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DO LEADERS MATTER? NATIONAL LEADERSHIP AND GROWTH SINCE WORLD WAR II*

BENJAMIN F. JONES AND BENJAMIN A. OLKEN

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ABSTRACT

Economic growth within countries varies sharply across decades. This paper examines one explanation for these sustained shifts in growth—changes in the national leader. We use deaths of leaders while in office as a source of exogenous variation in leadership, and ask whether these plausibly exogenous leadership transitions are associated with shifts in country growth rates. We find robust evidence that leaders matter for growth. The results suggest that the effects of individual leaders are strongest in autocratic settings where there are fewer constraints on a leader's power. Leaders also appear to affect policy outcomes, particularly monetary policy. The results suggest that individual leaders can play crucial roles in shaping the growth of nations.

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"There is no number two, three, or four… There is only a number one: that's me and I do not share my decisions."

-- Felix Houphouet-Boigny, President of Cote D'Ivoire (1960-1993)

I. INTRODUCTION

In the large literature on economic growth, economists have given little attention to the role of national leadership. While the idea of leadership as a causative force is as old if not older than many other ideas, it is deterministic country characteristics and relatively persistent policy variables that have been the focus of most econometric work.[1]

Recent research, however, suggests that countries frequently experience dramatic reversals in growth, so that a country's growth in one decade is often little related to growth in the next [Easterly et al. 1993; Pritchett 2000]. These reversals are an important part of the growth experience for many countries, particularly in the developing world. Moreover, the explanations for such reversals are not likely to be found in the slow-moving explanatory variables typically used in the cross-country growth literature. Shocks and/or higher frequency events can presumably provide better explanations.

This paper asks whether national leaders, who change sharply and at potentially high frequency, have a causative effect on growth. In addition to informing our understanding of the growth process, this question also relates to an old debate over the relative roles of individuals and historical forces in shaping outcomes. From this latter perspective, looking at growth outcomes sets the bar for individual leaders quite high. One

1. See, for example, Sachs and Warner [1997] on geography, Easterly and Levine [1997] on ethnic fragmentation, La Porta et al. [1999] on legal origin, and Acemoglu et al. [2001] on political institutions.

might believe that leaders can influence various government policies long before one is willing to believe that leaders could impact something as large as aggregate economic growth.

To examine whether leaders can affect growth, one can investigate whether changes in national leaders are systematically associated with changes in growth. The difficulty, of course, is that leadership transitions are often non-random, and may in fact be driven by underlying economic conditions. For example, there is evidence in the United States that incumbents are much more likely to be reelected during economic booms than during recessions [Fair 1978; Wolfers 2001]. Other research has found, in cross-country settings, that high growth rates inhibit coups [Londregan and Poole 1990].[2]

To solve this problem, we focus our examination on cases where the leader's rule ended at death due to either natural causes or an accident. In these cases, the *timing of the transfer* from one leader to the next was essentially random, determined by the death of the leader rather than underlying economic conditions. These deaths therefore provide an opportunity to examine whether leaders have a causative impact on growth.

This paper uses a data set on leaders collected by the authors. We identified all national leaders worldwide in the post World War II period, from 1945 to 2000, for whom growth data was available in the Penn World Tables. For each leader, we also identified the circumstances under which the leader came to and went from power. Using the 57 leader transitions where the leaders' rule ended by death due to natural causes or an accident and where growth data was available, we find robust evidence that leaders

2. Although other literature has found that growth rates have little predictive power in explaining the tenure of leaders more generally [Bienen and van de Walle 1991].

matter. Growth patterns change in a sustained fashion across these leadership transitions. The magnitude of these changes is large; the estimates imply that a one standard deviation change in leader quality leads to a growth change of 1.5 percentage points per year.

We then examine whether leaders matter more or less in different contexts. In particular, one might expect that the degree to which leaders can affect growth depends on the amount of power vested in the national leader. We find evidence that the death of leaders in autocratic regimes leads to changes in growth while the death of leaders in democratic regimes does not. Moreover, among autocrats, leader effects appear more pronounced when leaders have fewer constraints on their power.

We also examine what policies appear to change when leaders change, and find that leaders do affect some policy outcomes. In particular, we find substantial effects of leaders on monetary policy, while we see at best ambiguous evidence for changes in fiscal policy and trade policy. Interestingly, we find no unusual changes in either external conflicts or civil wars associated with leader deaths, though the fact that these events are relatively rare means we may not have sufficient statistical power to detect conflict effects in our sample.

The remainder of this paper is organized as follows. Section 2 discusses existing literature and debates about the role of national leaders. Section 3 presents the empirical methodology used in the paper. Section 4 presents the main results of the impact of national leaders on their nations' growth. Section 5 examines how country-level characteristics affect the degree to which leaders matter. Section 6 examines what policies seem to be affected by individual leaders. Section 7 concludes.

II. INDIVIDUALS, DETERMINISM, AND THE HISTORICAL DEBATE

The debate over the relative roles of individuals and deterministic forces in shaping historical outcomes is both old and unsettled. Within this debate, authors range from absolutist stances to more moderate, inclusive ones. At one extreme, Tolstoy's historical theory is perhaps the most dismissive of leaders, seeing so-called historic figures as mere ex-post justifications for events wholly beyond any individual's influence [Berlin 1978]. Marx, in his *Eighteenth Brumaire of Louis Napoleon* [Marx 1852], allows some minimal agency for leaders but argues that leaders must choose from a historically determined set of choices, which means that they have much less freedom to act than they think they do. More broadly, Marx's materialist dialectic continues to inspire many thinkers who see the contest of social or economic forces trumping the roles of individuals. These traditions often see leaders as merely symbolic: "labels" to describe particular expressions of underlying social phenomena. To Tolstoy, Marx, and others, leaders typically claim immodest powers although they are in fact of little consequence. Meanwhile, the population at large – and historians in later analysis – may accept this pretense as part of a long tradition, ingrained through religious faith, of believing in a higher power [Tolstoy 1869]. A modern view of leadership in the psychology literature considers the very idea of powerful leaders a social myth, embraced to satisfy individuals' psychological needs [Gemmill and Oakley 1999].

In contrast, there are absolutist extremes in which individuals are seen as the decisive influences in history -- the so-called "Great Man" view. From this perspective, the evolution of history is largely determined by the idiosyncratic, causative influences of certain individuals, and perhaps a very small number. Thomas Carlyle articulated this

historical theory clearly in his study of the French Revolution and later works [Carlyle 1837, 1859], and it perseveres today especially among military historians, who tend to see the individual leader as the key to military outcomes. For example, the British historian John Keegan has written that the political history of the twentieth century can be found in the biographies of six men: Lenin, Stalin, Hitler, Mao, Roosevelt, and Churchill [Keegan 2003].[3]

These extremely different historical viewpoints cloud a possible broad middle ground. Isaiah Berlin distinguishes in the debate over historical determinism between the singular approach of the "hedgehogs" and the flexibility of the "foxes" [Berlin 1978]. In Berlin's menagerie, Marx and Carlyle are hedgehogs. Weber, whose sociological theories act as a counterpoint to Marx on many dimensions, is a fox. Weber sees a role for "charismatic" leadership in certain circumstances [Weber 1947]. He allows for possibly substantial individual roles, but only in those cases where the national bureaucracy, or possibly traditional social norms, do not stand in the way of the individual. For Weber, individuals, historical forces and institutions are all important and they interact in an important way.

The texture of this possible middle ground has been investigated most extensively in political science, with particular attention to the ability of institutions to restrain leaders in democracies. The possibility of profound restraints on a democratic leader's power is raised from one direction – leadership selection – in Schumpeter's observation that political leaders must compete for electoral votes [Schumpeter 1950], an idea that can

3. Outside of military history, the great man view fell out of fashion for many historians in the twentieth century, its demise related to the seeming inevitability of World War I and Herbert Butterfield's broad attack, *The Whig Interpretation of History*, on earlier historical reasoning [Butterfield 1931].

produce decisive constraints through the median voter theorem [Downs 1957]. More broadly, the presence of many "veto players", either constitutionally-based institutions or opposing political parties, may severely constrain the action space of leaders and policy outcomes [Tsebelis 2002]. On the other hand, there is evidence that, in the context of legislatures, politicians are not fully constrained by electoral pressures, allowing some room for personal ideological views and party affiliations (see, for example, Kalt and Zupan 1984, Poole and Rosenthal 1984, Levitt 1996, and Lee, Moretti and Butler 2004]. All told, the evidence suggests that the degree to which political leaders may affect economic outcomes may depend on the institutional context.

Meanwhile, the rapidly expanding literature on economic growth has paid little formal attention to the role of individual leaders. Recent growth research has, however, building on North [1990], moved beyond conceptions of convergence based on purely economic factors to consider the role of institutions and social context in shaping economic outcomes. Among other results, this literature has found relationships between some measures of political institutions and macroeconomic outcomes [Keefer and Knack 1995; Hall and Jones 1999; Quinn and Woolley 2001; Acemoglu, Johnson, and Robinson 2001], although convincingly identifying the causal effects of institutions is difficult [Glaeser et al. 2004]. But if institutions have explanatory power, it is then perhaps a natural next step to ask whether national leaders, who may partly control or substitute for formal institutions, exert personal influences on growth.[4]

4. If the economics literature takes the idea that individual personalities matter seriously, it is primarily in the management literature, which has seen many studies of the impacts of particular CEOs, with notable contributions by Johnson et al. [1985] and Bertrand and Schoar [2003], who estimate leader effects on firm behavior. In the micro-development literature, recent work by Duflo and Chattopadhyay [2004] also examines leader effects at the village level in India.

In this paper we study national leaders explicitly and find that leaders do matter. In particular, our statistical tests reject the deterministic view where leaders are incidental to the evolution of their national economies. At the same time, we find that leader effects are limited to those settings in which they are relatively unconstrained. Changes in leaders in democracies appear to have no effect on economic growth. Leaders in autocracies, however, and particularly those without parties or legislatures to contest their rule, appear to have very large effects on growth. Thus our results fall most closely with Weber; leaders matter, but only in settings where other institutions are weak.

In the following sections we develop our methodology, present our results, and examine the interaction of leader effects with descriptions of their institutional constraints.

III. METHODOLOGY

The key question in this paper is whether growth rates change in a statistically significant manner across randomly-timed leader deaths. In this section, we derive two tests for whether leaders matter, a standard Wald test and a nonparametric Rank test.

To begin, consider the following growth process:

$$g_{it} = \nu_i + \theta l_{it} + \varepsilon_{it},$$

where g_{it} represents growth in country i at time t, ν_i is a fixed-effect of country i, and ε_{it} is normally distributed error term with mean 0 and variance $\sigma^2_{\varepsilon i}$. The term l_{it} represents leader quality, which is fixed over the life of the leader. Leaders are selected as follows:

$$l_{it} = \begin{cases} l_{it-1} & P(\delta_0 g_{it} + \delta_1 g_{it-1} + \ldots) \\ l' & 1 - P(\delta_0 g_{it} + \delta_1 g_{it-1} + \ldots), \end{cases}$$

where l' is normally distributed, with mean μ, variance σ^2_l, and $Corr(l,l') = \rho$. The fact that the probability of a leader transition can depend on growth captures the idea that, in general, leader transitions may be related to economic conditions.

The question we wish to answer is whether $\theta = 0$ or not, i.e. whether leaders have an impact on economic outcomes. If leader transitions were exogenous, a natural approach would be to look at the joint significance of leader fixed effects—i.e., dummy variables for each value of l_{it}— to see whether there were systematic differences in growth associated with different leaders. Given the endogeneity of leader transitions, however, this test may find significant results even under the null that $\theta = 0$, because leadership transitions, and thus the end dates of the leader fixed effect, may be related to atypical realizations of growth.

Comparing the difference in these fixed effects across leadership transitions caused by leader deaths solves part of the problem, as the date of the transition between leaders is now exogenously determined with respect to growth. However, the other end of the fixed effect for these leaders is still endogenously determined. Therefore, rather than compare differences in fixed effects, we compare differences in dummies that are true in the T periods before the death and in the T periods after the leader death.

In particular, denote by $\overline{PRE}_z$ average growth in the T years before a leader death in year z, and denote by $\overline{POST}_z$ average growth in the T years after the leader dies.[5] Then the change in growth across the leader transition in country i will be distributed:

5. To simplify the exposition, assume for the moment that during each of these periods, there is only one leader. This assumption does not affect the statistical tests because, under the null that $\theta = 0$, the variance as written in expression (2) would still be exactly correct even if there were multiple leaders in the pre or post period.

(1) $$\widehat{POST-PRE}_z \sim N\left(0, 2\frac{\sigma_{\varepsilon i}^2}{T} + 2\theta^2\sigma_l^2(1-\rho)\right).$$

The variance of $\widehat{POST-PRE}_z$ is equal to the sampling variance, $2\sigma_{\varepsilon i}^2 / T$, plus the variance from the expected difference in leaders, $2\theta^2\sigma_l^2$, less twice the covariance due to the correlation in leaders, $\theta^2\sigma_l^2\rho$.

Under the null hypothesis that leaders do not matter, $\theta = 0$. Therefore, under the null, the change in growth across a leader transition in country *i* will be distributed:

(2) $$\widehat{POST-PRE}_z \sim N\left(0, 2\frac{\sigma_{\varepsilon i}^2}{T}\right).$$

We can easily develop a Wald test statistic based on this null hypothesis. Define

(3) $$J = \frac{1}{Z}\sum_{i=1}^{Z} \frac{\left(\widehat{POST-PRE}_i\right)^2}{2\widehat{\sigma_{\varepsilon i}^2}/T},$$

where $\widehat{\sigma_{\varepsilon i}^2}$ is an estimate of $\sigma_{\varepsilon i}^2$ for country *i*, $\widehat{POST-PRE}_i$ represents the change in growth around a leader death in country *i*, and *Z* is the number of leaders. If the number of observations of country *i* is large, so that $\widehat{\sigma_{\varepsilon i}^2}$ is a good estimate for $\sigma_{\varepsilon i}^2$, then under the null $Z*J$ will be distributed $\chi^2(Z)$.[6]

The magnitude of *J* is informative as well. Recalling equation (1) and rearranging terms,

6. This exposition is based on simple *iid* errors. In the empirical work, we consider a more general error process that allows for heteroskedasticity and AR(1) autocorrelation when computing the *J* statistic.

(4) $$\theta^2 = \frac{(J-1)\sigma_\varepsilon^2}{T\sigma_l^2(1-\rho)}.$$

Normalizing σ_l to 1, setting $\rho = 0$ and substituting in the variance of the error process, σ_ε^2, provides a conservative estimate of how much one standard deviation in leader quality affects growth. That is, we can estimate θ, the magnitude of leader effects.

We also consider a general, nonparametric test that does not depend on assumptions about the structure of the growth process.[7] This test simply asks whether the change in growth around a leader death is unusual given the changes in growth witnessed in that country at other years. We calculate the percentile rank of $\widehat{POST - PRE}_z$ for each actual leader death date within the distribution of $\widehat{POST - PRE}_{it}$ for other years in that leader's country. This percentile rank, denoted r_z, will be uniformly distributed over the interval [0,1] under the null hypothesis that leaders don't matter. Under the alternative hypothesis that leaders *do* matter, r_z should be closer to extreme values—i.e. closer to 0 or 1—than would be predicted by a uniform distribution.

We can therefore form a test-statistic that is the nonparametric analogue of the Wald test. To do so, first define $y_z = \left| r_z - \frac{1}{2} \right|$. Under the null, $E[y_z] = \frac{1}{4}$, $Var[y_z] = \frac{1}{48}$, so that one can form the test-statistic:

$$K = \frac{\Sigma\left(y_z - \frac{1}{4}\right)}{\sqrt{\frac{Z}{48}}}.$$

7. This test is a modification of the Rank test developed by Corrado [1989] in the context of the event study literature in finance.

A nonparametric test for whether $\theta \neq 0$—i.e., whether the changes in $\widehat{POST - PRE}_z$ at leader deaths are systematically larger than average—is a one-sided test of whether K is systematically larger than is expected under the null.[8]

In the empirical work, we will also consider the possibility that there is heterogeneity in θ and ρ across countries. The degree to which leaders can affect growth (θ) and the correlation of successive leaders (ρ) may vary across institutional, historical, or social contexts, and we can examine this possibility by considering our empirical tests on subsets of leader deaths that share observable characteristics.

Note finally that, even if $\theta \neq 0$, the tests may still fail to reject the null. If successive leaders tend to be alike -- because ρ is close to 1 or σ^2_l is close to 0 -- then the tests will fail to reject even if leaders affect growth. Moreover, if the growth process in a country is extremely noisy, so that $\sigma^2_{\varepsilon i}$ is large, then it becomes more difficult to detect leader effects. A rejection of the null hypothesis therefore implies that leaders matter in three senses: (i) leaders impact outcomes, (ii) leaders vary enough that different leaders lead to different outcomes, and (iii) the impact of leader transitions is large relative to average events that occur in their countries.

8. In large samples, the Central Limit Theorem implies that K will be distributed under the null as $N(0,1)$. In practice, given the small number (≤40) of growth observations in each country, the rank is distributed as a discrete uniform variable rather than a continuous uniform. This discreteness slightly increases the variance of y_z, and failing to account for this issue will lead to over-rejection of the null. To be conservative, we therefore rely on Monte Carlo simulations to generate the exact distribution of K under the null.

IV. DO LEADERS MATTER? EVIDENCE

IV.A. Leader Deaths

This paper uses a data set on national leadership collected by the authors. The data set includes every post-war leader in every sovereign nation in the Penn World Tables for which there is sufficient data to estimate leader effects – a total of 130 countries, covering essentially every nation today that existed prior to 1990.[9] The resulting data set includes 1,108 different national leaders, representing 1,294 distinct leadership periods.[10] More details about the leadership dataset can be found in Jones and Olken [2004].

The leaders of particular interest for this paper are those who died in office, either by natural causes or by accident. To define this group, further biographical research was undertaken to determine how each leader came and went from power. Table 1 presents summary statistics describing the departure of leaders. Of the 105 leaders who died in office, 28 were assassinated, 65 died of natural causes, and 12 died in accidents.[11] As discussed above, it is important for the identification strategy that the timing of these leader deaths be unrelated to underlying economic conditions. For this reason, it is important that assassinations, which may be motivated by underlying changes in the country, be purged from the set of leader deaths. We therefore define the 57 leaders who died either of natural causes or in accidents, and for whom we can estimate growth effects, as the "random" deaths that we focus on in the paper.[12] Of these, heart disease is the most

9. Leader data is collected from 1945 or the date of independence, whichever came later.

10. The data set is similar to one collected by Bienen and Van de Walle [1991], with the main exceptions that our data focuses more closely on the nature of leadership transfer and extends to the year 2000, while their data includes countries that are not covered by the Penn World Tables and extends further into the past.

11. A further 21 leaders, not counted here, were killed during coups.

12. Of the 77 leaders who died of natural causes or in accidents, sufficient Penn World Tables data to estimate the change in growth around the leader's death was available for 62 of them. As discussed in

common cause of death, while cancer and air accidents were also relatively common. Table 2 describes each of these cases in further detail.

One question is whether the leaders we consider here are typical of leaders in power at any given time. To investigate this, in results not reported, we consider a Probit regression on all leaders-years in the entire data set, with the dependent variable a dummy distinguishing the 57 leaders in our sample. The independent variables in the regression are the leader's age and tenure, whether he was an autocrat (as classified by Polity IV), decade dummies, region dummies, and dummies for the country's per-capita income trecile in 1960. The main finding is that, not surprisingly, the leader's age positively predicts dying in office; in fact, leaders who die in office are 8 years older than the typical leader in power at a given time. The other variables we consider are not jointly significant.[13] Thus, with the prime exception of age, the leaders we consider here are broadly similar to the leaders occupying office throughout the period we consider.

Historical analysis of these leader deaths suggests many plausible cases in which leaders impact growth. Figure 1 highlights a few of the more dramatic examples, presenting the evolution of national income for four countries: China, Mozambique, Guinea, and Iran. In each graph, a solid vertical line indicates the exact date at which a leader died, and a dashed line indicates the date at which that leader came to power. In China, we see a remarkably close association between the long rule of Mao – from the period the data begins until his death in 1976 – and a long period of poor growth. In fact,

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footnote 15 below, we exclude a further 5 leaders whose deaths were too close to the deaths of other leaders to separately estimate their impacts on growth. This yields the 57 leader deaths we focus on in the empirical analysis.

13. The only other variable to be individually significant in the regression is the leader's tenure – conditional on the leader's age, longer tenure makes you *less* likely to die.

growth averages 1.7 percent per year under Mao but 5.9 percent per year subsequently. The forced collectivization of agriculture and the Cultural Revolution were among many national policies that likely served to retard growth during Mao's tenure, whereas Deng, who comes to power in 1978, is often regarded as having moved China towards more market-oriented policies.

The death of Samora Machel in Mozambique was followed by an especially sharp turnaround in economic performance. Machel, the leader of the Frelimo guerrilla movement, established a one-party communist state and nationalized all private land upon becoming president of Mozambique in 1975. Coincident with Machel's policies, most Portuguese settlers fled Mozambique and a new guerilla insurgency was born. After Machel's death, Mozambique moved firmly under his successor, Joaquin Chissano, toward free-market policies, multi-party democracy, and peace with the insurgents. During Machel's eleven-year rule, growth was persistently negative, averaging -7.7 percent per year; since Machel's death, growth in Mozambique has average 2.4 percent per year.

Guinea and Iran provide further examples. In Guinea, the rule of Sekou Toure was characterized by totalitarianism, paranoia, and violent purges until he died during emergency heart surgery in 1984. In Iran, the rule of Ayatollah Khomeini was marked by bloody conflict in both the Iranian Revolution and the Iran-Iraq war. Khomeini cast the Iran-Iraq war in strictly religious terms, which is said to have prevented peace negotiations for many years. As can be seen in Figure 1, both Guinea and Iran experienced dramatic growth reversals coincident with the death of these leaders.

Of course, the associations between particular leaders and particular growth episodes may be coincidental, and among the 57 leader deaths in our sample there are many cases where growth does not appear to change. In the next sections, we leave historical argument aside and pursue the question of whether leaders matter for economic growth using more rigorous econometric methods.

IV.B. Results

To implement the econometric tests developed in Section 3, we estimate the following regression:

$$g_{it} = \alpha_z PRE_z + \beta_z POST_z + \nu_i + \nu_t + \varepsilon_{it}, \quad (5)$$

where g_{it} is the annual growth rate of real purchasing-power-parity GDP per capita taken from the Penn World Tables, i indexes countries, t indexes time in years, and z indexes leader deaths. Country and time fixed effects are included through ν_i and ν_t respectively. For each leader death, indexed by z, there is a separate set of dummies, denoted PRE_z and $POST_z$. PRE_z is a dummy equal to 1 in the T years prior to leader z's death in that leader's country. $POST_z$ is a dummy equal to 1 in the T years after leader z's death in that leader's country. We estimate a separate coefficient α_z and β_z for each leader death z. Note that we estimate equation (5) using all countries and all years of data, as countries without leader deaths can be used to help estimate time fixed effects.

In the main analysis, we let the period of observation, T, be five years, though results are similar when we let T be either three or seven years. Note also that PRE_z and $POST_z$ are defined so that the actual year of the death is not included in either dummy. This is probably the most conservative strategy when looking for longer-term leader

effects, as it helps to exclude any immediate turbulence caused by the fact of leader transition itself.[14]

Table 3 presents the main results from the formal econometric tests developed in Section 3. Column (1) presents the *J* statistic defined in Section 3, with the errors corrected for region-specific heteroskedasticity and a region-specific AR(1) process. Column (2) presents the p-value on the *J* statistic. Column (3) presents the p-value from the analogous nonparametric Rank test. Columns (4)-(6) repeat this analysis, restricting the set of leaders to those who were in office for at least 2 years prior to their death, whose effect on growth we would expect to be stronger.

For each specification of the error structure, we present three different timings of the *PRE* and *POST* dummies. The actual timing is represented by the row labeled *t*. To ensure that the effects we ascribe to leaders are not simply caused by temporary changes during the transition period, the timings *t+1* and *t+2* are included, indicating that the *POST* dummies have been shifted 1 and 2 years later in time. Put another way, in the *t+1* timing, we exclude the year of the transition and the subsequent year from the analysis; in the *t+2* timing, we exclude the year of the transition and the two subsequent years from the analysis.[15]

The results presented in Table 3 show that leaders have significant effects on growth. Using the contemporaneous leader timing (*t*), both the Wald and the Rank tests

14. The results in this paper are robust to a number of other methods of handling transition years. For example, assigning the transition year to either the PRE or POST dummy, or assigning a fraction of the dummy to either the PRE or POST dummy, produces similar or slightly stronger results than those presented here.

15. Note that we exclude five leader deaths (Barrow of Barbados, Hedtoft of Denmark, Shastri of India, Frieden of Luxembourg, and Gestido in Uruguay), because their deaths followed closely on a prior leader death in their countries. Including both leaders would cause the *PRE* and *POST* dummies to overlap, contaminating the results. In each case, we drop the leader who died second, though the results are robust to dropping the leader who died first instead.

reject the null hypothesis that leaders do not matter. Results are also generally strong when we shift the *POST* timing forward one or two years, suggesting that the effect of leaders is not due to temporary effects of the transition. If we restrict the data to rule out leader deaths where the leader was in power for a very short period of time, then the results become stronger, despite having 10 fewer deaths in the sample.

The magnitudes of the estimated leader effects are substantial. For all leaders, the J statistic is 1.312, so the variance of the coefficients on POST-PRE is 31 percent higher around leader transitions than it would be normally. Recalling equation (4), which relates J to θ, normalizing the standard deviation of leader quality to 1, and substituting for the standard deviation in growth in these countries (0.060) yields an estimate of theta of 0.0147.[16] This means that a 1 standard deviation increase in leader quality increases growth rates by at least 1.47 percentage points per year – which is a quite dramatic effect.

Even though growth changes when leaders die, it does not appear to systematically increase or decrease; in fact, the average value of the coefficients on POST-PRE is -0.10 percentage points – i.e., almost exactly 0. However, if certain characteristics of a leader predicted the leader's quality, then the change in growth following a leader's death might be related to certain characteristics of the outgoing leader. For example, Lord Acton's famous observation that "power tends to corrupt; absolute power corrupts absolutely" suggests declining performance over a leader's tenure, while work by Clague et al. [1996] finds that property and contract rights actually tend to improve the longer an autocrat has

16. This estimate assumes ρ, the correlation between leaders, is 0; i.e., each leader is an independent draw from the potential leader quality distribution. Assuming leaders were perfectly inversely correlated (ρ = -1) implies a lower-bound value of θ of 0.0104, so that a one standard deviation in leader quality changes annual growth rates by 1 percentage point. If, as seems more likely, the quality of successive leaders is positively correlated, then θ would be even higher than the 0.0147 reported in the text.

been in power. Other researchers suggest that expectations of longer tenure can lead to longer planning horizons and greater expectations of stability by the leader and the public at large, potentially enhancing investment [Blondel 1987; Olson 1993; Olson 2000]. In results not reported here, however, we find that neither the leader's age nor tenure in office predicts the change in growth following the leader's death, either directly or when interacted with the autocracy measure discussed below.

IV.C. Specification Checks

These tests survive a wide range of robustness and specification checks. First, the final rows of Table 3 present p-values for "control timings", where the PRE and POST dummies are shifted 5 or 6 years backwards in time. If the identification strategy is valid and the growth process is correctly specified, one should not witness unusual changes in growth at these timings. In fact, we find that such control timings fail to reject the null, further confirming both the identification assumption and the specification of the error structure used in forming the Wald tests.

We can further test the underlying identification assumption – that leader deaths are exogenously timed with respect to underlying economic conditions – by attempting to predict the deaths using economic information. In particular, we estimate a conditional fixed-effects logit model, where the independent variables are lags of growth and other economic variables and the dependent variable is a dummy variable equal to 1 in the year of a leader death. As shown in Table 4, we find that the key variable of interest – growth – as well as changes in the components of GDP and changes in the terms of trade, do not predict these leader transitions. The one variable that has predictive power is the nominal exchange rate, which is unusually steady prior to leader deaths. This result turns out to be

driven by outliers in other years of observation, i.e., episodes of massive exchange rate adjustments, which do not occur in the years prior to the leader deaths. Such rare episodes substantially affect the mean shift in exchange rates in the background years, and if we drop the outliers (i.e., devaluations of more than 25 percent in a single year), then more normal exchange rate movements have no predictive power for leader deaths.

The main results in Table 3 are also robust to a number of further specification checks, including 3 or 7 year observation windows (T), different sets of right-hand-side control variables, and the exclusion of certain decades or types of deaths.[17]

V. HOW DO COUNTRY LEVEL CHARACTERISTICS INTERACT WITH LEADERS?

The above results indicate that, on average, leaders have detectable, causative impacts on national growth. However, the degree to which leaders matter may well be a function of their context, as different institutional systems might amplify or retard a leader's influence. We therefore extend the regression framework above to consider hypothesis tests on subsets of the leader deaths, in order to examine the interaction of various national characteristics with the ability of leaders to influence growth.

The primary measure of institutional constraints we use is the "polity" variable from the Polity IV dataset, which provides annual panel data on institutional

17. Specifically, we reestimate equation (5) without any time fixed effects, allowing for time fixed effects that are allowed to vary by region, and including lagged income plus a host of plausibly exogenous control variables. We also estimate leader effects separately excluding heart attacks and air crashes, the two types of death most frequently plagued by conspiracy theories. Finally, to ensure that no decade is driving the results, we re-run the results excluding each decade one-by-one. The results are broadly robust to all of these alternative specifications.

characteristics [Marshall and Jaggers 2000].[18] The results are presented in Table 5, which compares those leaders whose nations receive a polity score less than or equal to 0 in the year prior to their death, who we will refer to as "Autocrats", with those leaders whose nations receive a polity score better than 0, who we will refer to as "Democrats". The results indicate that autocratic leaders on average have a significant causative influence on national growth. In particular, the autocratic leader effects are strongly significant at treatment timings of t, $t+1$, and $t+2$, suggesting that the growth effects last over substantial periods and are not due to immediate turbulence in the first two years after the transition. In fact, the data suggest that growth tends to increase slightly following the death of autocrats, not decline, providing further evidence that the effect of autocrat deaths is not due to turbulence.[19] The magnitudes of the autocrat effects are substantial; using calculations analogous to those above, the J statistic of 1.621 for autocrats implies an estimated value of θ of 2.1 – i.e., a 1 standard deviation in leader quality increases growth by 2.1 percentage points per year. On the other hand, the deaths of leaders in democratic regimes produce no detectable impact on growth.[20]

Of course, autocracy vs. democracy is a crude measure, and there are several reasons why autocrats might have more of an effect than democrats. The role of leaders in democracies differs from that in autocracies in the constraints placed on the leader's

18. We focus on Polity IV ratings because they are available for the entire period we study. Other sources of institutional classification, such as Przeworksi et al. [2000] and Freedom House [Karatnycky et al. 2003], have generally similar classifications for the periods where they overlap with Polity.

19. On average, the change in annual growth rates following the leaders' death (i.e., the coefficients on POST-PRE) is +0.4 percentage points for autocrats and -0.5 percentage points for democrats, though the difference between the two is not statistically significant.

20. The differences between autocrats and democrats are also found when we use the smaller data sets for which the Przeworski et al. [2000] and the Freedom House measures are available. The only change is that we can now also find some statistically significant effects of democrats with the Przeworski et al. measure of democrats and with the Freedom House measure of "Free," although they are significant only using the Rank test and only then at t=0, while all other timings and many specifications of the Wald test show no democrat effects.

power, in how leaders are selected, and in the ease with which bad leaders are removed from power, among other things. Distinguishing between these different factors is difficult, both because they are hard to measure and because they tend to move hand-in-hand with one another.

Nevertheless, it is possible to obtain suggestive evidence regarding these factors. Table 6 shows that, among autocrats, we also find particularly strong leader effects in regimes without political parties, and no effects where there are political parties. (For brevity, we present only the Rank-based p-values in this table, though the Wald-based results are generally similar except where noted.) Similarly, in results not presented, we find that leader effects are much stronger among those autocrats without a legislature, where there presumably are few constraints on their power, than among autocrats whose regime also includes a legislature. In terms of how leaders are selected, Table 6 compares those autocrats who initially seized power in some type of coup d'etat with those autocrats who came to power though some other means (either by being elected or by being selected by the previous leader or ruling party.) The results are much less conclusive, but suggest somewhat stronger leader effects among leaders who seize power than among other leaders. This difference is much more pronounced using the Wald-based tests, which show substantial effects among leaders who seize power and no effects otherwise. Overall, these results provide further and more textured support for the Weberian hypothesis that leaders matter when institutions are weak.

An alternative hypothesis for the distinction between autocrats and democrats is that income, rather than institutions per se, drives the observed difference in leader effects. The second panel of Table 6 explores this hypothesis, and shows that leader effects are not

simply a matter of poverty. Indeed, the poorest countries show no leader effects on average, while both middle income and rich countries show significant effects. Meanwhile, the distinction between autocrats and democrats continues to operate, particularly within the middle income countries. Increasingly small sample sizes preclude conclusive interpretations, but one may speculate that the absence of autocrat effects among the poorest countries may be related to weaker state institutions and failed states, which may limit a leader's ability to influence national outcomes.

Table 6 also explores the effect of ethnic fragmentation on leader effects. Previous work has shown that ethnic fragmentation is a strong negative predictor of growth [Easterly and Levine 1997; Alesina et al. 2002] and helps predict institutional quality, including measures for the quality of government [La Porta et al. 1999] and corruption [Mauro 1995], although other authors note that ethnic identity itself may be endogenous with respect to political variables [e.g. Posner 2003]. With regard to national leadership, ethnically fragmented nations may provide particular opportunities for leaders to impact national outcomes by choosing to foment or suppress ethnic conflict. We divide countries into high and low ethnic fragmentation groups depending on whether they fall above or below the median level of the ethno-linguistic fractionalization measure from Easterly and Levine [1997] and then sub-divide them according to whether the leader was an autocrat or a democrat. We find that, overall, the autocrat/democrat distinction seems more important than the distinction by ethnic fragmentation.

VI. WHAT POLICIES DO LEADERS AFFECT?

So far, this paper has focused on growth as the outcome of interest. But leaders may affect a number of economic policy variables as well as growth. This section examines whether leaders have an impact on four types of policy outcomes – monetary policy, fiscal policy, trade policy, and security policy. To do this, we apply the same techniques developed above to a host of different policy variables.[21]

To investigate whether leaders affect monetary policy, we examined whether there were significant changes in the inflation rate following the deaths of leaders. We use the annual change in the log GDP deflator from the Penn World Tables as our main measure of inflation. We then examine whether each of these variables changes systematically around leader deaths. The results, presented in Table 7, show substantial evidence of changes in inflation rates following the death of autocrats, although not following the death of democrats. In results not reported, we also found significant changes in the broad money supply (M2), especially for autocrats, though we found no detectable movements in M1. We find only weak evidence of changes in real exchange rates, and no evidence of changes in the black market premium associated with leader deaths.

The fact that leaders appear to be affecting monetary policy is consistent with the work of Romer and Romer [2003], who found that different Federal Reserve chairs are associated with different monetary policies and different macroeconomic outcomes. The results here suggest that, particularly for countries with strong leaders and, presumably,

21. Many of the variables in this section, unlike growth, are highly serially correlated, and some (particularly the monetary variables) may follow GARCH processes, so in this section we focus on the Rank test, which is robust to these alternate error structures.

less independent central banks, it may be the views of the national leader that are critical in determining monetary policy.

To examine the impact of leaders on fiscal policy, we examine data from the Penn World Tables on the growth rate of government consumption in the national accounts. The results here are mixed. The results based on the Rank-test, presented in Table 7, show at best weak evidence for changes in fiscal policy surrounding the death of leaders. Wald tests (not presented) meanwhile suggest substantial and statistically significant changes in the growth rate of government expenditures, particularly following the death of autocrats. Unfortunately, more detailed annual panel data on other variables of interest, such as tax revenues and central government debt, were not available for most of the observations in our sample, and analysis of these other variables in the sub-samples do not produce robust results. Therefore, while we cannot rule out fiscal policy changes, we conclude that there is no strong evidence of such effects.

We also examine whether there were changes in the growth rate of international trade. While the results presented in Table 7 show no statistically significant overall changes in the growth of trade, the results may suggest an effect for autocrats, particularly when the POST dummy is shifted several years into the future. To look more directly at trade policy, we also examined data on average tariff rates, using data from the World Development Indicators. Unfortunately, data on tariffs was only available for 16 of the 57 leader deaths, and we found no statistically significant effects on tariff rates for those leaders.

Finally, we examine changes in security policy by looking at measures of conflict. We use annual conflict data from the PRIO / Uppsala Armed Conflict Dataset [Gleditsch

et al. 2002]. The conflict variable takes a value of 0 if there is no conflict, 1 if there is a minor armed conflict, 2 if there is a intermediate armed conflict, and 3 if there is a major armed conflict.[22] The results in Table 7 show no unusual changes in conflict associated with leader deaths. In results not reported, we also tried splitting the sample based on whether the country was in conflict or not in the year before the leader's death, and using discrete models such as probit or multinomial logit to examine the change in conflict status, and also to restricting the variable to look only at internal conflicts. None of these procedures found any unusual changes in conflict following the death of leaders.

The results therefore provide strong evidence that leaders affect monetary policy but no persuasive evidence that leaders affect fiscal, trade, or security policy. Of course, the set of panel data variables with coverage of the entire period is somewhat limited, so it is possible that, using more detailed data or a larger sample of leaders, we would find more effects.

VII. CONCLUSION

Recent work in the cross-country growth literature has suggested that growth in the typical country changes dramatically from one decade to the next, with developing countries in particular showing sharp changes in growth patterns. This paper considers one possible force – the national leader – in explaining these growth experiences. Exogenously-timed leader transitions are used as a natural experiment to identify the causative impact of leaders.

22. Minor conflict is defined to be at least 25 deaths per year but no more than 1,000 total deaths; intermediate is defined to be between 25 and 1,000 deaths per year but no more than 1,000 total deaths; major is defined to be more than 1,000 deaths per year.

We find that countries experience persistent changes in growth rates across these leadership transitions, suggesting that leaders have a large causative influence on the economic outcomes of their nations. The paper further shows that the effects of leaders are very strong in autocratic settings but much less so in the presence of democratic institutions.

These results add texture to a growing literature on institutions in shaping economic outcomes. In particular, this paper suggests that while political institutions may matter, their impact is not deterministic. Rather, one important effect of political institutions is to constrain the power of individual leaders. Democracies may be able to prevent the disastrous economic policies of Robert Mugabe in Zimbabwe or Samora Machel in Mozambique; however, they might also have constrained the successful economic policies of Lee-Kwan Yew in Singapore or Deng Xiaoping in China.

The authors' primary interest in this study is to improve our understanding of the forces behind economic outcomes. However, this research also informs a separate and very old literature in history and political science that considers the role of national leaders in shaping events. Deterministic views suggest that leaders have little or no influence, while the Great Man view of history, at the other extreme, sees history as the biographies of a small number of individuals. Tolstoy believed this debate methodologically impossible to settle [Tolstoy 1869]. Using exogenously-timed leader deaths, the analysis in this paper presents a methodology for analyzing the causative impact of leaders. We reject the hypothesis that leaders are incidental. We find that leaders do matter, and they matter to something as significant as national economic growth.

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TABLE I

How Leaders Leave Power

130 Countries
All Leaders from 1945 or National Independence Date through 2000
Number of Observations, by Type

Lost Election	Term Limits	Voluntary Retirement	Deposed	Death[a]	Other		Total
310	178	131	222	105	225		1184[b]
				Assassination	Natural	Accidental	
				28	65	12	105
					Heart disease	Cancer	Stroke	Other Disease	Surgical complications	Other	Air crash	Other	
					29	12	6	6	3	9	8	4	77

a. There are 21 further cases (not included here) where leaders are killed during a coup.

b. There are 1294 distinct terms in which leaders are in power in the data set, but only 1184 counted in this table, as we do not witness the exit of leaders who are still in power at the end of the year 2000.

c. There are 77 cases of leaders who die in office by natural causes or accidents, but only 57 who die during periods where there is available growth data before and after the leader's death.

TABLE II

Deaths of National Leaders Due to Accidental or Natural Causes

Country	Leader	Year of Death	Tenure (Years)	Nature of Death
Algeria	Houari Boumediene	1978	13.5	Waldenstrom's disease (blood disorder)
Angola	Agostinho Neto	1979	3.9	Cancer of the pancreas
Argentina	Juan Peron	1974	.7[a]	Heart and kidney failure
Australia	John Curtin	1945	3.7	Heart attack
Australia	Harold Holt	1967	1.9	Drowned while skin-diving in Port Philip Bay
Barbados	John (Tom) Adams	1985	8.5	Heart attack
Barbados	Errol Barrow	1987	1.0[a]	No cause of death announced
Bolivia	Rene Barrientos (Ortuna)	1969	2.7[a]	Helicopter crash
Botswana	Sir Seretse Khama	1980	13.8	Cancer of the stomach
Brazil	Arthur da Costa e Silva	1969	2.6	Paralytic stroke, then heart attack
China	Mao Tse-tung	1976	26.9	Parkinson's disease
China	Deng Xiaoping	1997	19.2	Parkinson's disease
Comoros	Prince Jaffar	1975	.4	While on pilgrimage to Mecca
Comoros	Mohamad Taki	1998	2.7	Heart attack
Cote d'Ivoire	Felix Houphouet-Boigny	1993	33.3	Following surgery for prostate cancer
Denmark	Hans Hedtoft	1955	1.3[a]	Heart attack in hotel in Stockholm
Denmark	Hans Hansen	1960	5.0	Cancer
Dominica	Roosevelt Douglas	2000	0.7	Heart attack
Ecuador	Jaime Roldos (Aguilera)	1981	1.8	Plane crash in Andes
Egypt	Gamal Abdel Nasser	1970	15.9	Heart attack
France	Georges Pompidou	1974	4.8	Cancer
Gabon	Leon Mba	1967	7.3	Cancer (in Paris)
Greece	Georgios II	1947	11.4	Heart attack
Grenada	Herbert Blaize	1989	5.0	Prostate cancer
Guinea	Sekou Toure	1984	25.5	Heart attack during surgery in Cleveland
Guyana	Linden Burnham	1985	19.2	During surgery
Guyana	Cheddi Jagan	1997	4.4	Heart attack a few weeks after heart surgery
Haiti	Francois Duvalier	1971	13.5	Heart disease
Hungary	Jozsef Antall	1993	3.6	Lymphatic cancer
Iceland	Bjarni Benediktsson	1970	6.7	House fire
India	Jawaharlal Nehru	1964	16.8	Stroke
India	Lal Bahadur Shastri	1966	1.6	Heart attack
Iran	Ayatollah Khomeini	1989	10.3	Following surgery to stem intestinal bleeding
Israel	Levi Eshkol	1969	5.7	Heart attack
Jamaica	Donald Sangster	1967	0.1	Stroke
Japan	Masayoshi Ohira	1980	1.5	Heart attack
Japan	Keizo Obuchi	2000	1.7	Stroke
Jordan	Hussein al-Hashimi	1999	46.5	Non-Hodgkin's lymphoma
Kenya	Jomo Kenyatta	1978	14.7	While sleeping
Liberia	William V.S. Tubman	1971	27.6	Complications surrounding surgery on prostate
Luxembourg	Pierre Dupong	1953	16.1	Complications from broken leg
Luxembourg	Pierre Frieden	1959	0.9	Cause unclear
Malaysia	Tun Abdul Razak	1976	5.3[a]	Leukemia (in London)
Mauritania	Ahmed Ould Bouceif	1979	.1	Plane crash in sandstorm over Atlantic
Morocco	Mohammed V	1961	5.3[a]	Following operation to remove growth in throat
Morocco	Hassan II	1999	38.4	Heart attack
Mozambique	Samora Machel	1986	11.3	Plane crash near Maputo
Nepal	Tribhuvan	1955	4.1	Heart attack in Zurich
Nepal	Mahendra	1972	16.9	Heart attack
New Zealand	Norman Kirk	1974	1.7	Heart attack

Nicaragua	Rene Schick Gutierrez	1966	3.3	Heart attack
Niger	Seyni Kountche	1987	13.6	Cancer (brain tumor)
Nigeria	Sani Abacha	1998	4.6	Heart attack (some say poisoned)
Pakistan	Mohammed Ali Jinnah	1948	1.1	Heart failure
Pakistan	Mohammed Zia Ul-Haq	1988	11.1	Plane crash in Pakistan
Panama	Domingo Diaz Arosemena	1949	.9	Heart attack
Panama	Omar Torrijos Herrera	1981	12.8	Plane crash near Penonomé
Philippines	Manuel Roxas y Acuna	1948	1.9	Heart attack
Philippines	Ramon Magsaysay	1957	3.2	Plane crash on Cebu Island
Poland	Boleslaw Bierut	1956	11.2	Heart attack
Portugal	Francisco de Sa Carneiro	1980	0.9	Light plane crash near Lisbon
Romania	Gheorghe Gheorghiu-Dej	1965	17.2	Pneumonia
Sierra Leone	Sir Milton Margai	1964	3.0	After “brief illness”
South Africa	Johannes G. Strijdom	1958	3.7	Heart disease
Spain	Francisco Franco	1975	36.3	Heart failure
Sri Lanka	Don Stephen Senanayake	1952	4.5	Thrown from horse
Swaziland	Sobhuza II	1982	60.7	Unknown
Sweden	Per Hansson	1946	10.0	Stroke
Syria	Hafiz al-Assad	2000	29.6	Heart attack
Taiwan	Chiang Kai-Shek	1975	25.3[a]	Heart attack
Taiwan	Chiang Ching-Kuo	1988	12.8	Heart attack
Thailand	Sarit Thanarat	1963	5.1	Heart and lung ailments
Trinidad and Tobago	Eric Williams	1981	18.6	Complications from diabetes
United States	Franklin D. Roosevelt	1945	12.1	Stroke
Uruguay	Tomas Berreta	1947	.4	During emergency surgery
Uruguay	Luis Ganattasio	1965	.9	Heart attack
Uruguay	Oscar Gestido	1967	.8	Heart attack

a. Second time in power.

TABLE III

Do Leaders Matter?

	All Leaders			Leaders with Tenure >= 2 Years		
	J statistic	Wald P-Value	Rank P-Value	*J* statistic	Wald P-Value	Rank P-Value
Treatment Timings						
t	1.312	.0573*	0.017**	1.392	.0390**	0.004***
t+1	1.272	.0845*	0.075*	1.361	.0537*	0.052*
t+2	1.308	.0669*	0.172	1.443	.0314**	0.121
Control Timings						
t-5	0.841	.7953	0.446	0.918	.6269	0.357
t-6	0.986	.5026	0.806	0.962	.5409	0.905
Number of leaders (t)	57	57	57	47	47	47
Number of observations (t)	5567	5567	5567	5567	5567	5567

Under the null hypothesis, growth is similar before and after randomly-timed leader transitions. P-values indicate the probability that the null hypothesis is true. The *J*-statistic is the test statistic described in equation (3) in the text; under the null, $J = 1$, and higher values of *J* correspond to greater likelihood that the null is false. P-values in columns (2) and (5) are from Chi-squared tests, where the POST and PRE dummies are estimated via OLS allowing for region-specific heteroskedasticity and a region-specific AR(1) process, where the regions are Asia, Latin America, Western Europe, Eastern Europe/Transition, Middle East/North Africa, Sub-Saharan Africa, and Other. Estimation using alternative error structures for the Wald test produce similar or stronger results. Estimation of columns (3) and (6) is via the Rank-method described in the text.
The regressions reported in this table compare 5-year growth averages before and after leader deaths. The treatment timing "t" considers growth in the 5-year period prior to the transition year with growth in the 5-year period after the transition year. The treatment timings "t+1" and "t+2" shift the POST period forward 1 and 2 years respectively. The control timings shift both PRE and POST dummies 5 and 6 years backwards in time. Significance at the 10 percent, 5 percent, and 1 percent level is denoted by *, **, and *** respectively.

Table IV

Do Economic Variables Predict Leader Deaths?

	(1)	(2)	(3)
Previous Year's			
Growth	1.648		0.902
	(2.254)		(2.306)
Change in Consumption		0.684	
		(1.553)	
Change in Government Expenditure		-0.127	
		(1.109)	
Change in Investment		0.802	
		(0.692)	
Change in Trade		0.075	
		(1.24)	
Change in Terms of Trade			0.814
			(1.110)
Change in Exchange Rate			-3.472**
			(1.431)
Observations	2267	2265	2267

Reported coefficients are from a conditional fixed-effects logit model of the probability of a leader death occurring in a given year, conditional on the number of leader deaths that actually occurred in each country. Results using mean changes in the independent variables over the previous 3 or 5 years, rather than in the previous year, are qualitatively similar. Standard errors are in parentheses. Significance at the 10 percent, 5 percent, and 1 percent level is denoted by *, **, and *** respectively.

TABLE V

Interactions with Type of Political Regime in Year Prior to Death

	J statistic	Wald P-Value	Rank P-Value	*J* statistic	Wald P-Value	Rank P-Value
	Autocrats (Polity IV)			Democrats (Polity IV)		
Treatment Timings						
t	1.621	0.019**	0.040**	1.000	0.460	0.106
t+1	1.672	0.016**	0.017**	0.932	0.552	0.712
t+2	1.592	0.028**	0.051*	1.021	0.432	0.636
Control Timings						
t-5	0.849	0.698	0.837	0.866	0.632	0.075*
t-6	1.094	0.334	0.977	0.647	0.873	0.191
Number of leaders (t)	29	29	29	22	22	22

See notes to Table III. Distinctions across leader sets are defined using the "polity" variable in the Polity IV data set in the year prior to the leader's death. Autocrats are defined by having a polity score less than or equal to 0. Democrats are those leaders with a polity score greater than 0.

TABLE VI

Interactions with Country Characteristics

P-values: Probability that dependent variable does not change systematically across randomly-timed leader deaths

	Presence of Political Parties (Autocracies only)		Selection of Leader (Autocracies only)	
	No political parties	Has political parties	Seized power	Did not seize power
Treatment timings				
t	0.001***	0.602	0.118	0.152
t+1	0.002***	0.280	0.040**	0.210
t+2	0.010***	0.185	0.133	0.272
Number of leaders (t)	9	15	13	13

	Low Income in 1960			Middle Income in 1960			High Income in 1960		
	All	Autoc	Democ	All	Autoc	Democ	All	Autoc	Democ
Treatment timings									
t	0.264	0.223	0.451	0.096*	0.072*	0.531	0.042**	0.067*	0.082*
t+1	0.263	0.158	0.590	0.063*	0.040*	0.840	0.403	0.138	0.517
t+2	0.701	0.490	0.804	0.059*	0.039*	0.459	0.495	0.111	0.638
Number of leaders (t)	15	11	3	24	17	5	15	1	12

	High Ethnic Fragmentation			Low Ethnic Fragmentation		
	All	Autoc	Democ	All	Autoc	Democ
Treatment timings						
t	0.029**	0.034**	0.371	0.091*	0.157	0.113
t+1	0.133	0.137	0.493	0.253	0.010***	0.750
t+2	0.483	0.375	0.608	0.193	0.004***	0.702
Number of leaders (t)	28	18	10	22	8	10

See notes to previous tables. "Presence of political parties" is based on the "mobilize" variable from from Przeworski et al. [2000], and "Selection of Leader" is from authors' classification. "High" ethnic fragmentation refers to all countries above the median in that variable among all countries in the sample, not just countries with random leader deaths. Low Income, Middle Income, and High Income split countries into thirds by per-capita income in 1960. The table reports p-values for the Rank test of the null hypothesis that growth does not change unusually in the five years before and after a random leadership transition.

TABLE VII

What Policies Do Leaders Affect?

	P-values: Probability that dependent variable does not change systematically across randomly-timed leader deaths			
	Inflation	Growth of Government Expenditure	Growth of Trade	Any Conflict
All leaders				
t	0.006***	0.200	0.284	0.715
t+1	0.036**	0.114	0.195	0.589
t+2	0.065*	0.178	0.164	0.482
Autocrats				
t	0.009***	0.356	0.251	0.471
t+1	0.039**	0.492	0.162	0.39
t+2	0.025**	0.300	0.057*	0.303
Democrats				
t	0.186	0.202	0.492	0.789
t+1	0.207	0.088*	0.445	0.717
t+2	0.158	0.327	0.682	0.701
Number of leaders (t)	57	57	57	55

See notes to previous tables. Dependent variables are described in the text.

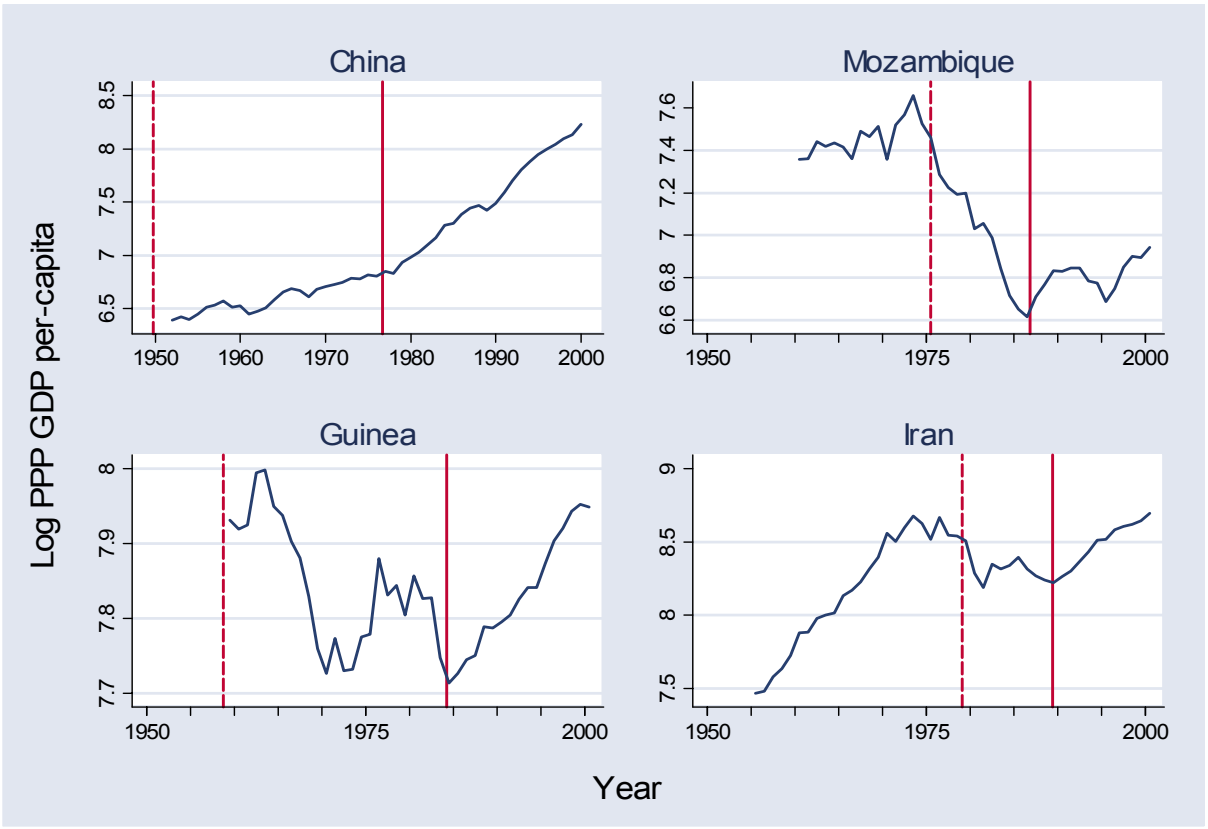

Figure I
Growth and Leader Deaths