National Leaders and Economic Growth: What Characteristics Matter?

National Leaders and Economic Growth:
What Characteristics Matter?

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Abstract

This paper uses data on more than 1000 national leaders between 1875 and 2005 to examine how four key individual characteristics – military experience, being a member of a political dynasty, belonging to the ethnic majority, and the number of daughters – influence the rate of economic growth. Following Jones and Olken (2005), I identify leadership transitions caused by natural deaths and illnesses to isolate the effect of leaders on economic growth, sidestepping the causality that runs between economic growth and the timing of leadership transitions. I find that even though leaders do seem to matter for economic growth, there does not seem to be substantial evidence that the identified characteristics systematically influence national growth. I then examine if these characteristics affect relevant policy outcomes. Although I do not find substantial evidence that the identified characteristics systematically influence the policy outcomes, I do find some evidence of a relationship between a leader's ethnicity and the infant mortality rate, as well as between the number of daughters a leader has and the female and male adult mortality rates.

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1 Introduction

"If there is a Versailles of Africa, a contemptuous display of wealth that trumpets the need for change, even for revolution, it is Our Lady of Peace, the brownstone basillica that rises from the rain forest of central Côte d'Ivoire, as if the vestige of some lost civilization."

-John Stackhouse, *Out of Poverty*

The Basilica of Our Lady of Peace of Yamoussoukro was built in 1989 by the former President of Côte d'Ivoire, Félix Houphouët-Boignyin. Imported contractors and materials from Europe were used to construct the "air-conditioned pews to the marble driveway to the stone pillars that contain elevator shafts" (Stackhouse, 2001). The completion of the largest Roman Catholic Church in the world reflected extravagant spending amounting to more than three hundred million dollars in one of the poorest countries in the world. Although Houphouët-Boignyin claimed he had paid for the construction from his personal plantation earnings, most historians believe instead that he had used reserves from the public treasury.[1] Today, the Basilica stands mostly empty, except for the few occasional tourists. The building of the Basilica of Our Lady of Peace demonstrates the immense power a single national leader can wield.

The study of the influence of national leaders, and the interaction between leaders and institutions, has previously been primarily the domain of comparative history and political science. There exists a substantial literature on this question by philosophers and historians, such as Leo Tolstoy,

[1]Mother Jones, July 25, 2014, "Photos: The World's Largest Church Is in the Middle of an African Coconut Plantation."

Karl Marx, Thomas Carlyle, John Keegan, and Isaiah Berlin. Research by political scientists have looked at the institutional constraints on leaders in democracies (Downs, 1957; Tsebelis, 2002).

Within development economics, there has been significant research into the relationship between institutions and economic growth (Acemoglu, Johnson and Robinson, 2001; Glaeser *et al.*, 2004; Fields, 2007). If institutions are an important determinant of economic development, a logical next step is to investigate the personal influence of national leaders on economic development, as leaders shape, and are constrained, by the institutions around them. Moreover, differences in the quality of national leadership may help explain the puzzlingly low correlation of economic growth across decades (of 0.1 to 0.3), and why countries experience dramatic reversals of growth (Easterly *et al.*, 1993). These substantial variations in growth are unlikely to be explained by relatively more persistent factors, including human and capital factor accumulation and country-level characteristics, which have a correlation across decades of 0.8 to 0.9 and 0.6 to 0.9, respectively (Easterly *et al.*, 1993).[2]

Previously, research into leadership has predominantly been at the sub-national level (Chattopadhyay and Duflo, 2004; Bertrand and Schoar, 2003; Kaplan, Klebanov, and Sorenson, 2012). Only recently has the development literature focused on the implications of national leaders. This is partly due to the difficulty of directly measuring the causal effect of national leaders on economic growth, as there is evidence that suggests that leadership transitions are nonrandom and are driven by underlying economic conditions. Fair (1978) finds that improved real economic activity

[2]For country level characteristics, Easterly *et al.* (1993) include education parameters (primary enrollment and secondary enrollment), number of assassinations, number of revolutions and coups, the black market premium, as well as typical macroeconomic indicators including inflation, share of government consumption in GDP, share of trade in GDP, and the ratio of money supply over GDP.

in the year of United States presidential elections increases the share of the vote for the candidate of the incumbent's party. Lewis-Beck and Stegmaier (2000) provide a summary of studies into election data from the United States, France, Britain, Denmark, and Australia. They find that across all elections, voter dissatisfaction with the economic performance decreases the likelihood of the incumbent being reelected.

To untangle the relationship between leadership quality and economic growth, Jones and Olken (2005) analyze transitions in national leadership where the head of state's rule ended due to a natural death or accident. Relying on these random events, the authors can isolate the effect of the change in leadership quality as distinct from the effect of those economic factors that usually drive changes in national leadership. Using data from the post World War II period, Jones and Olken (2005) find evidence that suggests leaders do matter for economic growth. Jones and Olken (2005) argue that their results serve as a potential explanation of why there are dramatic reversals in economic growth across decades (Easterly *et al.,* 1993).

Besley, Montalvo, and Reynal-Querol (2011) employ the same identification strategy, applied to a longer time period (1875 to 2001), to investigate whether leaders matter for economic growth. They further develop a methodology to explore how a leader's educational level contributes to leadership quality and economic growth, finding that transitioning from a more educated leader to a less educated leader has a significant negative impact on growth.

In this thesis, I apply the methodology developed in Besley *et al.* (2011) to explore how additional individual characteristics of national leaders influence economic growth. Doing so will allow me to identify the characteristics that contribute to leadership quality. Motivated by recent literature in sociology, political science, and development economics, I identify four potentially defining individual characteristics.

The first characteristic I analyze is the military background of the leader, including whether they experienced active combat or had rebel group participation. Horowitz and Stam (2013) find that leaders with prior rebel military experience and leaders with a military background but no active combat experience, are more likely to initiate military events and wars, affecting economic growth (Ramey, 2011).[3] Horowitz and Stam (2013) further show that their results are robust to controlling for leadership selection issues where for instance, countries in more war prone regions may be more likely to choose a leader with a strong military background. Thus the evidence suggests that a leader's military background can influence his leadership qualities and decisions during his tenure, and hence economic growth.

The second characteristic I explore is whether the leader was part of a political dynasty. Besley and Reynal-Querol (2013) find that economic growth is higher when there are both weak executive constraints and dynastic leaders, which they attribute to the persistence of policy-making skills. The existence of political dynasties is not relevant only in autocratic, but in democratic nations as well. For instance, in the United States Congress, Bo *et al.* (2009) use a regression discontinuity design to show that a longer period in power increases the likelihood that a person may continue or start a political dynasty. Querubin (2010) uses the same approach to analyze political dynasties in the Philippines and finds an even stronger tendency for political dynasties to persist over time.

[3] Ramey (2011) uses news about future military spending in the United States as a shock to government spending. The paper finds a significantly positive change in GDP with an associated fiscal multiplier of around 0.6-0.8 for post WWII. This falls in the range of other estimates by Hall (2009) and Barro and Redlick (2009).

The third characteristic I explore is whether the leader belongs to the ethnic majority. Franck and Rainer (2012) provide evidence in sub-Saharan Africa that children that belong to the same ethnic group of the leader experience lower infant mortality, increased female literacy, and increased educational attainment. Nye *et al.* (2010) likewise demonstrate the importance of a leader's ethnic and racial identity, finding increased black employment during the tenure of black mayors in cities in the United States.

The fourth characteristic is whether the leader has daughters. Sociologists Warner and Steel (1999) find that parents in the United States with only daughters are more likely to support liberal views, such as income equity, comparable worth, and affirmative action, than those with a mixture of sons and daughters. Washington (2008) shows that conditional on the number of total children, more daughters increase the propensity of US congressman to vote liberally. Furthermore, she finds that this propensity is most consistent with reproductive rights, which suggests that the shift in beliefs and voting behavior is related to the saliency of their children's lives and experiences.

I initially create an up-to-date sample of political leaders from 1875 onwards to 2005. In my baseline analysis, I find consistent results with the existing literature that leaders generally do impact economic growth. Moreover, I find that leadership quality has a significant influence on economic growth in both autocratic and democratic settings.

I then examine whether the identified characteristics systematically influence leadership quality, as reflected by changes in economic growth. Overall, there does not seem to be any substantial conclusions, but there is some evidence for a few compelling trends. I find that post-leaders with military experience are associated with a decrease in economic growth when they follow a pre-leader who did not have military experience. Leaders who belong to an ethnic minority seem to be beneficial only in the cases where their predecessor belongs to the ethnic majority. Finally, leaders who have more daughters than sons, that follow leaders who do not, are associated with positive changes in economic growth. Nevertheless, these conclusions drawn are not substantially supported by all of the results.

Even though the identified characteristics may not appear to directly influence national growth, they may have a significant influence on relevant policy outcomes. To investigate if this is the case, I identify three types of policy outcomes, including security policy, fiscal policy, and health policy. I first investigate whether leaders in general affect these policy outcomes. I find that leaders do not seem to influence conflict intensity, government expenditure, male adult mortality rate, and female adult mortality rate. However, leaders do seem to be relevant for the infant mortality rate.

I then consider how the identified leadership characteristics influence the policy outcomes. I find evidence that leaders who belong to the ethnic majority may have a significant impact on the infant mortality rate, and that leaders who have more daughters than sons may be more beneficial for the mortality rate of adult females compared to the mortality rate of adult males. Nevertheless, the strength of these results are tempered by some inconsistencies as well as a insufficient detailed panel data on additional policy outcomes.

The remainder of this thesis is organized as follows. In Part 2, I will provide an overview of the data sources used. In Part 3, I develop and describe the methodology of the empirical models. In Part 4, I perform tests on the identification strategy. In Part 5, I present the main results of the influence of national leaders on economic growth. In Part 6, I run specification checks on the empirical method. In Part 7, I consider how national leaders affect different policy outcomes. Finally in Part 8, I conclude.

2 Data

Following Besley *et al.* (2011), I use the Archigos data set on over 3000 national leaders for 188 countries from 1875 to 2004.[4] This rich data set identifies the "effective" leader of each independent state: the "person that *de facto* exercised power in the country" (Goemans *et al.* 2009).[5] Within this time frame, the data includes 185 leader transitions caused by a natural death from illness or suicide, which occur across 100 countries between 1875 to 2000.[6] Besley *et al.* (2011) expands the number of "natural transitions" to 215 by including exits caused by a serious illness, as well as natural transitions that occurred in countries and time periods not identified by the Archigos data. Due to coding errors in Besley *et al.* (2011), I make several modifications to their list of leadership transitions, removing two transitions as well as modifying the year of a transition.[7] I also further identify 5 new natural transitions that occurred between 2003-2005.[8] Interestingly, out of the total 218 natural transitions, there are 33 transitions (15%) that occur

[4]The Archigos data set is the result of a collaborative effort between Kristian Skrede Gleditsch (University of Essex, UK) and Giacomo Chiozza (Vanderbilt).

[5]In countries with more than one head of state, the Archigos data identifies the effective ruler based on the characteristics of the political system in place.

[6]Leaders can exit power through a regular manner, an irregular manner, by natural death, or through direct removal from another state.

[7]From the list of transitions in Besley *et al.* (2011), I remove two observations due to contradictory information from the *Encyclopedia of Heads of states and Governments*, the Archigos data set, as well as other online sources. The first is Pehr E. Svinhuffud from Finland in 1918 and the second is Uhu K. Paasikivi from Finland in 1956. I also update Jamaica's Michael Manley's year of exit to 1992 which was previously 1991.

[8]For new transitions between 2003-2005, I exclude Thomas Klestil, former President of Austria, who died in 2004 as his death occurred only 3 days before his planned retirement.

within 10 years of a previous natural transition. Following the literature, I remove the leader who died second because of issues with the econometric estimation, leaving 185 natural transitions.[9]

For my main dependent variable, country-level per capita GDP growth rates by year, I use an expanded growth data set that is available from the Maddison Project (2013). The recently updated Maddison Project data contains estimates of per capita GDP for 160 countries from the 1800s to 2010 (expressed in 1990 international dollars). To capture differences in the cost of living, the values are adjusted for purchasing power parity using the Geary-Khamis method.

After I account for missing growth data within the 10 year window around each leadership transition, the sample of random transitions is further reduced to 122 transitions.[10] See Appendix E for a full list of my final sample of the 122 transitions, including the country, year, and the names of the pre- and post-transition leader. I select the post-transition leader as the first leader who had a tenure greater than one year (to avoid interim leaders after the death or illness).[11] Out of the 122 transitions, 33 (27%) occur before 1945, the start of the period studied in Jones and Olken (2005).

To consider how the importance of leaders may vary systematically by the political setting, I use information from the Polity IV data set, which traces individual country regime trends from 1800-2012. The most commonly used measure, *polity2*, ranges from -10 to 10, from most autocratic to most democratic (Marshall *et al.*, 2000). The measure considers competitiveness and openness of

[9]The indicator variables for the pre-transition and post-transition leaders would overlap and cause collinearity issues. This is further motivated as the leader who follows will not likely have had time to have a significant impact on economic growth.

[10]Note that this is in line with Besley *et al.* (2011), as they also end up with 122 natural leadership transitions.

[11]This definition does not work for one transition, Alija Izetbegovic's death in Bosnia and Herzegovina in 2003 as the transition is followed by cycles of leaders with tenures of around 8 months. In this case, I select the leader right after the transition. An alternative method of defining the post-transition leader would be to select the leader who was in power the majority of the time in the post-period. However, the discrepancy would likely be very small from my current definition.

the state's election, the checks and balances on the leader of the state, and how many restrictions are placed on the process of political participation.[12] Interestingly, 54% of the natural transitions are categorized as autocratic, while for all other non-natural transitions, only 40% of transitions are categorized as autocratic.

I obtain military data from the Leader Experience and Attribute Descriptions (LEAD) data set (Horowitz and Sam 2013). LEAD expands Archigos to include the leader's previous occupation and military background. Importantly, it identifies if a leader had military service, if the leader experienced combat during military service, and if the leader ever had rebel military experience. .

Information on political dynasties, the ethnicity, and the number of sons and daughters of the pre- and post- leaders comes mainly from *Encyclopedia Britannica*, *Encyclopedia of Heads of States and Governments*, *Oxford Dictionary of Political Biography*, *Oxford Dictionary of National Biography*, the CIA World Factbook, historical newspapers, official biographies, and other online and reference resources.[13] For political dynasties, I consider two definitions from Besley and Reynal-Querol (2013). The first broadly defines a leader belonging to a political dynasty if their "father, mother, grandfather, uncle, brother, cousin, spouse, or brother-in-law had held any political position," including both high and low positions (e.g. Prime Minister, Mayor, Member of Parliament), and for some cases, a tribal or clan chief. The second definition restricts the previous definition to only a "direct hereditary line from a previous generation," or if the leader's father, mother, or grandfather were politicians.

[12]Following the literature, I take into account regime shifts over a leader's tenure by defining the autocrat and democratic transitions based on the *polity2* value the year before the natural transition occurred.

[13]It is not necessary to collect information on all 2000 plus leaders due to the structure of the methodology (see Part 3).

Ethnicity categories are identified from the CIA World Factbook. When available, ethnic categories and their populations were obtained from the years corresponding to the leadership tenure from other sources. I faced two main problems when gathering the data. The first was the decision whether to use narrower or broader ethnic categories, which is known as the "grouping problem" in the ethnic fractionalization literature (Posner, 2004). The second problem were the cases where the mother and father were from different ethnic groups. In these cases, I performed additional research to evaluate how the leader's ethnicity was viewed by the general public. If no information was available, I used the ethnicity of the father.[14]

Using the information on sons and daughters, I classify the leaders using three categorizations. The first categorization is if the leader has at least one daughter. The second is if the leader had only daughters. The third categorization is if the leader had strictly more daughters than sons. Sons and daughters are only included if they were officially recognized by the leader, survived past infancy, and not adopted.[15]

Table 1 reports summary statistics of the pre- and post-transition leaders, including the age at entry and exit, tenure length, and the proportion of the leaders with each characteristic. In the "Difference (Pre - Post)" column, I test whether the differences in the summary statistics between the pre- and post- transition leaders are statistically different from zero. I use either the unpaired t-test or the unpaired test of proportions, depending on whether the variable is continuous or binary. Pre-transition leaders are on average 66.2 years old at the end of their tenure, compared to

[14]Moreover, note that belonging to the ethnic majority may be time and country specific, and hence the data collected on this characteristic may be subject to a significant degree of error.

[15]Due to the lack of information, I do not differentiate whether the son or daughter was born before or during the leadership tenure.

Table 1: Key Summary Measures

	Pre	Post	Difference (Pre - Post)
Age at Entry	54.6	53.5	1.1
	[119]	[117]	(0.46)
Age at Exit	66.2	60.9	5.2**
	[119]	[117]	(0.00)
Tenure Length	11.6	7.4	4.1**
	[119]	[117]	(0.00)
Percent with Military Background	36.0	31.5	4.4
	[114]	[111]	(0.48)
Percent that Experienced Combat	29.8	21.6	8.2
	[114]	[111]	(0.16)
Percent who had Rebel Military Experience	37.7	26.1	11.6
	[114]	[111]	(0.06)
Percent who Belonged to Political Dynasties	31.6	27.2	4.4
(Direct Hereditary)	[114]	[114]	(0.47)
Percent who Belonged to Political Dynasties	37.7	33.3	4.4
(Broad)	[114]	[114]	(0.49)
Percent who Belonged to Ethnic Majority	85.2	85.7	-0.5
	[115]	[112]	(0.92)
Percent who had at Least One Daughter	70.5	84.4	-13.9**
	[122]	[122]	(0.01)
Percent who had Only Daughters	8.3	8.5	-0.2
	[109]	[106]	(0.95)
Percent who Had More Daughters Than Sons	28.4	42.6	-14.2*
	[109]	[122]	(0.02)

Note: "Pre" refers to the pre-transition leader and "Post" refers to the post-transition leader. The numbers in the square brackets are the number of leaders in which there is available information on the specific measure. In the "Difference" column, I test whether the differences are significant from 0. The p-values (shown in parentheses) are estimated using either the unpaired t-test or the unpaired test of proportions, depending on whether the variable is continuous or binary. For both tests, I assume unequal sample sizes and unequal variances. The results are robust to using paired tests or assuming equal variance assumptions. Significance at the 5 percent and 1 percent level is denoted by * and ** respectively.

post-transition leaders, who are on average 53.5 years old when they enter office. Hence the post-transition leader is typically much younger than the previous leader when he enters office. Since Jones and Olken (2005) show that the change in economic growth across these transitions is on average extremely close to 0, this suggests that youth and inexperience do not play an important role in determining leadership quality. Moreover, the result increases the confidence in the randomness of the transition, as the variation in economic growth does not seem to be caused by old and decrepit leaders at the end of their tenures.[16]

Pre-transition leaders have an average tenure length of 11.6 years, 4.1 years longer (significant at the 1% level) than post-transition leaders who have an average tenure length of 7.4 years, while the average tenure length for all other leaders in the data set is 3.9 years. These differences are not surprising when I take into account the ages at which the leaders exit power. Within the sample, pre- and post-transition leaders enter office at similar ages, but pre-transition leaders leave office on average 5.2 years older (significant at the 1% level) than post-transition leaders when they leave office. Furthermore, leaders outside of the sample who exit due to non-random causes are 56.8 years old when they exit the office, substantially younger relative to pre-transition leaders in the sample, who on are on average 66.2 years when they exit the office. The differences between the average ages at exit and the length of the tenures indicate that leaders who die in power might not have as stringent term limits as the typical leader.

If pre- and post-transition leaders are not inherently different, I would expect the proportions of pre- and post-transition leaders with each characteristic to be, on average, the same. As seen

[16] I perform a detailed analysis of the identification strategy in Part 4.

in Table 1, this is true for all three definitions of military experience, both definitions of political dynasty, ethnic background, and only daughters. Unexpectedly, the proportion of pre-transition leaders with at least one daughter is 13.9% lower than the proportion of post-transition leaders with at least one daughter. Similarly, the proportion of pre-transition leaders with strictly more daughters than sons is 14.2% lower than the proportion of post-transition leaders with strictly more daughters than sons (both of these differences are significant at the 5% level). It is unknown whether this discrepancy is due to increased availability of information on daughters for more recent leaders, or if it is simply due to random chance.[17]

As the direct hereditary definition is contained within the broad definition of political dynasties, the data suggests that most political dynasties are direct hereditary. However, the proportion of the leaders that belong to political dynasties is surprising when compared to the results to Besley and Reynal-Querol (2013), as they find that out of all leaders from 1875-2004 (both natural and non-natural), 11% are classified according to the first definition while 9% are classified according to the second definition. Thus, in my sample of natural transitions, the presence of political dynasties seems to be about 3 times higher than in the entire population of national leaders. This is further evidence for the prior discussion that the leaders who die in power may not have a stringent term limits as typical leaders and are more likely to be part of autocratic regimes.

From Table 1, 85% percent of both pre- and post-transition leaders belonged to the ethnic majority, which is in line with expectations. However, this high percentage will result in less

[17]Note that there cases where leaders had multiple wives and many children. For instance King Abdulla of Saudi Arabia had a total of 15 sons and 20 daughters. Thus it is unknown his involvement in bringing up his daughters.

heterogeneity to measure across the natural transitions. This may be a problem for leaders who only had daughters as well since the proportions for both the pre- and post-transition leaders are extremely low, suggesting that this characteristic will not generate enough variation for the analysis later on.

Table 2 presents mean growth levels in either the pre-transition or post-transition period, allowing for heterogeneity in the characteristics of the pre- and post-leaders. For each leadership characteristic, consider the subset of transitions where the pre-leader had the characteristic. Column (1) ("Pre Yes") then reports the average per capita growth (in percent) in the five years before each transition in the subset (e.g. the 40 pre-transition leaders who had a military background). Column (2) ("Post Yes") considers the subset of transitions where the post-transition leader had the characteristic, reporting the mean growth levels in the five years after each transition in the subset. Column (3) ("Pre No") likewise reports mean growth levels in the five years before the transitions where the pre-leaders did not have the characteristic and column (4) ("Post No") reports mean growth levels in the five years after the transitions where the post-leaders did not have the characteristic. As described in Part 3, the empirical approach requires sufficient heterogeneity in the characteristics of the pre- and post-leaders. As seen, most of the subsets are relatively well balanced except for "No Experience with Combat", "Ethnic Majority", "At Least One Daughter", and "Only Daughters."

The average growth values are quite similar for the two definitions of Political Dynasty except for "Pre Yes", where there is on average 3.25% per capita growth under the broad definition compared to 1.90% per capita growth under the direct definition. Note that this difference is only

Table 2: Summary of Growth with Differing Leadership Characteristics

	Pre Yes	Post Yes	Pre No	Post No
Military Background	2.63	2.04	1.21	1.76
	[41]	[35]	[73]	[76]
No Experience with Combat	3.67	2.03	1.59	1.83
	[7]	[11]	[107]	[100]
Experience with Combat	2.42	2.05	1.42	1.80
	[34]	[24]	[80]	[87]
Rebels	0.94	2.25	2.19	1.71
	[43]	[29]	[71]	[82]
Political Dynasty (Direct Hereditary)	1.90	2.07	1.92	2.14
	[21]	[22]	[61]	[57]
Political Dynasty (Broad)	3.25	2.07	1.23	2.14
	[28]	[26]	[54]	[53]
Ethnic Majority	1.63	1.64	5.26	4.72
	[73]	[67]	[8]	[11]
At Least One Daughter	2.21	2.14	1.12	2.23
	[60]	[74]	[24]	[10]
Only Daughters	1.43	2.43	2.03	2.04
	[9]	[7]	[69]	[65]
More Daughters Than Sons	2.05	2.63	1.93	1.79
	[24]	[36]	[54]	[48]

Note: For transitions where the pre-transition leader has the characteristic, “Pre Yes” refers to the average per capita growth (in percent) in the 5 years before the transition. For transitions where the pre-transition leader does not have the characteristic, “Pre No” refers to the average growth in the 5 years before the transition. Correspondingly, if the post-transition leader has the characteristic, then “Post Yes” refers to the growth in the 5 years after the transition. If the post-transition leader did not have the characteristic, then “Post No” refers to the growth in the 5 years after the transition. The numbers in the square brackets are the number of leadership transitions that satisfy each criterion.

caused by 7 transitions, as the Direct Hereditary definition is a subset of the Broad definition.

As an initial point of comparison of what characteristics may matter, I can compare the average growth rates in “Pre Yes” and “Post Yes” against “Pre No” and “Post No”. The 5.26% average growth rate for “Pre No” for Ethnic Majority and 4.72% growth rate for “Post No” for Ethnic Majority (compared to the much lower growth rates for “Pre Yes” and “Post Yes”) suggests that belonging to the ethnic minority may be associated with higher economic growth. The opposite pattern is seen with Military Background as the “Pre Yes” and “Post Yes” values are slightly higher than the “Pre No” and “Post No” values. However, a more rigorous approach developed in Part 3 is required to obtain statistical significance.

3 Methods

To identify the effect on leadership transitions on economic growth, given the underlying endogeneity issues, I follow the empirical strategy developed in Jones and Olken (2005). They first develop a theoretical model where leadership transition is a function of the growth in the previous periods (see the Math Appendix for details). Because of this causality, Jones and Olken argue that they cannot simply estimate leader fixed effects to measure the impact of leaders on economic growth. Instead, by identifying natural transitions which are random with respect to growth (a detailed analysis of the identification strategy is performed in Part 4), Jones and Olken construct a Wald test statistic based on the the null hypothesis that there is no variation in growth beyond what is expected before and after a natural transition.

To implement the Wald test, they compare the real economic growth rate (g_{ct}) for country c at time t before and after the natural death of a leader by estimating the following regression:

$$g_{ct} = \alpha_z PRE_{zt} + \beta_z POST_{zt} + v_c + v_t + \varepsilon_{ct} \tag{3.1}$$

where z indexes each random transition caused by a natural death, controlling for country (v_c) and year (v_t) fixed effects. PRE_{zt} is equal to 1 for country c in the 5 years prior to the natural transition z (excluding the year of the transition), and $POST_{zt}$ is equal to 1 for country c in the 5 years after the random transition (again excluding the year of the transition). Thus, the analysis will look at the growth rate in country c in the 10 years flanking the exogeneous leadership transition. Following the literature, I run the regression on the entire Maddison growth data, covering 160 countries from 1875 to 2004, to consistently estimate country and year fixed effects. Given country fixed effects, α_z can then be interpreted as the level difference, relative to the country's average over the full 136 years, in the average growth rate in the 5 years before transition z in country c. Similarly, β_z can be interpreted as the level difference in the average growth rate in the 5 years after transition z.

Following Jones and Olken (2005), I estimate Equation (3.1) via ordinary least square estimates, but allow for region-specific heteroskedasticity and region-specific autocorrelation (AR1).[18] Although Besley *et al.* (2011) allow for country-specific heteroskedasticity and country-specific autocorrelation, I use region-specific corrections as they almost always yield more conservative standard errors (See Part 6). Due to the special structure of Equation (3.1), I follow Jones and Olken (2005) and do not modify the point estimates from the OLS.[19] See the Econometric Ap-

[18]Regions include Asia, Latin America, Western Europe, Eastern Europe/Transition, Middle East/North Africa, Sub-Saharan Africa, and Other.

[19]Hence these results are not typical Feasible Generalized Least Squares estimates.

pendix for a more detailed description and motivation of the empirical strategy.

Using the coefficient estimates from Equation (3.1), I build an estimate, $(\widehat{\beta_z - \alpha_z})$, which is the average difference between the growth in the post- and pre-transition period for transition z. To test whether leaders matter for economic growth, Jones and Olken (2005) construct the following Wald statistic J:

$$J = \frac{1}{Z} \sum_{z=1}^{Z} \frac{T * (\widehat{\beta_z - \alpha_z})^2}{2\widehat{\sigma^2_{\varepsilon c}}} \tag{3.2}$$

where Z is the total number of random transitions, $T = 5$, and $\widehat{\sigma^2_{\varepsilon c}}$ is the square of the standard error of the residuals for country c in which the transition z occurs. Then $\widehat{\sigma^2_{\varepsilon c}}$ is an estimate for $\sigma^2_{\varepsilon c}$, and hence $Z * J \sim \chi^2(Z)$. Thus, the Wald Statistic, J, lets me test for the equality of the coefficients of Pre_{zt} and $Post_{zt}$ for all natural transitions.

Following the analysis by Besley *et al.* (2011), there are two methods based on Equation 3.1 to test for heterogeneity in the effect of leadership quality driven by different individual characteristics. The first method is to differentiate the transitions by the pre-transition leader's characteristics only, while the second method is to differentiate the transitions by the characteristics of both leaders. Consider a specific characteristic, *IndChar* (e.g. military experience).

The first method focuses on heterogeneity in the characteristic of the pre-transition leader. Let the set of all natural transitions be denoted Z and a specific transition be denoted z, so $z \in Z$. Now I can define $IndCharPre_z$ to be equal to 1 if the pre-transition leader for transition z has the characteristic, and 0 otherwise. Let M denote the subsets from a partitioning of Z, so that $\bigcup_u M_u = Z$.

We can then split all transitions into two distinct subsets:

$$M_1 = \{z \in Z | IndCharPRE_z = 0\}$$

$$M_2 = \{z \in Z | IndCharPRE_z = 1\}$$

Running Regression 3.1 separately on the two subsets, M_1 and M_2 yields

$$g_{ct} = \alpha_z PRE_z + \beta_z POST_z + v_c + v_t + \varepsilon_{ct} \qquad \forall z \in M_u,\ \forall u = 1,2 \tag{3.3}$$

By comparing the results of the two regressions, I can evaluate whether the characteristic of the pre-leader influences the change in growth across a natural transition.

The second method focuses on heterogeneity in the characteristics of both the pre-transition leader and post-transition leader. I can define $IndCharPost_z$ equal to 1 if the post-transition leader for transition z has the characteristic and 0 otherwise. Let N_v denote the subsets from a partitioning of Z, so that $\underset{v}{\cup} N_v = Z$. We can then classify all transitions into four subsets:

$$N_1 = \{z \in Z | IndCharPRE_z = 0\} \cap \{z \in Z | IndCharPOST_z = 0\}$$

$$N_2 = \{z \in Z | IndCharPRE_z = 0\} \cap \{z \in Z | IndCharPOST_z = 1\}$$

$$N_3 = \{z \in Z | IndCharPRE_z = 1\} \cap \{z \in Z | IndCharPOST_z = 0\}$$

$$N_4 = \{z \in Z | IndCharPRE_z = 1\} \cap \{z \in Z | IndCharPOST_z = 1\}$$

Running Regression 3.1 separately on the four subsets, N_1, N_2, N_3, and N_4 yields:

$$g_{ct} = \alpha_z PRE_z + \beta_z POST_z + v_c + v_t + \varepsilon_{ct} \qquad \forall z \in N_v,\ \forall v = 1,2,3,4 \tag{3.4}$$

By comparing the results of the four regressions, I can evaluate if the transition from one leader to another with the same or different characteristics influences the change in growth across a natural transition.

For instance, to estimate the influence of a leader's military background, I build two indicator variables, $militaryPRE_z$ and $militaryPOST_z$ for each transition z, where the former indicates if the pre-transition leader had military experience and the latter whether the post-transition leader had military experience. For the first method, I subset the transitions into two cases depending on the value of $militaryPRE_z$. For the second method, I consider four distinct cases:

1. $militaryPRE_z = 0$ and $militaryPOST = 0$ (pre- and post-leaders have same characteristics)
2. $militaryPRE_z = 0$ and $militaryPOST = 1$ (different characteristics)
3. $militaryPRE_z = 1$ and $militaryPOST_z = 0$ (different characteristics)
4. $militaryPRE_z = 1$ and $militaryPOST_z = 1$ (same characteristics)

4 Validity of the Identification Strategy

Previous research suggests that leadership transitions are nonrandom and are driven by underlying economic conditions. To address this, the identification strategy developed by Jones and Olken (2005) is based on the assumption that the timing of a leadership transition due to a natural death or retirement from serious illness is independent of the preceding economic conditions. To test for such a relationship in the data, I follow Jones and Olken (2005) by using a conditional fixed effects logit regression to evaluate whether the previous years' real growth rate in country c

is predictive of a natural transition occurring.[20] I estimate the following regression:

$$Pr(natural_{ct}|v_c, g_{c,t-1}) = Logistic\Phi(\beta_0 + \beta_1 g_{c,t-1} + v_c + \varepsilon_{ct}) \tag{4.1}$$

where $natural_{ct}$ is an indicator variable that identifies if at least one natural transition[21] occurred at time t in country c, $Logistic\Phi$ denotes the Logistic CDF, g_{ct} is the growth rate, and country fixed effects are included as v_c.[22]

The theoretical model developed in Part 3 assumes that the timing of non-natural leadership transitions are endogenous to economic growth. Hence as a point of comparison, and to test whether the identification strategy is addressing any causality issues, I re-estimate Regression (4.1) with $natural_{ct}$ replaced by $nonnatural_{ct}$, an indicator variable that identifies if at least one non-natural transition occurred in country c at time t.

To consider the effects of growth before the year prior to the the transition, I then expand the specification to include growth rates for the 5 years beforehand:

$$Pr(natural_{ct}|v_c, g_{c,t-1}, ..., g_{c,t-5}) = Logistic\Phi(\beta_0 + \beta_1 g_{ct} + \beta_2 g_{c,t-1} + ... + \beta_6 g_{c,t-5} + v_c + \varepsilon_{ct}) \tag{4.2}$$

Like before, I re-estimate Regression (4.2) with the dependent variable, $natural_{ct}$ replaced by $nonnatural_{ct}$. For additional specifications and robustness checks, I include decade fixed effects to absorb potentially omitted variables that vary over decades but are constant for all countries.

[20] Doing so will control for unobserved variables that are constant over time for each country and correct for "incidental parameters bias" that arises from a nonlinear fixed effects model.

[21] Note that there are several cases in which more than one transition occur in the same year in the same country. I only include the first transition that occurred in that year.

[22] Jones and Olken (2005) include changes in consumption, government expenditure, investment, trade, terms of trade, and exchange rate as additional independent variables. However, due to the lack of non-growth data for countries before 1945, I do not include these variables in my analysis.

The results of estimating Regression (4.1) are shown in Table 3 in columns (1) and (2) with dependent variables $natural_{ct}$ and $nonnatural_{ct}$, respectively. If the natural transitions are truly random, then I would expect the coefficient of the growth term in column (1) to not be statistically different from 0. Nevertheless, if there is decreased economic growth before the transition due to old and decrepit leaders at the end of their tenures, then I would expect the coefficient to be negative. As seen, although the previous years' growth does not predict natural transitions, it does predict non-natural transitions at the 1% significance level. The negative coefficient for the previous years growth for non-natural transitions is consistent with the intuition from previous research that increased economic growth and hence happier constituents decreases the probability of a leadership transition.

In columns (3) and (4) of Table 3, I present the results of estimating Regression (4.2), where I expand the independent variables to include five years of economic growth before each transition. I find that previous economic growth still does not predict natural transitions, while the previous two years of growth now significantly predict non-natural transitions. Columns (5) and (6) demonstrate that these results are robust to including decade fixed effects.[23] Overall, the results provide further evidence of the conclusions in Fair (1978) and Lewis-Beck and Stegmaier (2000) that typical non-natural leadership transitions are predicted by prior economic conditions.[24] Moreover, these results strongly support the validity of the identification strategy. Hence the evidence suggests that

[23]The results are also robust to including 10 previous years of growth.

[24]However, it is difficult to draw causality between previous economic growth and leadership transition from these models. For instance, if term limits exist, then the point estimates may be capturing the effects of apathetic leaders at the end of their tenures who will be forced to exit office anyways. This may cause a downward bias (estimate is lower then the true parameter) and overstate the significance of previous economic growth in causing leadership transitions.

Table 3: Validity of the Identification Strategy

	(1) Natural Transitions	(2) Non-natural Transitions	(3) Natural Transitions	(4) Non-natural Transitions	(5) Natural Transitions	(6) Non-natural Transitions
L.growth	0.008	-0.014**	0.009	-0.013**	0.010	-0.015**
	(0.015)	(0.004)	(0.015)	(0.005)	(0.015)	(0.005)
L2.growth			-0.003	-0.009*	-0.001	-0.009*
			(0.015)	(0.005)	(0.015)	(0.005)
L3.growth			0.006	-0.003	0.009	-0.002
			(0.015)	(0.005)	(0.015)	(0.005)
L4.growth			-0.006	0.004	-0.002	0.005
			(0.014)	(0.005)	(0.014)	(0.005)
L5.growth			0.003	-0.003	0.006	-0.001
			(0.015)	(0.005)	(0.015)	(0.005)
Decade Fixed Effects	No	No	No	No	Yes	Yes
Observations	7494	11341	7104	10663	7104	10663

Note: Each reported regression is a conditional fixed-effects logit model of the probability of a specific type of leadership transition. The unit of observation is a country *c* in year *t*, where *t* ranges from 1875 to 2010. The dependent variable in columns (1), (3), and (5) is an indicator variable that identifies if at least one natural transition occurred. The dependent variable in columns (2), (4), and (6) is an indicator variable that identifies if at least one non- natural transition occurred. Significance at the 5 percent and 1 percent level is detonated by * and **, respectively.

by focusing on natural transitions, I can isolate the effects of national leaders on economic growth and sidestep the endogeneity problem that economic growth influences the timing of leadership transition.

5 Results and Discussion

5.1 Baseline Analysis

In Table 4, column (1) reports the results of the econometric test (Wald test) developed in Part 3, implemented after estimating Equation (3.1) on the entire set of natural transitions, where the errors are corrected for region-specific heteroskedasticity. From the description of the methodology in Part 3, the J-statistic in Equation (3.2) tests whether leadership matters by comparing the mean growth in the pre- and post-transition period. The null hypothesis assumes that there is no variation in growth beyond what is expected before and after a natural transition, indicating that leaders do not matter. Multiplying this statistic by Z, where Z is the total number of natural transitions, gives the corresponding Chi-squared statistic with Z degrees of freedom. Thus we can calculate the p-value of this statistic, denoted in the table as the Wald p-value. The Wald p-value in column (1) is extremely small (significant at the 0.1% level), providing substantial evidence that I can reject the null hypothesis that leaders do not matter.

$Post - Pre$ denotes the average change in growth across the transitions, or $\sum_{z=1}^{Z}(\beta_z - \alpha_z)$. Thus, the average change in growth across all natural transitions is 0.155% (almost exactly 0%), meaning that even though growth varies significantly across a natural transition, it does not seem to system-

Table 4: Initial Analysis of Leaders and Economic Growth

	(1) All	(2) Democratic	(3) Autocratic	(4) All	(5) Democratic	(6) Autocratic
Post-Pre	0.155***	-0.958***	1.104***	0.155***	-0.958*	1.104**
J-statistic	1.884	1.909	1.869	1.524	1.430	1.503
Wald P-value	0.000	0.000	0.000	0.000	0.020	0.006
Number of Leaders	122	55	63	122	55	63
Standard Errors	H	H	H	H and A	H and A	H and A
Observations	11839	11839	11839	11839	11839	11839

Notes: "H" denotes correcting for region-specific heteroskedasticity, and "A" denotes correcting for region-specific autocorrelation (AR1). Regions include Asia, Latin America, Western Europe, Eastern Europe/Transition, Middle East/North Africa, Sub-Saharan Africa, and Other. Democratic transitions are defined a "polity" score greater than 0 in the Polity IV data set in the year prior to the natural transition. Correspondingly, autocratic transitions include the transitions where the "polity" score in the Polity IV data set was less than or equal 0 in the year prior to the natural transition. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

atically increase or decrease.[25] These results are robust to controlling for both region-specific heteroskedasticity and region-specific autocorrelation (AR1 process), as shown in column (4). Although the J-statistic decreases slightly, the significance of the p-value does not change at the 0.1% level.[26]

Column (2) and (3) displays the results of the Wald test implemented after estimating Equation (3.1) on the subsets of democratic and autocratic transitions, respectively. Democratic and autocratic transitions are defined using the "polity" score from the Polity IV data set in the year prior to the natural transition. The results indicate that leaders do influence economic growth in both democratic and autocratic settings, with significance at the 0.1% level. After controlling for both region-specific heteroskedasticity and region-specific autocorrelation (AR1 process), the J-statistic is significant at the 5% level, as shown in columns (5) and (6). Interestingly, although the magnitudes of the average change in economic growth are relatively similar in both settings, the average change is negative for democratic transitions and positive for autocratic transitions. In democratic settings, growth decreases across a natural transition by 0.958% on average, while in autocratic settings, growth increases by 1.104%.

It is unknown whether this difference is due to random chance or due to systematic differences of the pre- and post-leaders in democratic versus autocratic settings. For instance, due to limitations on tenure length and power in democratic settings, there may be learning on the job causing increased growth toward the end of the tenure. This could potentially explain why the average

[25] Jones and Olken (2005) obtain a point estimate of -0.10%, which they argue to be almost exactly 0.

[26] These results are also robust to correcting for country-specific heteroskedasticity and country-specific autocorrelation. See Part 6, Table 11 for full results.

change across natural transitions is negative in democratic settings. On the other hand, there may be declining performance over an autocrat's tenure, as demonstrated by Lord Acton's famous quote that "power tends to corrupt and absolute power corrupts absolutely." This could explain why the average change across natural transitions is positive in autocratic settings. However, it is not clear if this is the correct interpretation as Blondel (1987) shows that expectations of longer tenure can actually lead to more investment due to expectations of stability.[27]

The results from Equation (3.1) line up broadly with the conclusions of Besley *et al.* (2011) and Jones and Olken (2005) that leaders do matter for economic growth. Although the significance of the Wald tests is the same as in Besley *et al.* (2011), my point estimates are relatively different. For the main result in column (4), my point estimate of $POST - PRE$, the average difference between growth in the post- and pre- transition period, is 0.155% compared to -0.212% in Besley *et al.* (2011). One possible explanation of this difference is the slightly modified set of leadership transitions. Due to coding errors in Besley *et al.* (2011), I make several modifications to their list of leadership transitions, removing two transitions as well as modifying the year of a transition.[28] I also further identify 5 new natural transitions that occurred between 2003-2005.[29] The difference may also be caused by different growth data since I utilize the updated 2013 Maddison growth data

[27]Furthermore, Clague *et al.* (1999) construct a measure of property and contract rights and find that autocrats who survive in office for only a short time do a poorer job, while autocrats who are in power longer perform relatively similar to their democratic counterparts. However, Olson (1993) argues that if there is significant uncertainty over succession in autocratic settings, then there may be poor performance as the autocrat has an incentive to confiscate assets whose value is greater than the tax yield over their tenure.

[28]From the list of transitions in Besley *et al.* (2011), I remove two observations due to contradictory information from the *Encyclopedia of Heads of states and Governments*, the Archigos data set, as well as other online sources. The first is Pehr E. Svinhuffud from Finland in 1918 and the second is Uhu K. Paasikivi from Finland in 1956. I also update Jamaica's Michael Manley's year of exit to 1992 which was previously 1991.

[29]For new transitions between 2003-2005, I exclude Thomas Klestil, former President of Austria, who died in 2004 as his death occurred only 3 days before his announced retirement.

set compared to the 2003 version used in Besley *et al.* (2011).

Using the Maddison growth data as well as the expanded set of natural transitions suggests that leadership quality has a significant influence on economic growth in both autocratic and democratic settings. Although Besley *et al.* (2011) obtain the same pattern of results, Jones and Olken (2005) find that leaders are only significant in autocratic settings. Besley *et al.* (2011) attribute this contradiction to the sample size difference between the post World War II sample and the expanded Archigos transition data set which contains transitions from 1875 to 2004.[30]

5.2 Characteristics and Leader Quality

Are there certain characteristics that influence leadership quality? The following discussion will use the methodology described in Part 3 to analyze this question in more detail. I consider heterogeneity in military service, rebel military experience, political dynasty (broad), ethnic majority, and daughters in Tables 5 through 9, respectively.

For each of these tables, columns (1) and (2) report the results of the Wald test, implemented after estimating Equation (3.3), which only considers differences in the characteristics of the pre-transition leader. "Pre No" refers to the subset of transitions where the pre-leader does not have the characteristic while "Pre Yes" refers to the subset of transitions where the pre-leader has the characteristic. Columns (3), (4), (5), and (6) display the results of the Wald test, implemented after estimating Equation (3.4), which subsets the transitions into the four possible types of leadership

[30]Jones and Olken (2005) further use the Penn World Tables for their growth data as their sample period is only from 1945 onwards.

transitions. For instance, column (3) is "Pre No and Post No", which defines the subset of transitions where both the pre-leader and post-leader do not have the characteristic. "Pre No and Post Yes", "Pre Yes and Post No", and "Pre Yes and Post Yes" are defined correspondingly.[31]

Note that in each table, the column (1) point estimate of $POST - PRE$, the average difference between growth in the post- and pre- transition period, is the average of the point estimates of $POST - PRE$ in columns (3) and (4), weighted by the number of transitions in each of the respective columns. Similarly, the point estimate of $POST - PRE$ in column (2) is the weighted average of the point estimates of $POST - PRE$ in columns (5) and (6).

The point estimates in columns (1) and (2) provide an idea of what generally happens to economic growth when a pre-leader with or without a characteristic leaves power, taking into account statistical significance. A point of concern is that the post-leader's characteristics may be endogenous with respect to economic growth. This may indicate that the estimates from columns (1) and (2) are more valid than the estimates from columns (3), (4), (5), and (6). Nevertheless, as the point estimates of $POST - PRE$ in columns (1) and (2) are a weighted average of columns (3), (4), (5), and (6), the point estimates of (1) and (2) may also be affected by selection issues of the post-leader, as well as vary from mechanical differences caused by the relative proportions of leaders who have a certain characteristic. For instance, there are probably fewer candidates for national leadership who belong to the ethnic minority. Thus I consider both results equally important in my analysis.

[31] As discussed in Besley *et al.* (2011), this approach may introduce bias in the results due to a sample selection factor. Consider a characteristic that is beneficial for growth. If a leader does not have that characteristic, it is likely that they have some positive unobservable skills or additional characteristics that allowed them to be initially selected to the leadership position. Hence the results will underestimate the causal effect of leadership characteristics.

Consider columns (3) and (6) where the pre- and post-leaders do not differ in the specific characteristic of interest. Assume for the sake of argument that the characteristic is the sole determinant of economic growth. Then economic growth should be identical between the pre- and post-period. Hence the point estimate of $POST - PRE$ should be indistinguishable from 0, and the Wald p-value much greater than 0 (it should not recognize that a transition occurred).

Instead, if the characteristic is one of many determinants of economic growth, then I may expect that averaging across multiple transitions will cause the additional determinants to balance on both sides equally. This would lead to no systematic increases or decreases in economic growth across the transition, which would be reflected in the point estimate of $POST - PRE$ being almost exactly 0. But, I would also generally expect the J-statistic to be statistically significant as a result of significant variation in growth across the transition caused by the other determinants.[32] Crucially, I assume that other determinants of economic growth are relatively balanced before and after a natural transition, which may not necessarily be true.

If the characteristic in question (e.g., military service) is not important for economic growth, then I am essentially focusing on a random sample of transitions within the overall 122 natural transitions. The point estimates ($POST - PRE$) can then range quite significantly from zero by chance. Depending on the exact sample of transitions, the J-statistic may or may not be significant. The variability in the possible interpretations demonstrates the difficulty in directly interpreting conclusions solely from columns (3) and (6). Examining columns (4) and (5) where the pre-

[32]If the Wald p-value is large, this means that there is no significant variation in economic growth around the transition, which is slightly different then obtaining significant variation in growth but on average, no systematic increases or decreases in economic growth across the transition.

and post-leaders differ along the specific characteristic will then provide additional evidence and indicate whether the characteristic positively or negatively influences economic growth.[33]

Military Experience

The results allowing for variation in military experience on economic growth using Equation (3.3) are presented in Table 5. I also consider whether having combat experience or not influences economic growth (Horowitz and Stam, 2013), where I find relatively consistent results.[34]

The estimate of $POST - PRE$ for column (1) in Table 5 is slightly positive at 0.81%, significant at the 1% level. This suggests that there is on average, increased economic growth after a leader without a military background leaves power due to a death or illness. However, it is surprising that column (2) is not statistically significant at the 10% level, which means that in the subset of transitions where a leader with military experience leaves power, the variation in growth across the transitions is indistinguishable from a completely random process. I do not know why this occurs, especially as there are a large number (41) of transitions in column (2).[35] To more carefully interpret these result, I examine the results from columns (3) and (4).[36]

Column (3) is run on the subset of transitions where both the pre- and post-leaders did not have military experience, while column (4) is run on the subset of transitions where the pre-leader did not have military experience while the post-leader did have military experience. Transitioning

[33] Another way of looking at these results may be in terms of the relative costs associated with transitioning between different regimes. This is an potential area for future research.

[34] See Appendix C for more details.

[35] A potential confounding variable may be the length of tenure of leaders with military background as there may be a higher probability that they are part of transitional or interim governments.

[36] Note that columns (5) and (6) are not significant at the 10% level for all three tables.

Table 5: Analysis of Military Service

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.813**	-0.228	1.024	-1.744*	-1.954	1.174
J-statistic	0.633	1.234	0.755	0.475	1.175	1.266
Wald P-value	0.001	0.801	0.051	0.011	0.640	0.742
Number of Leaders	73	41	57	13	18	22
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for region-specific heteroskedasticity and region-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 6: Analysis of Rebel Experience

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	-0.418***	1.820**	-0.609	-0.821	0.810	2.277**
J-statistic	1.074	1.625	1.077	0.547	1.158	1.913
Wald P-value	0.000	0.006	0.314	0.741	0.291	0.005
Number of Leaders	71	43	64	5	17	24
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for region-specific heteroskedasticity and region-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

from a pre-leader without military experience to a post-leader also without military experience is associated with an average increase in per capita growth of 1.02% (significant at the 10% level). This result is evidence that military experience is not an important characteristic that influences economic growth by the reasoning developed before.

On the other hand, the point estimate in column (4) is very negative. Transitioning from a leader without military experience to a leader with military experience yields an average reduction in per capita growth of around 1.6% in the post-transition period. Thus military experience for the post-leader is associated with a decrease in economic growth when they follow a pre-leader who did not have military experience. However, if *not* having military experience is a positive trait, then I would expect column (5), estimated on transitions from a pre-leader with military experience to a post-leader without military experience, to show a statistically positive point estimate. As this is not the case, this implies that the point estimate of column (4) may be capturing determinants or trends other than military experience.[37] Overall, the results suggest that military experience is not an essential determinant of leadership quality as measured by the impact on economic growth.

Rebel Military Experience

Table 6 displays the results of the Wald tests, implemented after estimating Equation (3.3) on rebel military experience. In column (2), when a pre-leader who had rebel experience leaves office, growth on average increases by 1.82% (significant at the 1% level). This result initially suggests that rebel experience negatively impacts economic growth. However, an inspection of columns

[37] Note that there are only 14 transitions included in column (4), suggesting the presence of outliers.

(5) and (6) reveals that the point estimate of $POST - PRE$ in column (2) is driven by transitions between pre- and post-leaders who both had rebel experience. The estimate of $POST - PRE$ in column (6) indicates that on average, there is a 2.28% average increase growth across transitions when both leaders have rebel experience (significant at the 1% level). By the reasoning developed before, if rebel experience was a significant determinant of economic growth, then I would expect this point estimate to instead be close to 0. Consequently, it seems that I am simply capturing a random subset of the 122 natural transitions and rebel experience may not be a significant determinant of economic growth.

This conclusion is further supported by the the results of columns (1), (3), and (4). Column (1) is not statistically significant at the 10% level, which means that in the subset of transitions where a leader without rebel experience leaves power, the variation in growth across the transitions is indistinguishable from a completely random process. I cannot explain why this occurs, especially as there are a large number (71) of transitions in column (1). Both of the J-statistics in columns (3) and (4) are also not statistically significant at the 10% level. Note that there are only 5 transitions in column (4), which considers the subset of transitions where the pre-leader did not have rebel experience while the post-leader did have rebel experience, indicating a lack of variation in the data. Overall, these inconsistent results provide further evidence that rebel experience may not be important for economic growth. Hence, stratifying the transitions based on rebel experience may simply be capturing random subsets of the 122 transitions.

Political Dynasties

The results of the Wald tests, implemented after estimating Equation (3.3) on the broad definition of political dynasties are displayed in Table 7. Column (1) shows that for pre-leaders who were part of a political dynasty, leaving office caused growth to fall on average in the post-transition period by -0.16% per annum (significant at the 0.01% level). On the other hand, column (2) is not significant at the 10% level, indicating that following a pre-leader who belonged to a political dynasty, growth is not expected to be appreciably different than "normal", suggesting that this characteristic is not important. To obtain a better understanding of these trends, I can analyze the four subsets of transitions.

The results from columns (3), (4), (5), and (6) indicate that belonging to a political dynasty does not seem to influence economic growth. Transitioning from a pre-leader who did not belong to a political dynasty to a post-leader who did (column (4)) is expected to increase the average growth rate by 0.13%, while transitioning from a pre-leader to a post-leader who both did not belong to political dynasties (column (3)) is expected to slightly decrease growth by 0.24% (both are significant at the 1% level). As the point estimate of 0.13% in column (4) is relatively close to 0%, this suggests that political dynasties do not matter. Hence even though the point estimate of -0.24% from column (3) is relatively close to 0%, which could potentially indicate that political dynasties matter, taking everything into account the rest of the results suggests that the estimate was obtained by random chance. Additional evidence of this conclusion is seen in columns (5) and (6), where both J-statistics are not statistically significant at the 10% level, suggesting that when the previous

Table 7: Analysis of Political Dynasty (Broad)

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	-0.162***	0.971	-0.242**	0.132**	1.008	0.910
J-statistic	1.698	0.872	1.544	2.350	0.888	0.827
Wald P-value	0.000	0.687	0.004	0.003	0.608	0.648
Number of Leaders	78	36	61	14	21	15
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroscedasticity and country-specific autocorrelation. This definition specifically defines belonging to a political dynasty if a leader had a "direct hereditary line from a previous generation", or if the leader's father, mother, or grandfather were politicians. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 8: Analysis of Ethnic Majority

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	-0.273***	0.264	-1.046***	0.591	3.125	0.050
J-statistic	2.532	1.217	3.473	1.129	1.254	1.241
Wald P-value	0.000	0.071	0.000	0.340	0.269	0.062
Number of Leaders	17	98	9	8	7	88
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroskedasticity and country-specific autocorrelation. Ethnicity categories are identified from the CIA World Factbook. When available, ethnic categories and their populations were obtained from the years corresponding to the leadership tenure from other sources. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

leader is part of a political dynasty, the growth around the natural transitions are indistinguishable from the "normal" growth trends. Overall, there does not seem to be any evidence that belonging to the broad definition of a political dynasty is a characteristic that determines economic growth.

Ethnic Majority

The results allowing for variation in ethnicity on economic growth are presented in Table 8. On average, when pre-leaders who belong to the ethnic majority leave office naturally (column (2)), there is an increase in growth by 0.26% per annum in the post-transition period, while there is a decrease in growth of 0.27% when pre-leaders who did not belong to the ethnic majority leave office naturally (column (1)). The J-statistic in column (2) is significant at the 10% level while the J-statistic in column (1) is significant at the 0.1% level. At first glance, these results imply that not belonging to the ethnic majority is associated with increased economic growth.

An analysis of columns (5) and (6) further support this conclusion. In column (5), there is a significant increase in growth of 3.13% when there is a transition from a pre-leader who belonged to the ethnic majority to a post-leader who belonged to an ethnic minority. Additionally, in column (6), a transition where both the pre- and post-leaders belong to the ethnic majority is associated with an almost zero percent change in growth that is significant at the 0.1% level, suggesting that ethnicity is an important determinant of leadership quality.

The evidence so far presented suggests that not belonging to the ethnic majority is positively correlated with increased economic growth. However, the estimates of $POST-PRE$ in column (1) are close to 0 and are smaller in magnitude relative to the estimates of $POST-PRE$ in autocratic and democratic settings in Table 4. Furthermore, in column (3), transitions where both the pre- and post-leaders do not belong to the ethnic majority leads to a 1.05% decrease in growth per annum in the post-transition period relative to the pre-transition period. This seems to contradict the conclusion that ethnicity is an important determinant of leadership quality from the reasons discussed previously. However, an alternative interpretation may be that the point estimate is not averaging out to around zero (which is expected) due the fact that there are only nine transitions included in column (3).

Interestingly, the Wald-statistic in column (4) is not significant at the 10% level. The lack of significance, as discussed in the military analysis, is meaningful. It implies that transitioning from pre-leader who belongs to an ethnic minority to a post-leader who belongs to the ethnic majority is not significant for growth and is indistinguishable from the "normal" growth trends. If belonging to an ethnic minority is positive for economic growth, then I would expect the point estimate to be negative and statistically significant. Thus the lack of significance contradicts the previous conclusion. Note that this also suffers from a small sample size as there are only 8 transitions driving the results in column (4). Considering all of the results, it seems that a leader who belongs to an ethnic minority seems to be beneficial only in the cases where his predecessor belongs to the ethnic majority. Any causal relationship between belonging to the ethnic minority and economic growth may suffer from confounding variables. For instance, the selection of a leader from the ethnic minority into power may only happen if the leader has some special characteristics along some other dimensions.

Daughters

Table 9 displays the results of the Wald tests, implemented after estimating Equation (3.3) on the characteristic of having more daughters than sons.[38] Column (2) is not significant at the 10% level, indicating that following a pre-leader who had more daughters than sons, growth is not expected to be appreciably different than "normal." On the other hand, column (1) in Table 9 shows that for pre-leaders who had fewer daughters than sons, leaving office caused growth to increase on average in the post-transition period by 0.271% per annum (significant at the 10% level).

At first glance, these results provide some evidence that having more daughters than sons may have a positive impact on economic growth. This conclusion is also supported column (3), which shows that transitioning from a pre-leader to a post-leader who both had fewer daughters than sons is expected to slightly decrease growth by 0.36% (significant at the 10% level). This point estimate is close to 0%, which provides some evidence that having more daughters than sons may be a determinant of economic growth.

However, taking into account columns (4), (5), and (6) shows that the previous conclusions may be incorrect. If having more daughters positively influences economic growth, then I would expect column (4) to have a positive point estimate of $POST - PRE$, column (5) to have a negative point estimate, and column (6) to have point estimate equal to 0. As seen, the estimate of $POST - PRE$ in column (4) but is indistinguishable from 0 due to the lack of significance at the 10% level. Furthermore, both columns (5) and (6) are not statistically significant at the 10% level, suggesting

[38]The other two methods of categorization, "only daughters" and "at least one daughter," provide inconsistent results, in part because of small sample sizes. See Appendix C for the results.

Table 9: Analysis of More Daughters than Sons

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.271	0.270	-0.356	1.208	0.517	-0.196
J-statistic	1.272	0.690	1.346	1.075	0.469	1.083
Wald P-value	0.053	0.902	0.057	0.354	0.978	0.370
Number of Leaders	78	31	47	31	20	11
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroskedasticity and country-specific autocorrelation. Note that I only consider leaders who had strictly more daughters than sons. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

that when the pre-leader has more daughters than sons, the growth around the natural transitions are indistinguishable from the "normal" growth trends. A possible explanation for the lack of significance in column (6) is that there are only 11 transitions included. Nevertheless, considering the overall evidence, there does not seem to be consistent evidence that having more daughters than sons influences economic growth within the 10 year window around the natural transitions.

6 Specification Checks

To address whether the results in Part 5.1 are robust to country-specific corrections, which was used in Besley *et al.* (2011), I re-estimate Equation (3.1) with country-specific heteroskedasticity and country-specific autocorrelation (AR1) in Table 10.[39] As discussed previously, the point estimates do not change since I only modify the standard errors. Comparing the baseline results from Table 4 to the results in Table 10, I find that the J-statistics are smaller when using region-specific corrections. Nevertheless, the Wald p-values do not differ at the 0.1% level except for column (5), which considers the subset of democratic transitions, and column (6), which considers the subset of autocratic transitions. Previously, the J-statistics were significant at the 5% and 1% levels, respectively, when using region-specific corrections. When correcting for country-specific errors, the J-statistics in columns (5) and (6) both become significant at the 0.1% level. Using the replication data and code provided by Benjamin Olken, I find a similar pattern in Jones and Olken (2005) where region-specific corrections produce more conservative estimates. I find that when

[39]While country-specific corrections allow me to measure the error process in detail for each country, it does not take into account spacial autocorrelation. Spatial autocorrelation may be important due to geographical, economical, and political links between countries, causing heteroskedasticity to be correlated between countries

Table 10: Initial Analysis of Leaders and Economic Growth using Country-Specific Corrections

	(1) All	(2) Democratic	(3) Autocratic	(4) All	(5) Democratic	(6) Autocratic
Post-Pre	0.155***	-0.958***	1.104***	0.155***	-0.958***	1.104***
J-statistic	2.393	2.842	2.146	2.059	2.695	1.621
Wald P-value	0.000	0.000	0.000	0.000	0.000	0.001
Number of Leaders	122	55	63	122	55	63
Standard Errors	H	H	H	H and A	H and A	H and A
Observations	11839	11839	11839	11839	11839	11839

Notes: “H” denotes correcting for country-specific heteroskedasticity, and “A” denotes correcting for country-specific autocorrelation. Democratic transitions are defined as the subset of the natural transitions where the “polity” score in the Polity IV data set was greater than 0 in the year prior to the natural transition. Correspondingly, autocratic transitions include the transitions where the “polity” score in the Polity IV data set was less than or equal 0 in the year prior to the natural transition. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

country-specific corrections are used instead of region-specific corrections, their baseline results are now significant at the 1% level instead of the 10% level.[40]

Jones and Olken (2005) perform falsification tests on their sample of leadership transitions by creating control timings where each transition is shifted back by either 5 or 6 years. If the identification strategy is valid and a correct error structure is used, then there should not be any unusual changes in economic growth around the control timings, and the Wald test should fail to reject the null hypothesis. Jones and Olken (2005) show that at the control timings, their results are not significant at the 10% level, justifying their methodology. From the replication data and code provided by Jones and Olken, I find that when country-specific corrections are used instead of region-specific corrections, the Wald statistic at the control timing becomes statistically significant at the 10% level (which is the same significance level as their main result).[41] Thus, for Jones and Olken (2005), region-specific corrections produce more conservative estimates and seem to correctly identify the significance of leadership transitions.

In Table 11, I present the results of my falsification tests where I shift the timing of the transition back by 5 years, using region-specific corrections. The number of transitions now decreases to a total of 115 transitions from 122 in the baseline analysis due to missing growth data. Comparing Table 11 to Table 12 reveals how the results change when using either region-specific corrections or country-specific corrections at the control timing. There seem to be some substantial differences,

[40] I was unable to obtain replication data and code used in Besley *et al.* (2011) as their files were not ready for public distribution and some of the statistical analysis was performed outside of Stata.

[41] Replicating Jones and Olken (2005), I find that using country-specific corrections finds the control timing for 6 years statistically significant at the 10% level while the control timing for 5 years is not statistically significant at the 10% level.

Table 11: Initial Analysis with Region-Specific Corrections: Falsification Test

	(1) All	(2) Democratic	(3) Autocratic	(4) All	(5) Democratic	(6) Autocratic
Post-Pre	-0.486***	-0.263	-0.569***	-0.486*	-0.263	-0.569**
J-statistic	1.598	1.141	1.897	1.311	0.908	1.532
Wald P-value	0.000	0.233	0.000	0.014	0.654	0.005
Number of Leaders	115	48	59	115	48	59
Standard Errors	H	H	H	H and A	H and A	H and A
Observations	11839	11839	11839	11839	11839	11839

Notes: H, corrected for region-specific heteroskedasticity, A corrected for region-specific autocorrelation. Democratic transitions are defined as the subset of the natural transitions where the “polity” score in the Polity IV data set was greater than 0 in the year prior to the natural transition. Correspondingly, autocratic transitions include the transitions where the “polity” score in the Polity IV data set was less than or equal 0 in the year prior to the natural transition. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

Table 12: Initial Analysis with Country-Specific Corrections: Falsification Test

	(1) All	(2) Democratic	(3) Autocratic	(4) All	(5) Democratic	(6) Autocratic
Post-Pre	-0.486***	-0.263**	-0.569***	-0.486***	-0.263*	-0.569***
J-statistic	1.934	1.609	2.255	1.719	1.414	1.998
Wald P-value	0.000	0.005	0.000	0.000	0.031	0.000
Number of Leaders	115	48	59	115	48	59
Standard Errors	H	H	H	H and A	H and A	H and A
Observations	11839	11839	11839	11839	11839	11839

Notes: H, corrected for country-specific heteroskedasticity, A corrected for country-specific autocorrelation. Democratic transitions are defined as the subset of the natural transitions where the “polity” score in the Polity IV data set was greater than 0 in the year prior to the natural transition. Correspondingly, autocratic transitions include the transitions where the “polity” score in the Polity IV data set was less than or equal 0 in the year prior to the natural transition. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

but overall the J-statistics remain significant at the 5% level.[42] For instance, comparing the main results in column (4) in both tables (where I control for both heteroskedasticity and autocorrelation), the J-statistic is significant at the 0.1% level when using country-specific corrections, but is only significant at the 5% level when using region-specific corrections. For democratic transitions, the Wald p-values changes much more substantially between Tables 11 and 12. When using region-specific corrections, the J-statistics in both columns (2) and (5) are not significant, with respective Wald p-values of 23% in column (2) and 65% in column (5) . However, the J-statistics become significant at the 5% level when using country-specific corrections. Consequently, there seems to be a consistent pattern both within my own results as well as Jones and Olken (2005) where region-specific corrections produce more conservative estimates than country-specific corrections.

In contrast to Jones and Olken (2005), the results in Tables 11 indicate that I should reject the null hypothesis of the Wald test when the transitions are shifted to the control timing. This is extremely surprising since this suggests that the variation in economic growth is significant even 5 years before a natural transition, implying that the empirical strategy may be over-identifying the influence of national leaders on economic growth. Besley *et al.* (2011) find similar results when they perform the same falsification test, which they argue demonstrates how spurious transitions may yield incorrect point estimates. As seen in column (4) of Table 11, my point estimate of $POST-PRE$, -0.486%, is quite different compared to the main result of 0.155% in Table 4, supporting this argument. Overall, when I expand the list of transitions and use the Maddison growth

[42] An additional concern is that the error structure changed from 1945 onwards (stationarity assumption). Nevertheless, these results are robust to only including growth data for the post 1945 period.

data, there seems to be issues with the identification strategy and/or the error structure no matter whether or not I use country-specific corrections or region-specific corrections.

7 Additional Results: What Policies Do Leaders Affect?

The results so far suggest that even though national leaders matter for economic growth, leadership characteristics including military background, being a member of a political dynasty, belonging to the ethnic majority, and the number of daughters do not seem to substantially influence aggregate economic growth. Nevertheless, these leadership characteristics could have a significant effect on relevant policy outcomes. To investigate whether this is the case, I employ the empirical strategy developed before in Part 3 with the different policy outcomes as my dependent variable instead of per capita economic growth. This approach is motivated by Jones and Olken (2005), where they examine if leaders generally influence four policy outcomes; monetary policy, fiscal policy, trade policy, and security policy.

Taking into account the availability of data and the relevancy of policy outcomes, I investigate three types of policy outcomes; security policy, fiscal policy, and health policy. First I will examine if leaders generally matter for these policy outcomes. Then I will examine if leadership characteristics have a significant influence on these policy outcomes.

I investigate the effect on security policy by looking at the incidence and intensity of conflict. Following Jones and Olken (2005), I use the UCDP/PRIO Armed Conflict Dataset, which contains information on armed conflicts from 1945-2014. I construct a conflict intensity variable that reflects the maximum intensity of any conflict that a country was involved in within a specific year.[43] The measure is equal to 0 if the country was not involved in any conflicts in that year, 1 if the country was involved in a minor armed conflict in that year, and 2 if the country was involved in a war in that year.[44]

I also investigate the influence on fiscal policy by examining government expenditure. More specifically, I consider the annual percentage change in government spending.[45] I obtain this data from the World Development Indicators, which includes information on over 1300 indicators for 214 countries from 1960-2010. Due to a lack of detailed annual data, I am unable to consider more specific policy outcomes of government expenditure, including military spending, education spending, and health spending (see Appendix D for some baseline results).

Finally, I examine the effects on health policy. I first investigate the annual percentage changes in female and male adult mortality rates.[46] I then consider the annual percentage change in the infant mortality rate. Data on these policy outcomes from 1960 to 2010 are obtained from the World Development Indicators. Due to a lack of detailed annual data, I am unable to consider other health policy outcomes including infant female and infant male mortality rates, as well as educational policy outcomes including primary school completion rates and literacy rates (See Appendix D for some baseline results).

[43] Note that I restrict conflict participation to the primary parties.

[44] A minor armed conflict is defined to be any conflict where there are between 25 to 999 battle-related deaths in a year, while a war is defined to be at least 1000 battle-related deaths in a year.

[45] Government spending is expressed as a percentage of GDP.

[46] These rates are expressed as per 1000 individuals.

7.1 Baseline Analysis

Table 13 reports the results of the Wald test, implemented after estimating Equation (3.1) on the entire set of natural transitions. For each column, I consider a different policy outcome that replaces per capita economic growth as the dependent variable in Equation (3.1). In all of the regressions, I allow for region-specific heteroskedasticity and region-specific autocorrelation (AR1 process). The J-statistic, which is derived in Equation (3.2), tests whether leadership matters for the specific policy outcome by comparing the means of the policy outcome in the pre- and post-transition period. The null hypothesis assumes that there is no variation in the specific policy outcome beyond what is expected before and after a natural transition.

As seen from the Wald p-values in Table 13, I fail to reject the null hypothesis at the 10% level for conflict intensity, government expenditure, male adult mortality rate, and female adult mortality rate. This indicates that there are no unusual changes in these policy outcomes around the control timings. This is in line with the results from Jones and Olken (2005), where they find that there is no evidence to suggest that leaders generally impact conflict or government expenditure. Jones and Olken (2005) argue the lack of significance for conflict intensity may be a reflection of the rarity of conflicts in general and the limited power of the statistical analysis. Interestingly, the Wald p-value of 0.01 in column (5) provides evidence that I can reject the null hypothesis at the 1% significance level that leaders do not matter for the infant mortality rate. In other words, the results suggest that infant mortality rates may be a policy outcome significantly impacted by national leaders.

Table 13: Baseline Analysis of Additional Outcome Variables

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Post-Pre	-0.018	-0.005	0.001	0.001	0.000
J-statistic	0.519	0.848	1.342	1.037	1.455
Wald P-value	1.000	0.767	0.031	0.393	0.010**
Number of Leaders	74	49	69	69	65
Observations	8619	6344	8254	8254	7592

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

7.2 Characteristics and Leadership Qualities

The following discussion will use the methodology described in Part 3 to analyze whether leadership characteristics influence three types of policy outcomes; security policy, fiscal policy, and health policy. I consider heterogeneity in military background, being a member of a political dynasty, belonging to the ethnic majority, and the number of daughters in Tables 14 through 18, respectively.

Due to the unique structure of the tables, a concrete example is to consider Table 14: Analysis of Military Experience and Policy Outcomes. The first element in the table is “Pre No” and “Conflict Intensity.” This means that the dependent variable is “Conflict Intensity” instead of economic growth and I am considering the subset of natural transitions where the pre-transition leader did not have any military experience. Consequently, 0.000 is the estimate of $POST - PRE$, the average change in the intensity of conflict across all the transitions where the pre-transition leader did not have any military experience. The number in the round parentheses, 0.892, is the Wald p-value and the number in the square brackets, 36, denotes the number of natural transitions where the pre-transition leader did not have any military experience. Thus, it seems that when pre-transition leaders who do not have military experience leave power, the intensity of conflict does not vary more than “normal.”

More generally, for each of these tables, the columns identify the dependent variable that replaces per capita economic growth in Equation (3.1). This is unlike before, where there was only one dependent variable, per capita economic growth, and where I reported the different partitions of transitions on the columns. Now in Tables 14 through 18, the rows define the different partitions of transitions according to the characteristics of the pre- and post-leader. Rows (1) and (2) report the results of the Wald tests, implemented after estimating Equation (3.3), which only considers differences in the characteristics of the pre-transition leader. "Pre No" refers to the subset of transitions where the pre-leader does not have the characteristic while "Pre Yes" refers to the subset of transitions where the pre-leader has the characteristic. For Tables 14 through 18, the reported values are the estimates of $POST - PRE$, which is the average change in the specific policy outcome variable across the transitions, or $\sum_{z=1}^{Z}(\beta_z - \alpha_z)$. The numbers in the round parentheses are the Wald p-values, and the numbers in the square brackets are the number of transitions that satisfy each partition.

Rows (3), (4), (5), and (6) display the results of the Wald tests, implemented after estimating Equation (3.4), which subsets the transitions into the four possible types of leadership transitions. For instance, row (3) is "Pre No and Post No", which defines the subset of transitions where both the pre-leader and post-leader do not have the characteristic. "Pre No and Post Yes", "Pre Yes and Post No", and "Pre Yes and Post Yes" are defined correspondingly.

Military Experience

The results allowing for variation in military experience on the different policy outcomes using Equation (3.3) are presented in Table 14. Surprisingly, I find that having military experience does not seem to influence the intensity of conflict in column (1). None of the point estimates of $POST - PRE$ are significant at the 10% level, meaning that I do not find sufficient evidence to reject the null

Table 14: Analysis of Military Experience and Policy Outcomes

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Pre No	0.000	-0.014	0.003***	0.003*	-0.003***
	(0.892)	(0.369)	(0.001)	(0.015)	(0.001)
	[36]	[24]	[33]	[33]	[31]
Pre Yes	-0.036	0.011	-0.002	-0.001	-0.001
	(0.991)	(0.980)	(0.955)	(0.999)	(0.995)
	[25]	[17]	[24]	[24]	[24]
Pre No and Post No	0.003	-0.017	0.003***	0.004**	-0.001**
	(0.574)	(0.219)	(0.001)	(0.002)	(0.002)
	[28]	[17]	[25]	[25]	[23]
Pre No and Post Yes	-0.008	-0.016	0.007	0.001	0.002
	(1.000)	(0.586)	(0.685)	(0.911)	(0.910)
	[6]	[5]	[6]	[6]	[6]
Pre Yes and Post No	0.034	-0.029	0.002	-0.005	-0.002
	(0.930)	(0.706)	(0.870)	(0.810)	(0.847)
	[10]	[6]	[9]	[9]	[9]
Pre Yes and Post Yes	-0.087	0.037	-0.004	0.002	-0.004
	(0.936)	(0.969)	(0.831)	(0.999)	(0.989)
	[14]	[10]	[14]	[14]	[14]

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. The reported values are the average difference in the policy outcomes between the post- and pre-transition period, or POST-PRE (as defined in the text). The numbers in the round parentheses are Wald p-values. The numbers in the square brackets are the number of leadership transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

hypothesis that conflict intensity varies unusually when I partition the natural transitions according to military experience. This conclusion is not in line with Horowitz and Stam (2013), as they find that leaders with military experience (but no combat), and leaders with rebel military experience are most likely to initiate militarized disputes. This may be due to the fact that Horowitz and Stam (2013) use a different empirical strategy, include all military conflicts that occurred throughout the tenure of a leader (instead of the 10 years around a natural transition), and use a larger data set from 1875 to 2004.

Even if having military experience does not seem to directly influence the intensity of conflict, military experience could still impact the amount of military spending and thus the size of the government. However, in column (2) I find that there does not seem to be any evidence that military experience is a characteristic that causes the growth of government expenditure to change unusually around a natural transition. Note that rows (4), (5), and (6) have a very small number of transitions.

For the adult female mortality rate and the adult male mortality rate in columns (3) and (4), the point estimates in row (1), "Pre No", and row (3), "Pre No and Post No", are significant at the 5% level. This means that for transitions where the pre-transition leader did not have military experience, the annual growth rate of the adult mortality rate for both males and females varies more than "normal" in the 10 year window around a natural transition. On average, there is an increase of 0.3% in the annual growth rate of both the female and male adult mortality rate across transitions where the pre-transition leader did not have military experience. Across all the years and countries, the average annual growth of the adult mortality rate is -1.41% for females and

-1.05% for males. Thus, the estimate of 0.3% for $POST - PRE$ seems to be a quite substantial and implies that not having military experience is negatively associated with adult mortality rate for both males and females. However, it is unknown why this occurs, especially as the estimate of $POST - PRE$ in row (2), "Pre Yes", is not significant and has a similar number of transitions to row (3).

There is a similar pattern of significance with infant mortality in column (5), where the point estimates of $POST - PRE$ are significant at the 1% level for row (1), "Pre No", and row (3), "Pre No and Post No." However, the point estimates are now negative at -0.3% and -0.1% respectively. Across all the years and countries, the average annual growth of the infant mortality rate is 3.37%. Thus these point estimates seem to be relatively small. Overall, it does not seem that military experience substantially influences security policy, fiscal policy, or health policy using the empirical strategy outlined in Part 3.

Rebel Military Experience

Table 15 displays the results of the Wald tests, implemented after estimating Equation (3.3) on rebel military experience with different policy outcomes as the dependent variable. For column (1), which considers conflict intensity as the dependent variable, there seems to be a relatively similar results with military experience except for row (4), "Pre No and Post Yes", which is significant at the 0.1% level. However, as there are only 2 transitions that are included, there does not seem to be any evidence that rebel military experience influences conflict intensity.

Columns (2), (3), (4), and (5) all produce results extremely similar to military experience,

Table 15: Analysis of Rebel Military Experience and Policy Outcomes

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Pre No	-0.0014	-0.015	0.003**	0.004*	-0.001*
	(0.837)	(0.344)	(0.008)	(0.018)	(0.010)
	[34]	[25]	[31]	[31]	[30]
Pre Yes	0.008	0.013	-0.002	-0.001	-0.003
	(0.996)	(0.991)	(0.498)	(0.997)	(0.543)
	[27]	[16]	[26]	[26]	[25]
Pre No and Post No	-0.021	-0.012	0.003**	0.004*	-0.001**
	(1.000)	(0.281)	(0.005)	(0.012)	(0.006)
	[31]	[23]	[29]	[29]	[28]
Pre No and Post Yes	-0.242***				
	(0.001)	N/A	N/A	N/A	N/A
	[2]				
Pre Yes and Post No	0.086	0.030	-0.001	0.001	-0.005
	(0.904)	(0.949)	(0.517)	(0.968)	(0.799)
	[11]	[8]	[10]	[10]	[10]
Pre Yes and Post Yes	-0.046	-0.011	0.001	-0.001	0.001
	(0.976)	(0.865)	(0.819)	(0.973)	(1.000)
	[14]	[6]	[14]	[14]	[13]

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. The reported values are the average difference in the policy outcomes between the post- and pre-transition period, or POST-PRE (as defined in the text). The numbers in the round parentheses are Wald p-values. The numbers in the square brackets are the number of leadership transitions that satisfy the specific criteria. N/A indicates that there are no transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

including the Wald p-values, the directions of the point estimates of $POST - PRE$, as well the magnitudes of the point estimates. Thus, overall there does not seem to be evidence that rebel military experience influences security policy, fiscal policy, or health policy.

Political Dynasties

The results allowing for variation in political dynasties (broad definition) on different policy outcomes are presented in Table 16. In column (1), none of the point estimates of $POST - PRE$ are significant at the 10% level, meaning that I do not find sufficient evidence to reject the null hypothesis that conflict intensity varies unusually when I partition the natural transitions according to political dynasties. The same conclusion is reached for column (2) which analyzes government expenditure as the dependent variable.

For adult female mortality rates in column (3), row (1), "Pre No", and row (3), "Pre No and Post No," have point estimates that are significant at the 0.1% level. At first glance, as the point estimate of $POST - PRE$ in row (3) is statistically significant and close to 0%, this suggests that belonging to a political dynasty may be an important determinant of female mortality rates. However, if this conclusion is valid I would expect row (6), "Pre Yes and Post Yes" to be statistically significant as well and close to 0%, as well as rows (4) and (5) to have point estimates that are significant and opposing. Nevertheless, this is not the case and hence there does not seem to be evidence that belonging to a political dynasty affects the annual growth rate of the mortality rate of adult females.

Interestingly, the results of the Wald tests in column (4), which considers the mortality rate

Table 16: Analysis of Political Dynasty (Broad) and Policy Outcomes

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Pre No	-0.016	-0.013	0.000**	-0.001	-0.004
	(0.784)	(0.642)	(0.004)	(0.905)	(0.058)
	[40]	[27]	[38]	[38]	[36]
Pre Yes	-0.029	0.020	0.004	0.005*	0.005**
	(1.000)	(0.877)	(0.525)	(0.014)	(0.006)
	[22]	[15]	[21]	[21]	[21]
Pre No and Post No	-0.002	-0.016	-0.001***	0.000	-0.004**
	(0.421)	(0.451)	(0.001)	(0.808)	(0.002)
	[31]	[22]	[29]	[29]	[27]
Pre No and Post Yes	-0.062	-0.002	0.002	-0.005	-0.001
	(1.000)	(0.908)	(0.662)	(0.857)	(0.555)
	[8]	[5]	[8]	[8]	[8]
Pre Yes and Post No	0.001	0.013	-0.002	-0.005	-0.004
	(0.998)	(0.978)	(0.255)	(0.315)	(0.941)
	[11]	[7]	[11]	[11]	[11]
Pre Yes and Post Yes	-0.060	0.026	0.009	0.016**	0.014***
	(1.000)	(0.504)	(0.796)	(0.006)	(0.000)
	[11]	[8]	[10]	[10]	[10]

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. The reported values are the average difference in the policy outcomes between the post- and pre-transition period, or POST-PRE (as defined in the text). The numbers in the round parentheses are Wald p-values. The numbers in the square brackets are the number of leadership transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

of adult males as the dependent variable, differs from the results in column (3). The estimates of $POST - PRE$ in row (2), “Pre Yes”, and in row (6), “Pre Yes and Post Yes,” are significant at the 5% level. The point estimate in row (6) is 1.6%, which means that on average, the growth rate of the mortality rate for adult males increases by 1.6% when both the pre- and post-transition leader belong to a political dynasty. This is large relative to the aggregate growth rate of adult mortality for males across all countries and years of -1.05%. Note that due to the lack of significance in the other rows and as there are only 10 transitions included in row (6), there seem to be confounding factors that may be causing the large positive increase in the male adult mortality rate instead of leaders who belong to political dynasties.

Finally, for column (5) which considers infant mortality, the point estimates of $POST - PRE$ in rows (2), (3), and (6) are significant at the 1% level. The positive sign of $POST - PRE$ in row (2) and negative sign of $POST - PRE$ in row (3) suggests that having a leader who does not belong to a political dynasty is beneficial for the infant mortality rate. However, taking into account row (6), which I would expect to be significant and close to 0% if political dynasties mattered for infant mortality, indicates that this may not be the correct conclusion. Note that these 10 transitions are the same 10 transitions included in columns (3) and columns (4), providing evidence that there is an underlying trend that is hidden in the aggregate analysis. Overall there seem to be some interesting trends in the health outcomes, but is unknown whether they are due to leaders who are members of political dynasties or other factors.

Ethnic Majority

Table 17 displays the results of the Wald tests, implemented after estimating Equation (3.3) on the leadership characteristic of belonging to the ethnic majority. The results from column (1) and (2) indicate, using the previous reasoning, that belonging to the ethnic majority does not seem to influence the intensity of conflict or government expenditure. Note that even though row (5), "Pre Yes and Post No," in column (2) has a significant point estimate at the 1% level, there are only 3 observations which discounts the validity of the result.

For columns (3) and (4), there also does not seem to be any consistent evidence that belonging to the ethnic majority influences the annual growth rate of the mortality rate of adult males or adult females. For infant mortality in column (5), since $POST - PRE$ is statistically significant at the 1% level and close to 0% in rows (2) and rows (6), this suggests that belonging to the ethnic majority is a significant determinant of the annual growth rate of the infant mortality rate. However, whether belonging to the ethnic majority positively or negatively impacts infant mortality rate is unknown since the point estimates in rows (3) and (4) are not significant at the 10% level. In other words, this means that the transitions between leaders without the same ethnic background are not associated with unusual variation in the growth rate of the infant mortality rate. Since there are only 4 transitions in row (4) and 2 transitions in row (5), this demonstrates the lack of natural variation in the data.

Consequently, there may be an effect of belonging to the ethnic majority on the infant mortality rate, but there is not enough heterogeneity in the data to draw substantive conclusions. With respect

Table 17: Analysis of Ethnic Majority and Policy Outcomes

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Pre No	0.021	0.013	0.002	0.001	-0.004
	(1.000)	(0.638)	(0.934)	(0.956)	(0.987)
	[11]	[8]	[11]	[11]	[11]
Pre Yes	-0.029	-0.005	0.001**	0.001	0.000***
	(0.953)	(0.812)	(0.002)	(0.065)	(0.001)
	[52]	[34]	[48]	[45]	[46]
Pre No and Post No	0.015	-0.020	0.002	0.001	-0.002**
	(0.993)	(0.545)	(0.856)	(0.947)	(1.000)
	[7]	[5]	[7]	[7]	[7]
Pre No and Post Yes	0.032	0.066	0.001	0.000	-0.008
	(0.994)	(0.564)	(0.788)	(0.691)	(0.572)
	[4]	[3]	[4]	[4]	[4]
Pre Yes and Post No	-0.070	-0.122**	-0.002	-0.001	0.001
	(0.954)	(0.005)	(0.987)	(0.970)	(0.625)
	[3]	[3]	[3]	[3]	[2]
Pre Yes and Post Yes	-0.026	0.007	0.001	0.002*	0.000***
	(0.908)	(0.997)	(0.001)	(0.031)	(0.000)
	[48]	[31]	[44]	[44]	[43]

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. The reported values are the average difference in the policy outcomes between the post- and pre-transition period, or POST-PRE (as defined in the text). The numbers in the round parentheses are Wald p-values. The numbers in the square brackets are the number of leadership transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

to the existing literature, Franck and Rainer (2012) find that there is widespread ethnic favoritism in sub-Saharan Africa, which is reflected in infant mortality and primary education. However, it is not clear how ethnic favoritism affects the aggregate infant mortality and primary education rates across all ethnic groups. For instance, although there may be transfer effects (e.g. reduced funding to hospitals in areas where there are fewer individuals from the ethnic group of the leader), it is unknown how this affects the overall infant mortality rate since a decrease in the infant mortality rate in one group might offset an increase in the infant mortality rate in another group

Daughters

The results allowing for variation in having more daughters than sons on different policy outcomes are presented in Table 18. In column (1), none of the point estimates of $POST - PRE$ are significant at the 10% level, meaning that I do not find sufficient evidence to reject the null hypothesis that conflict intensity varies unusually when I partition the natural transitions according to whether leaders have more daughters than sons. The same conclusion is reached column (2) which analyzes government expenditure as the dependent variable.

For columns (3) and (4), $POST - PRE$ is significant at the 0.1% level for row (4), "Pre No and Post Yes." As seen, both estimates are positive, but the magnitudes are quite different. On average there is an increase the growth rate of the mortality rate for adult females by 0.3%, while there is an increase in the growth rate of the mortality rate for adult males by 1.1% across transitions between a pre-leader who did not have more daughters than sons to a post-leader who did have more daughters than sons. Although the point estimates are positive, the difference between the

Table 18: Analysis of More Daughters than Sons and Policy Outcomes

	(1) Conflict Intensity	(2) Government Expenditure	(3) Mortality Rate (Adult Females)	(4) Mortality Rate (Adult Males)	(5) Mortality Rate (Infant)
Pre No	-0.020	0.014	0.002**	0.002	-0.005**
	(0.998)	(0.969)	(0.009)	(0.101)	(0.006)
	[39]	[25]	[37]	[37]	[37]
Pre Yes	-0.003	-0.009	-0.002	-0.003	0.009*
	(0.454)	(0.968)	(0.245)	(0.597)	(0.015)
	[19]	[13]	[17]	[17]	[16]
Pre No and Post No	0.013	0.021	0.001	-0.003	-0.005
	(0.978)	(0.986)	(0.795)	(0.997)	(1.141)
	[23]	[17]	[23]	[23]	[23]
Pre No and Post Yes	-0.064	-0.002	0.003***	0.011***	-0.006**
	(0.984)	(0.558)	(0.000)	(0.000)	(0.003)
	[16]	[8]	[14]	[14]	[14]
Pre Yes and Post No	0.000	0.000	0.003	0.001	0.009
	(0.130)	(0.833)	(0.133)	(0.429)	(0.336)
	[13]	[8]	[11]	[11]	[10]
Pre Yes and Post Yes	-0.013	-0.022	-0.009	-0.011	0.009**
	(1.000)	(0.961)	(0.632)	(0.702)	(0.003)
	[6]	[5]	[6]	[6]	[6]

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. The reported values are the average difference in the policy outcomes between the post- and pre-transition period, or POST-PRE (as defined in the text). The numbers in the round parentheses are Wald p-values. The numbers in the square brackets are the number of leadership transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

growth mortality rate for adult females and the mortality rate for adult males indicates that there may be some evidence that having a leader with more daughters than sons is more beneficial for the mortality rate of adult females compared to the mortality rate of adult males.

However, the strength of this conclusion is moderated by the relatively small sample size of 14 transitions and the lack of significance in the other rows. For instance, I would expect $POST - PRE$ in row (5) for both columns (3) and (4) to be statistically significant, with the growth rate of the mortality rate of adult males higher than the growth rate of the mortality rate of adult females. Hence, overall there seems to be some evidence that leaders who have more daughters than sons may be more beneficial for the mortality rate of adult females than the mortality rate of adult males.

8 Conclusion

Following the expanding literature on the influence of national leadership on economic growth, I build upon the empirical strategy developed by Jones and Olken (2005). Previous research has found that the timing of leadership transitions are non random with respect the underlying economic conditions. By identifying leadership transitions caused by natural deaths and illnesses, Jones and Olken (2005) argue that they can isolate the effect of national leaders on national growth as the timing of these leadership transfers are essentially random with respect to economic growth.

Using the methodology developed in Besley *et al.* (2011) to evaluate the effect of education heterogeneity on economic growth, I investigate additional individual characteristics that may influence leadership quality and economic growth. To do so, I create an up-to-date sample of political leaders from 1875 onwards to 2005. Motivated by recent literature in sociology, political science, and development economics, I collect data on potentially important individual characteristics including military experience, being a member of a political dynasty, belonging to the ethnic majority, and the number of daughters.

I provide empirical evidence for the exogeneity of leadership transitions caused by natural deaths and illnesses with respect to economic growth. Thus, by focusing on these natural leadership transitions, I am able to isolate the effect of leaders on economic growth and sidestep the causality that runs between economic growth and the timing of leadership transitions. Nevertheless, there is some evidence to suggest that the identification strategy may be over-identifying the significance of leaders, indicating issues either with the error structure or the identification strategy.

Although I find consistent results with the literature that leaders generally do impact economic growth, the results also indicate that the identified leadership characteristics do not seem to substantially influence aggregate economic growth. However, there is some evidence for a few compelling trends. I find that post-leaders with military experience are associated with a decrease in economic growth when they follow a pre-leader who did not have military experience. Leaders who belong to an ethnic minority seem to be beneficial only in the cases where their predecessor belongs to the ethnic majority. Finally, leaders who have more daughters than sons, that follow leaders who do not, are associated with positive changes in economic growth. Nevertheless, these conclusions drawn are not substantially supported by all of the results. Moreover, the unexplained and contradictory point estimates reveal underlying themes that are hidden by the aggregate analysis.

Even though the identified leadership characteristics do not seem to impact economic growth, these leadership characteristics could have a significant effect on relevant policy outcomes. I investigate three types of policy outcomes, including security policy, fiscal policy, and health policy. I find that none of the characteristics significantly affect the intensity of conflict and government spending. There seems to be some evidence that leaders who belong to the ethnic majority may have a significant impact on the infant mortality rate, but due to the lack of natural variation in the data, I am unable to draw more substantive conclusions. I also find some evidence that having leaders who have more daughters than sons may be more beneficial for the mortality rate of adult females compared to the mortality rate of adult males. Nevertheless, the strength of these results are tempered by some inconsistencies as well as a lack of available panel data on policy outcomes.

The research presented in this thesis has explored whether four potentially defining individual characteristics systematically influence leadership quality, as reflected in economic growth. This thesis contributes to the expanding literature on identifying the characteristics that determine leadership quality and the channels in which national leadership influences economic growth.

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A Math Appendix

Jones and Olken (2005) model the economic growth rate (g_{ct}) for country c at time t as:

$$\begin{aligned} g_{ct} &= \theta l_{ct} + v_c + \varepsilon_{ct} \\ \varepsilon_{ct} &\sim N(0, \sigma_{ct}^2) \end{aligned} \tag{A.1}$$

where v_c are country fixed-effects, and l_{ct} represents the leader in country c at time t. Hence l_{ct} can be interpreted as leadership quality, which is assumed to be constant over a leader's tenure. Jones and Olken (2005) further express leadership transition as a function of previous economic growth, where

$$l_{ct} = \begin{cases} l_{c,t-1} & P(g_{ct}, g_{c,t-1}, \ldots.) \\ l' & 1 - P(g_{ct}, g_{c,t-1}, \ldots.) \end{cases} \tag{A.2}$$

where l' represents a new leader.

$$\begin{aligned} l' &\sim N(\mu, \sigma_l^2) \\ corr(l_{ct}, l') &= \rho \end{aligned}$$

where we assume that leadership quality is drawn from a Normal distribution centered at μ with variance σ_l^2.

The model shows simultaneous causality between economic growth and leadership transition. This is the crux of the identification problem as economic growth can influence the probability of a leadership transition and hence the leadership quality that appears in country c at time t. To resolve this, Jones and Olken (2005) analyze the T years of growth before and after a leadership transition caused by a natural death. Let α_z equal the level difference in the average growth T years before transition z occurs and β_z equal the level difference in the average growth T years after transition z occurs. β_z and α_z are approximately normal by the central limit theorem, assuming that the growth rate in country c at time t is independent of previous growth rates (as seen in Equation (A.1)). Thus as the linear combination of independent normal random variables is normal, we have that $\widehat{\beta_z - \alpha_z}$ is approximately normal. I can then calculate the expected value by:

$$E(\widehat{\beta_z - \alpha_z}) = E(\beta_z) - E(\alpha_z)$$

$$E(\widehat{\beta_z - \alpha_z}) = E(\frac{1}{T}\sum_{y=1}^{T} g_{c,t+y}) - E(\frac{1}{T}\sum_{y=1}^{T} g_{c,t-y})$$

$$E(\widehat{\beta_z - \alpha_z}) = E(\frac{1}{T}\sum_{y=1}^{T}(v_c + \theta l_{c,t+y} + \varepsilon_{c,t+y})) - E(\frac{1}{T}\sum_{y=1}^{T}(v_c + \theta_{c,t-y} + \varepsilon_{c,t-y}))$$

$$E(\widehat{\beta_z - \alpha_z}) = E(\frac{1}{T}\sum_{y=1}^{T} \theta l_{c,t+y}) - E(\frac{1}{T}\sum_{y=1}^{T}(\theta l_{c,t-y})$$

$$E(\widehat{\beta_z - \alpha_z}) = 0 \tag{A.3}$$

I can calculate the variance by:

$$Var(\widehat{\beta_z - \alpha_z}) = Var(\frac{1}{T}\sum_{y=1}^{T} g_{c,t+y} - \frac{1}{T}\sum_{y=1}^{T} g_{c,t-y})$$

$$Var(\widehat{\beta_z - \alpha_z}) = Var(\frac{1}{T}\sum_{y=1}^{T}(v_c + \theta l_{c,t+y} + \varepsilon_{c,t+y}) - \frac{1}{T}\sum_{y=1}^{T}(v_c + \theta l_{c,t-y} + \varepsilon_{c,t-y}))$$

$$Var(\widehat{\beta_z - \alpha_z}) = Var(\frac{1}{T}\sum_{y=1}^{T}(\theta l_{c,t+y} - \theta l_{c,t-y}) + \frac{1}{T}\sum_{y=1}^{T}\varepsilon_{c,t+y} + \frac{1}{T}\sum_{y=1}^{T}\varepsilon_{c,t-y}) \tag{A.4}$$

Assuming no simultaneous causality and uncorrelated error terms, $Cov(\varepsilon_{ct}, l) = 0\ \forall c,t$ and

$Cov(\varepsilon_{cx}, \varepsilon_{cy}) = 0 \; \forall x, y \in t$, we have:

$$Var(\widehat{\beta_z - \alpha_z}) = Var(\frac{1}{T}\sum_{y=1}^{T}(\theta l_{c,t+y} - \theta l_{c,t-y})) + Var(\frac{1}{T}\sum_{y=1}^{T}\varepsilon_{c,t+y}) + Var(\frac{1}{T}\sum_{y=1}^{T}\varepsilon_{c,t-y})$$

$$Var(\widehat{\beta_z - \alpha_z}) = \frac{1}{T^2}(2\theta^2 T\sigma_l^2 - 2\theta^2\sigma_l^2 T\rho) + \frac{2}{T^2}(T\sigma_{\varepsilon c}^2)$$

$$Var(\widehat{\beta_z - \alpha_z}) = \frac{2\theta^2\sigma_l^2}{T} - \frac{2\theta^2\sigma_l^2\rho}{T} + \frac{2\sigma_{\varepsilon c}^2}{T}$$

$$Var(\widehat{\beta_z - \alpha_z}) = \frac{2\theta^2\sigma_l^2}{T}(1-\rho) + \frac{2\sigma_{\varepsilon c}^2}{T} \tag{A.5}$$

Intuitively this combines the sampling variance, $\frac{2\sigma_{\varepsilon c}^2}{T}$, plus the variance that arises from the average difference between growth rates before and after the transition, taking into account the correlation between the two leaders, $\frac{2\theta^2\sigma_l^2}{T}(1-\rho)$. Hence:

$$(\widehat{\beta_z - \alpha_z}) \sim N(0, \frac{2\theta^2\sigma_l^2}{T}(1-\rho) + \frac{2\sigma_{\varepsilon c}^2}{T}) \tag{A.6}$$

Under the Null hypothesis that $\theta = 0$, we have that:

$$(\widehat{\beta_z - \alpha_z}) \sim N(0, \frac{2\sigma_{\varepsilon c}^2}{T}) \tag{A.7}$$

We can then form a Wald Statistic based on this Null hypothesis:

$$J = \frac{1}{Z}\sum_{z=1}^{Z}\frac{(\widehat{\beta_z - \alpha_z})^2}{2\hat{\sigma}_{\varepsilon c}^2/T} \tag{A.8}$$

where $\hat{\sigma}_{\varepsilon c}^2$ is an estimate of $\sigma_{\varepsilon c}^2$ for country c, and $\widehat{\beta_z - \alpha_z}$ compares the average growth rate before and after a natural transition.

B Econometric Appendix

I follow the empirical strategy developed in Jones and Olken (2005). I use standard ordinary least squares to estimate:

$$g_{ct} = \alpha_z PRE_{zt} + \beta_z POST_{zt} + \nu_c + \nu_t + \varepsilon_{ct} \tag{B.1}$$

In my primary analysis, I follow Jones and Olken (2005) and adjust for region-specific heteroskedasticity and region-specific autocorrelation (AR1).[47] Note that for robustness checks, I follow Besley *et al.* (2011) and instead adjust the standard errors for country-specific heteroskedasticity and country-specific autocorrelation (AR1). Based on the description of the empirical strategy as well as STATA code from Jones and Olken (2005), I make the following modifications:

B.1 Heteroskedasticity Adjustment Only

From Greene (2012), the generalized least squares model is:

$$\begin{aligned} \mathbf{y} &= X\beta + \varepsilon \\ E(\varepsilon|X) &= \mathbf{0} \\ Var(\varepsilon|X) = E(\varepsilon\varepsilon^T|X) &= \sigma^2\Omega = \Sigma \end{aligned} \tag{B.2}$$

where given that we have have n observations, $\mathbf{y}$ is a $n \times 1$ vector of our dependent variable, X is the data matrix of size $n \times K$ (K independent variables), β is a $K \times 1$ vector of our independent variables, ε is a $n \times 1$ vector of the error terms, Ω is a positive definite matrix, and ε^T denotes the

[47] In an earlier draft of Jones and Olken (2005), they justify not using White or Newey-West robust standard errors "as there are only 5 observations for each fixed effect, there are not enough observations for each variable to satisfy the consistency requirements of these methods".

transpose of ε. From Theorem 9.1 we know that the correct covariance matrix of $\hat{\beta}_{OLS}$ is now:

$$V(\hat{\beta}_{OLS}|X) = \sigma^2(X^T X)^{-1}[X^T \Omega X](X^T X)^{-1} \tag{B.3}$$

The least squares estimator remains unbiased, consistent, and asymptotically normally distributed.

Assuming groupwise heteroskedasticity, no correlation in heteroskedasticity between groups, and the disturbance variance is constant within the i^{th} group, we can now consider an extension of White's estimator to a fixed effects model. We have n observations grouped into G groups, each with n_g observations.[48] Within each group,

$$Var(\varepsilon_{ig}|\mathbf{x}_{ig}) = \hat{\sigma_g^2} = \frac{\mathbf{e}_g^T \mathbf{e}_g}{n_g}$$

where i denotes the i^{th} observation for $i = 1, ..., n$, and $\mathbf{e}_g$ is the OLS residual vector associated with group g. Hence $\sigma^2\Omega$ can now be interpreted as a diagonal matrix of least squares residuals. In other words,

$$X^T \sigma^2 \Omega X = X^T \begin{pmatrix} \hat{\sigma_1^2} I_{T\times T} & 0 & \cdots & 0 \\ 0 & \hat{\sigma_2^2} I_{T\times T} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \hat{\sigma_g^2} I_{T\times T} \end{pmatrix} X = \sum_g \hat{\sigma_g^2} X_g^T X_g = \sum_g (\frac{\mathbf{e}_g^T \mathbf{e}_g}{T}) X_g^T X_g$$

where T is the number of observations for each group and I is the identity matrix.

For country-specific heteroskedasticity corrections, we can obtain the estimated residuals from Equation (B.1). Note that I have 160 countries so $G = 160$ and a maximum of $T = 136$ observations within each group (as the years ranges from 1875 to 2010). Thus we can obtain the standard errors

[48] See Greene (2012) Section 9.7.2. and 11.6 for a full derivation.

ε_{ct} from the OLS estimate and construct

$$\sigma^2\Omega = \begin{pmatrix} \hat{\sigma_1^2} I_{136\times 136} & 0 & \cdots & 0 \\ 0 & \hat{\sigma_2^2} I_{136\times 136} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \hat{\sigma_{160}^2} I_{136\times 136} \end{pmatrix}$$

where $I_{136\times 136}$ is the 136×136 identity matrix. Thus we have

$$\hat{\sigma_c^2} = \frac{\mathbf{e}_c^T \mathbf{e}_c}{n_c} = \frac{\sum_{t=1}^{n_c} (\varepsilon_{ct})^2}{n_c}$$

where n_c is the number of years of per capita growth available for country c. After doing so, we can evaluate Equation (B.3) to obtain the correct covariance matrix of $\hat{\beta}_{OLS}$.

For region-specific heteroskedasticity corrections, we can again obtain the estimated residuals from Equation (B.1). Here we still let $G = 160$ and $T = 136$. As I have 7 regions, let $r = 1,..,7$. Each region has a certain number of countries, with each country, c, having n_c years of growth observations. Thus the total number of observations in each region is now $n_r = \sum_{c\in r} n_c$. Thus we can obtain the standard errors ε_{ct} from the OLS estimate and construct

$$\sigma^2\Omega = \begin{pmatrix} \hat{\sigma_1^2} I_{136\times 136} & 0 & \cdots & 0 \\ 0 & \hat{\sigma_2^2} I_{136\times 136} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \hat{\sigma_{160}^2} I_{136\times 136} \end{pmatrix}$$

where for the region r that country c belongs to,

$$\hat{\sigma_c^2} = \hat{\sigma_r^2} = \frac{\mathbf{e}_r^T \mathbf{e}_r}{n_r} = \frac{\sum_{c\in r} \sum_{t=1}^{n_c} (\varepsilon_{ct})^2}{\sum_{c\in r} n_c} \quad for\ c \in r$$

B.2 Heteroskedasticity and Autocorrelation (AR1) Adjustment

From Greene (2012), the AR(1) process can be represented by:

$$\varepsilon_t = \rho \varepsilon_{t-1} + u_t \tag{B.4}$$

where

$$\begin{aligned} E[u_t|\mathbf{X}] &= 0 \\ E[u_t^2|\mathbf{X}] &= \sigma_u^2 \\ Cov[u_t, u_s|\mathbf{X}] &= 0 \quad if\ t \neq s \end{aligned}$$

assuming stationary, we have that

$$Corr[\varepsilon_t, \varepsilon_{t-s}] = \rho^s \tag{B.5}$$

Thus we can see that the autocorrelations fade over time. Building from the generalized least squares model discussed in Part B.1, we can construct:

$$\sigma^2 \Omega_{general} = \begin{pmatrix} 1 & \rho & \rho^2 & \rho^3 & \cdots & \rho^{T-1} \\ \rho & 1 & \rho & \rho^2 & \cdots & \rho^{T-2} \\ \rho^2 & \rho & 1 & \rho & \cdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \rho \\ \rho^{T-1} & \rho^{T-2} & \rho^{T-3} & \cdots & \rho & 1 \end{pmatrix} \tag{B.6}$$

Now to estimate autocorrelation (AR1) and groupwise heteroskedasticity, we estimate for each group, g, the matrix

$$W_g = \hat{\sigma_g^2} * \begin{pmatrix} 1 & \rho_g & \rho_g^2 & \rho_g^3 & \cdots & \rho_g^{T-1} \\ \rho_g & 1 & \rho_g & \rho_g^2 & \cdots & \rho_g^{T-2} \\ \rho_g^2 & \rho_g & 1 & \rho_g & \cdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \rho_g \\ \rho_g^{T-1} & \rho_g^{T-2} & \rho_g^{T-3} & \cdots & \rho_g & 1 \end{pmatrix}$$

Putting everything together yields:

$$\sigma^2 \Omega_{groupwise} = \begin{pmatrix} W_1 & 0 & \cdots & 0 \\ 0 & W_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & W_g \end{pmatrix} \tag{B.7}$$

For country-specific heteroskedasticity and country-specific autocorrelation corrections, we can obtain the estimated residuals from Equation (B.1) and construct

$$\sigma^2 \Omega = \begin{pmatrix} W_1 & 0 & \cdots & 0 \\ 0 & W_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & W_{160} \end{pmatrix}$$

where

$$W_c = \hat{\sigma_c^2} * \begin{pmatrix} 1 & \rho_c & \rho_c^2 & \rho_c^3 & \cdots & \rho_c^{135} \\ \rho_c & 1 & \rho_c & \rho_c^2 & \cdots & \rho_c^{134} \\ \rho_c^2 & \rho_c & 1 & \rho_c & \cdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \rho_c \\ \rho_c^{135} & \rho_c^{134} & \rho_c^{133} & \cdots & \rho_c & 1 \end{pmatrix}$$

$$\rho_c = \frac{\sum_{t=1}^{n_c} (\varepsilon_t * \varepsilon_{t-1})}{\hat{\sigma_c^2}} / n_c$$

For region-specific heteroskedasticity and region-specific autocorrelation corrections, we can again obtain the estimated residuals from Equation (B.1). Previously we found that the total number of observations in each region is now $n_r = \sum_{c \in r} n_c$. Thus we can obtain the standard errors ε_{ct} from the OLS estimate and construct

$$\sigma^2 \Omega = \begin{pmatrix} W_1 & 0 & \cdots & 0 \\ 0 & W_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & W_{160} \end{pmatrix}$$

where for the region r that country c belongs to,

$$W_c = W_r = \hat{\sigma_r^2} * \begin{pmatrix} 1 & \rho_r & \rho_r^2 & \rho_r^3 & \cdots & \rho_r^{135} \\ \rho_r & 1 & \rho_r & \rho_r^2 & \cdots & \rho_r^{134} \\ \rho_r^2 & \rho_r & 1 & \rho_r & \cdots & \vdots \\ \vdots & \vdots & \vdots & \vdots & \ddots & \rho_r \\ \rho_r^{135} & \rho_r^{134} & \rho_r^{133} & \cdots & \rho_r & 1 \end{pmatrix} \quad for\, c \in r$$

$$\rho_r = \frac{\sum_{c \in r} \sum_{t=1}^{n_c} (\varepsilon_t * \varepsilon_{t-1})}{\hat{\sigma_r^2}} / n_r$$

C Characteristics and Growth Appendix

Table 19: Analysis of Military Service (No Combat)

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.565	-1.272	0.380	0.186	-1.247	-1.301
J-statistic	1.392	0.288	1.408	0.484	0.126	0.505
Wald P-value	0.005**	0.959	0.005**	0.868	0.973	0.679
Number of Leaders	107	7	95	8	4	3
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroscedasticity and country-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 20: Analysis of Military Experience (With Combat)

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.629	-0.014	0.710	-2.832	-1.701	1.785
J-statistic	1.470	0.918	1.183	2.956	0.883	0.985
Wald P-value	0.004**	0.605	0.142	0.003**	0.595	0.470
Number of Leaders	80	34	69	8	17	16
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroscedasticity and country-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 21: Analysis of Political Dynasty (Direct Hereditary)

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.083	0.391	-0.261	0.905	0.147	0.747
J-statistic	1.472	1.328	1.349	1.881	1.689	0.736
Wald P-value	0.006**	0.074	0.052	0.011*	0.015*	0.768
Number of Leaders	71	43	49	19	26	17
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroskedasticity and country-specific autocorrelation. This definition defines belonging to a political dynasty if a leader's father, mother, or grandfather were politicians. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 22: Analysis of at Least one Daughter

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	-1.067	0.645	-3.963	-0.151	0.306	0.700
J-statistic	1.309	1.519	3.065	0.704	0.204	1.687
Wald P-value	0.102	0.001**	0.001**	0.870	0.996	0.000***
Number of Leaders	36	86	9	27	10	76
Observations	11839	11839	11839	11839	11839	11839

Notes: All regressions are corrected for country-specific heteroscedasticity and country-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

Table 23: Analysis of Only Daughters

	(1) Pre No	(2) Pre Yes	(3) Pre No and Post No	(4) Pre No and Post Yes	(5) Pre Yes and Post No	(6) Pre Yes and Post Yes
Post-Pre	0.354	-0.587	0.302	1.226	-0.917	N/A
J-statistic	1.143	0.819	1.302	0.476	1.033	N/A
Wald P-value	0.155	0.598	0.034*	0.892	0.405	N/A
Number of Leaders	100	9	83	9	7	N/A
Observations	11839	11839	11839	11839	11839	N/A

Notes: All regressions are corrected for country-specific heteroscedasticity and country-specific autocorrelation. N/A indicates that there are no transitions that satisfy the specific criteria. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and ***, respectively.

D Characteristics and Policy Outcomes Appendix

Table 24: Supplementary Analysis of Additional Outcome Variables

	(1) Military Expenditure	(2) Health Expenditure	(3) Education Expenditure	(4) Primary School Completion Rate (Females)	(5) Primary School Completion Rate (Males)	(6) Ratio of Female to Male Primary Enrollment
Post-Pre	-0.003	0.072	0.043	0.019	0.013	0.000
J-statistic	0.242	0.631	0.513	0.409	0.338	0.402
Wald P-value	0.998	0.676	0.673	0.961	0.982	0.997
Number of Leaders	14	5	3	12	12	25
Observations	2844	2479	2212	2475	2475	4687

Notes: All regressions are corrected for region-specific heteroscedasticity and region-specific autocorrelation. Significance at the 5 percent, 1 percent, and 0.1% level is detonated by *, **, and *** respectively.

E Natural Leadership Transitions

Country	Pre-transition Leader	Post-transition Leader	Year of Transition
Albania	Enver Hoxha	Ramiz Alia	1985
Algeria	Houari Boumediene	Chadli Bendjedid	1978
Angola	Agostinho Neto	José Eduardo dos Santos	1979
Argentina	Manuel Quintana	José Figueroa Alcorta	1906
Argentina	Roberto María Ortiz	Ramón Castillo	1942
Australia	Joseph Lyons	Robert Menzies	1939
Australia	Harold Holt	John Gorton	1967
Azerbaijan	Heydar Aliyev	Ilham Aliyev	2003
Bahrain	Isa Ibn Al-Khalifah	Hamad bin Isa Al Khalifa	1999
Belgium	Jules de Trooz	Frans Schollaert	1907
Bolivia	Rene Barrientos Ortuna	Alfredo Ovando Candia	1969
Bosnia and Herzegovina	Alija Izetbegovic	Živko Radišić	2000
Botswana	Seretse Khama	Quett Masire	1980
Brazil	Afonso Pena	Nilo Peçanha	1909
Brazil	Café Filho	Juscelino Kubitschek	1955
Brazil	Artur da Costa e Silva	Emílio Garrastazu Médici	1969
Cameroon	Ahmadou Ahidjo	Paul Biya	1982
Canada	John Macdonald	John Abbott	1891
Canada	Robert Borden	Arthur Meighen	1920
Canada	Mackenzie King	Louis St. Laurent	1948

Chile	Federico Echaurren	Germán Riesco Errázuriz	1901
Chile	Pedro Aguirre Cerda	Juan Antonio Ríos	1941
China	Mao Tse-Tung	Hua Guofeng	1976
China	Deng Xiaoping	Jiang Zemin	1997
Colombia	Francisco Javier Zaldúa	José Eusebio Otalora	1882
Comoros	Mohamed Taki Abdoulkarim	Azali Assoumani	1998
Cote d’Ivoire	Félix Houphouët-Boigny	Henri Konan Bédié	1993
Croatia	Franjo Tudjman	Stjepan Mesić	1999
Czechoslovakia	Antonín Zápotocký	Antonín Novotný	1957
Denmark	Thorvald Stauning	Vilhelm Buhl	1942
Denmark	Hans Christian Hansen	Viggo Kampmann	1960
Ecuador	Mosquera Narvaez	Carlos Arroyo del Rio	1939
Ecuador	Jaime Roldós Aguilera	Osvaldo Hurtado	1981
Egypt	Gamal Abdel Nasser	Anwar Sadat	1970
Finland	Kyösti Kallio	Risto Ryti	1940
Finland	Urho Kekkonen	Mauno Koivisto	1981
France	Pierre Waldeck-Rousseau	Émile Combes	1902
France	Georges Pompidou	Valéry Giscard d'Estaing	1974
Gabon	Léon M'ba	Omar Bongo	1967
Georgia	Zurab Zhvania	Zurab Noghaideli	2005
Germany	Wilhelm I	Friedrich III	1888
Greece	Ioannis Metaxas	German Interim Government	1941

Greece	Alexander Papagos	Konstantinos Karamanlis	1955
Greece	Andreas Papandreou	Konstantinos Simitis	1995
Guatemala	José María Orellana	Lázaro Chacón González	1926
Guinea	Ahmed Sékou Touré	Lansana Conté	1984
Haiti	François Duvalier	Jean-Claude Duvalier	1971
Honduras	Juan Manuel Gálvez	Lozano Diaz	1954
Hungary	József Antall	Gyula Horn	1993
India	Jawaharlal Nehru	Lal Bahadur Shastri	1964
Iran	Ruhollah Khomeini	Ali Hosseini Khamenei	1989
Iraq	Abdul Salam Arif	Rahmen Aref	1966
Israel	Levi Eshkol	Golda Meir	1969
Italy	Agostino Depretis	Francesco Crispi	1887
Italy	Giuseppe Zanardelli	Giovanni Giolitti	1903
Jamaica	Michael Manley	P. J. Patterson	1992
Japan	Katō Tomosaburō	Katō Takaaki	1923
Japan	Ikeda	Sato	1964
Japan	Masayoshi Ōhira	Zenkō Suzuki	1980
Japan	Keizō Obuchi	Yoshirō Mori	2000
Jordan	Hussein bin Talal	Abdullah Ibn Hussein	1999
Kenya	Jomo Kenyatta	Daniel arap Moi	1978
Korea, Dem. Rep.	Kim Il-Sung	Kim Jong-il	1994
Kuwait	Abdullah Al-Salim Al-Sabah	Sabah Al-Salim Al-Sabah	1965

Kuwait	Sabah Al-Salim Al-Sabah	Jaber Al-Ahmad Al-Sabah	1977
Laos	Kaysone Phomvihane	Nouhak Phoumsavanh	1992
Lesotho	Ntsu Mokhehle	Pakalitha Mosisili	1998
Liberia	William Tubman	William R. Tolbert, Jr.	1971
Macedonia	Boris Trajkovski	Branko Crvenkovski	2004
Malaysia	Abdul Razak Hussein	Hussein Onn	1976
Morocco	Mohammed V	Hassan II	1961
Morocco	Hassan II	Mohammed VI	1999
Mozambique	Samora Machel	Joaquim Chissano	1986
Myanmar	Saw Maung	Than Shwe	1992
Nepal	Mahendra	Birendra	1972
New Zealand	Richard John Seddon	Joseph Ward	1906
New Zealand	William Massey	Gordon Coates	1925
New Zealand	Michael Joseph Savage	Peter Fraser	1940
New Zealand	Sidney Holland	Walter Nash	1957
New Zealand	Norman Kirk	Bill Rowling	1974
Nicaragua	René Schick Gutierrez	Anastasio Somoza Debayle	1966
Niger	Seyni Kountché	Ali Saibou	1987
Nigeria	Sani Abacha	Abdulsalami Abubakar	1998
Norway	Peder Kolstad	Johan Ludwig Mowinckel	1932
Norway	Odvar Nordli	Gro Harlem Brundtland	1981
Pakistan	Muhammad Zia-ul-Haq	Ghulam Ishaq Khan	1988

Panama	Omar Torrijos	Rubén Darío Paredes	1981
Peru	Remigio Morales Bermúdez	Nicolás de Piérola	1894
Poland	Bolesław Bierut	Władysław Gomułka	1956
Portugal	Luís I	Carlos I	1889
Portugal	António de Oliveira Salazar	Marcelo Caetano	1968
Romania	Gheorghe Gheorghiu-Dej	Nicolae Ceaușescu	1965
Russia	Alexander III	Nicholas II	1894
Russia	Vladimir Lenin	Joseph Stalin	1923
Russia	Joseph Stalin	Nikita Khrushchev	1953
Russia	Leonid Brezhnev	Yuri Andropov	1982
Saudi Arabia	Khalid	Fahd	1982
Saudi Arabia	Fahd	Abdullah	1996
Sierra Leone	Milton Margai	Albert Margai	1964
South Africa	Johannes Gerhardus Strijdom	Hendrik Verwoerd	1958
Spain	Francisco Franco	Adolfo Suárez	1975
Sri Lanka	D. S. Senanayake	Dudley Senanayake	1952
Swaziland	Sobhuza II	Ntfombi	1982
Sweden	Per Albin Hansson	Tage Erlander	1946
Switzerland	Wilhelm Hertenstein	Bernhard Hammer	1888
Syria	Hafez al-Assad	Bashar al-Assad	2000
Taiwan	Chiang Kai-shek	Yen Chia-kan	1975
Taiwan	Chiang Ching-Kuo	Lee Teng-hui	1988

Thailand	Sarit Thanarat	Thanom Kittikachorn	1963
Trinidad and Tobago	Eric Williams	George Chambers	1981
Turkey	Mustafa Kemal Atatürk	İsmet İnönü	1938
United Arab Emirates	Zayed bin Sultan Al Nahyan	Khalifa bin Zayed Al Nahyan	2004
United Kingdom	Henry Campbell-Bannerman	H. H. Asquith	1908
United States	Warren G. Harding	Calvin Coolidge	1923
United States	Franklin D. Roosevelt	Harry S. Truman	1945
Uruguay	Juan José de Amézaga	Luis Batlle Berres	1947
Uruguay	Luis Giannattasio	Washington Beltrán	1965
Venezuela	Juan Vicente Gómez	Eleazar López Contreras	1935
Vietnam	Ho Chi Minh	Lê Duẩn	1969
Vietnam	Lê Duẩn	Nguyễn Văn Linh	1986
Yemen	Ahmed Ibn Yahya Hamid Aldin	Abdullah al-Sallal	1962
Yugoslavia	Josip Broz Tito	Cvijetin Mijatović	1980