DEMOC-AUTOC, which runs from -10 to $+10$, with $+10$

[8]These data are available from the *World Development Indicators* database (http://www.worldbank.org/data/wdi2001/index.htm).

[9]Our results remain robust, though slightly weakened, when we employ total life expectancy or secondary education in place of the female-only variants.

[10]Nonetheless, as a robustness check, we replicated our models using tertiary enrollment ratios. The results were substantively similar, though slightly weaker, than those reported below. We also replicated our results using female illiteracy rates, again with comparable results. Hence, our results do not appear to be an artifact of the particular education indicator we have employed. We prefer the secondary enrollment ratio because it is available for more countries in more years than any other education indicator we were able to identify.

[11]Keith Jaggers and Ted Robert Gurr, principal investigators, Polity III: Regime Type and Political Authority [computer file] (Ann Arbor, Mich. Inter-university Consortium for Political and Social Research [distributor], 2nd ICPSR ed., September 1996). The Polity 98 dataset, which updates *Polity III*, can be downloaded at: http://weber.ucsd.edu/~kgledits/Polity.html.

[12]Ted Robert Gurr, Polity II Codebook (Boulder: University of Colorado, 1989); available at http://www.colarado.edu/IBS/GAD/spacetime/data/Polity.html; see also Gurr, Jaggers, and Moore (1990). Gleditsch and Ward (1997) discuss the elements comprising the DEMOC and AUTOC scales and compare several additional indicators of democracy.

being *most* democratic (Ward and Gleditsch 1998; Reiter and Stam 1998).

The Polity measure is a combination of institutional (e.g., constraints on chief executive) and behavioral (e.g., competitiveness of executive recruitment) indicators. It is designed to capture the minimal practices that constitute democracy rather than its fundamental institutions, such as the rule of law, or its outcomes, like the protection of property rights (see discussion below). Precisely because it is minimalist in definition and open to many alternative forms of democracy, we believe it is the most appropriate indicator available for our theory. Nonetheless, to check the robustness of our findings, we replicated our results using the Freedom House scales for political rights and civil liberties (Gastil 1987), as well as the Alvarez et al. (1999) "regime" dummy variable. While the Polity 98 democracy scale is highly correlated with the Freedom House and Alvarez et al. indicators (the combined Freedom House indicator and the Alvarez et al. regime dummy correlate with the Polity 98 scale at .92 and .87, respectively), they are not identical. Nonetheless, our results are largely comparable when we employ the alternative indicators.[13] Moreover, because the Freedom House data begin in 1972, while the Alvarez et al. (1999) data ends in 1990, several observations are lost with either alternative. Several studies (including Barro 1997) have spliced the series created by Bollen (1991) and covering the years 1960 and 1965 to the Freedom House index, thus generating a longer series for democracy. We prefer a single, continuous measure. We therefore report results only employing the Polity 98 variable.

Control Variables

We introduce four control variables in our models. Although there are certainly additional factors that might influence the provision of public services or growth, we believe that these variables collectively address a majority of the potential alternative explanations. These controls, moreover, include all those implied by the neoclassical model. As discussed below, we also tested, where possible, a wide range of additional controls. None materially affected our reported results.[14]

The natural logarithm of per capita Gross Domestic Product, *lnGDPpc*, is included to capture prior levels of technology (created by authors from World Bank variables for GDP, NY.GDP.MKTP.KD, and population, SP.POP.TOTL). In our public service models, *Population* (World Bank variable SP.POP.TOTL) is included both because it may be more (or less) difficult to provide public services to larger populations and to normalize our measures.

In our growth models, the annual percentage change in the size of a nation's *Labor Force* is included as a direct measure of the labor component of growth (World Bank variable SL.TLF.TOTL.IN).[15] Following current practice, we also include a measure of *Investment*, defined as gross domestic fixed investment as a percentage of real GDP (World Bank variable NE.GDI.FTOT.ZS). To mitigate the possibility of reverse causality, at least in part, we lag these economic control variables by one year.

As proxies for human capital, we include, in the first system of equations, female life expectancy and that portion of female secondary education not accounted for by variations in democracy. In the second system of equations, we include female secondary education and that portion of female life expectancy not accounted for by variations in democracy.[16]

As discussed below, we find a distinct substantive break in the relationship between democracy and human capital at around $2500 GDP per capita.[17] The relationship between democracy and both life expectancy

[13] When we employ the Alvarez et al. indicator, our results are comparable for the education system, but somewhat weaker, though still correctly signed, for the life expectancy system. We attribute the weaker relationships in the life expectancy system primarily to the relative lack of variation in this dichotomous indicator, which captures only wholesale regime changes. The Polity 98 indicator, in contrast, is far more sensitive to incremental regime changes.

[14] The only variable that we desired to include as a control but could not because of its limited availability is income inequality. Although it is available for some countries in some years, coverage remains thin and is nonrandom in its distribution, potentially introducing selection bias if used. In our five-year averaged panels, for those countries and years in which we have data, the Gini coefficient (a measure of income inequality) correlates negatively with GNP per capita (−.42) and, less strongly, with democracy (−.12), implying that this omitted variable is biasing the coefficient on income and, to a lesser extent, democracy downwards. This, of course, makes it more difficult for us to obtain statistically significant results.

[15] The labor force indicator comprises people who meet the International Labour Organization definition of the economically active population: all people who supply labor for the production of goods and services during a specified period, including both the employed and the unemployed.

[16] For each growth model we ran bivariate models. In the life-expectancy model, for instance, we regressed democracy on secondary education. We then saved the residuals and substituted them in place of the education variable in the growth equation. The residuals represent that portion of secondary enrollment ratios not explained by democracy.

[17] We varied this threshold from $1000 to $3000 to test for robustness. Our results do not differ significantly with any threshold in this range. Nonetheless, the $2500 threshold appears most appropriate, as it consistently produces the strongest results. An alternative model would interact GDP per capita and democracy to capture nonlinearities. When we used such an interaction, the results largely mirrored those employing the $2500 break point dummies.

and secondary educational enrollment shifts around this threshold. This is consistent with our second and third hypotheses above, although the sign reversal (not significant when in the "wrong direction") and the precise threshold are not predicted. Przeworski et al. find a similar threshold. In their view, "poor countries are too poor to afford a strong state, and without an effective state there is little difference any regime can make for economic development" (2000, 166). Although our results differ from theirs on this score (see below), we find this same breakpoint and use it to differentiate poor from nonpoor countries in our analysis. To capture the different effects of increasing democracy on life expectancy and education, we include a dummy variable, *GDPpc* $\leq$ \$2500, in our human capital models. This dummy is coded 1 if a country's per capital GDP is \$2500 or less, and 0 otherwise. We then separately interact this variable and its opposite (*GDPpc* $>$ \$2500) with *Democracy*. The resulting interaction terms (*Democracy x GDPpc* $\leq$ \$2500 and *Democracy x GDPpc* $>$ \$2500) are included in our education and life-expectancy models to capture the qualitatively distinct effects of democracy for poor versus nonpoor nations.

Methodology

The relationships anticipated by our theory describe a system of two equations, as shown below. Only the life expectancy system is shown. The models are, however, identical for both dependent variables, with the exception that, for the secondary education system, we employ in the growth model the residual of life expectancy in place of the residual of secondary education.

$$\begin{aligned} \textit{Life Expectancy} = {} & \alpha + \beta_1(\textit{Democracy x GDPpc} \\ & \leq \$2{,}500) + \beta_2(\textit{Democracy x GDPpc} > \$2{,}500) \\ & + \beta_3(\textit{GDPpc} \leq \$2{,}500) \\ & + \beta_4(\textit{lnGDPpc}_{t-1}) + \beta_5(\textit{Population}) + \varepsilon. \end{aligned} \quad (1)$$

For two reasons—one practical and one analytic—we prefer the latter specification. First, calculating standard errors for the predicted indirect effects is much more difficult when employing nondummy interaction terms in a recursive model. This is particularly consequential given the tendency of the relationships to reverse signs at extreme levels of per capita GDP. These counterintuitive effects are most likely statistically insignificant and hence substantively meaningless. Yet, absent a reliable calculation of standard errors, we cannot be certain. Second, and more importantly, empirical testing revealed the \$2500 per capita GDP level, or thereabouts, to be a critical breakpoint. This suggests that the incremental patterns predicted by a continuous interaction term may be deceptive, as "most" of the nonlinearity in the effects of democracy appears to occur at or near a single inflexion point or threshold of wealth.

$$\begin{aligned} \textit{Growth} = {} & \alpha + \phi_1(\textit{Life Expectancy}) + \phi_2(\textit{Democracy}) \\ & + \phi_3(\textit{lnGDPpc}_{t-1}) + \phi_4(\textit{Investment}_{t-1}) \\ & + \phi_5(\textit{Labor Force}_{t-1}) \\ & + \phi_6(\textit{Residual of Secondary Education}) + \varepsilon. \end{aligned} \quad (2)$$

Each system of equations is recursive, in that the first endogenous variable, life expectancy, is an explanatory variable in the growth equation. (Similar relationships are hypothesized across both dependent variables.) Growth, however, is not a causal variable in the life-expectancy model. Hence, there is no feedback between the two models, suggesting that two- or three-stage least squares would be inappropriate. Rather, for this hypothesized relationship, recursive regression appears the appropriate estimator.[18]

The absence of feedback effects, however, is obviously assumed rather than demonstrated. This is potentially problematic. Yet, as found repeatedly in other studies, although there is a clear relationship between *levels* of income and democracy, there is no statistically significant relationship between *rates of growth* in income and democracy (Burkhart and Lewis-Beck 1994; Londregan and Poole 1996; Helliwell 1994, 233–4). In the absence of good instruments for our key variables,[19] we believe it is reasonable to ignore feedback effects, at least in this first stage of research.[20]

[18]Recursive regression is a hierarchical model in which each endogenous variable is "caused" by either causally prior endogenous variables or by exogenous variables, and in which the errors are independent across equations. Recursive regression is appropriate when all equations in a model are just- or over-identified. To meet this requirement, each equation must satisfy the Order Condition, which entails excluding at least *G*-1 variables, where *G* equals the total number of equations in the system. In our two-equation system, each equation must therefore exclude at least one variable. While our two models share a number of common exogenous variables, they each exclude a minimum of two variables. Hence, our system satisfies the Order Condition and is over-identified. It is important to point out that system identification is purely theoretical, as we have chosen to include and exclude exogenous variables on the basis of theory. If, however, our theory is flawed, then our system may in fact be under-identified. If so, our standard errors may be biased.

[19]For possible instruments for political institutions, but not necessarily for democracy, see Acemoglu, Johnson, and Robinson (2001) and Easterly and Levine (2002). Their colonial death rate and geographic data, however, are constants that would drop out in our fixed-effects specification.

[20]Nonetheless, as a check on our approach, we conducted a two-stage least squares regression using the same basic models ("xtivreg" in Stata). Even though, absent good instruments, this methodology is inappropriate by definition, the results nonetheless did not differ in their fundamentals. Even though we were unable to identify satisfactory instruments, it is perhaps still worth mentioning that in our fully specified models, growth did not exert any statistically significant effect on either life expectancy or education. This suggests, albeit far from definitively, that any feedback effects may not be

Our theory suggests that the relationship between the first endogenous variable (life expectancy or secondary education) and the second (growth) is in part a function of the effects of democracy on public health and education. In other words, the effects of democracy on growth may contain both a direct and indirect element. In a recursive system of equations, the several models are estimated separately. The direct effect of democracy on growth is given simply by the coefficient on democracy in equation (2). To determine the magnitude of the indirect effect of democracy, through life expectancy or secondary education, we multiply the coefficient on democracy from equation (1) and the coefficient on life expectancy or secondary education in equation (2). In this instance, because we have included interactions between democracy and the poor and nonpoor country dummies in the first equation, we separately calculate the indirect effect of democracy on growth for poor and nonpoor countries. Hence, the indirect effect of democracy on growth through life expectancy, for poor countries, is given by equation (3), while that through secondary education, for nonpoor countries, is given by equation (4). In both instances, the first term represents the coefficient on democracy (for poor or nonpoor countries) from equation (1) and the second term represents the coefficient on life expectancy (or secondary education) from equation (2).

From Equation (1)		From Equation (2)	
Democracy x GDPpc $\leq$ \$2,500	x	*Life Expectancy*	(3)
Democracy x GDPpc $>$ \$2,500	x	*Secondary Enrollment*	(4)

Because the indirect effects of democracy are calculated by multiplying coefficients across equations, establishing the statistical significance of the product of the two coefficients—and hence of the indirect effects—is not entirely straightforward. To do so, we employ the delta method, shown in equation (5).

$$SE(\hat{G}) = \sqrt{\hat{\beta}_1^2 SE(\hat{\phi}_1)^2 + SE(\hat{\beta}_1)^2 \hat{\phi}_1^2} \qquad (5)$$

where $\hat{\beta}_1$ and $\hat{\phi}_1$ represent the coefficients on *Democracy x GDPpc* $\leq$ 2,500 and *Life Expectancy* from equations (1) and (2), respectively, and $\hat{G}$ is the standard error of the predicted indirect effect of democracy on growth.

One problem endemic to time-series data is serial autocorrelation (Beck and Katz 1995). Because our data represent averages over five-year periods, we did not anticipate a severe autocorrelation problem. Nevertheless, Lagrange multiplier and Durbin-Watson tests revealed the potential presence of at least some autocorrelation. Specialized estimation procedures have been developed to address the many statistical problems that are common in TSCS panel data. For our purposes, we employ the "xtreg" command in Stata, which estimates linear TSCS models. In addition, to correct for serial autocorrelation, it was necessary to add three lagged values of the dependent variable to the right-hand side.[21] Subsequent tests indicate that this procedure successfully mitigated the autocorrelation problem. To account for any country-specific effects, we specify a fixed-effects (within) regression estimator (using the "fe" command in Stata).

Results

The results from both systems are presented in Table 1.[22] The first two models present the life-expectancy system, with life expectancy the dependent variable in Model 1 and growth the dependent variable in Model 2. Models 3 and 4 present the education system, with secondary-enrollment ratio the dependent variable in Model 3 and growth the dependent variable in Model 4.[23]

that large even if they exist. It further suggests that our assumption is not unreasonable for present purposes.

[21] One implication of including lagged dependent variables is that the coefficients on the other independent variables represent their immediate, or impact, effects on the dependent variable, rather than cumulative effects (Rao and Miller 1971, 44–6).

[22] For all models, we report results employing the "optimal" lag structure, as defined in Lake and Baum (2001). Selecting the optimal lag is, admittedly, a form of "data mining" in that we are allowing the data to dictate the lag structure employed in our models. Moreover by testing all of the models with each lag structure and choosing that which performs best, we are potentially biasing the standard errors by, in effect, increasing the probability of obtaining a significant coefficient among the several models. If our democracy and human capital coefficients tended to be significant under only a single lag structure and varied widely in a nonsystematic fashion across the others, such bias might be substantial. Fortunately, this is not the case. The coefficients on the relevant variables tend to be consistent across multiple lag structures and to vary in a fairly systematic manner as the lag structure changes. This suggests that any bias introduced by our optimal lag procedure is likely to be modest. Absent a theoretical basis for predicting exactly how long it should take for democracy's effects to take hold, and then for human capital to influence growth, we believe it is preferable to allow the data to determine the appropriate lag structure, even at the risk of introducing some modest bias into our results. In our earlier research, we were somewhat surprised to find that the lag structures were in nearly all cases quite short, the same result we obtain here. The effect that increased democracy has on public health or education appears to be more rapid than intuition sometimes suggests.

[23] All models exclude 1-3 influential outliers. In the education system, the education model excludes Australia (COW country ID#900), South Korea (ID#732), and Greece (ID#350) and the

TABLE 1 Recursive Regression of Indirect Effect of Democracy on Growth, Through Life Expectancy and Secondary School Enrollment

	Female Life Expectancy		Female Secondary Enrollment	
Independent Variables	**MODEL 1 *(DV = Life Expectancy)* Coef. (Std.Err.)**	**MODEL 2 *(DV = Growth)* Coef. (Std.Err.)**	**MODEL 3 *(DV = Secondary Enrollment)* Coef. (Std. Err.)**	**MODEL 4 *(DV = Growth)* Coef. (Std. Err.)**
Female Life Expectancy$_{t-1}$	—	.00073 (.00027)**	—	—
Female Secondary Enrollment$_{t-4}$	—	—	—	.00022 (.00010)*
Democracy	—	—	—	−.00013 (.00037)
Democracy$_{t-5}$	—	.00002 (.0003)	—	—
Democracy x GDPpc ≤ $2,500	—	—	.017 (.013)	—
Democracy x GDPpc > $2,500	—	—	.057 (.021)**	—
Democracy$_{t-5}$ *x GDPpc ≤ $2,500*	.045 (.016)**	—	—	—
Democracy$_{t-5}$ *x GDPpc > $2,500*	−.018 (.018)	—	—	—
lnGDPpc$_{t-1}$	.213 (.191)	−.016 (.004)***	1.025 (.223)***	−.021 (.005)***
Labor Force$_{t-1}$	—	−.439 (.097)***	—	−.351 (.100)***
Investment$_{t-1}$	—	−.0002 (.0002)	—	−.0002 (.0002)
Population (in millions)	.0027 (.0020)	—	.0005 (.0021)	—
GDPpc ≤ $2,500	.233 (.262)	—	.180 (.286)	—
Residual of Secondary Enrollment	—	.0000 (.0001)	—	—
Residual of Life Expectancy	—	—	—	−.0001 (.0004)
1-year lag of Dependent Variable	.550 (.267)*	1.085 (.040)***	1.54 (.034)***	1.043 (.040)***
2-year lag of Dependent Variable	1.279 (.322)***	−.228 (.074)**	−.574 (.037)***	−.259 (.072)***
3-year lag of Dependent Variable	−.910 (.124)***	.040 (.061)	.015 (.008)^	.110 (.059)^
Constant	4.217 (1.333)**	.092 (.029)***	−6.904 (1.617)***	.164 (.032)***
Observations/Groups	740/124	548/128	661/122	513/118
R^2 (within group)	.99	.79	.99	.79
F-Statistic	1266.65	166.90	15369.92	157.53
$p > \chi^2$	.000	.000	.000	.000

^p < .10, *p < .05, **p < .01, ***p < .001.
Note: All models employ country-specific fixed effects.

Beginning with Model 1, we see that neither population nor per capita GDP is a statistically significant predictor of life expectancy. More importantly for our theory, democracy (lagged five years) does appear to positively and significantly ($p \leq .01$) affect life expectancy, at least in the roughly 62% of the countries in our data set whose annual GDP per capita is less than $2500. The results indicate that among "poor" countries a maximum increase in democracy improves life expectancy by about 9.4 years. In contrast, among countries where per capita GDP exceeds $2500, democracy exerts no statistically significant effect on life expectancy.

Turning to Model 2, we see that life expectancy (lagged one year) exerts a positive and significant effect on economic growth ($p \leq .01$). The coefficient on democracy (for consistency, again, lagged five years), however, is statistically insignificant.[24] This appears to suggest that once the indirect effect of democracy is accounted for, there is no statistically significant direct effect. Along these lines, it

growth model excludes Mongolia (ID#712) and Congo (ID#484). In the life-expectancy system, the life-expectancy model excludes Sierra Leone (ID#451) and the growth model excludes Zaire (ID#490) and Iran (ID#630). Including some or all of these outliers modestly weakens, but does not fundamentally alter, the reported results.

[24]Note that democracy has a nonlinear effect on life expectancy but a linear direct effect on growth. In the growth models for both life expectancy and education, we tested for various possible nonlinear direct effects. Contrary to Barro (1997), we found no evidence of any nonlinearities. Even though it remains statistically insignificant, the linear estimate of the direct effect of democracy appears the most appropriate.

is worth noting that when life expectancy is omitted from the model (not shown), the coefficient on democracy increases substantially in magnitude and significance. This suggests the indirect effect of democracy may be more important than its direct effect. Moreover, these patterns persist regardless of whether democracy is lagged from zero to five years.

The question that concerns us, however, is whether the life-expectancy coefficient is masking an indirect effect of democracy on growth. The coefficient on life expectancy indicates that each additional year of expected life is associated with an increase in economic growth of a little less than one-tenth of one percentage point (.073%). The maximum increase in life expectancy, from about 33 to about 83 years, is therefore associated with about a 3.7 percentage point increase in growth (i.e., if the rate of growth were previously, say, 2% per year, the maximum increase in life expectancy would be associated with an increase in the growth rate to approximately 5.7% per year).

To determine the indirect effect of democracy on growth that is masked by life expectancy, we employ equation (3). Substituting the pertinent coefficients into this equation, we find that, among relatively poor countries, the indirect effect of a maximum increase in democracy, which is contained within the coefficient on life expectancy, is slightly more than a .68 percentage point increase in growth, or about a .032 percentage point increase in growth per one point increase in democracy on the 21-point Polity 98 scale ($p \leq .05$) (see Table 2). In other words, if the growth rate were otherwise two 2% per annum, a maximum increase in democracy would increase this rate to 2.68% simply through its effects on increased life expectancy. Over the course of a decade, then, in a country like El Salvador, with a per capita income of about $1,674 in 1998, the indirect effect of a maximum increase in democracy would add about $117 to per capita income.

Because the direct effect of democracy is statistically insignificant, we cannot reliably estimate the proportion of the total effect of democracy on growth accounted for by the *indirect* effect. We can, however, confidently conclude from these data that, among relatively poor countries, at least *some* statistically significant portion of the effect of life expectancy on growth is indeed masking democracy's influence on economic growth.

The indirect effects of democracy on growth are clearly nonlinear. As discussed, among poorer countries, democracy exerts a significant positive effect on life expectancy, and, through that relationship, on growth. Among nonpoor countries, on the other hand, increases in democracy have no statistically significant effect on economic growth, even indirectly. As we predicted above, life expectancy is likely to matter more to newly enfranchised voters in developing than in developed countries. We did not anticipate that the indirect effect of democracy on growth through life expectancy would be negative in nonpoor countries, but this result is, in any event, statistically insignificant and hence most likely substantively meaningless. Combined, these results support our first and second hypotheses.

We now turn to the relationship between democracy, secondary education, and growth. The effects of democracy on secondary education are shown in Model 3 in Table 1. As before, population is highly insignificant. Per capita GDP, however, is positive and highly significant ($p \leq .001$), indicating, not surprisingly, that wealth is associated with greater secondary school attainment. Democracy is also positively associated with secondary enrollment, though the coefficient on democracy for poor countries fails to achieve standard levels of statistical significance.

Among nonpoor countries (i.e., those with a per capita GDP greater than $2500), a maximum increase in democracy is associated with an increase in the female secondary enrollment ratio of about 12 students ($p \leq .01$). Among poor countries, the effect of a corresponding increase in secondary enrollment is smaller: about 3.5 students ($p \leq .20$). As before, the results appear to support our hypothesis concerning nonlinear effects.

TABLE 2 Indirect Effects (Through Education and Life Expectancy) on Economic Growth of Maximum Increase in Democracy

	Per Capita GDP	Indirect Effect	Standard Error	Significance Level
Female Life Expectancy	≤$2,500	.68%	.34%	.05
	>$2,500	−.28%	.29%	.31
Female Secondary Enrollment Ratio	≤$2,500	.08%	.07%	.21
	>$2,500	.26%	.16%	.08

In Model 4, we see again that democracy has no statistically significant direct effect on economic growth. The question that concerns us, of course, is whether democracy exerts an indirect influence on growth through its effect on secondary enrollment. The coefficient on secondary enrollment indicates that each additional unit of female secondary enrollment is associated with an increase in economic growth of a little more than two-hundreths of one percentage point (.022%, $p \leq .05$). A maximum increase in the female secondary enrollment ratio (from .1 to 128) is therefore associated with about a 2.8 percentage point increase in economic growth (from, say, 2 to 4.8% per annum).

To determine the indirect effect of democracy on growth, we employ equation (4). Substituting the pertinent coefficients into this equation, we find that, among relatively poor nations, variations in democracy have no statistically significant indirect effect on growth rates. Among nonpoor nations, however, variations in democracy do appear to exert a positive and significant indirect influence. For these countries, each one-point increase in democracy on the 21 point Polity 98 scale is associated with about a .012 percentage point increase in growth ($p \leq .08$). A maximum increase in democracy is thus associated with a .26 percentage point increase in the growth rate (see Table 2). This represents the indirect effect of democracy on growth, manifested through variations in secondary enrollment ratios. Over the course of a decade in, say, Argentina, with a per capita income of about $7,929 in 1998, the indirect effect of a maximum increase in democracy through education would add about $209 to per capita income.

As before, the statistically insignificant coefficient on democracy in Model 4 makes it difficult to determine the proportion of the total effect of democracy on growth accounted for by this *indirect* effect. Still, it is worth noting here that, as in the prior system, when education is omitted the coefficient on democracy increases substantially in magnitude and significance (not shown). This, again, suggests that the indirect effect of democracy may be more important than its direct effect. We conclude that, at least among countries with a per capita GDP greater than $2500, *some* significant portion of the total effect of democracy on growth is indirect, through secondary education's effect on growth. The results from our secondary education system support our third hypothesis, as well as further supporting our first hypothesis.

As we anticipated, the effects of democracy on growth through life expectancy and education differ in important ways. This indicates that they are capturing different facets of the underlying concept of human capital, with life expectancy capturing "low end" human capital, more relevant to developing countries, and secondary education capturing "high end" human capital, more relevant to developed countries. This distinction helps make sense of some of the variations in our results.

Where it is significant, the indirect effect of democracy through life expectancy or secondary education is positive, indicating that as countries become more democratic, growth increases. Moreover, these indirect effects appear to represent a significant proportion of the overall effect of democracy on growth. Though this is by no means definitive evidence, it does suggest that the indirect effects reported above represent an important component of the overall effect of democracy on growth.

Discussion

As noted above, sensitivity tests on cross-sectional models of growth find few robust predictors. Sensitivity tests guard against rank forms of data mining by assessing whether relationships found in one specification are robust across alternative specifications; such tests do systematically what any good analyst does informally. Sensitivity tests may be appropriate where we lack clear theory to guide model creation, but they are less appropriate when theory does provide a guide. Oddly enough, we have stronger theoretical priors on democracy and its effects on growth than we do on what economic and other political variables to include in a properly specified model.

In recursive regression, what to include or not include is largely determined by theory, not the data themselves. Nonetheless, to guard against inconsistent results, especially in the growth model, we carried out a series of secondary robustness checks. Most variables in the cross-sectional sensitivity tests are, as we noted, constants or near constants that are absorbed by our fixed-effects specification. Region, proportion of the population adhering to a dominant religion, or absolute distance from the equator—to name three sets of variables commonly used in sensitivity analyses—are essentially controlled in all of our fixed-effects models. In checking the robustness of our results, therefore, we focused on dynamic factors for which reasonably complete data were available, specifically war, domestic riots, strikes, and openness to trade. None of these variables, however, materially affected our results and so they were omitted from our final models.[25]

[25]More precisely, when riots, strikes or wars were included in the models, the results became substantially weaker. Additional testing, however, revealed that virtually all of the change resulted not from the substantive effects of these variables, but rather from the reduction in observations engendered by their inclusion. (In each case, the N dropped by 20% or more when any of these variables

A second concern is that the relationship between democracy and growth may be spurious, masking an alternative relationship between growth and institutions correlated with democracy. Democracy may be associated with stronger rule of law, more clearly defined property rights, greater autonomy of central banks (Cukierman, Webb, and Neyapti 1993; Broz 2002), broader labor union organization (Alvarez et al. 1991; Garrett 1995; and Iverson 1998), deeper federalism (Weingast 1993), and other institutional features of strong market economies that are more important drivers of growth. Lacking complete panel data on such factors precludes testing our causal argument against these alternatives. Yet, we predict and test a specific indirect causal pathway from democracy through human capital to growth. It is unlikely that other institutional features—such as property rights or central bank autonomy, for instance—would be related to life-expectancy or secondary-enrollment ratios in similar ways. Although we cannot rule out spuriousness, we provide a relatively direct test of our theoretical argument that, now passed, supports our hypotheses.

In a related issue, there may be additional indirect effects of democracy on growth. The existing literature certainly hints at others (see discussion above). Democracy may also influence the trade regime (Mansfield, Milner, and Rosendorf 2000) or corporate governance and capital market development (Rajan and Zingales 2001), both of which may affect growth. Democracy is also strongly and negatively related to war and civil unrest. Even though (see above) we found no direct effect for these conflict variables, an alternative model that focused on a possible indirect effect might be supported. This does not, however, imply that other indirect effects are unimportant, or that the indirect effect of democracy through human capital is necessarily the most important.[26] This is a rich field that we leave for future research.

Finally, our results call into question some recent findings in the empirical literature. Where existing studies find mixed results on the relationship between democracy and growth, we find that, once its indirect effects are included, greater democracy always improves growth. Unlike Barro (1997), in turn, we do not find that the direct effects of democracy are nonlinear or subject to diminishing marginal returns. Nor do we find, contrary to Przeworski et al. (2000), that regime type does not matter at low levels of income.

At the same time, we also confirm several other recent empirical findings. In particular, similar to Durham (1999), Gasiorowski (2000), and Mbaku (1994), we find systematically different effects of democracy on growth in developed and developing economies. Rather than segmenting our samples or dropping developed countries from our analysis, however, we believe it is important to explain the differences we observe, which we do through the different roles that different types of human capital play at different stages of development. The larger and perhaps more important point, however, is that democracy's effects are not uniform across different types of countries.

Conclusion

The effect of democracy on economic growth is subtle, indirect, and contingent on levels of development. It is not surprising, therefore, that early studies that simply added a variable for democracy to the neoclassical growth model failed to find systematic and significant relationships. Although often inspired by arguments about the political effects of democracy, such early attempts failed to develop an appropriately political model of growth.

We provide one possible model of the *political* economy of growth in this article. We hypothesize that, in addition to protecting property rights (or not), redistributing income (or not), and other activities central to the "compatible" and "conflict" approaches, states also provide public services that directly influence levels of human capital within society. Political regime type, in turn, affects how and at what level these services are provided, with more democratic states typically providing higher levels than their less democratic counterparts. We find important, indirect, and positive effects of democracy on growth through life expectancy in relatively poor countries and through secondary enrollment ratios in nonpoor countries. Our results show that the indirect effect

was included in the model.) Once the N was held constant, none of these variables exerted any meaningful effect on the statistical relationships. The sole exception was openness to trade, for which substantial data was available. Contrary to Dollar and Kraay (2001), this variable—measured as either exports, imports, or total trade relative to GDP—had essentially zero effect on our reported results. It remains possible that our results may not be robust to variations in the set of countries included in our panels. To test this possibility, we ran 100 iterations of our growth models (50 per model), each time drawing a different random sample of 80% of our data. Our results remained robust (i.e., correctly signed and statistically significant or nearly so) across the overwhelming majority of these tests. This clearly indicates that our findings are not unstable to variations in our panels.

[26] As an additional test, we examined the possible indirect effect of democracy on growth through physical capital investment. Using a specification similar to that above (except that we included the residuals for both life expectancy and education), we found no statistically significant indirect effect of democracy on growth through this route. We should also note that using the residual of physical capital in the life expectancy and education models did not materially affect the results reported above either.

of democracy on growth through public health and education are positive, large, and important indeed.

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