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Income, Democracy, and the Cunning of Reason

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**ABSTRACT**

A long-standing debate pits those who think economic development leads to democratization against those who argue that both result from distant historical causes. Using the most comprehensive estimates of national income available, I show that development is associated with more democratic government—but in the medium run (10 to 20 years). The reason is that, for the most part, higher income only prompts a breakthrough to more democratic politics after the incumbent leader falls from power. And in the short run, faster economic growth increases the leader's odds of survival. This logic—for which I provide evidence at the levels of individual countries and the world—helps explain why democracy advances in waves followed by periods of stasis and why dictators, concerned only to entrench themselves in power, end up preparing their countries to leap to a higher level of democracy when they are eventually overthrown.

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# 1 Introduction

Does economic development cause countries to become more democratic—and, if so, why do dictators ever promote it? In the wake of the Arab uprisings of early 2011, these questions are particularly topical. To many observers, the protests that shook regimes from Libya to Bahrain seemed a direct result of modernization, which created glaring inequalities, spread literacy and access to information, and provided networking tools such as Twitter and Facebook to mobilize discontent into the streets (e.g. Giglio 2011). Yet if development undermines the control of authoritarian rulers, why do those rulers nevertheless encourage it?

One answer might be that they do not. Concerned precisely to forestall the mobilization of opposition, some dictators deliberately *de*-modernize their countries. President Mobutu of Zaire allowed his country's infrastructure to decay, shrinking the network of paved roads along which regime opponents might mobilize (Robinson 2001, p.28). However, while some dictators fit the Mobutu mold, many others have overseen—and often actively supported—economic development. Under South Korea's General Park Chung-hee and Singapore's Prime Minister Lee Kuan Yew, growth averaged more than six percent a year.<sup>1</sup> Nor is this a uniquely Asian pattern. When Zine El Abidine Ben Ali took over as president of Tunisia in 1987, GDP per capita at purchasing power parity was \$2,512. By the time he fled the country in January 2011, it was more than \$8,000.<sup>2</sup> On Ben Ali's watch, the adult literacy rate rose from 48 to 78 percent; enrollment in higher education increased from 5 to 34 percent; the proportion of women in parliament rose from 4 to 28 percent; internet users increased from zero to 34 percent; and mobile phone subscriptions soared from zero to 93 per 100 people.<sup>3</sup> Dictators like Ben Ali may not grow their economies as fast as democratic leaders do on average (Persson and Tabellini 2009). But the puzzle is why they grow them at all if doing so hastens their overthrow in a democratic revolution.

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<sup>1</sup> World Bank, *World Development Indicators* (May 2011), using GDP per capita growth rates.

<sup>2</sup> World Bank, *World Development Indicators* (May 2011), in current international dollars, for 1987 and 2009, the latest available year. In constant dollars, the increase adjusted for purchasing power parity was 94 percent.

<sup>3</sup> World Bank, *World Development Indicators*, using the closest years for which data were available. Figures for literacy for 2008 compared to 1984; higher education for 2008 compared to 1987; women in parliament for 2010 compared to 1990; internet and mobile phones for 2009 compared to 1990.

A second possibility is that Lipset and other modernization theorists were wrong: economic development does not lead to democracy. Dictators need not fear modernization since modernization does not erode the bases of their power. Examining the post-war period, Przeworski et al. (2000) concluded that although development helped entrench democracies it did not increase the odds that a dictatorship would become democratic. Acemoglu, Johnson, Robinson, and Yared (2008, 2009), also focusing mostly on recent decades, contend that development has no impact on either the stability of democracy or transitions to it if one controls for countries' different historical legacies. However, these claims have been challenged. Boix (2009) finds evidence of a link from higher income to democracy if one includes data from before World War II. Benhabib, Corvalan, and Spiegel (2011) also detect a relationship once data coverage is broadened and allowance is made for censoring at the top of the democracy scale. I begin by replicating and extending the findings of Boix and Benhabib et al. I confirm their results, but show that evidence linking income and democracy is much stronger in the medium run (10-20 year periods) than in the short run (annual or five-year periods).

So why do dictators promote the very economic changes that eventually predispose their populations to demand political freedom? I argue that a mechanism analogous to what Hegel called "the cunning of reason" leads rulers who seek only their own survival in power to support economic growth. Economic development has different effects in the short run and the long run. In the long run, it transforms societies, creating the preconditions for democracy. As a country's national income rises, its population becomes more differentiated, educated, bourgeois, tolerant, interconnected by decentralized media, and eager to participate politically. However, that society is ready for democracy does not mean a transition immediately occurs. I argue that in general higher income only prompts a breakthrough to more accountable government *after the incumbent leader falls from power*. And in the short run higher economic growth increases the leader's odds of survival. By raising citizens' incomes, growth boosts the ruler's popularity, intimidating potential rivals; by increasing state revenues, it helps the ruler finance patronage or repression. Thus, in the short run economic progress may facilitate the rollback of political freedoms. A Ben Ali may promote growth in order to lengthen his tenure in office, and exploit the cushion of support generated by rising incomes

to tighten the screws on society, while simultaneously and quite unintentionally bringing about changes that increase the odds of democratization when he is eventually overthrown.

And no leader survives forever. International economic shocks may frustrate the dictator's efforts to promote domestic growth, or he may be deposed after losing a war or a civil war, or for other non-economic reasons. When an autocrat falls, the level of economic development then influences whether he is replaced by another dictator or a more democratic regime. Evidence for this argument can be found both in individual countries and in global patterns of economic performance and leadership turnover. I show that worldwide recessions and depressions are associated with more rapid replacement of national leaders. This does not by itself produce democracy. In the 1930s, the Great Depression destabilized democratic leaders in a number of poor democracies, prompting reversion to authoritarian rule. But when global recessions cause turnover in dictatorships that have become relatively rich under their previous rulers, waves of democratization result.

In the following sections, I report statistical evidence for each step in this argument. First, I reprise the current state of the debate about development and democracy, replicating the empirical findings of previous papers using the most up-to-date data on national income, and demonstrating that the income-democracy relationship is stronger in the medium run than in the short run. Section 3 then explores why this is the case, and shows that the impact of income on democracy is conditional on leadership turnover. In periods with no change at the top, income has practically no detectable effect, but in periods after a leader falls, higher income—or a more educated population—is associated with increases in democracy. Section 4 examines the causes of leadership change and shows that low economic growth makes it likelier the incumbent will be replaced. I instrument for each country's growth rate, using the trade-weighted average rate of growth in other countries, which increases confidence that the effect is causal. Section 5 extends the analysis to the global pattern of economic growth and leadership change. Estimating error correction models, I show that global economic performance and the rate of leadership change are linked by both a long-run equilibrium relationship and a short run dynamic one. Section 6 concludes.

## 2 Income and democracy

Since Lipset (1959), many scholars have held that as countries develop economically they tend to become more democratic. This was consistent with the strong cross-national correlation between income and measures of democracy observable in any given year. Moreover, a variety of plausible mechanisms—from the spread of education and mass media to growing tolerance and social differentiation—seemed likely to render citizens of richer societies both more eager to participate and harder to control.<sup>4</sup> Confidence in this logic was shaken in the 1970s by the appearance of military dictatorships in some relatively rich Latin American countries (O'Donnell 1988). But after these returned to democracy in the 1980s they came to seem the exceptions that proved the rule.

A stronger challenge emerged more recently. Acemoglu et al. (AJRY 2008, 2009) argue that rather than economic development causing democracy, the two evolve in parallel, driven by factors rooted in distant history. As early as 1500, some countries had good institutions that prompted rapid growth and democratization, while others had bad institutions that retarded both economic and political development. In tracing today's cross-national differences to critical junctures many centuries past, they drew on the historical work of North (1981), Moore (1966), and various others. Empirically, they showed that in panels of countries between 1960 and 2000 (and also in a balanced panel of 25 countries at 25-year intervals starting in 1875), the link between income and democracy disappeared once country fixed effects were introduced to control for time-invariant factors.

However, two still more recent papers rediscover the relationship. Boix (2009), using data that go back to the early 19<sup>th</sup> Century, finds income to be significant, even including country dummies. He argues that the 1960-2000 period was exceptional in that it overlapped with the Cold War, during which the superpowers intervened to prevent regime change. Benhabib et al. (2011) confirm that the relationship returns if data coverage is expanded.<sup>5</sup> They also note that a significant

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<sup>4</sup> For recent treatments, see Barro (1999), Boix and Stokes (2003), and Epstein et al. (2006). On the importance of education, see Glaeser et al. (2004) and Glaeser, Ponzetto, and Shleifer (2007); on value change, see Inglehart and Welzel (2005).

<sup>5</sup> Besides extending the data into the 19<sup>th</sup> Century by use of Maddison's estimates, they use the Penn World Tables Version 6.3 rather than Version 6.1, as in AJRY (2008, 2009).

proportion of the data is censored by the top of the commonly used Polity democracy scale: once countries reach a perfect score of 10, they cannot rise any higher. Since 1900, the share of countries with perfect scores has averaged around 18 percent. Using methods that take such censoring into account also increases the significance of the relationship.

I begin here by replicating the main findings of AJRY (2008, 2009), Boix (2009), and Benhabib et al. (2011), using the latest national income estimates of Angus Maddison and his collaborators (Maddison 2010). As in these papers, I use two measures of democracy, one more or less continuous, the other dichotomous. The first is the Polity2 index from the Polity IV dataset (2009 version). Constructed by scholars at George Mason University, this equals the difference between an index of democracy and an index of autocracy, both of which measure in different ways the openness and competitiveness of political participation and executive recruitment, along with the extent of constraints on the executive.<sup>6</sup> The data include all countries that currently have populations over 500,000, starting in 1800 or the year of independence. As in AJRY (2008, 2009) and Boix (2009), I rescale the index, which runs from -10 to +10, to take values between 0 and 1. The dichotomous measure was constructed by Boix and Rosato (2001) and used in Boix and Stokes (2003) and AJRY (2009). This codes countries as democratic if elections are free and competitive, the executive is accountable (i.e. the president is directly elected or the head of government is answerable to parliament), and at least half the male population has the right to vote (Boix and Rosato 2001). Coverage ranges from 22 countries in 1800 to 186 in 2000.<sup>7</sup> Some studies have also used ratings produced by the NGO Freedom House. However, since these begin in 1972, and even extensions go back only to 1950 (Bollen 1998), they cannot test arguments about the pre-World War II experience.

Since I contend that long run and short run effects of income differ, I construct panels of data

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<sup>6</sup> For details, see [www.systemicpeace.org/polity/polity4.htm](http://www.systemicpeace.org/polity/polity4.htm). I use the Polity2 index, which, unlike the simple Polity index, includes estimates for years in which the regime was in transition.

<sup>7</sup> I thank Carles Boix for sharing these data. The BR definition is similar to that of Przeworski et al. (2000). However, the datasets differ on a number of cases. Combining the BR data with those of Cheibub, Gandhi and Vreeland, which updates the Przeworski et al. data (CVG; available at José Cheibub's website, [https://netfiles.uiuc.edu/cheibub/www/DD\\_page.html](https://netfiles.uiuc.edu/cheibub/www/DD_page.html)), I found 130 country-years in which BR coded the country as democratic but CGV coded it as undemocratic. There were 175 cases where the opposite was true.

at different frequencies.<sup>8</sup> I show results of each estimation for annual, 5-year, 10-year, 15-year, and 20-year panels and examine how findings differ across them, where relevant calculating the cumulative long-run effect.<sup>9</sup> Rather than averaging the data for the given period, which would introduce additional serial correlation, I follow AJRY (2008, 2009) in using the observations from every fifth year for the five-year panel, and so on. I include in each regression the lagged value of the dependent variable, again as in AJRY (2008, 2009) and Boix (2009), to capture persistence in democracy, reduce serial correlation, and pick up any tendency to revert to the mean. The basic model I estimate, as in AJRY (2008), can be written:

$$d_{it} = \alpha d_{it-1} + \gamma y_{it-1} + \mathbf{x}'_{it-1} \boldsymbol{\beta} + \mu_t + \delta_i + u_{it} \quad (1)$$

where  $d_{it}$  is the extent of democracy in country  $i$  in period  $t$ ;  $y_{it-1}$  is the natural log of per capita GDP in country  $i$  in the previous period;  $\mathbf{x}_{it-1}$  is a vector of other covariates;  $\delta_i$  is a full set of country dummies;  $\mu_t$  a full set of year dummies; and  $u_{it}$  a random error with  $E(u_{it}) = 0$  for all  $i$  and  $t$ . I calculate robust standard errors clustered by country.

In Table 1, panels A-C, I estimate this model by OLS, using the Polity2 index as the dependent variable. Panel A includes just 1960-2000. As in AJRY (2008, Table 3, column 2; 2009, Table 1, Panel B, column 2), Boix (2009, Table 2, column 1), and Benhabib et al. (2011, Table 4, columns 3 and 4), income is statistically insignificant with estimated long-run impact close to zero. This is true at all panel frequencies. Panel B extends the data to include all observations for 1820-2008. Now a new pattern emerges. In the 10- and 20-year panels, income is significant, with a positive coefficient (the 15-year panel also fits the pattern, but income is only significant at  $p = .12$ ). The cumulative effect of income rises as the panel frequency falls, reaching .18 for the 20-year data.

So far, I have not adjusted in any way for the fact that countries that reach the top of the Polity scale cannot rise any higher. The simplest way to do so is to reformulate the question

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<sup>8</sup> AJRY (2008, 2009) focused on 5-year panels, and presented some models with annual, 10-year, 20-year, and 25-year data as robustness checks. Boix (2009) reported five-year, 10-year, and 25-year panels. Benhabib et al. (2011) used five-year panels, with annual and 10-year panels as robustness checks.

<sup>9</sup> In a model with a lagged dependent variable:  $d_{it} = \alpha d_{it-1} + \gamma y_{it-1}$ , the cumulative effect of income is  $\gamma / (1 - \alpha)$ .



**Table 1: Income and democracy**

<i>Polity measure</i>															
<i>Method</i>	<i>(A) 1960-2000</i>					<i>(B) 1820-2008</i>					<i>(C) 1820-2008, Polity2<sub>t-1</sub> &lt; 6</i>				
	<i>OLS, country and year fixed effects</i>					<i>OLS, country and year fixed effects</i>					<i>OLS, country and year fixed effects</i>				
<i>Type of panel:</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>
Democracy <sub>t-1</sub>	.87*** (.01)	.45*** (.05)	.15* (.08)	-.16 (.11)	-.17* (.09)	.92*** (.01)	.62*** (.04)	.33*** (.06)	.10 (.07)	.03 (.08)	.90*** (.01)	.56*** (.06)	.21** (.09)	-.07 (.12)	.04 (.12)
Ln GDP per Capita <sub>t-1</sub>	-.005 (.007)	.007 (.029)	.022 (.051)	.041 (.10)	.012 (.114)	-.002 (.004)	.010 (.019)	.07* (.04)	.12 (.08)	.18** (.09)	-.00 (.01)	.026 (.026)	.14*** (.05)	.10 (.10)	.26** (.12)
Implied cumulative effect of income	-.04	.01	.03	.04	.01	-.02	.03	.11*	.13	.18**	-.00	.06	.18***	.09	.27**
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.79]	[.00]	[.00]	[.00]	[.00]	[.01]	[.00]	[.00]	[.00]	[.00]	[.38]
Observations	5,377	1,103	562	318	267	10,304	1,932	884	503	391	6,594	1,291	616	345	275
Countries	160	159	137	132	131	165	160	138	132	132	142	138	124	117	116
R-squared	.9453	.8215	.7758	.7894	.8121	.9520	.8133	.7346	.7234	.7272	.8589	.6129	.5831	.6625	.6911

***Dichotomous Boix-Rosato measure, only non-democracies***

<i>Method</i>	<i>(D) 1960-2000</i>					<i>(E) 1820-2000</i>					<i>(F) 1820-2008</i>				
	<i>OLS, country and year fixed effects</i>					<i>OLS, country and year fixed effects</i>					<i>fixed effects conditional logit</i>				
<i>Type of panel:</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>
Ln GDP per Capita <sub>t-1</sub>	.01 (.01)	.07 (.05)	.11 (.08)	-.09 (.17)	.02 (.24)	.005 (.008)	.075** (.032)	.21*** (.06)	.14 (.13)	.33** (.16)	.95* (.54)	2.24*** (.74)	3.91*** (1.32)	5.33** (2.58)	6.11 (4.50)
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.99]	[.00]					
Observations	3,545	733	376	219	182	5,735	1,169	594	334	264	3,358	702	356	185	152
Countries	126	125	114	108	111	141	137	126	119	118	68	65	58	46	46
R-squared	.1027	.3320	.5122	.7089	.7788	.0995	.2532	.4397	.5860	.6598					

**Sources:** see Table A4 in appendix.

**Note:** standard errors in parentheses; \* p<.10, \*\* p<.05, \*\*\* p<.01. Panels A-E: robust standard errors, clustered by country. All regressions include year dummies. Implied cumulative effect of income: coefficient on Ln GDP per Capita<sub>t-1</sub>/(1 - coefficient on Democracy<sub>t-1</sub>). “Fisher p level” is probability level at which one can reject H0: residuals are I(1), from Fisher test of residuals.

to ask whether higher income predisposes *non-democracies* to become more democratic. The Polity creators recommend treating a Polity2 score of +6 as the lower bound for democracy. Panel C shows results estimated on just countries with Polity2 scores below six in the previous period. This increases the estimated effect of income, although the result for the 15-year panel is still not significant.<sup>10</sup>

Panels D-F show similar regressions using the dichotomous Boix-Rosato measure. I focus on just countries that were non-democracies in the previous period and therefore drop the lagged dependent variable. Since non-linear models cannot easily accommodate unit fixed effects, I begin with simple linear models in Panels D and E, for 1960-2000 and 1820-2008, including full sets of country and year fixed effects. Panel F reports results of a conditional logit fixed effects model, run with the estimator of Chamberlain (1980), for which the estimates of structural parameters are consistent.<sup>11</sup> All models include year dummies. Again, we see the same pattern: once 19<sup>th</sup> Century data are included, income is significant, with the largest estimated effects in 10- to 20-year panels.

In Table A1 in the appendix, I present various alternative formulations, robustness checks, and extensions. I try controlling for the country's stock of accumulated democratic experience and for the level of democracy in other countries, using measures devised by Persson and Tabellini (2009), and also try restricting attention to the pre-1945 data. I rerun the regressions using the estimator of Alan, Honoré, and Leth-Petersen (2008), which allows for censoring at the top and bottom while also controlling for unobserved heterogeneity, as in Benhabib et al. (2001). I also estimate the models with the dynamic GMM estimator of Arellano and Bond, as in AJRY (2008).<sup>12</sup> Each method has its own problems, about which more could be said. My goal is to address the existing debate by using the same models as in previous papers wherever possible.

These checks reinforce the main finding observed so far. If one includes data that go back to the 19<sup>th</sup> Century, and especially if one also adjusts for censoring at the top of the Polity scale, higher

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<sup>10</sup> Results are similar if one excludes only countries with a perfect Polity2 score of +10: see Table A1 in appendix.

<sup>11</sup> This can be estimated in STATA with the `xtlogit, fe` command (Rabe-Hesketh and Skrondal 2008, p.272).

<sup>12</sup> The standard fixed effect OLS model in equation (1) can yield biased estimates because the lagged dependent variable,  $d_{it-1}$ , will be mechanically correlated with the error term for all periods before  $t$ .

income is significantly associated with movement towards greater democracy. In failing to detect a relationship in annual data—and usually also in five-year panels—these results are in line with AJRY (2008, 2009). However, in finding a relationship in panels at lower frequency, the results echo those of Boix (2009) and Benhabib et al. (2011).

The new point that I emphasize here is that the relationship between income and democracy is clearest and strongest *in the medium to long run* (i.e. panels of 10 to 20-year periods). In fact, the robustness tests in both Boix (2009) and Benhabib et al. (2011) also found larger estimated effects in panels of 10 years or more, but neither paper commented on this. Year on year, there is little change in measures of democracy. In annual panels, the coefficient on lagged democracy is close to one. But as the interval between observations increases, the coefficient on lagged democracy falls; in 20-year panels, it is close to zero or even negative, suggesting regression to the mean. If one wants to predict how democratic a country will be next year, its current level of democracy is overwhelmingly important. But if one wants to know how democratic it will be in 20 years, its current democracy score helps little; its level of economic development is far more informative.<sup>13</sup>

### 3 The importance of leadership change

Why might income matter for democracy mostly in the medium to long run? There are probably several reasons. Various aspects of modernization may affect politics with a lag. Rising literacy and the spread of education will create pressure for more accountable government only after newly literate and educated groups become politically aware and develop organizational skills. Time is also required for urbanization and industrialization to translate into political mobilization.

Here I focus on one reason. I hypothesize that the demand for democracy and the readiness of society to sustain it have a greater impact in periods after change occurs in a country's top leadership. Political change is discontinuous. In most years, a country's governing institutions are

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<sup>13</sup> The estimated effects are quite large. For instance, the difference between a per capita GDP of \$2,000 and one of \$20,000 would correspond to a long-term difference of .41 on the 0-to-1 Polity2 scale if one uses the estimate from Panel B (20-year data) or a difference of .62 points using the estimate from Panel C (20-year data).

highly inertial. But when, for whatever reason, the ruler of an autocracy falls, constitutional questions suddenly come on the agenda. The direction and extent of political reform then depend on what level of economic development the country has reached under the last dictator's rule.<sup>14</sup>

For years, a society may evolve under the surface, growing more complex, bourgeois, literate, interconnected, media savvy, tolerant, and difficult to control, without any corresponding alteration in the political superstructure—until a crisis occurs and the latent demand for participation combines with the new potential for social organization. Leadership change by itself does not produce democracy: one dictator may just replace another. Economic development by itself only makes democracy more feasible. In the short run, growth without leadership turnover tends to boost the incumbent's popularity, enabling him—if he wishes—to curb political freedom. It is the combination of economic development and leadership change that opens the way for political reform.

Why does leadership turnover in countries that have become relatively rich have this effect? There are at least three possible reasons. First, the new leader may himself be a product of the country's recent modernization. More educated than his predecessor, with more tolerant and liberal values, this representative of a new generation may be readier to free the press, empower society, and permit more political participation. In the Soviet Union under Leonid Brezhnev, per capita income rose from \$4,439 in 1964 to \$6,536 in 1982.<sup>15</sup> The share of Soviet adults with a high school diploma increased on Brezhnev's watch from 17 percent to almost 60 percent (Hough 1997, p.44). Yet it was only after Brezhnev's death—and those of two decrepit successors—that a member of the new generation, Mikhail Gorbachev, took command and began a process of political decompression.

Another possibility is that the new leader, although not himself more democratic in outlook, recognizes that appealing to the new groups and interests engendered by modernization is his best bet for political survival. Especially if the previous ruler fell in a crisis that undermined the old regime's legitimacy, his successor may see the need to compromise with such groups. One example comes from Indonesia. After the long-time dictator General Suharto was forced from power by

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<sup>14</sup> As Huntington noted, the decision of a failing authoritarian regime to democratize in the 1970s and 1980s "almost always first required a change of leadership" (1991, p.57) .

<sup>15</sup> Estimates of Maddison (2010) in 1990 Geary-Khamis dollars, adjusted for purchasing power parity.

protests sparked by the 1997 Asian financial crisis, his vice-president, B.J. Habibie, promptly relaxed controls over the press, legalized opposition parties, and promised democratic elections the following year. By doing so, he diverted the opposition, which had been seeking to overthrow him with street demonstrations, into instead preparing to run for office (Liddle 1999).

A third possibility is that the fall of a dictator leaves modern and traditional factions or social interests relatively balanced, and their leaders agree to more democratic procedures to avert more violent modes of competition. Democracy may emerge by default as a means of sharing power. In Spain's post-Franco transition, there were many committed believers in democracy; but a democratic order was accepted by Francoist elements in the armed forces because—especially after the 1981 failed coup—they no longer had confidence that they could dominate by force.

Table 2 presents evidence for this argument. I examine whether the link between income and democracy differed in countries where the leader had recently been replaced from that in countries where the same leader had remained in power.<sup>16</sup> The data on leader turnover come from the Archigos dataset of Goemans, Gleditsch, and Chiozza (2009a, 2009b), which contains information on the top leaders of all independent states between 1875 and 2004 and on the manner in which leaders left office. Archigos defines a country's leader as "the person that de facto exercised power" (Goemans et al. 2009a). In general, that means the prime minister in parliamentary regimes, the president in presidential and mixed systems, and the communist party chairman in communist systems. Panel A uses the Polity democracy measure, restricting attention as before to countries not already democratic (i.e. with Polity2 less than 6), and Panel B uses the Boix-Rosato binary variable.

The regressions support the conjecture that income has a different effect in periods following turnover at the top. If the country's leader had not been replaced, there was generally no relationship between income and the country's level of democracy, controlling for democracy one period earlier (statistically insignificant coefficients, close to zero). However, if the leader had been replaced, countries with higher income tended to move faster towards democracy. For periods of one

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<sup>16</sup> For instance, in the 5-year panel, I distinguish cases in which the leader had been replaced in periods  $t - 5$  through  $t - 1$  from those in which he had not.

**Table 2: Income, education, democracy, and leadership change**

	<i>(A) Income</i>					<i>(B) Income</i>					<i>(C) Education</i>			
	<i>1875-2004: Polity, Polity2&lt;6</i>					<i>1875-2000: BR binary measure, non-democracies</i>					<i>1875-2004: Polity, Polity2&lt;6</i>		<i>1875-2000: BR binary measure, non- democracies</i>	
<i>Period of panel:</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>10-yr</i>	<i>10-yr</i>	<i>10-yr</i>	<i>10-yr</i>
Democracy $t-1$	.89*** (.01)	.46*** (.06)	.11 (.10)	-.12 (.11)	-.11 (.11)						.37*** (.11)	.25** (.10)		
Leader replaced in previous period	-.07* (.04)	-.17 (.14)	-.36 (.28)	-.90** (.42)	-.76 (.82)	-.14 (.09)	-.50** (.24)	-.54 (.37)	-1.71*** (.58)	-1.72 (1.26)		.08* (.04)		-.06 (.05)
Ln GDP per Capita $t-1$	-.002 (.006)	-.01 (.03)	.07 (.05)	-.02 (.09)	.10 (.14)	.001 (.008)	.02 (.03)	.11* (.07)	-.07 (.12)	.04 (.20)				
Ln GDP per Capita $t-1$ * leader replaced	.010* (.005)	.04* (.02)	.07* (.04)	.14** (.06)	.14 (.10)	.023* (.013)	.08** (.03)	.08 (.05)	.25*** (.08)	.26* (.15)				
Average years of schooling (age 15 and over) $t-1$											.032 (.024)	.014 (.028)	.040 (.032)	-.004 (.036)
Average years of schooling $t-1$ * leader replaced												.041*** (.012)		.080*** (.016)
Implied cumulative effect of income														
if leader replaced	0.08	0.04	0.15**	0.11	0.22**	.024	.10**	.20***	.18	.30*				
if leader not replaced	-0.02	-0.03	0.08	-0.01	0.09	.001	.02	.11*	-.07	.04				
Implied cumulative effect of schooling														
if leader replaced												.073*		.076**
if leader not replaced												.018		-.004
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.87]	[.00]	[.00]	[.00]	[.06]	[.88]	[.00]	[.00]	[.00]	[.00]
Observations	5,829	1,178	554	324	247	5,274	1,066	537	317	240	424	417	405	401
Countries	137	135	121	115	114	138	135	124	118	116	66	65	64	64
R-squared	.8531	.6294	.6136	.6999	.7605	.1074	.2853	.4646	.6221	.7167	.5027	.5787	.3857	.4458

**Sources:** see Table A4 in appendix.

**Note:** All estimations by OLS with country and year fixed effects. Robust standard errors, clustered by country, in parentheses; \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ . “Fisher p level” is probability level at which one can reject  $H_0$ : residuals are  $I(1)$ , from Fisher test of residuals.

to 15 years, the interaction term was statistically significant at least at  $p < .10$  for the Polity measure. For the dichotomous measure, it was significant for all but the 10-year panel.<sup>17</sup> At extremely low per capita income—the implied thresholds are mostly a few hundred dollars a year—leadership turnover is associated with less democracy. But at higher income levels, a change in leader is associated with movement towards democracy that is larger, the more developed the country.

Panel C shows one mechanism by which higher income translates into more democracy when accompanied by leadership change. As countries grow richer, their populations become more educated, which increases the desire for political participation, enhances individuals' capacity to organize, and inculcates values of tolerance and compromise. Lipset thought a high level of education was “close to being a necessary condition” for democracy (1959, p.80). Various scholars have reported empirical evidence of this link (Barro 1999, Przeworski et al. 2000, Glaeser et al. 2004). However, Acemoglu et al. (2005) argue that once fixed effects for country and year are included, the relationship disappears.

To measure countries' educational levels, I use estimates of the average number of years of schooling among those aged 15 and older, compiled by Morrisson and Murin (2009); data were available at 10-year intervals for 74 countries in 1870-2010. Just entering the education variable into regressions of democracy, including country and year fixed effects, education was not statistically significant. However, education was strongly related to movement towards democracy in periods in which the state's leadership changed (second and fourth columns). As the populations of non-democracies grow more educated, this lays the ground for movement toward more accountable government. But the change comes, for the most part, only after the incumbent leader is replaced.

One conceivable alternative interpretation is that the democracy coders take leadership change itself to be a sign of democratization. In fact, of the 1,126 cases in the data of leader change in non-democracies, only 84 were coded as transitions to democracy. Clearly, the coders do not equate the two. Even if they did, that would not explain why the effect of *income* is greater after a leader is replaced.<sup>18</sup>

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<sup>17</sup> But note that a Fisher test of the residuals raises doubts about the stationarity of the 20-year panel.

<sup>18</sup> Londregan and Poole (1996) found that leadership change and regime change were not related in their dataset. The 1,126 leader replacements do not include cases of natural death, suicide, or retirement for ill health, and exclude six cases where data on the regime in the following period were missing.

That economic development matters mostly after leaders change helps to explain why one finds no simple relationship between income and democracy in 1960-2000. Table A2 in the appendix shows regressions similar to those in Table 2 for just this period. Statistical significance is weaker, as one might expect given the smaller number of cases and the historically low rate of leadership turnover after 1960 (see Section 5), but the results are generally consistent, especially for education.

Another perspective on these results is offered by the record of political change in countries where an authoritarian leader was lucky or skilled enough to preside over an extended period of rapid growth. In the data there were 15 leaders under whose rule income per capita increased by at least 150 percent. Two of these—Konrad Adenauer of West Germany and Seretse Khama of Botswana—headed governments in democracies (average Polity2 scores under their leadership of six or higher). Under each of the other 13, the average Polity2 score was negative, indicating quite repressive non-democracies. These “developmental dictators” are listed in Table 3.

With the exception of Tunisia’s President Bourguiba, who during 30 years in power increased his country’s Polity2 score by one point on the 21-point scale, none of these leaders left his country more democratic than he found it, and a number exploited favorable economic conditions to reduce political freedom.<sup>19</sup> (Of course, this partly reflects a selection effect: those dictators who *did* democratize early on were more likely to lose office before their countries could achieve large increases in income.) What is noteworthy is what happened after these developmental dictators lost power. In 10 of the 13 cases, the next 10 years saw movement towards democracy—often a dramatic breakthrough. A decade after the deaths of Spain’s Generalissimo Franco, Portugal’s Prime Minister Salazar, and South Korea’s General Park, their countries had leapt from dictatorship to democracy (Polity2 > 5). Ten years after Indonesia’s General Suharto, Bulgaria’s First Secretary Zhivkov, and Mongolia’s General Secretary Tsedenbal were forced out, their countries had also become democracies. In each case, the country rapidly closed the gap that had opened under its former dictator between its stagnant political institutions and its increased level of economic development.

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<sup>19</sup> In some cases (e.g. Franco, Suharto), there is a little ambiguity because the Polity2 score rises in the year the dictator left office. I assume in these cases that the improvement occurred after the dictator’s replacement.



**Table 3: Political change under “developmental dictators” and their successors**

Country	Leader	Year in	Year out	Change in GDP per capita (times)	Change in Polity2 score under dictator	Change in Polity2 score after dictator
Libya	Idris	1951	1969	9.78	0	0
Singapore	Lee Kuan Yew	1959	1990	6.50	-9	0
Spain	Franco	1939	1975	4.36	0	+17
Taiwan	Chiang Kai-shek	1950	1975	3.85	0	+1
Venezuela	Gomez	1908	1935	3.78	-6	+6
South Korea	Park Chung-hee	1961	1979	3.44	-1	+14
Indonesia	Suharto	1966	1998	3.29	-1	+15
Iran	Mohammad Reza	1953	1979	3.03	-6	+4
Portugal	Salazar	1932	1968	2.97	0	+18
Bulgaria	Zhivkov	1956	1989	2.92	0	+15
China	Deng Xiaoping	1980	1997	2.84	0	0
Tunisia	Bourguiba	1957	1987	2.73	+1*	+5
Mongolia	Tsedenbal	1952	1984	2.70	0	+16

**Sources:** See Table A4.

**Note:** Table includes all leaders out of power by 2004 during whose tenure the average Polity2 score was less than 6 and GDP per capita increased by at least 150 percent. “Change in Polity2 score under dictator”: on 21-point scale, from leader’s entry year to his last full year in office. “Change in Polity2 score after dictator”: on 21-point scale, from last full year in office to 10 years later. \* from 1959 (first year in data).

Not all countries made such a large jump. Taiwan’s democratization took a little longer but was equally dramatic when it arrived. Tunisia after Bourguiba and Iran after the Shah merely became slightly more pluralistic dictatorships. Libya after King Idris, China after Deng, and Singapore after Lee Kuan Yew recorded no increase in political freedom at all. Still, the average rise in the Polity2 score in these 13 countries in the 10 years after the dictator fell, +8.5, is much larger than the average change in all 10-year periods for countries that started out as non-democracies, +1.0.<sup>20</sup>

## 4 What causes leadership change?

If higher income only leads to greater democracy when the ruler is replaced, what causes political leaders to fall from power? So far I have treated such turnover as exogenous. But, of course, it may

<sup>20</sup> If we lowered the threshold to consider all authoritarian countries where a leader doubled GDP per capita, this would reduce the average jump in the decade following the leader’s exit to +7.5 points. The additional six cases include two in which the dictator’s fall was followed by a leap to democracy (Hungary after Kadar and Paraguay after Stroessner), one intermediate case (Malaysia after Mahatir bin Mohammad: +3 points as of seven years later), and three in which there was no increase in political freedom (Saudi Arabia after Faisal, South Yemen after Ali Rubayyi: 0 points; and Jordan after King Hussein: -1 point).

itself be influenced by economic—and other—factors. In this section, building on previous work, I estimate the determinants of leadership change.

What might explain different rates of turnover? The nature of the regime and its formal procedures for selecting top officials are obviously relevant (Bueno de Mesquita et al. 2003). In democracies—especially those with short term limits—leaders are likely to change more often than in autocracies. Among authoritarian regimes, turnover may be greater in some types than in others (Geddes 1999). Dynastic monarchies aim to limit change to the aftermath of a ruler’s natural death. In military regimes, generals may rotate in and out of political posts. Autocracies that use pseudo- or partly democratic institutions such as elected legislatures to coopt opposition may achieve greater stability (Gandhi and Przeworski 2007). On the other hand, it may be only regimes that already feel threatened that resort to such strategies.

Characteristics of individual leaders may also affect their tenure. Older rulers may be more vulnerable to challenges, although those with greater experience may handle threats more adeptly (Londregan and Poole 1996, Bienen and van de Walle 1991). The passage of time may help incumbents to secure themselves, but discontent may also cumulate, rendering the effect of time unclear (Londregan and Poole 1996). Wars are bound to matter (Bueno de Mesquita and Siverson 1995, Chiozza and Goemans 2004). During a civil war, rulers are more likely to be overthrown. Almost by definition, a ruler who loses a civil war is likely to fall, and one who wins is more likely to survive. The implications of external war are less obvious. They may cause citizens to rally behind their commander-in-chief, but they may also destabilize the incumbent. Victory should improve the leader’s prospects, while defeat may prompt externally imposed or internally generated change. Finally, stability or instability may spread across borders: the fall of one country’s ruler may encourage regime opponents in others, producing regional waves of turnover.

All these factors have been examined in previous work so I control for them here. But my key hypothesis is that economic growth increases a leader’s odds of survival. I also look to see if the level of economic development has a direct effect. And, motivated by earlier work, I check whether growth affects turnover differently in democracies and non-democracies (Bueno de Mesquita et al. 2003).

Scholars have used various statistical methods to analyze leadership change. I show results with four alternative models. The dependent variable in each is a dummy that equals 1 if the leader is replaced and 0 otherwise.<sup>21</sup> First, to control for country and year in a way that parallels the previous analysis, I estimate the relationship by OLS with country and year fixed effects. Second, to better accommodate the non-linear nature of the dependent variable, I use a conditional logit fixed effects model, including year dummies. I run both of these models on country-year data. Some papers have analyzed leader-year data with hazard models (e.g., Chiozza and Goemans 2004). These have a number of attractive features. For instance, besides gauging the impact of independent variables, one can calculate a hazard rate at which leaders are replaced on average, other things equal. As in Bueno de Mesquita and Smith (2010), I fit a Weibull hazard model, which allows the hazard rate to change over time; how it changes depends on an “ancillary parameter,”  $p$ , which is estimated from the data. I model this parameter as a function of whether the country is a democracy (Polity2 greater than 5).<sup>22</sup>

One concern is that regressions of leader replacement on economic growth might pick up the opposite causal process: more leadership change might, by creating uncertainty for investors, inhibit growth. To address this, I estimate a model instrumenting for the growth rate with a trade-weighted measure of average growth in all *other* countries. Specifically, the instrument is:

$$\hat{g}_{at} = \frac{\sum_{b \neq a} \omega_{abt-1} I_{bt} g_{bt}}{\sum_{b \neq a} \omega_{abt-1} I_{bt}} \quad (2)$$

where  $g_{bt}$  is the growth rate of GDP per capita in country  $b$  in period  $t$ ;  $I_{bt}$  is an indicator that takes the value one if the dataset includes data on growth in country  $b$  in period  $t$  and 0 otherwise; and  $\omega_{abt-1} = X_{abt-1} / Y_{at-1}$ , where  $X_{abt-1}$  is trade between  $a$  and  $b$  in period  $t-1$ , and  $Y_{at-1}$  is country  $a$ 's GDP in period  $t-1$ . The trade data come from Russett, Oneal, and Berbaum (2003); since these data end in

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<sup>21</sup> I code as 0 cases in which the leader died in office of natural causes, committed suicide, or retired because of ill health as I wish to focus on removal through social action; of course, suicide and ill health might be prompted by the stress of leadership challenges, but they will often be exogenous to such processes.

<sup>22</sup> Bueno de Mesquita and Smith (2010) model this as a function of what they call “coalition size”. The Weibull function can be written:  $h(t) = p \exp(X\beta)t^{p-1}$ , where  $h(t)$  is the hazard at time  $t$ ,  $p$  is the ancillary “shape” parameter,  $X$  is a vector of explanatory factors, and  $\beta$  is a vector of their estimated coefficients.

1992, I use the trade weights from 1992 for the years 1993-2008. Trade-weighted growth in other countries is strongly correlated with growth in the first stage regression.<sup>23</sup>

The main finding in Table 4 is that, as hypothesized, economic growth is a highly significant determinant of the turnover of leaders. Where growth is higher, leaders are less likely to be replaced. The coefficients cannot be compared directly across different methods of estimation, but growth is statistically significant in all. In columns 3, 5, and 7, the interaction of growth with democracy is also statistically significant and positive, implying that the effect of growth on leader survival is greater in non-democracies than in democracies. (However, the interaction is not significant in the models with multiple controls.)<sup>24</sup> The estimates from the Weibull models in columns 7-8 imply that each additional percentage point of growth reduces the hazard rate by 3-5 percentage points for leaders of non-democracies, and by about 2 percentage points for leaders of democracies.

Columns 3 and 4 suggest that the impact of growth on leader survival may, indeed, be causal. No instrument is perfect. One can think of ways in which the exclusion restriction might fail; higher growth in other countries might affect leadership turnover in the given country by influencing the frequency of wars, for instance. Still, the results in columns 3 and 4 increase confidence that lower growth causes more frequent leader replacement, and the estimated effect when instrumented is considerably larger than that in columns 1 and 2. Leadership turnover does not appear to be related to the level of income. With controls included—and generally even without—the coefficient on log GDP per capita is close to zero and statistically insignificant.

As expected, regime type also matters. Consistent with previous work, leaders are replaced more often in democracies (Londregan and Poole 1996, Bueno de Mesquita and Smith 2010). I use the rescaled Polity2 index in the basic regressions, but a dummy for Polity2 > 5 in those that control for

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<sup>23</sup> This instrument is similar to one that AJRY (2008) use for per capita income. Although I tried to instrument for income using an instrument corresponding to theirs, in the larger dataset used in this paper the instrument was too weakly correlated with income to serve adequately.

<sup>24</sup> Bueno de Mesquita et al. (2003) similarly find that economic growth has a greater effect in non-democracies (small-coalition systems); however, they argue that the incentive to pursue growth will still be stronger in democracies because they have a much higher baseline hazard rate (from estimates of the ancillary parameter). My aim here is not to compare the motivation to promote growth under democracy and autocracy but just to show that for dictators securing a higher growth rate is an effective way to reduce the odds of being deposed.

**Table 4: Why leaders lose office**

<i>Data format:</i>	<i>country/year</i>		<i>country/year</i>		<i>country/year</i>		<i>leader/year</i>	
<i>Method:</i>	<i>OLS, country and year</i>		<i>IV, country and year</i>		<i>Fixed effects conditional</i>		<i>Weibull</i>	
	<i>fixed effects</i>		<i>fixed effects</i>		<i>logit, year dummies</i>		<i>hazard model</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln GDP per Capita $t-1$	-.01 (.02)	.01 (.02)	-.02 (.02)	-.02 (.03)	-.09 (.12)	.04 (.13)	-.09* (.05)	-.01 (.06)
GDP per Capita Growth Rate	-.004*** (.001)	-.004*** (.001)	-.015*** (.006)	-.016** (.007)	-.05*** (.01)	-.04*** (.01)	-.05*** (.01)	-.03*** (.01)
Democracy $t-1$								
Rescaled Polity2 score	.21*** (.03)		.17*** (.04)		1.40*** (.15)		.76*** (.19)	
Dummy for Polity2>5		.11*** (.04)		.08** (.04)		.66*** (.16)		.00 (.20)
Democracy $t-1$ * Growth Rate	-.001 (.002)	-.002 (.002)	.010* (.005)	.005 (.005)	.03* (.02)	.00 (.01)	.03*** (.01)	.01 (.01)
Proportion of other countries in region that replaced their leaders		-.03 (.06)		.01 (.05)		-.34 (.33)		1.47*** (.26)
Leader's age		-.000 (.001)		-.001 (.001)		-.004 (.004)		.015*** (.004)
Previous times in office		.01 (.01)		.008 (.014)		.03 (.06)		.11** (.05)
Leader's years in office this time		.000 (.001)		.001 (.001)		.00 (.01)		-.035** (.016)
Monarchy $t-1$		-.04 (.04)		-.03 (.04)		-.27* (.16)		-.10 (.16)
Military regime $t-1$		.06** (.03)		.05 (.03)		.46** (.20)		.21 (.17)
Authoritarian regime with elected parliament $t-1$		.02 (.02)		.01 (.02)		.15 (.13)		-.08 (.13)
Civil war in progress		.08*** (.03)		.05** (.02)		.51*** (.17)		.30** (.13)

Country won civil war								
this year or last year								
Country lost civil war								
this year or last year								
Interstate war in progress								
Country won interstate war								
this year or last year								
Country lost interstate war								
this year or last year								
Constant								
Ancillary parameter (ln(p))								
Democracy (Polity2 > 5)								
Constant								
t-score (significance level)								
growth instrument in first stage								
Fisher p level								
Observations								
Countries								
Leaders								
R-squared								

**Sources:** see Table A4 in appendix.

**Note:** Robust standard errors, clustered by country, in parentheses; \* p<.10, \*\* p<.05, \*\*\* p<.01. All data are annual. "Fisher p level" is probability level at which one can reject H0: residuals are I(1), from Fisher test of residuals. Models 3 and 4: growth instrumented with trade-weighted growth in other countries.

types of authoritarian regime, since these controls overlap with what Polity2 is supposed to measure. Besides the coefficients on the democracy terms, estimates of the ancillary parameter suggest the shape of the hazard function differs for democracies and non-democracies: the odds of losing office fall over time in both, but much faster in non-democracies. For example, using model 8, in a non-democracy the leader's hazard rate after five years is just one third of his hazard rate after one month; in a democracy, the rate after five years is still three quarters of the one-month rate.<sup>25</sup>

Among the other controls, those related to war were most significant. A leader fighting a civil war—or who had just lost one—was more likely to be deposed.<sup>26</sup> Victory in a civil war was associated with lower odds. The results for interstate war were less clear, but winning one may have increased—and losing decreased—the leader's tenure. In the hazard model, a leader's age and more previous spells in government were both associated with higher odds of replacement, but the longer he had been in office this time, the lower were the odds.<sup>27</sup> A faster rate of turnover in the region also implied lower survival odds. However, none of these findings was significant when estimated in country-year data with linear models or conditional logit, controlling for unobserved heterogeneity of countries. Military regimes may replace leaders more often than other types of autocracy.

These findings are generally consistent with those of Londregan and Poole (1996) and Bueno de Mesquita and Smith (2010), who also analyzed the causes of leadership turnover. This is interesting, in itself, since I am able to include a much larger number of data points, extending further back in time, and to show that various results hold using a number of different estimation methods.<sup>28</sup> Neither of these papers instrumented for economic growth.<sup>29</sup>

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<sup>25</sup> The parameter  $p$  is  $\exp(-.32 + .25) = .93$  for democracies and  $\exp(-.32) = .73$  for non-democracies. Thus, the ratio of the hazard rate after 60 months to that after one month is  $.93 \exp(X\beta)60^{-.07} / .93 \exp(X\beta)1^{-.07} = .75$  for democracies and  $.73 \exp(X\beta)60^{-.27} / .73 \exp(X\beta)1^{-.27} = .33$  for non-democracies.

<sup>26</sup> As in prior papers, I focus on civil wars that cause 1,000 battle-related combatant deaths within 12 months.

<sup>27</sup> This is consistent with Bienen and van de Walle (1991), but not Londregan and Poole (1996); Bueno de Mesquita and Smith (2010) found that age lowered survival for leaders of non-democracies, but not democracies.

<sup>28</sup> In their leadership change regressions, Londregan and Poole (1996) report 2,707-2,798 observations, from 1952-1985; Bueno de Mesquita and Smith's (2010) regressions include 1,452-5,831 observations, from 1960-2000. Bueno de Mesquita et al. (2003, p.303) report regressions for the impact of growth on leader survival that

The Archigos database distinguishes four ways leaders leave office. Besides death from natural causes and removal by another state, they may be replaced in a “regular” or an “irregular” manner. “Regular” replacements occur “according to the prevailing rules, provisions, conventions, and norms of the country” (Goemans et al. 2009, p.272). Although such turnovers are the rule in democracies, they also occur in authoritarian regimes, as, for instance, when an heir inherits the throne in a dynastic monarchy. “Irregular” replacements occur amid abnormal events such as military coups or popular revolts. In Table A3 in the appendix, I analyze regular and irregular leadership change separately. Higher economic growth reduces the odds of being removed from office in either a regular or an irregular manner; for both, growth may matter more in non-democracies than in democracies. And, as before, the instrumental variables regressions suggest that the effect of growth is much larger once endogeneity is taken into account.<sup>30</sup>

In sum, dictators have an incentive to support economic growth since this increases their odds of survival. Of course, this holds other things equal. Other survival strategies—such as expropriating businesses to enrich key supporters—may depress growth (Bueno de Mesquita et al. 2003), so autocrats trade off the marginal benefit of growth against those of alternative approaches. Dictators who control copious free resources in the form of oil rents or unconditional foreign aid may focus on patronage and repression rather than stimulating the economy (Bueno de Mesquita and Smith 2009). Still, economic downturns are such a familiar engine of public protest in authoritarian states that dictators try hard to avoid them. From Tunisia’s Ben Ali to Chile’s Pinochet, many have

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include 5,821 data points. Using Maddison’s GDP estimates, I am able to include 6,872-10,757 observations, going back to 1875 in some cases. At times, broader time coverage requires dropping controls for which data availability is a problem. My strategy is to include full sets of country and year dummies to pick up much of the unobserved heterogeneity. Londregan and Poole also included country but not year fixed effects. Bueno de Mesquita and Smith (2010) and Bueno de Mesquita et al. (2003) used only hazard models without fixed effects.

<sup>29</sup> Campante and Chor (2011) argue that the frustrated ambitions of over-educated youths increase the pressure on incumbent leaders, accelerating turnover. In a panel of countries between 1976 and 2010, they show that, for a given level of national income, the more educated the population was, the more frequently its leaders were replaced. Since using even the most comprehensive data available on education levels would require a drastic drop in coverage, I do not include controls for education and its interaction with income here. In regressions that do control for these (not shown), the results for growth are similar (sometimes slightly less significant), and the estimated effects of education and its interaction are generally consistent with Campante and Chor’s argument.

<sup>30</sup> The income level is not a significant determinant of either type of leadership change. Being in a civil war—and having just lost one—were associated with higher odds of irregular, but not regular, replacement.



sought to ensure at least moderate growth. By the time these dictators did leave office, their countries had become much more developed, enhancing the prospects of a political opening.

## 5 The global dimension

I have shown the relationship between economic growth and leadership change in individual countries. But what about the world as a whole? Global economic progress is far from even.

Countries periodically succumb to recessions that spread across borders. One might expect to see such economic contractions reflected in the rates of leadership turnover around the world. Economic downturns are known to affect political attitudes. In the US, distrust of the national authorities rises during recessions. During the recent international financial crisis, trust in government fell more in those countries where unemployment rose the most (Stevenson and Wolfers 2011).

To examine this, I constructed time series of the average growth rate in the world, the proportion of countries experiencing negative growth—which is one definition of recession—and the proportion of countries in which the leader was replaced. Table 5 reports two error correction models that estimate both the long run equilibrium and short run dynamic relationships between economic performance in the world and leadership turnover. The models take the form:

$$\Delta l_t = \alpha + \beta \Delta g_t + \gamma l_{t-1} + \delta g_{t-1} + \eta d_{t-1} + \phi year_t + u_t \quad (3)$$

where  $l_t$  is the proportion of countries that replaced their leader in period  $t$ ;  $g_t$  is either the average growth rate of GDP per capita in all countries in period  $t$  (model 1) or the proportion of countries with negative growth rates (model 2);  $d_t$  is the average democracy score in all countries in  $t$ ;  $year_t$  is a variable equal to the year; and  $u_t$  is a random error. I control for the world average democracy level because we know from Table 4 that leadership turnover is higher in democracies. I also control for year to allow for a possible long-term trend (the regressions confirm a downward trend). Finally, I test the residuals from these regressions for stationarity using the Augmented Dickey Fuller and Phillips Perron tests and show that we can reject with high confidence that they have a unit root.

**Table 5: The global economy and leader turnover, 1875-2004**

<i>Dependent variable: change in proportion of countries where leader was replaced</i>		
	(1)	(2)
$\Delta$ Global average growth rate	-.006** (.003)	
$\Delta$ Proportion of countries with negative growth		.11*** (.04)
Global average growth rate $t_{-1}$	-.005 (.003)	
Proportion of countries with negative growth $t_{-1}$		.11** (.04)
Proportion of countries where leader replaced $t_{-1}$	-.77*** (.09)	-.79*** (.09)
Average democracy score (Polity2 rescaled) $t_{-1}$	.35*** (.08)	.37*** (.08)
Year	-.0007*** (.0002)	-.0006*** (.0002)
Constant	1.27*** (.30)	1.17*** (.29)
Observations	130	130
R-squared	.4023	.4216
ADF test of H0: residuals are I(1)	-5.22***	-5.26***
Phillips-Perron test of H0: residuals are I(1)	-9.71***	-9.40***

**Sources:** see Table A4 in appendix.

**Note:** Robust standard errors in parentheses; \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

The results in Table 5 suggest there are, indeed, both long and short run relationships between the state of the world economy and the rate of leadership change. In the short run, a one percentage point fall in the average growth rate worldwide—as occurred, for instance, in 1961—translates into a 0.6 percentage point increase in the number of countries where leaders are replaced. A 10 percentage point increase in the number of countries with negative growth—as in 2001—is associated with an immediate 1.1 percentage point increase in the number of countries with leadership change (which, in 2001, would mean about two additional leaders deposed).

Besides the short run effect, leadership turnover and the proportion of countries with negative growth are in a long run equilibrium: the more countries with contracting economies, the more leadership change.<sup>31</sup> To see the size of the total effect, it is useful to simulate a major global

<sup>31</sup> There is probably also a relationship with the average growth rate, but it is significant at only  $p = .13$ .

downturn like that of the 1930s. Fixing the average level of democracy worldwide at its 1928 level, and starting the rate of leadership turnover at its equilibrium level given the other variables, I calculated what path of leadership change in the following years was implied by the pattern of actual economic growth (using the model in Table 5, column 2). The share of countries with negative growth increased from 23 percent in 1928 to 81 percent in 1931, before falling back to 21 percent in 1937. Compared to the leadership change to be expected had the proportion of countries with negative growth remained 23 percent, the model implies a rate of turnover higher by one percentage point in 1929, five points in 1930, and seven points in 1931 and 1932, after which the rate would have fallen back to around its starting level by 1935. In combination, these higher rates would have resulted in leaders being replaced in an additional 18 country-years.<sup>32</sup>

In short, global recessions and depressions lubricate the system, increasing leader turnover. This does not by itself produce greater democracy. What regime results when a ruler falls depends in part on the country's level of economic development. In poorer democracies, the incumbent's departure may prompt reversion to dictatorship, as in 1930s Europe. But for those non-democracies that have reached a high national income, the odds favor transition to democracy.

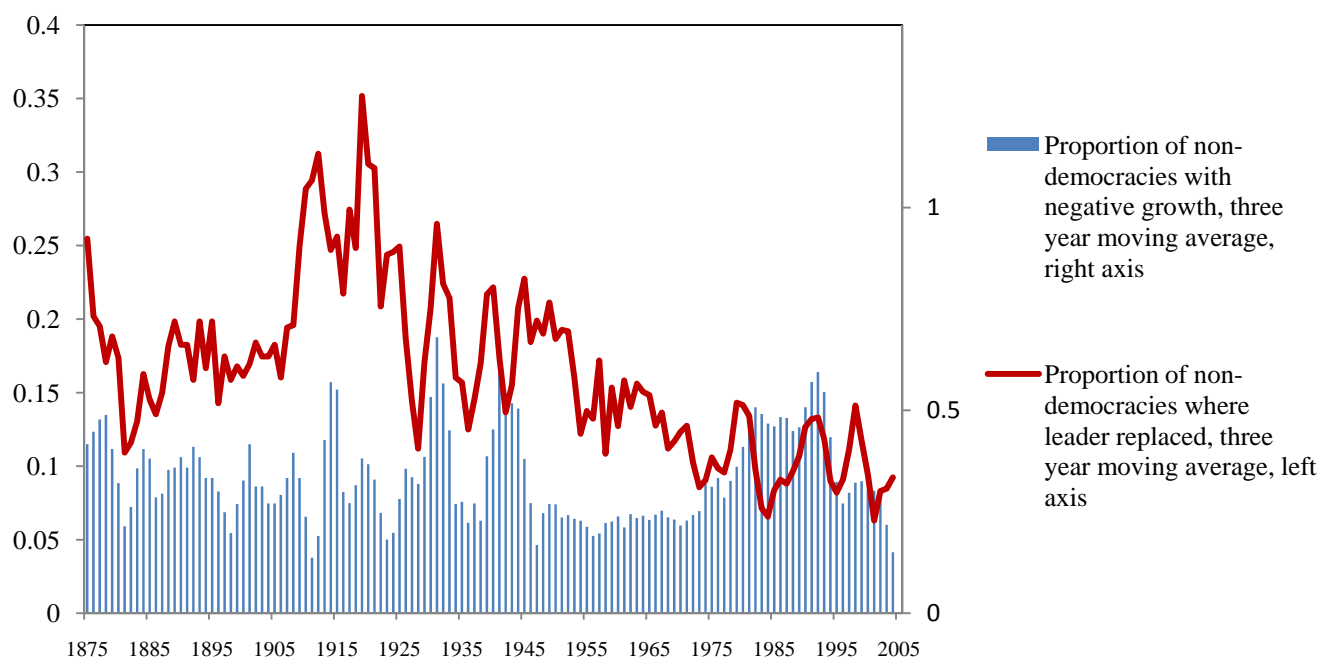
Finally, analysis of the global rate of leadership turnover suggests one reason why since World War II the link between income and democracy has seemed to weaken. As Figure 1 shows, the rate of leadership change in non-democracies has trended down since the early 20th Century, and it has been at a historic low since 1950. If, as argued, economic development affects the political regime mostly in periods after leadership change, lower ruler turnover should result in a weaker—and harder to detect—relationship between income and democracy.

Why were leaders changed less frequently in recent decades? Superpower competition during the Cold War may have enabled dictators to bid for aid from Washington or Moscow, helping them resist domestic challenges (Boix 2009). However, the rate remained low even after the Cold War's end. In the 1950s and 1960s, unusually broad and stable economic growth may have depressed

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<sup>32</sup> I multiply the annual increments in the proportion of countries predicted to replace leaders by the number of countries for which there were data in these years (67 to 69). Since some of the cases of turnover might have been in the same countries, we cannot say in exactly how many countries change would have occurred.

turnover, as described here. Between 1946 and 1973, the share of countries where GDP per capita fell was consistently low. However, severe recessions returned after the 1970s, so this cannot be the whole explanation. In part, decreasing turnover probably reflects a selection effect: as more autocracies turn democratic, those left are the hardest cases—countries whose dictators are entrenched particularly securely or enjoy some unusual advantage such as vast mineral wealth. As the balance among the world’s autocracies shifts from the likes of PRI Mexico and Greece’s generals to Kim Jong Il’s North Korea and the Persian Gulf emirates, leadership change becomes rarer.



**Figure 1: Economic growth and leadership change in non-democracies, 1875-2005**

**Source:** See Table A4 in appendix.

**Note:** "Non-democracies" are those with Polity2 scores below 6.

## 6 Conclusion

In *Lectures on the Philosophy of World History*, Hegel gave the name “the cunning of reason” to the way great leaders, driven only by the “energy of their ego,” and seeking their own self-aggrandizement, were unwittingly used by history for its own purposes (Hegel 1980 [1837], pp.86-9).

A Napoleon Bonaparte or a Julius Caesar sought only personal power and glory. Yet such men became the tools by which outmoded political orders were destroyed and ever more universal forms of the state brought into being. Of course, the logic identified here is not exactly Hegel's; the notion that economic development drives political change is closer to Marx. But the idea that autocrats, merely by trying to ensure their supremacy and survive a little longer, end up preparing their countries—and the world—for breakthroughs to democracy does have a Hegelian flavor.

Dictators like Tunisia's Ben Ali promote their countries' economic development because higher growth each year decreases the odds that they will be overthrown. Although some pretend otherwise, most do not see themselves as preparing the ground for democracy after they depart. In the short run, rising incomes allow them to freeze or even curtail political freedoms and popular participation. But when they are eventually forced out—whether by a drop in growth, a civil war, or some other shock—the level of income that their survival strategy has produced over the years influences whether or not the country jumps to a higher level of democracy.

Worldwide, this self-interested behavior of dictators produces a kind of democratic ratchet. Periodic global or regional recessions turf out incumbent leaders at a higher rate than usual. When recession comes after years of subterranean modernization within autocratic regimes, the extra turnover translates into a wave of democratization. Neither economic development nor leadership change by itself produces democracy, but together they increase the odds of transition. As long as countries continue getting richer, better educated, and more modern in other respects, the screw turns in one direction. In rich democracies, recessions also overturn incumbent leaders, although the effect is weaker than in autocracies. But there is no sign that this threatens democracy.<sup>33</sup>

It is worth restating that, empirically, it is the level of income, not recent growth, that is associated with more accountable government. A high level of income stands in for many aspects of modernity—broad and deep education, social complexity, communications technology, liberal

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<sup>33</sup> I ran regressions corresponding to those in Table 2, Panel A, but for just countries with Polity2 scores of 6 or higher. The coefficient on ln GDP per capita interacted with leadership turnover was always either insignificant or significant and positive, suggesting that even for countries near the top of the democracy scale, higher income when accompanied by leadership turnover leads to more democracy. However, the relatively small number of cases and the severe censoring issue in this subset dictates caution with regard to these results.

values—that increase the demand for and ability to sustain democracy. By contrast, the immediate effect of high growth is to strengthen the incumbent ruler, reducing pressure for reform. Of course, over time growth leads to high income, which, after the leader falls, increases the odds of a jump to democracy. But poor countries can grow for some time before getting very rich. And relatively rich and modern countries, even if growth stalls for a while, do not lose the ability to sustain democracy.

This logic can explain the pattern of “two steps forward, one step back,” in which waves of democratization are followed by stasis or even temporary reversions (Huntington 1991). The world economy and the economies of subregions also exhibit a wave-like pattern of change. During periods of high, relatively stable growth, incumbents—whether in democracies or autocracies—can entrench themselves; those so inclined can use their popularity and increased budget revenues to curb popular control. As Diamond notes, in developing countries from Nigeria to the Philippines executive abuses have recently eroded democracy despite robust economic performance (2011, p.21). For a while, the levels of democracy and economic development can get out of synch. But this increases the gap to be crossed quickly when leadership change once again puts constitutional questions on the agenda.

The logic also explains why modernization theory often seems at odds with current events, and why breakthroughs to more accountable government frequently come as a surprise. Under Brezhnev, Soviet society grew more educated, urban, and differentiated, without any sign of democratization. In retrospect, we see that this prepared the ground for a significant leap forward under Mikhail Gorbachev. In Indonesia under Suharto, per capita GDP more than tripled (Table 3). Yet, two years before the general was forced out by street protests, his autocratic regime seemed to informed observers more secure than ever (Liddle 2007). That democracy made almost no inroads in North Africa and the Persian Gulf before the recent uprisings does not mean that these states will not democratize in the future; it suggests they may move quickly once they start. Similarly, the doubling of GDP per capita in Russia between 1998 and 2008 alongside the gradual hollowing out of democratic institutions does not show that income and democracy are unrelated. It suggests a gap has opened that may be closed faster than many expect.

As usual, various caveats need to be considered. To have identified a pattern in the statistics does not guarantee that the same pattern will continue to hold. History often changes direction. As noted, leadership turnover in the remaining authoritarian states has been slowing since the early 20<sup>th</sup> Century. If this continues, shifts from dictatorship to democracy may become both rarer and more extreme. It is also possible that as authoritarian government becomes increasingly restricted to totalitarian regimes and oil states the processes witnessed to date may no longer operate.

Although economic development is associated with democracy, that does not mean historical junctures do not also matter. The country fixed effects capture the influence of such factors; many are statistically significant, with large coefficients. For instance, in the 20-year panel in Table 1, Panel B (1820-2008), the country fixed effects range from a high of .18 for India—suggesting it is more democratic than predicted given its income—to a low of -1.44 for Qatar—which is far less democratic than expected. The year fixed effects are also important. These increase through the 19<sup>th</sup> Century until around the First World War, then oscillate in a range until the 1980s, when they shoot up again. Controlling for income, countries were far more likely to become more democratic after 1985 than in previous eras. Of course, country and year dummies do not in themselves explain the variation they capture. The statistical “horse race” between a single meaningful variable such as income or education and scores or hundreds of meaningless dummies is hardly a fair contest. The real challenge for believers in critical junctures is to define and measure a parsimonious set of substantive variables that capture the historical causes of countries’ divergent paths and to show that these fit the variation in democracy more closely than does income.

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## Appendix

### Income and Democracy, alternative formulations, extensions and robustness checks

In Table A1, Panel A, I regress the Polity2 index on income for all countries whose Polity2 score in the previous period was less than a perfect +10. Income is significantly related to democracy in the 10- to 20-year panels. To address the censored data problem, Benhabib et al. (2011) use an estimator developed by Alan, Honoré, and Leth-Petersen (2008) that allows for censoring at the top and bottom while also incorporating fixed effects to control for unobserved heterogeneity. Panel B shows results with this estimator, run using the STATA routine provided by Honoré.<sup>34</sup> In the 10, 15, and 20-year panels, I was able to include year fixed effects as well. In the 5-year and annual panels, this was not possible because of the large number of parameters. Income is statistically significant in all panels, with the magnitude of the effect increasing as panel frequency falls.

The standard fixed effect OLS model in equation (1) can yield biased estimates because the lagged dependent variable,  $d_{it-1}$ , will be mechanically correlated with the error term for all periods before  $t$ . To deal with this, AJRY (2008) also estimate using the dynamic GMM estimator of Arellano and Bond. In Panel C I do the same, using the full 1820-2008 data, but excluding countries that already had perfect democracy scores. The Arellano-Bond procedure is appropriate for panels with few time periods relative to the number of units. This is clearly not the case for the annual data—in fact, STATA was unable to estimate the model—so I show results for panels of from 5 to 20 years. In the first three cases I instrument for both democracy and income with their second lags; in the 20 year panel, I include a second lag of the dependent variable to reduce autocorrelation and instrument with the third lag of democracy and the second lag of income. The results follow the familiar pattern, with the effect of income increasing as the panel interval grows, at least up to a frequency of 15 years.

The apparently greater impact of income in lower frequency panels might reflect merely the larger share of pre-1945 observations in such panels; the proportion of these rises mechanically as

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<sup>34</sup> The STATA routine is available at Bo Honoré's website, [www.princeton.edu/~honore/stata/index.html](http://www.princeton.edu/~honore/stata/index.html).

the gap between panel years lengthens. Panel D shows that the same pattern of larger and more significant income effects at medium-to-long panel intervals emerges also in a model run on just the pre-1945 data. (The smaller number of observations means statistical significance is lower.)

Countries' odds of becoming democratic might depend on their past experience with democracy. Persson and Tabellini (2009) constructed a sophisticated measure of accumulated democratic experience, which they call "domestic democratic capital."<sup>35</sup> At the same time, the likelihood of a transition in one country might be influenced by the extent of democracy in other countries, especially those nearby (Gleditsch and Ward 2006, Gleditsch and Choung 2004). Democratization tends to come in waves that are concentrated in time and space (Huntington 1991). Persson and Tabellini also constructed an index of "foreign democratic capital," which essentially measures the average level of democracy in other countries, weighted by their distance.<sup>36</sup> In panel E, columns 1-5, I show regressions for 1820-2008, controlling for Persson and Tabellini's measures of domestic and foreign democratic capital. The results for income are largely unchanged.<sup>37</sup>

Table A2 estimates the relationship between income and democracy, conditional on leadership change, for just 1960-2000. Although statistical significance is weaker, the relationships are similar to those in Table 2. Table A3 examines separately the determinants of regular and irregular leadership change. Table A4 lists data sources.

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<sup>35</sup> They assume this accumulates at a fixed rate in each year a country is democratic ( $\text{Polity2} > 0$ ) and depreciates geometrically in years of autocracy. Specifically, domestic democratic capital,

$$z_{it} = (1 - \delta) \sum_{\tau=0, \dots, t_0} (1 - a_{i-\tau}) \delta^\tau$$

, where  $i$  indexes countries,  $t$  indexes year,  $t_0$  is the initial year,  $a$  takes the value 1 for autocracies and 0 for democracies, and  $\delta$  is a discount rate that they estimate from the data.

<sup>36</sup> Their measure of foreign democratic capital is:  $f_{it} = \left( \sum_{j \neq i} (1 - a_j) \varpi(\rho) \right)_t^{ij}$ , where  $i$  and  $j$  index countries,  $\varpi^{ij}$

measures the distance between  $i$  and  $j$ , and  $\rho$  operationalizes a geographical limit beyond which influence falls to zero, which they, in fact, estimate from the data.

<sup>37</sup> Note that this is not a test of the importance of domestic and foreign democratic capital, which are meant as substantively richer substitutes for the lagged dependent variable and the country and year fixed effects, which pick up much of the same variation. If the fixed effects and lagged dependent variables are dropped, the two kinds of democratic capital are highly significant—see panel E, column 6.

**Table A1: Income and democracy, robustness checks and extensions**

<i>Type of panel:</i>	<i>(A) 1820-2008, Polity2<sub>t-1</sub> &lt; 10</i>					<i>(B) 1820-2008, Polity2</i>					<i>(C) 1820-2008, Polity2<sub>t-1</sub> &lt; 10</i>			
	<i>OLS, country and year fixed effects</i>					<i>Honoré Two Side Estimator</i>					<i>Arellano-Bond GMM</i>			
	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>
Democracy <sub>t-1</sub>	.90*** (.01)	.54*** (.04)	.21*** (.07)	-.10 (.09)	-.11 (.09)	.97*** (.00)	.79*** (.03)	.30*** (.08)	.01 (.10)	-.06 (.09)	.47*** (.10)	.23*** (.12)	.02 (.15)	-.33* (.18)
Ln GDP per Capita <sub>t-1</sub>	.001 (.005)	.027 (.024)	.12** (.05)	.17* (.10)	.24** (.10)	.016*** (.002)	.10*** (.01)	.21*** (.05)	.31*** (.09)	.40*** (.10)	-.17 (.13)	.32* (.19)	.65** (.26)	.57* (.32)
Democracy <sub>t-2</sub>														-.28* (.15)
Implied cumulative effect of income	.01	.06	.15**	.16*	.22***						-.33	.41	.66***	.43*
Observations	8,349	1,584	733	409	327	10,305	1,933	884	503	391	1,368	566	276	142
Countries	159	154	134	128	128	164	160	134	115	100	151	128	110	53
AR(2) test											[.97]	[.25]	[.73]	[.16]
Hansen J-test											[.52]	[.49]	[.23]	[.50]
Fisher p level	[.00]	[.00]	[.00]	[.03]	[.15]									
R-squared	.9229	.7245	.6510	.6580	.7011									
Pct. censored below						19	19	19	22	21				
Pct. censored above						3	3	4	2	3				

<i>Period of panel:</i>	<i>(D) 1820-1945: Polity2<sub>t-1</sub> &lt; 6</i>					<i>(E) 1820-2008: Polity2<sub>t-1</sub> &lt; 6</i>					
	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>
	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>15-yr</i>	<i>20-yr</i>	<i>10-yr</i>
Democracy <sub>t-1</sub>	.90*** (.02)	.59*** (.09)	.33** (.14)	-.30 (.22)	-.45* (.22)	.91*** (.01)	.58*** (.06)	.23** (.09)	-.03 (.13)	.08 (.13)	
Ln GDP per Capita <sub>t-1</sub>	.01 (.01)	.04 (.05)	.16** (.08)	.07 (.30)	.50 (.32)	.006 (.006)	.04 (.03)	.15*** (.05)	.13 (.10)	.27** (.12)	.07*** (.02)
Domestic democratic capital <sub>t-1</sub>						-.04** (.02)	-.08 (.05)	-.04 (.09)	-.09 (.12)	-.12 (.20)	.32*** (.05)
Foreign democratic capital <sub>t-1</sub>						.01 (.07)	.38 (.29)	.61 (.58)	.93 (.91)	.67 (1.07)	.31*** (.12)
Implied cum. effect of inc.	.06	.09	.25	.05	.35	.06	.09	.20***	.12	.29**	
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.99]	[.00]	[.00]	[.00]	[.00]	[.18]	[.00]
Observations	1,741	365	202	95	87	5,913	1,264	603	341	272	603
Countries	48	43	41	32	36	135	132	119	115	113	119
R-squared	.8893	.7014	.6739	.7108	.7561	0.8545	.6159	.5861	.6665	.6940	.1673

**Sources:** see Table A4.

**Note:** standard errors in parentheses; \* p<.10, \*\* p<.05, \*\*\* p<.01. All except Panel B: robust standard errors, clustered by country in A, D, E. All regressions except first two columns of Panel B and last of Panel E include year dummies. Implied cumulative effect of income, all except last column of Panel C: coefficient on Ln GDP per Capita<sub>t-1</sub>/(1 - coefficient on Democracy<sub>t-1</sub>); cumulative effect of income, last column of Panel C: coefficient on Ln GDP per Capita<sub>t-1</sub>/(1 - coefficient on Democracy<sub>t-1</sub> - coefficient on Democracy<sub>t-2</sub>). Arellano-Bond regressions: Democracy and Ln GDP per Capita instrumented with second lags (5, 10, 15-yr regressions) and Democracy by 3rd lag and Ln GDP per capita by 2nd lag (20-yr regression); in final column, second lag of Democracy included to reduce autocorrelation. “Fisher p level” is probability level at which one can reject H0: residuals are I(1), from Fisher test of residuals.

**Table A2: Income, democracy, and leadership change: 1960-2000**

<i>Period of panel:</i>	<i>(A)</i>				<i>(B)</i>			
	<i>1960-2000: Polity, Polity2&lt;6</i>				<i>1960-2000: BR binary measure, non-democracies</i>			
	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>10-yr</i>	<i>1-yr</i>	<i>5-yr</i>	<i>10-yr</i>	<i>10-yr</i>
Democracy $t-1$	.85*** (.02)	.35*** (.08)	.06 (.12)	-.01 (.15)				
Leader replaced in previous period	-.08 (.05)	-.09 (.16)	-.22 (.31)	-.01 (.07)	-.10 (.11)	-.23 (.25)	-.21 (.43)	-.07 (.12)
Ln GDP per Capita $t-1$	-.00 (.01)	.01 (.04)	.04 (.07)		.01 (.01)	.04 (.05)	.09 (.09)	
Ln GDP per Capita $t-1$ * leader replaced	.014* (.007)	.02 (.02)	.05 (.04)		.02 (.01)	.04 (.03)	.04 (.06)	
Average years of schooling (ages 15 and over) $t-1$				-.01 (.04)				-.09 (.08)
Average years of schooling $t-1$ * leader replaced				.07*** (.02)				.08** (.03)
Implied cumulative effect of income								
if leader replaced	.06	.06	.09		.02	.08	.13	
if leader not replaced	-.03	.02	.04		.01	.04	.09	
Implied cumulative effect of schooling								
if leader replaced				.05				-.01
if leader not replaced				-.01				-.09
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]
Observations	3,576	744	385	192	3,501	725	373	176
Countries	125	124	110	54	124	123	112	53
R-squared	.8161	.6274	.6643	.7050	.1097	.3478	.5195	.5441

**Sources:** see Table A4.

**Note:** All estimations by OLS with country and year fixed effects. Robust standard errors, clustered by country, in parentheses: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ . “Fisher p level” is probability level at which one can reject  $H_0$ : residuals are  $I(1)$ , from Fisher test of residuals.

**Table A3: Regular and irregular leader replacement**

<i>Type of leader replacement</i>	<i>Regular</i>		<i>Regular</i>		<i>Irregular</i>		<i>Irregular</i>	
<i>Method:</i>	<i>OLS, country and year</i>		<i>IV, country and year</i>		<i>OLS, country and year</i>		<i>IV, country and year</i>	
	<i>fixed effects</i>		<i>fixed effects</i>		<i>fixed effects</i>		<i>fixed effects</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln GDP per Capita $t-1$	.001 (.018)	.01 (.02)	-.01 (.02)	-.00 (.02)	.002 (.009)	.013 (.009)	-.011 (.010)	-.007 (.011)
GDP per Capita Growth Rate	-.002** (.001)	-.002*** (.001)	-.013** (.005)	-.013* (.007)	-.003*** (.001)	-.003*** (.001)	-.007** (.003)	-.009*** (.003)
Democracy $t-1$								
Rescaled Polity2 score	.19*** (.03)		.15*** (.03)		.00 (.02)		-.004 (.02)	
Dummy for Polity2>5		.10*** (.03)		.08** (.04)		-.018 (.017)		-.02 (.02)
Democracy $t-1$ * Growth Rate	-.002 (.002)	-.002 (.002)	.010* (.005)	.005 (.005)	.001 (.001)	.002** (.001)	.003 (.003)	.004* (.002)
Proportion of other countries in region that replaced their leaders		.03 (.05)		.06 (.05)		-.03 (.02)		-.046* (.024)
Leader's age		-.00 (.00)		-.00 (.00)		-.001* (.000)		-.00 (.00)
Previous times in office		.00 (.01)		.00 (.01)		-.00 (.00)		-.00 (.00)
Leader's years in office this time		-.001 (.001)		-.00 (.00)		.001* (.000)		.001 (.001)
Monarchy $t-1$		-.04 (.04)		-.03 (.04)		.01 (.01)		.02* (.01)
Military regime $t-1$		.06** (.03)		.05 (.03)		.04* (.02)		.04 (.03)
Authoritarian regime with elected parliament $t-1$		.02 (.02)		.00 (.02)		-.00 (.01)		.01 (.01)
Civil war in progress		.03 (.02)		.02 (.02)		.07*** (.02)		.05*** (.01)
Country won civil war this year or last year		-.08*** (.03)		-.10*** (.03)		-.04 (.03)		-.05* (.03)

Country lost civil war		.06							
this year or last year		(.06)							
Interstate war in progress		-.00							
		(.02)							
Country won interstate war		-.09**							
this year or last year		(.04)							
Country lost interstate war		.08							
this year or last year		(.05)							
t-score (significance level)			6.39	5.92			6.39	5.92	
growth instrument in first stage			(.000)	(.000)			(.000)	(.000)	
Fisher p level	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]	[.00]
Observations	8,941	7,811	7,461	6,872	8,941	7,811	7,461	6,872	
Countries	159	157	145	145	159	157	145	145	
R-squared	.2023	.2032	.2012	.2053	.0729	.0983	.0681	.0889	

**Sources:** see Table A4.

**Note:** Robust standard errors, clustered by country, in parentheses; \* p<.10, \*\* p<.05, \*\*\* p<.01. All data annual. "Fisher p level" is probability level at which one can reject H0: residuals are I(1), from Fisher test of residuals. Models 3,4,7, and 8: growth instrumented with trade-weighted growth in other countries.



**Table A4: Data sources**

<b>Variable</b>	<b>Notes</b>	<b>Source</b>
Democracy: close to continuous measure	Polity2, rescaled to take values from 0 to 1.	Polity IV Dataset, Version 2009, <a href="http://www.systemicpeace.org/inscr/inscr.htm">http://www.systemicpeace.org/inscr/inscr.htm</a>
Democracy: binary measure	Dummy: 1 = democracy; 0 = non-democracy.	Constructed by Boix and Rosato (2001), for 1800-2000, provided by Carles Boix.
GDP, GDP per capita, GDP per capita growth	In 1990 international Geary-Khamis dollars.	Maddison (2010), downloaded from <a href="http://www.ggd.net/MADDISON/oriindex.htm">http://www.ggd.net/MADDISON/oriindex.htm</a>
Trade (for growth instrument)	Trade between dyads of countries, in 1990 dollars.	Dataset for Russett, Oneal, and Berbaum (2003), downloaded from Bruce Russett's website at: <a href="http://pantheon.yale.edu/~brusset/">http://pantheon.yale.edu/~brusset/</a> .
Domestic democratic capital, foreign democratic capital	Definitions in Persson and Tabellini (2009)	Dataset for Persson and Tabellini (2009), downloaded from Guido Tabellini's website at <a href="http://didattica.unibocconi.it/mypage/index.php?IdUte=48805&amp;idr=7569&amp;lingua=ita">http://didattica.unibocconi.it/mypage/index.php?IdUte=48805&amp;idr=7569&amp;lingua=ita</a> .
Average schooling	Average years of schooling in population aged 15 and over	Morrisson and Murtin (2009), downloaded <a href="http://www.pse.ens.fr/data/index.html">www.pse.ens.fr/data/index.html</a> , May 2011.
Leader replaced (Table 2)	Dummy for leader leaves office for any reason.	Archigos, downloaded from Henk Goemans' website <a href="http://www.rochester.edu/college/faculty/hgoemans/data.htm">http://www.rochester.edu/college/faculty/hgoemans/data.htm</a> .
Leader falls (Table 4)	Dummy for leader leaves office excluding exits caused by death from natural causes, suicide, or retirement due to ill health.	Archigos (see above)
Leader's age		Archigos (see above)
Leader's previous times in office		Archigos (see above)
Leader's years in office this time		Archigos (see above)
War and civil war	Variables constructed for war (civil war) occurring, war (civil war) won this year or last year, war (civil war) lost this year or last year.	Correlates of War intrastate and interstate wars datasets, v.4.0, downloaded from <a href="http://www.correlatesofwar.org/COW2%20Data/WarData_NEW/WarList_NEW.html#Intra-State%20War%20Data">http://www.correlatesofwar.org/COW2%20Data/WarData_NEW/WarList_NEW.html#Intra-State%20War%20Data</a>
Military regime	Head of State coded as "military" in Banks dataset.	Arthur Banks' "Cross-National Time-Series Data Archive," as reproduced in Bueno de Mesquita et al. (2003) dataset, downloaded from <a href="http://www.nyu.edu/gsas/dept/politics/data/bdm2s2/bdm2s2_nation_year_data_may2002_wbversion.zip">http://www.nyu.edu/gsas/dept/politics/data/bdm2s2/bdm2s2_nation_year_data_may2002_wbversion.zip</a> .
Monarchy	Head of State coded as "monarch" in Banks dataset.	Banks (see above)
Elected parliament	Legislative selection = "elective" in Banks dataset.	Banks (see above)