Political Economy of Development: Health as a Development Outcome, Micro Evidence, and Heterogeneity of Democracies and Autocracies

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Declaration

I declare that the work presented in this thesis is my own, except for Chapters 2 and 4, which are co-authored with Professor Timothy Besley.

Signature: [signature] Date: 13/12/2007

Abstract

The thesis explores whether and how democratic and autocratic political institutions affect the welfare of people in developing countries. First, we empirically investigate whether democracy improves people's health, by using time-series country-level aggregate statistics. We find that there is a robust cross-sectional correlation between democracy and life expectancy at birth. Country fixed effects estimation, on the other hand, does not yield a statistically significant correlation between the two. This empirical approach, however, does not disentangle the effect of democracy from country-level confounding factors. To overcome this, I empirically examine whether democratization has reduced infant mortality in sub-Saharan Africa in the 1990s, by using micro data on child survival. Mother fixed effects estimation shows that mothers see their infants more likely to survive after democratization than before. This result may suggest that African dictatorships are particularly bad compared to those in other regions. To shed some light on this possibility, we theoretically investigate under what condition autocracy yields good policy outcomes. We show that such a condition is that those enfranchised in autocracy can retain the right of leadership selection after overthrowing a dictator for his bad performance. We also show that such a successful autocracy outperforms a democracy if distributional issues are so important that voters in democracy cannot discipline policy-makers in the general interest policy outcomes. What affects the salience of distributional issues, therefore, needs to be understood. One such factor may be ethnic favoritism by the government, which has rarely been empirically investigated in a systematic way. By using micro data on infant mortality and by exploiting one-time unexpected change in the president's ethnicity in Guinea, I provide evidence on whether the ethnicity of those in power affects infant mortality for each ethnic group under an autocratic rule.

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Chapter 1

Overview

Development economics has long been a field of economics that studies what policy will improve the welfare of people in poor countries. What policy promotes development is, however, still unknown, partly because policy-making is endogenous, posing a serious difficulty in identifying the effect of policies empirically. During the last decade, development economists have begun to take politics seriously. A research program that can be called political economy of development has emerged in which researchers analyze how socio-economic characteristics typical for poor countries affect the nature of politics and, through the resultant political process, policy and welfare outcomes. The present thesis contributes to this young literature on political economy of development, by focusing on health as a development outcome, using individual-level data, and explicitly considering heterogeneities among democracies and autocracies.

Health as a development outcome has been ignored in the literature on political economy of development. However, along with education, better health constitutes what is now known as human development, and is in itself what we should aim to achieve. Although higher income appears to contribute to better health, the role of public health policies is not negligible, either.[1] Focusing on the role of politics on economic growth alone, therefore, does not help us wholly understand how better

[1]Examples of Cuba, Sri Lanka, and the Indian state of Kerala, where mortality fell in the 20th century despite only modest gains in per capita income, support this view. Acemoglu and Johnson (2006) exploit the role of public health in mortality reduction to estimate the effect of longer life expectancy on economic growth.

health can be achieved. How politics directly affects people's health needs to be understood.

Chapter 2, co-authored with Timothy Besley, tackles this research agenda by looking at whether democracy increases life expectancy at birth. Democracy is probably the most important political institution today, and investigating its effect on development is one of the most recurring themes in social science. Using cross-country aggregate statistics on life expectancy, we find that there is a robust correlation between democracy and health (conditional on per capita income). However, this correlation is mainly cross-sectional—once country fixed effects are controlled for, the correlation is no longer statistically significant, leaving evidence for a positive effect of democracy on health inconclusive.

This inconclusiveness partly comes from the use of country-level aggregate data. As democracy status only varies at the country level, using country-level aggregate data does not allow us to disentangle the effect of democracy from unobservable country-level factors affecting the outcome under investigation. The use of individual-level panel data to measure an outcome can solve this problem, because tracking the same individual over time allows us to separate the effect of democracy—or more generally, any country-wide political institutions or events—from changes in the composition of individuals in a country over time. Although this empirical approach is not a panacea for solving the endogeneity of democracy, or political institutions and events in general, it excludes probably the most important factors that affect political institutions—changes in population characteristics over time—from the list of alternative explanations on findings from regressions of socio-economic outcomes on political institutions.

Chapter 3 takes this empirical approach to estimate the effect of democracy on infant mortality, another popular measure of people's health. Using mothers' recall data on their child survival from 28 countries in sub-Saharan Africa, I find that democratization in 11 of these countries has reduced infant mortality after controlling for unobservable time-invariant mother characteristics. I also find that not every kind of democratization matters. If the introduction of multiparty elections

for the chief executive of government leads to a new person assuming office, then infant mortality goes down. If a dictator introduces multiparty elections and stays in power by winning them, infant mortality does not change.

The second finding leads to the third tenet of this thesis: heterogeneity of democracies and autocracies. One interpretation of this finding is that democracy has an impact on health only if multiparty elections bring about leadership change. Another interpretation is that African dictators winning multiparty elections are relatively benevolent and have already reduced infant mortality to a certain level.[2] In either case, my empirical finding stresses the importance of recognizing heterogeneity both among democracies and among autocracies.

Chapter 4, co-authored with Timothy Besley, takes this heterogeneity within each political regime seriously. We develop a simple model that explains when dictators implement general interest policies such as those promoting economic growth, educational attainment, and population health. By extending the model to democracy, we also show when democracy delivers such general interest policies to citizens. The critical factors turn out to be polarization among citizens. If citizens are polarized in the sense that they care much more about distributional policies than general interest policies, then democracy fails to deliver the latter. Autocracy can overcome this to the extent that it mitigates polarization by excluding groups of citizens opposing the government from political process. If the degree of polarization is minimal, then democracy outperforms autocracy in terms of implementing general interest policies.

These theoretical results, which are largely consistent with several case studies discussed in the second half of Chapter 4, suggest the importance of understanding what causes polarization of the population. One source of such polarization is ethnic favoritism by the government, namely, the phenomenon that the ethnic group represented in the government is better off than other groups in the same country. Chapter 5 tackles this issue empirically, by focusing on health as a development outcome—as in Chapters 2 and 3—and by using micro data as in Chapter 3. It

[2]This interpretation can be seen in Figure 3.3.

proposes an empirical strategy that gives convincing evidence on whether the ethnic group in power is really better off than other groups in the same country.

Chapter 2

Health and Democracy

co-authored with Timothy Besley

2.1 Introduction

In spite of the inexorable march of democracy around the globe, just how democratic institutions affect human well-being is open to debate. The evidence that democracy promotes prosperity is neither strong nor robust. Moreover which aspects of policy making and human well-being are promoted by democracies is still a subject of debate.[1]

Even if correlations between democracy and outcome measures can be found, there is an overriding difficulty of interpreting them as causal effects. Whether democracy matters *per se* or simply serves as a proxy for societal and political development presents a difficult problem for research in this area. Thinkers such as Lipset (1959) have argued that democracy can thrive only when conditions are right. If this is correct, then becoming democratic may only serve as a proxy for these hard-to-measure cultural and societal preconditions.

This chapter explores these issues further by reconsidering the link between democracy and health using panel data from a cross-section of countries. The data show a strong (conditional) correlation between life expectancy and democracy. This

[1] See, for example, Mulligan et al. (2004). Sen (1999) emphasizes the intrinsic benefits of democracy in addition to the search for instrumental policy and stability gains that are normally the subject of economic analyses.

relationship is strongest for the decades of the 1960s and 1970s and is robust to controlling for the initial level of human capital as well as political histories. The data also suggest that health policy interventions are superior in democracies.

The remainder of the chapter is organized as follows. In the next section, we discuss some background issues. In Section 2.3, we present the results and the possible interpretations of these empirical findings. Section 2.4 concludes.

2.2 Background

Human history has witnessed remarkable increases in life expectancy alongside increases in prosperity. Preston (1975) showed that this relationship is non-linear with the largest gains in life expectancy being associated with increases in income per capita at low incomes. Crudely speaking, these increases in life expectancy can be traced to three factors. First, there are reductions in malnutrition and improvements in infrastructure such as clean water supply and improved sanitation facilities. Second, there is medical intervention through control (due to immunization and insecticides) and treatment of infectious diseases using antibiotics. Third, there are improvements in knowledge and lifestyle. All three of these are associated with increases in prosperity although the direction of causation is hard to establish.[2]

Of particular importance in recent history is the increased use of insecticides and antibiotics which lead to remarkable increases in life expectancy in the post war period (see, for example, Gwatkin (1980)). Preston (1975, 1980) attributes the upward shift in the non-linear relationship between life expectancy and per capita income in the 20th century to social policy measures, especially vector control and immunization, undertaken in less developed countries. Deaton (2004) attributes this wave of mortality reduction which hit the third world after World War II to "the globalization of knowledge, facilitated by local political, economic, and educational conditions"(page 109). The literature to date has focused more on the latter influences (education and economics) rather than the political foundations of increased

[2]See Acemoglu and Johnson (2006) for a recent attempt to establish whether increases in life expectancy were a cause of increased prosperity.

life expectancy.

As a background, Figure 2.1 presents the "Preston Curve" for mid-way through our data period (1982) showing the link between life-expectancy and income per capita. The curve shown here is fitted non-parametrically. The Figure labels the democracies and autocracies differently to get a feel for whether they have different levels of life-expectancy. The importance of controlling for income is apparent here as most very poor countries are autocracies while all very rich countries are democracies.

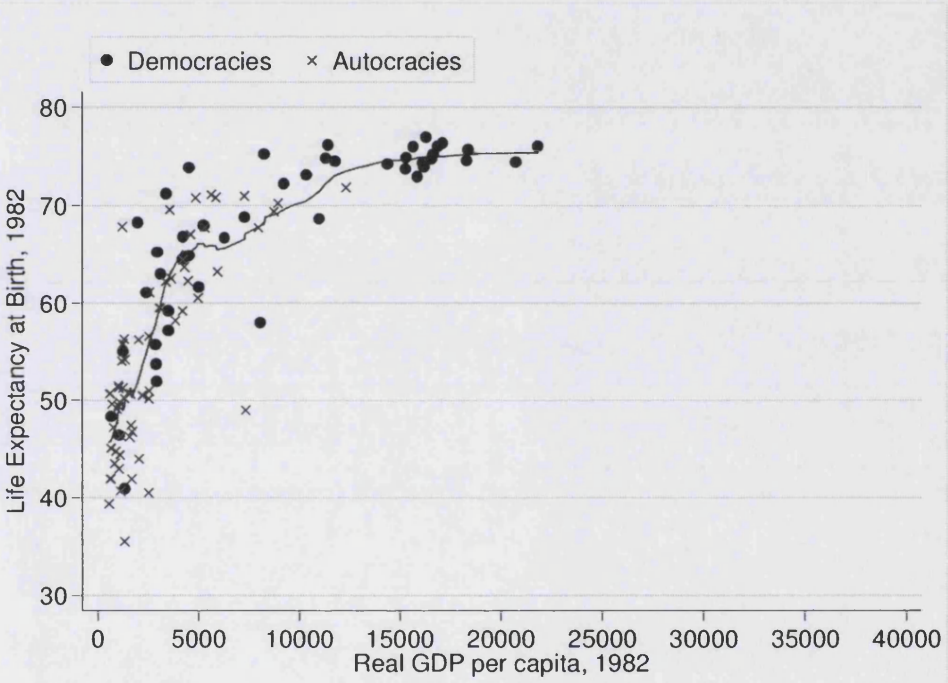

Figure 2.1: The Preston Curve in 1982

Notes: The solid line is a plot of a non-parametric regression using the tricube weighting function with bandwidth 0.2.

There are three main theoretical differences between democracies and autocracies that we might expect to influence health issues. The first concerns representation. Acemoglu and Robinson (2005) focus on who controls political office, modeling autocracy as a dictatorship of the rich and democracy as a dictatorship of the poor or middle classes. On this view, health indicators will improve if public health is more of a priority for groups who dominate under a democracy compared to those

who gain political influence in an autocracy. An effect on health seems plausible on this view to the extent that the rich have less interest in public solutions to health problems.[3]

A second view of the difference between democracy and autocracy emphasizes accountability structures. Democracies demand accountability to a broad set of citizens at regular intervals whereas autocrats are accountable only to a smaller group such as the military.[4] Moreover, autocrats typically repress political opposition and the media to stifle public policy debate. This view also predicts that greater attention will be paid to health issues in democracies since failure to do so should result in leaders being removed from office – this link being weaker in autocracies.

A third difference between democracies and autocracies concerns the process of political selection with democracies having stronger mechanisms for selecting competent and honest leaders to implement policy. To the extent that health interventions are supported by skilled and incorruptible political leaders, then democracies should lead to better health outcomes than autocracies.

There are conflicting views about whether democracy affects policy and economic performance. Przeworski and Limongi (1993) review empirical research on the effect of democracy on economic growth, concluding that the correlation is weak and not robust. Persson and Tabellini (2006a) try a novel econometric approach finding some support for the proposition that persistent democracy is associated with improvements in economic performance.[5]

There is a small literature that looks at the relationship between life expectancy and democracy in cross-country data. Franco et al. (2004) report a positive correlation between life expectancy and democracy. (See also Govindaraj and Rannan-Eliya (1994).) Lake and Baum (2001) relate democracy to a variety of public health interventions.

[3]This view is borne out in discussions of investments in public health measures historically; see, for example, Szreter (1988) for a discussion of Great Britain.

[4]Bueno de Mesquita et al. (2002) argue that, given the total amount of government expenditures, the larger the number of people whose support is required for the government to stay in power, the higher the level of public goods provided by the government.

[5]See also Papaioannou and Siourounis (2005) and Rodrik and Wacziarg (2005) for the argument that democratization is associated with subsequent growth.

2.3 Evidence

We use panel data across countries from the 1960s to the 2000s.[6] We begin by showing that there is a strong and robust link between life expectancy at birth and democracy after controlling for income. Our basic specification uses data for every fifth year between 1962 and 2002. We estimate an equation of the form:

$$h_{srt} = \alpha_r + \beta_t + \gamma_1 d_{srt} + \gamma_2 D_{srt} + \theta_1 y_{srt} + \theta_2 (y_{srt})^2 + \mathbf{x}'_{srt}\lambda + \varepsilon_{srt} \quad (2.1)$$

where h_{srt} is some health indicator in country s in region r in year t, α_r is a region dummy variable, β_t is a year dummy variable, y_{srt} is income per capita in country s in region r averaged over years $t-4$ to t,[7] and $\mathbf{x}_{srt}$ are other (in practice time invariant) exogenous variables such as legal origins and political history.[8] The variables (d_{srt}, D_{srt}) are measures of democracy. The first is a contemporaneous measure denoting the fraction of democratic years between year $t-4$ and t while D_{srt} is a longer-term one denoting the fraction of democratic years since 1956 until year t.[9] The variable ε_{srt} is an error for which we compute robust standard errors clustered at the country level.

The main concern in interpreting results stems from the possibility that, as argued by Lipset (1959), there are social and cultural factors that evolve and make it easier for democratic institutions to be supported. Thus:

$$d_{srt} = a_r + b_t + \kappa_1 y_{srt} + \kappa_2 (y_{srt})^2 + \mathbf{x}'_{sr}\mu + \mathbf{z}'_{srt}\rho + \eta_{srt}$$

[6] Our measure of democracy is from the Polity IV data base. Following Persson (2005) and Persson and Tabellini (2006a), a country is defined as democratic if variable POLITY2 is positive. See Appendix A for the definitions, sources, and the construction of variables used in the analysis. For descriptive statistics, see Tables A.1 to A.3.

[7] As we know from the work of Preston (1975) and others, there is a strong correlation between income and life expectancy with a non-linear effect. This is illustrated in Figure 2.1.

[8] Legal origin dummies effectively control for the effects of communist regimes on health outcomes (see Govindaraj and Rannan-Eliya 1994) as legal origin classification includes socialist law. La Porta et al. (1999) find that legal origins are significantly correlated with infant mortality and democracy.

[9] Keefer (2005) (young versus old democracies) and Persson and Tabellini (2006a) (democratic capital) argue that longer-lived democratic experience is important. We choose 1956 as infant mortality data begins in 1960 (see column (5) of Table 2.1).

where $\mathbf{z}_{srt}$ is a vector of factors that evolve and make it easier to sustain democratic institutions. If such factors exist, then we would spuriously attribute a direct effect of democracy on outcomes that is really due to $\mathbf{z}_{srt}$.

Table 2.1 presents the basic results. In column (1), we look solely at the partial relationship with contemporaneous democracy finding that being democratic is associated with a 3.5 year increase in life expectancy. In column (2) we add income per capita measures. After controlling for income, the democracy effect falls to around two years, but remains positive and significant. Column (3) adds the fraction of democratic years since 1956. The data suggest that it is more permanent democratic transitions that matter and the contemporaneous democracy effect is no longer significant, although an F-test indicates that the two democracy variables are jointly significant. The point estimate suggests that a country that has been democratic for the whole period from 1956 through year t has a life expectancy that is more than five years higher than a country that has been autocratic since 1956. To put this in perspective, this point estimate "explains" 3.5 of the 13.7 year life expectancy difference between Ghana (democratic for 11 out of 47 years) and the U.S.A. (always democratic) in 2002. Column (4) reports the results for a different measure of democracy available due to Boix and Rosato (2001).[10] The main results hold up in this case.[11] Column (5) shows that the result holds when we look at infant mortality rather than life-expectancy. It indicates that countries that have always been democratic since 1956 have fewer infants dying before reaching one year of age by about 17 per 1000 live births (about one-fourth of the sample mean) than countries that have been continuously autocratic since 1956.

The remaining columns in Table 2.1 look at the possibility that democracy is correlated with pre-existing values and hence not picking up an institutional effect.

[10]Boix and Rosato (2001), who extend the democracy dataset constructed by Przeworski et al. (2000), define a country as a democracy if the following three conditions are satisfied: (1) the legislature is elected in multiparty elections; (2) the executive is elected in a multicandidate election or elected by the legislature satisfying condition (1); (3) at least 50 percent of adult men have the right to vote. Compared to POLITY IV, this measure of democracy heavily depends on political contestation, putting less weight on political participation and on executive constraints.

[11]The number of observations goes down since Boix and Rosato (2001)'s data covers only years until 1994. The number of countries in the sample goes down even though Boix and Rosato (2001), unlike POLITY IV, include the least populous countries, because countries for which income is observed only in the late 1990s in the Penn World Table are all dropped in column (4).

Table 2.1: Health and Democracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable:		Life Expectancy at Birth			Infant Mortality		Life Expectancy at Birth		
DEMOCRACY	3.55***	2.44**	-0.24	-0.78	-2.09				
since t-4	[1.26]	[0.96]	[1.14]	[1.68]	[5.36]				
INCOME		1.75***	1.61***	2.08***	-9.19***	1.62***	1.61***	1.48***	1.45***
		[0.22]	[0.22]	[0.29]	[1.15]	[0.23]	[0.23]	[0.26]	[0.25]
INCOME squared		-0.05***	-0.05***	-0.08***	0.32***	-0.05***	-0.05***	-0.05***	-0.04***
		[0.01]	[0.01]	[0.01]	[0.04]	[0.01]	[0.01]	[0.01]	[0.01]
DEMOCRACY			5.39***	4.88**	-17.41**	5.49***	5.45***	4.09**	4.10**
since 1956			[1.65]	[2.26]	[8.17]	[1.45]	[1.46]	[1.60]	[1.61]
DEMOCRACY						-0.92	-0.05	-2.98	-3.21
during 1900-1955						[1.59]	[2.37]	[1.97]	[2.00]
COLONY						0.57	1.97	1.71	1.78
during 1900-1955						[1.13]	[1.86]	[1.25]	[1.26]
(DEMOCRACY							-0.20		
during 1900-1995)*TREND							[0.38]		
(COLONY							-0.34		
during 1900-1955)*TREND							[0.29]		
Average years of schooling								1.19***	1.49***
aged over 15 in 1960								[0.41]	[0.44]
(Average years of schooling									-0.09**
aged over 15 in 1960)*TREND									[0.04]
F-test: F value			7.297	3.910	4.482				
p-value			0.001	0.022	0.013				
Controls:									
Legal Origin Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Countries	160	146	145	136	146	144	144	92	92
Observations	1309	999	996	764	543	993	993	752	752
Adjusted R^2	0.991	0.994	0.994	0.994	0.921	0.994	0.995	0.995	0.995

Notes: Robust standard errors clustered at country level are reported in brackets. The sample years are every fifth year from 1962 through 2002 except for column (5) in which the sample years are every tenth year from 1960 through 2000. The data source for democracy variables is POLITY IV except for column (4), in which Boix and Rosato (2001)'s democracy dataset (available until 1994) is used instead. This drops observations in 1997 and 2002. TREND is a trend variable taking 0 in 1962, 1 in 1967, and so forth. See Appendix A for other variable definitions. Germany is dropped from the sample for columns (3) to (9) because it is difficult to construct DEMOCRACY since 1956. Yemen is dropped from the sample for columns (6) to (9) because it is difficult to calculate DEMOCRACY during 1900-1955 and COLONY during 1900-1955. The null for F-test is that coefficients on DEMOCRACY since $t-4$ and since 1956 are both zero. *** significant at 1%; ** 5%; * 10%.

In column (6) we add measures of political history – specifically the fraction of years between 1900 and 1955 for which the country was democratic and the fraction of years in the same period for which the country was a colony. These are not significant and the effect of democratic years since 1956 remains. This holds true even if we allow the history to affect the time trend in life expectancy in column (7). Thus, it is difficult to argue that we are picking up long lived differences in values that are related to prior democratic experience.

Column (8) controls for the stock of education in the population aged over 15 in 1960 using Barro and Lee (2000)'s data. Prerequisites for democracy are likely to be correlated with human capital and Glaeser et al. (2006) have recently argued that education affects the sustainability of democratic institutions. Education is positively related to life expectancy. However, the democracy variable remains positive and significant although a little smaller in size (by about one year compared to column (3)). In column (9), we allow the initial level of education to affect the time trend in life expectancy. Countries with more education in 1960 tend to have smaller trend increases in life expectancy but the proportion of democratic years since 1956 remains significant.

In Table 2.2, we explore in greater detail where the democracy effect is coming from.[12] First, we allow the democracy effect (γ_1 in equation (2.1)) to be different across time periods by estimating separate year effects for democracies and non-democracies. The results reported in column (1) reveal that the significant differences obtain for the early part of our sample and disappear in the later period. Figure 2.2 plots the estimated year effects for democracies and autocracies. This shows that the upward trend in life expectancy disappear in the 1990s for both democracies and autocracies. These results are consistent with a view that the 1960s and 1970s were a key period in mortality decline (Gwatkin (1980)), coupled with an additional observation that democracies were quicker to adopting mortality reducing technologies.[13]

[12]Note that we do not include the longer-term democracy variable, D_{rst}, as a regressor in Table 2.2.

[13]As shown in Table A.1, the average life expectancy goes up in the 1990s. This, combined with Figure 2.2, suggests that increases in life expectancy in the 1990s are mainly due to income growth

Table 2.2: Democracy and Life Expectancy across Time and Income
(Dependent Variable: Life Expectancy at Birth)

	(1)	(2)
DEMOCRACY*YEAR1962	6.33***	
	[1.39]	
DEMOCRACY*YEAR1967	3.66***	
	[1.25]	
DEMOCRACY*YEAR1972	2.86**	
	[1.31]	
DEMOCRACY*YEAR1977	2.74**	
	[1.26]	
DEMOCRACY*YEAR1982	1.92	
	[1.20]	
DEMOCRACY*YEAR1987	1.08	
	[1.11]	
DEMOCRACY*YEAR1992	1.86*	
	[1.12]	
DEMOCRACY*YEAR1997	1.14	
	[0.99]	
DEMOCRACY*YEAR2002	2.20	
	[1.45]	
DEMOCRACY*HIGHINCOME		1.02
		[1.36]
DEMOCRACY*MIDDLEINCOME		3.28**
		[1.27]
DEMOCRACY*LOWINCOME		3.63**
		[1.43]
DEMOCRACY*VERYLOWINCOME		1.97
		[1.35]
HIGHINCOME		12.48***
		[1.57]
MIDDLEINCOME		7.83***
		[1.42]
LOWINCOME		3.60***
		[1.22]
F-test: F value	3.788	1.334
p-value	0.000	0.266
Controls:		
INCOME	YES	NO
$(\text{INCOME})^2$	YES	NO
Legal Origins	YES	YES
Regions	YES	YES
Year Dummies	YES	YES
Countries	146	146
Observations	999	999
Adjusted R^2	0.994	0.994

Notes: Robust standard errors clustered at country level are reported in brackets. DEMOCRACY is the fraction of democratic years since 4 years ago. HIGHINCOME is a dummy for per capita GDP (averaged during 4 years ago to present) being 10,000 constant 1996 international dollars or more; MIDDLEINCOME for between 5,000 and 10,000; LOWINCOME for between 2,500 and 5,000; and VERYLOWINCOME for less than 2,500. The null for F-test is the equality of all coefficients on the interaction terms between DEMOCRACY and year dummies (for column 1) or income dummies (for column 2). *** indicates 1% signifncance; ** 5%; and * 10%.

Column (2) of Table 2.2 shows that the democracy effect is identified primarily from middle and lower income countries as opposed to the very poorest and richest countries. This reflects the fact that most very low income countries have tended to be autocracies and rich countries tend to be democracies so we simple observe no variation in these cases.[14]

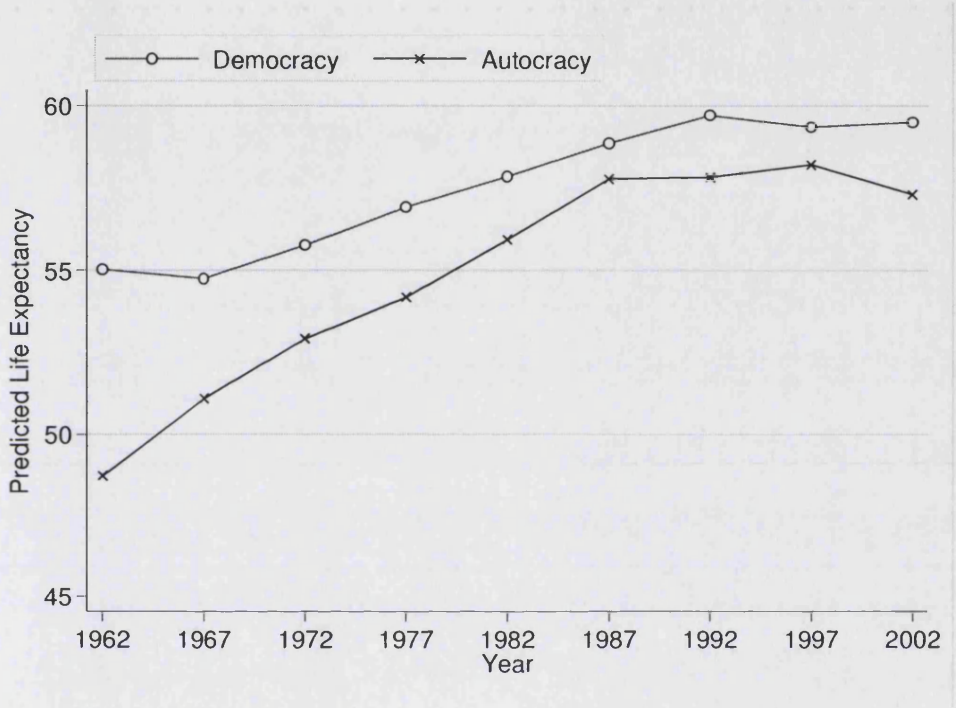

Figure 2.2: Estimated Year Fixed Effects for Democracy and Autocracy

Notes: Estimated year fixed effects for autocracy is obtained as coefficient estimates on year dummies in a regression of life expectancy on the interaction terms of DEMOCRACY since t-4 and year dummies, INCOME, INCOME squared, legal origins, regions, and year dummies for the same sample as in Column (2) of Table 2.1. Estimated year fixed effects for democracy is obtained by adding coefficient estimates on the interaction terms of year dummies and DEMOCRACY since t-4 in the same regression to the estimated fixed effects for autocracy.

Table 2.3 explores in more detail the source of identification.[15] The first column shows that the result is not robust to including country fixed effects.[16] If most of the identification is coming from cross-sectional differences between countries that are permanent in nature, we will not find anything in the fixed effects regressions. However, it could also be symptomatic of there being common omitted factors, such

(Figure 2.2 shows year fixed effects after controlling for income).

[14] In fact, we cannot reject the equality of coefficients on all the interaction terms.

[15] We drop the short term measure of democracy, d_{srt}, from our specifications in the following.

[16] We need to be cautious in interpreting fixed effects estimates as their consistency requires strict exogeneity: regressors are orthogonal to the errors at all leads and lags.

as culture and institutions, driving both democracy and life-expectancy.[17] We divide the sample into those countries that have been either continuously democratic or autocratic over the entire period (no regime change) and those that have switched at some point (switching regimes). Using the basic specification, the original effect shows up in both sub-samples as shown in columns (2) and (3). In column (4), we show that there is no effect when we exploit only within-country variation in the group of countries that switched regime. Columns (5) and (6) show that, when we concentrate on those countries that have had a single democratic transition which has not subsequently been reversed, then we do get an effect of being democratic once again.[18] In column (5), this is identified solely from the 21 countries that have been in the data set throughout the period whereas column (6) is an unbalanced panel including, for example, some countries that were formed after the break-up of the Soviet Union and Yugoslavia.

Table 2.4 looks for evidence of differences in policy priorities between democracies and autocracies.[19] In columns (1) and (2), we investigate the difference in sanitation and clean water supply between democratic and non-democratic countries. These two health infrastructures prevent deaths caused by diarrhea, typhoid, and cholera. We see that the percentage of the population with access to improved sanitation facilities and improved water sources is higher by about 15 points (25 percent of the sample mean) and about 11 points (14 percent of the sample mean), respectively, in permanent democracies since 1956 than in permanent autocracies.

In columns (3) and (4), we explore the relationship between democracy and immunization. The latter is mostly a preventive measure against air-borne infectious diseases.[20] We find that the percentage of children aged 12 to 23 months who received DPT (diphtheria, pertussis, and tetanus) vaccination before the age of one

[17] Acemoglu et al. (2005b) have argued that the relationship between income and democracy is suspect on the basis of its non-robustness to the inclusion of country fixed effects. Acemoglu et al. (2005a) makes a similar claim in respect of the link from education to democracy.

[18] This result does not, however, survive clustering of the standard errors at the country level.

[19] Note that we do not cluster standard errors for Table 2.4 due to the limited time span of the sample.

[20] As immunization data is observed annually, we replace h_{srt} in equation (2.1) with a health indicator averaged over the period from $t-4$ to t, where t is a five year interval between 1985 and 2000. We also substitute D_{srt-5} for D_{srt} accordingly.

Table 2.3: How Much Does Within-country Variation Matter?
(Dependent Variable: Life Expectancy at Birth)

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Whole	No Regime Change	Switching Regimes	Switching Regimes	Single Switch to Democracy (Balanced)	Single Switch to Democracy (Unbalanced)
DEMOCRACY	0.08	7.26***	3.72***	0.69	7.65**	6.15*
since 1956	[1.02]	[1.23]	[0.78]	[1.07]	[3.26]	[3.21]
INCOME	0.28*	1.10***	2.19***	0.17	0.37	0.08
	[0.15]	[0.14]	[0.32]	[0.30]	[0.55]	[0.52]
INCOME squared	-0.01***	-0.03***	-0.08***	-0.01	-0.03	-0.02
	[0.00]	[0.00]	[0.02]	[0.01]	[0.03]	[0.03]
Controls:						
Country Dummies	YES	NO	NO	YES	YES	YES
Legal Origins	NO	YES	YES	NO	NO	NO
Regions	NO	YES	YES	NO	NO	NO
Year Dummies	YES	YES	YES	YES	YES	YES
Countries	145	54	91	91	21	38
Observations	996	358	638	638	189	235
Adjusted R^2	0.998	0.997	0.993	0.998	0.998	0.998

Notes: Robust standard errors are reported in brackets. The sample years are every fifth year from 1962 to 2002. Column (2) restricts the sample to countries without regime change (ie. DEMOCRACY since 1956 is either 0 or 1 for the whole sample period). Columns (3) and (4) restrict the sample to countries switching regimes at least once (including independence from the colonial rule) during the sample period. Columns (5) and (6) restrict the sample to countries switching only once from autocracy to democracy during the sample period with Column (5) further restricting the sample to those with observations for all the nine sample years. Germany is always dropped from the sample (see notes for Table 2.1). *** significant at 1%; ** 5%; * 10%.

Table 2.4: Democracy and Other Health Outcomes

	(1)	(2)	(3)	(4)	(5)
Dependent	Sanitation	Clean	Immunization		Health
variable		Water	DPT	Measles	Spending
DEMOCRACY	14.93**	10.76**	8.80**	0.55	161.38*
since 1956	[6.72]	[4.70]	[3.53]	[3.30]	[95.28]
DEMOCRACY	-0.82	-0.38	-0.88	5.78	191.58**
for 1900-1955	[6.66]	[4.21]	[4.01]	[4.12]	[75.73]
COLONY	6.45	-0.82	-4.37	-5.05*	-97.37*
for 1900-1955	[4.05]	[3.78]	[2.71]	[3.04]	[53.08]
Controls:					
INCOME	YES	YES	YES	YES	YES
$(\text{INCOME})^2$	YES	YES	YES	YES	YES
Legal Origins	YES	YES	YES	YES	YES
Regions	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES
Countries	108	112	145	145	145
Observations	183	190	486	484	145
Adjusted R^2	0.957	0.976	0.956	0.959	0.947

Notes: Robust standard errors are reported in brackets. The sample years are 1990 and 2002 for columns (1) and (2), every fifth year during 1985 to 2000 for columns (3) and (4), and 2000 for column (5). For columns (3) to (5), the dependent variable is the mean value over the period from 4 years before to the present year, and DEMOCRACY since 1956 is the value for year t-5. For the same reason as in columns (5) to (8) of Table 2.1, Germany and Yemen are dropped from the sample. *** significant at 1%; ** 5%; * 10%.

is higher by about 9 points (more than 10% of the sample mean) in democracies compared to autocracies. For measles vaccination, democracy variables are not significant while former colonies have lower immunization rates.[21]

Finally, column (5) investigates the relationship between democracy and government health expenditures per capita (excluding expenditures on water and sanitation provision). The specification is the same as in columns (3) and (4) with data being available for the year 2000 only. Here we find that the government in a permanent democracy during 1956 to 1995 spends around 160 dollars (in purchasing power parity terms) per person more on health than the one in a permanent autocracy.[22]

In Table 2.5, we undertake some further robustness checks by including exogenous variables that might be thought to affect either the disease environment or the ease of public action. In column (1), we introduce the malaria ecology index of Kiszewski et al. (2004). The higher this index, the more likely malaria is transmitted due to ecological factors. This is negatively correlated with life expectancy as we might expect. In column (2), we control for European settler mortality in the 19th century as in Acemoglu et al. (2001).[23] This is correlated with lower life expectancy today though the magnitude is very small.[24] Column (3) includes the ethnic fractionalization index studied in Alesina et al. (2003).[25] Higher ethnic fractionalization is correlated with lower life expectancy.[26] In column (4), we control for the incidence of armed conflicts using the Armed Conflict Dataset by Gleditsch et al. (2002). Wars are negatively correlated with life expectancy. Finally, column (5) adds the mineral exporter dummy (time-invariant), constructed from World Development Indicators,

[21] Lake and Baum (2001) find a similar result (significant for DPT but insignificant for measles). Gauri and Khaleghian (2002) find that, after controlling for country fixed effects, the democracy effect on immunization is positive among poorest countries but decreases with per capita income and eventually becomes negative among middle-income countries.

[22] The fact that countries that were democratic between 1900 and 1955 spend around 200 dollars more per capita than those that were continuously autocratic suggests that democratic experience may well be picking up long-lived cultural/political trends as well as health investments.

[23] In their subsequent research, Acemoglu et al. (2005b) argue that European settler mortality is associated with the evolution of democracy as well as long-run economic development.

[24] Settler mortality is measured as the number of deaths per 1000 settlers.

[25] Aghion et al. (2004) theoretically argue that increased polarization of preference leads to the adoption of a Constitution in which political leaders are more insulated. They also find some empirical support for this claim by using the same index of ethnic fractionalization.

[26] Alesina et al. (2003) find that infant mortality is higher in ethnically more fractionalized countries.

to the set of controls.[27] Mineral exporting countries have lower life expectancy. In all cases, the democracy effect that we identified in Table 2.1 remains significant.

Table 2.5: Further Robustness Checks
(Dependent Variable: Life Expectancy at Birth)

	(1)	(2)	(3)	(4)	(5)
DEMOCRACY	5.33***	5.74***	5.45***	5.58***	5.55***
since 1956	[1.43]	[1.92]	[1.42]	[1.45]	[1.35]
DEMOCRACY	-1.11	-1.63	-1.06	-0.88	-1.19
for 1900-1955	[1.60]	[2.82]	[1.52]	[1.58]	[1.54]
COLONY	1.07	1.11	0.47	0.48	1.15
for 1900-1955	[1.21]	[2.26]	[1.08]	[1.13]	[1.01]
Malaria ecology	-0.14*				
	[0.07]				
Settler mortality		-0.0014**			
		[0.0005]			
Ethnic fractionalization			-2.99**		
			[1.50]		
Incidence of wars				-1.33*	
				[0.69]	
Mineral exporters					-1.88**
					[0.75]
Controls:					
INCOME	YES	YES	YES	YES	YES
$(INCOME)^2$	YES	YES	YES	YES	YES
Legal Origins	YES	YES	YES	YES	YES
Regions	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES
Countries	143	61	144	144	138
Observations	992	523	993	993	972
Adjusted R^2	0.995	0.994	0.995	0.995	0.995

Notes: Robust standard errors clustered at country level are reported in brackets. See Appendix A for variable definitions. Compared to the sample for column (6) of Table 2.1, Bahrain drops from the sample for column (1) as the malaria ecology index is unavailable; Cuba, Eritrea, Equatorial Guinea, Laos, Lesotho, and Uzbekistan drop from the sample for column (5) due to unavailability of mineral export data. Germany and Yemen are dropped from the samples for all columns (see notes for Table 2.1). ***significant at 1%; **5%; *10%.

Finally, Table 2.6 looks at more disaggregated measures of democracy. Column (1) explores whether disaggregating democracies into presidential and parliamentary regimes yields differential correlations with life expectancy. Column (2) does the same analysis for proportional representation and majoritarian electoral rules. In neither case is there a significant difference between these different forms of democ-

[27] Ross (2001) provides a panel cross-country evidence that mineral exporting countries are more likely to be non-democratic.

racy. In column (3), we disaggregate democracy in POLITY IV's three sub-indices. There is suggestive evidence of the correlation driven by there being higher executive competition in democracies. However, given the relatively high correlations between these components, one should not "over-interpret" the significance of this finding.

Table 2.6: Disaggregating Democracy
(Dependent Variable: Life Expectancy at Birth)

	(1)	(2)	(3)
PRESIDENTIAL	5.04***		
since 1956	[1.55]		
PARLIAMENTAL	5.39***		
since 1956	[1.52]		
MAJORITARIAN		5.63***	
since 1956		[1.52]	
PROPORTIONAL		4.88***	
since 1956		[1.49]	
EXECUTIVE COMPETITION			5.13***
since 1956			[1.66]
EXECUTIVE CONSTRAINT			1.67
since 1956			[2.04]
POLITICAL PARTICIPATION			-1.04
since 1956			[2.12]
F-test	0.068	0.422	2.353
p-value	0.795	0.517	0.099
Controls:			
INCOME	YES	YES	YES
$(INCOME)^2$	YES	YES	YES
Legal Origins	YES	YES	YES
Regions	YES	YES	YES
Year Dummies	YES	YES	YES
Countries	145	145	145
Observations	996	996	996
Adjusted R^2	0.994	0.994	0.995

Notes: Robust standard errors clustered at country level are reported in brackets. See Appendix A for variable definitions. Germany is dropped from the sample (see notes for Table 2.1). The null for F-test is the equality of coefficients on the disaggregated democracy measures (all the coefficients reported in each column of this table). ***significant at 1%; **5%; *10%.

2.4 Concluding Comments

Our results suggest that there is a robust correlation between democratic institutions and health, resulting in greater life expectancy in democracies. The results suggest

that it is a pro-longed exposure to democracy that matters. However, without truly exogenous variation in constitutional differences, the concern that this represents omitted cultural and social variables remains. Still, the fact that these results are robust to including education and political history as regressors is encouraging to the interpretation of this effect as telling us something about the impact of institutions of policy making.

The results contribute to a growing body of the literature that takes political economy factors seriously in understanding human well-being. The challenge now is to take this agenda beyond broad cross-country comparisons and into the detailed workings of political and bureaucratic behavior under different systems of government.

Chapter 3

Has Democratization Reduced Infant Mortality in Sub-Saharan Africa? Evidence from Micro Data

3.1 Introduction

Does democracy promote development? This question has long attracted attention from many social scientists. Despite a large number of empirical studies on this subject, evidence remains inconclusive because it is difficult to establish causality running from democracy to development: democracy is likely to be endogenous to socio-economic factors that also affect development (Lipset 1959). The empirical challenge is to disentangle the effect of democracy from other confounding factors. This chapter revisits this question in the context of human development in sub-Saharan Africa. Specifically, I investigate whether democratization sweeping the region in the 1990s has reduced infant mortality, by using a cross-country *micro* panel dataset covering 28 countries in the region.

How to confront underdevelopment in sub-Saharan Africa is one of the most important questions in economics today. Economists, however, have so far ignored one important change that the world's poorest region recently experienced: a wave of democratization in the 1990s. By the end of 2000, among the 48 countries in

sub-Saharan Africa "[o]nly Congo-Kinshasa, Eritrea, Rwanda, Somalia, Swaziland, and Uganda held no multiparty elections whatsoever."[1] Much has been discussed, by political scientists and Africanists, on what caused democratization in Africa and whether new democracies in the region will be consolidated.[2] Very few, however, pay attention to how this political change has affected the lives of people in sub-Saharan Africa.[3] Perhaps because of this, the pessimism on the quality of African government is deeply entrenched in any debate on African underdevelopment. The long-standing question of whether democracy promotes development, therefore, gains additional importance in sub-Saharan Africa.

As a measure of development, this chapter focuses on infant mortality, defined as death within the first year of life. The survival of infants remains a huge concern in sub-Saharan Africa today. Figure 3.1 plots infant mortality rates per 1,000 live births by developing region over time. Sub-Saharan Africa has been lagging behind other regions in reducing infant mortality, since 1980 in particular, with more than one in ten babies still dying before turning one year old in 2000. In addition, focusing on infant mortality has a methodological advantage: unlike other socio-economic outcomes such as personal income, the data at the *individual* level across many countries over a long period of time is available from the retrospective fertility survey component of the Demographic and Health Surveys (DHS), conducted in 28 African countries after the mid-1990s. In these surveys, women of childbearing age report when their children were born and whether, and when (if applicable), they died. As surveyed women in Africa give birth to four children on average during their lifetime, I observe a sizable number of mothers having babies both before and after democratization in the 1990s. This characteristic of the data allows me to identify the effect of democratization by exploiting within-mother variation in the

[1]Van de Walle (2002), p. 67. See also Bratton (1998) and Lindberg (2003). Rwanda then held multiparty elections in 2003, and Congo-Kinshasa in 2006. Uganda has been holding multi-*candidate* elections since 1996.

[2]One exogenous factor that contributes to democratization in Africa in the 1990s is the end of the Cold War. The news of the collapse of communist dictatorships encouraged Africans to protest against non-democratic regimes. Western donor countries became reluctant to provide development assistance to African countries unless democracy was introduced. These changes often forced African dictators to accept the introduction of multiparty elections.

[3]An exception to this is Stasavage (2005), who looks at whether democratization in Africa has improved primary school attendance.

survival of babies, instead of cross-country or within-country variation. As a result, the estimated effect of democratization on infant mortality is robust to a possibility that changes in the composition of the population over time (e.g. overall education level) drive both democratization and changes in infant mortality with no direct relationship between the two.

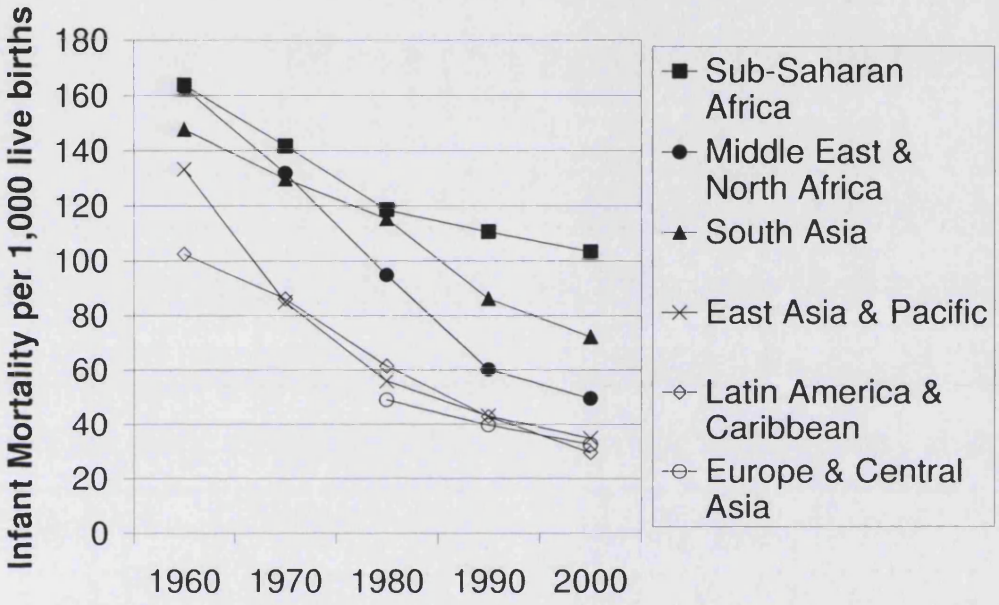

Figure 3.1: Infant Mortality by Developing Region, 1960-2000
Source: World Development Indicators, April 2006.
Notes: The definition of regions follows the World Bank's classification.

The DHS surveys also provide information on socio-economic characteristics of interviewed mothers, including their educational attainment and ethnicity. Using this information, I check if the effect of democracy is larger for babies born to disadvantaged groups of mothers such as those uneducated or those whose ethnicity is different from the former dictator's. The fundamental idea of democracy is to give voice to every citizen in a country whereas typically only a few people can influence policy-making under dictatorship. The effect of democratization will therefore be larger for groups of people who are otherwise excluded from political process. The use of individual-level data allows me to see if this argument holds in reality.

Last but not least, any discussion regarding democracy faces a thorny issue of what constitutes democracy. In this chapter, I define democracy as a political institution satisfying the following two conditions: (1) the chief executive of the government has been elected in multiparty elections with universal suffrage, without subsequently banning opposition parties and (2) the first multiparty election brings in a new chief executive to office. Political economy models predict that the combination of contested elections and universal suffrage — features of democracy underlying the first condition — will provide an incentive for the government to implement public health interventions to combat infant mortality. Several additional arguments suggest that contested elections and universal suffrage do not make a difference in policy-making unless the second condition is also satisfied. To identify the year of democratization defined this way, I originally collect information on these requirements for a country to be democratic. I check how results differ when I drop the second requirement in the definition above or rely on widely-used democracy indicators to define democracy instead. I also check whether leadership without democratization reduces infant mortality. By doing so, I try to make some progress in our understanding of what features of democracy, and what combination of them, contribute to development.

My findings are as follows. Democratization has reduced infant mortality in sub-Saharan Africa by 1.8 percentage point, roughly equivalent to what the region as a whole has achieved over the past two decades (see Figure 3.1). The effect of democratization emerges immediately and becomes larger over time. A sizable portion of this reduction comes from a fall in neonatal mortality, the number of deaths within the first month of life. The effects of democratization on both infant and neonatal mortality are larger for babies born to uneducated mothers and mothers who do not share their ethnicity with the dictator who ruled the country until democratization. There is no such reduction in infant mortality in countries where the dictator holds multiparty elections and stays in power by winning them. When the year of democratization is identified from widely-used democracy indicators, estimation results suggest that such measures of democracy may be subject to measurement error.

Additional evidence suggests that maternal health care provision to uneducated mothers has expanded since democratization, consistent with the finding that democratization has reduced neonatal mortality, especially for babies born to uneducated mothers. The breastfeeding practice has spread after democratization, which can explain the immediate effect of democratization. Access to better sanitation facilities has also expanded, consistent with the growing effect of democratization over time. On the other hand, there is no evidence for an increase in affluence after democratization. Consequently, the key mechanism in which democratization has reduced infant mortality in sub-Saharan Africa is likely to be improvements in public health service delivery, not in overall living standards.

This chapter contributes to the large empirical literature that tries to identify the effect of democracy on development or other socio-economic outcomes. I am not aware of studies using micro panel data to estimate the effect of democracy. Most studies focus on economic growth as an outcome variable. As the source of identification, early studies reviewed in Przeworski and Limongi (1993) hinge on cross-country variation while recent studies rely on within-country variation (Papaioannou and Siourounis 2005 and Rodrik and Wacziarg 2005). Others look at the effect of democracy on manufacturing wages (Rodrik 1999), child immunization (Gauri and Khaleghian 2002), socio-economic policies (Mulligan, Gil, and Sala-i-Martin 2004), and life expectancy at birth (Chapter 2 of this thesis). Ross (2006) studies the effect of democracy on infant mortality at the country level, finding no association between the two. This finding may, however, be subject to confounding factors at the country level.

As an attempt to disaggregate a blunt concept of democracy in the estimation of its effect, this chapter is also related to works summarized in Persson and Tabellini (2006b). Finally, this study contributes to recent debates on how to improve public service delivery in poor countries (e.g. World Bank 2003; Banerjee and Duflo 2006; Chaudhury, Hammer, Kremer, Muralidharan, and Rogers 2006).

The rest of the chapter is organized as follows. The next section discusses how I measure democracy in sub-Saharan Africa and describes the individual-level data

on infant mortality. Section 3.3 describes empirical method, reports main results, checks their robustness, and investigates what type of democracy matters for infant mortality. Section 3.4 provides evidence for possible pathways from democratization to the reduction of infant mortality. Section 3.5 concludes.

3.2 Background and Data

To estimate the effect of democratization on infant mortality at the individual level, we need to decide how to measure democracy and to obtain micro data on the survival of babies. In this section, I first discuss how I measure democracy and, based on this measure, show how democracy has evolved in African countries in the sample. Then I describe the Demographic and Health Surveys, from which I obtain micro data on infant mortality.

3.2.1 Measuring Democracy in Africa

Democracy is a multi-faceted political institution. Some features of democracy may affect a certain outcome while other features may not. To identify the effect of democracy, therefore, we need to choose the appropriate definition of democracy depending on what outcome we study. In this chapter, I define democracy as a political system in which (1) the chief executive of the government has been elected in multiparty elections with universal suffrage without subsequently banning opposition parties and (2) a new chief executive assumed office after the first multiparty elections. Below I explain theoretical motivations behind these two conditions for democracy.

The key concepts underlying the first condition are contested elections and universal suffrage. The political economy literature provides at least two reasons for which public health interventions to reduce infant mortality will be implemented after the introduction of contested elections with universal suffrage. First, the median voter theorem, combined with the assumption that public health interventions are the policies the majority of all citizens prefer, predicts that contested elections with

universal suffrage make politicians propose public health policies to assume office. Under universal suffrage, candidates proposing policies favored by the majority of the population will win elections.[4] Second, under the assumption that public health interventions are the provision of public goods, the model of distributive politics indicates that implementing public health interventions is less costly for politicians to win the majority of votes than distributing private goods to each voter, because under universal suffrage politicians need to appease a large number of people to win elections.[5] These two arguments suggest that contested elections and universal suffrage are complements. If suffrage is limited to a certain segment of the population, contested elections alone do not ensure that politicians propose policies favored by the majority of the population or provide public goods to appease a large number of people, because they can still win the elections without doing so. Likewise, universal suffrage alone does not lead to the implementation of these policies because politicians will stay in office anyway by "winning" non-contested elections.

There are reasons to believe that public health policy to combat infant mortality was one of the policies the majority of the population prefer in sub-Sahara African countries in the early 1990s, when democratization took place (see below). In 1990, only 33% of the population had access to improved sanitation facilities in sub-Saharan Africa (*World Development Indicators 2005*). Only 40% of births in the region in 1990 were attended by skilled health personnel (UNICEF 2006, Table 2).[6] These figures suggest that the provision of sanitation facilities and skilled child delivery care would benefit the majority of the population in the region in the early 1990s.

Public health interventions to reduce infant mortality also have a public good component in sub-Saharan Africa because a large number of child deaths in the region are caused by infectious diseases. According to estimates provided by Murray and Lopez (1996, Appendix Table 6f), the following four infectious diseases together account for about 65 percent of 4.03 million deaths of children aged under 5 years in

[4] Acemoglu and Robinson (2000) develop a model of democratization based on this idea.

[5] See Bueno de Mesquita, Morrow, Siverson, and Smith (2002) and Lizzeri and Persico (2004) for this line of arguments.

[6] See section 3.4 for how these two public health interventions affect infant mortality.

sub-Saharan Africa in 1990: diarrhea (20%), lower respiratory infections (e.g. pneumonia) (18%), malaria (15%), and measles (12%).[7] Providing preventive measures and treatments against these diseases, therefore, benefits all infants living in the same area.[8]

The argument has so far indicated that politicians need to be elected in contested elections with universal suffrage so that democratization leads to a reduction in infant mortality. Further considerations refine this condition in three ways. First, contested elections must be multiparty elections. It may be difficult for opposition candidates without the support of political parties to defeat the incumbent, undermining the incentive for the government to adopt policies favored by the majority or to provide public goods. This is particularly important in the parliamentary system of government. Second, the political agency model (Barro 1973; Ferejohn 1986) suggests that, if the chief executive elected in multiparty elections bans opposition parties, he or she loses an incentive to implement policies favored by the majority of citizens. Therefore, opposition parties need to be legal to exist after multiparty elections are held. Finally, the political office that is filled via multiparty elections must be an effective one in policy-making. Otherwise multiparty elections do not bring about policy change. The literature on African politics indicates that such political office is the chief executive.[9]

The second condition for a country to be democratic — the replacement of a chief executive — is an equilibrium outcome rather than the rule of the game. There are, however, several reasons to believe that leadership turnover is necessary for contested elections with universal suffrage to have any bite.

If a dictator decides to introduce multiparty elections in which he intends to run as a candidate and actually wins, he does so because he knows he can win. This

[7]Estimates for infant death (i.e. death during the first year of life) are not available. In 1990, HIV accounts for only 1.5 percent of child deaths in sub-Saharan Africa.

[8]Mani and Mukand (2007) offer another possible explanation for why health policies may change after democratization. Outcomes caused by health policies may be easier for voters to observe than, say, economic growth at the country level. This observability of health outcomes for voters creates an incentive for policy-makers who seek re-election to prioritize health issues over others. This effect does not emerge under non-democratic policy-making.

[9]For example, van de Walle (2003, p. 310) notes that "power is highly centralized around the president".

may be due to his popularity relative to potential opposition candidates or due to his capability of rigging the votes. As a result, he does not need to change his policy to win multiparty elections. (See Przeworski et al. 2000, pp. 23-8, for a similar argument.)

The second reason is that the identity of political leaders matters for policy-making.[10] Democratization may bring about change in government policy only if it replaces policy-makers with those whose policy preference is different from their predecessor.

Yet another reason can be given based on Acemoglu and Robinson (2006b). They argue that democratization does not lead to change in economic institutions if the elite can intensify their influence on policy outcomes through what they call *de facto* political power, such as lobbying. This argument may apply to health policies as well. Change in political leadership after democratization may increase the cost of lobbying for the elite as they need to cultivate personal connections with new political leaders from scratch. As a result, the cost of intensifying political influences outweighs its benefit, allowing democratization to bring policy change.

Whether or not these arguments hold true is, however, an empirical question. In section 3.3.4, I investigate whether the replacement of a chief executive is necessary for democratization to have an impact on infant mortality.

As none of the existing democracy datasets collect all of the requirements for democracy discussed above, I need to originally create the measurement of democracy.[11]

For each of the 28 sub-Sahara African countries for which the DHS surveys were conducted since 1996 (see section 3.2.2 below) and for the beginning of each

[10]There is a growing number of empirical studies that support this idea. See Pande (2003); Chattopadhyay and Duflo (2004); Lee, Moretti, and Butler (2004); Jones and Olken (2005); and Besley, Persson, and Sturm (2005).

[11]The dataset that is most closely related to the purpose of this study is the one constructed by Przeworski et al. (2000) for the period from 1950 to 1990. There are, however, two differences. First, Przeworski et al. (2000) do not require universal suffrage to qualify a country as democratic. Second, they require multiparty elections not only for executive office but also for legislature. If their dataset covered the period up to present, I would only need to collect information on universal suffrage because Przeworski et al. (2000) provide information on multiparty elections for executive office and for legislature separately. Boix and Rosato (2001) and Cheibub and Gandhi (2004) update Przeworski et al. (2000)'s data to more recent years, but they do not provide such disaggregated information as necessary to fit the purpose of this study.

year since independence or 1950, I collect information on who the chief executive of the government is, whether the chief executive in office (or national legislature if a country adopted the parliamentary form of government) has been elected in multiparty elections with universal suffrage, and whether opposition parties are legal. I consult Nohlen et al. (1999) and *Africa South of the Sahara* (London: Europa Publications, various issues) for collecting such information.[12]

This coding procedure reveals the following pattern of the evolution of democracy in the 28 countries. Among 23 countries that became independent by the 1960s, 13 were democratic at independence. All these countries, however, experienced the collapse of democracy either by a military coup or by the banning of opposition parties by the early 1970s. Around 1980, three countries (Ghana, Nigeria, and Uganda) became democratic, but all of them saw military coups toppling democratic governments by the mid-1980s. During the 1990s, 11 countries were democratized (see column (1) in Table 3.1 for the list of these democratized countries).[13]

I exploit these 11 episodes of democratization during the 1990s to estimate the effect of democracy in the following analysis. The focus on democratization during the 1990s deserves some explanation. The end of the Cold War has increased the African government's cost of ignoring democratic procedures for choosing the chief execuive of government. Western donor countries are now reluctant to provide foreign aid to non-democratic countries. If an African president wants to terminate democracy, he needs to be prepared for financing the government expenditure without foreing aid revenues. Democratic institutions are therefore more likely to persist and shape the incentive of policy-makers. During the Cold War, on the other hand, the African government could ignore democratic procedures as long as it expressed the support for the U.S. or the Soviet Union, because foreign aid then kept flowing in irrespective of political regimes. Therefore, democratic rules of the game were unlikely to shape the incentive of policy-makers.

[12]See Appendix B for more details on the measurement of democracy.

[13]Namibia and Zimbabwe became independent in 1990 and 1980, respectively, with the chief executive elected in multiparty elections with universal suffrage. Opposition parties have been legal in both countries until present. However, it is impossible to disentangle the effect of democratization from that of independence in these two cases. Therefore, I treat the two countries as non-democratized ones by dropping the sample before the year of independence.

Table 3.1: Years of Democratization by Different Measures of Democracy and the Sample Period for 28 African Countries

Country	(1) Multiparty	(2) PR<3	(3) PR<4	(4) PR<5	(5) POLITY2>6	(6) POLITY2>	(7) POLITY2>0	(8) EXREC≥7 & PARCOMP≥3	(9) Sample Period
Democratized Countries									
Benin	1991	1991	1991	1991		1991	1991	1991	1964-2000
Comoros	1990			1991			1990	1990	1975-1995
Ethiopia	1995			1995			1993	1995	1963-1999
Lesotho	1993	2002	*1993	1993	*1993	*1993	*1993	*1993	1967,69-2004
Madagascar	1993	1993	1993	1990	1992	1992	1991	1992	1962-1996
Malawi	1994	1994	1994	1994	1994	1994	1994	1994	1964-1999
Mali	1992	*1992	1992	1992	*1992	1992	1992	1992	1964-2000
Niger	1993		*1993	*1993	*1992	*1992	*1991	*1992	1960-1997
Nigeria	1999			1999			1999		1965-2002
South Africa	1994	1994	1994	1994	1993	1990	-	1994	1961-1997
Zambia	1991	*1991	*1991	*1991		*1991	1991	*1991	1965-2001
Non-democratized Countries									
Burkina Faso	1991			1999					1966-2002
Cameroon	1992								1968-2003
Chad	1996								1962,65,67-2003
Cote d'Ivoire	1990								1962-1998
Gabon	1993			*1990					1962-1999
Ghana	1992	2000	1996	1995		2001	1996	2001	1967-2002
Guinea	1993								1961-1998
Kenya	1992			*1992	2002	2002	2002	2002	1965-2002
Mauritania	1992								1962-2000
Mozambique	1994		1994	1994		1994	1994	1994	1975-2002
Namibia	-	-	-	-	-	-	-	-	1990-1999
Rwanda	(2003)								1963-1999
Senegal	1978	(2002)	*1984	1978	(2000)	(2000)	(2000)		1961-1996
Tanzania	1995			1999			2000	2000	1968-2004
Togo	1993								1960-1997
Uganda	1996			*1997					1964-2000
Zimbabwe	-								1980-1998

Notes: Column (1) lists the year of the first multiparty elections for executive office. "-" indicates that the country is democratic for all years in the sample. Years in parentheses are the years of democratization outside the sample period. The blank cells indicate that the country is never democratic during the sample period.

* Democracy collapses within the sample period.

I create a dummy variable for the post-Cold War democratization which is equal to one for years *after* the year of democratization in these 11 democratized countries (listed in column (1) of Table 3.1). This ensures that the post-Cold War democratization dummy is equal to one only if all babies born in a given year are exposed to democracy.[14] Below I call this dummy the democratization dummy for simplicity although it should be noted that this variable is actually an interaction term between the democracy dummy and the post-Cold War period dummy.

For the consistent estimation of the effect of democratization, the 11 democratized countries must be comparable to the other 17 countries in terms of determinants of infant mortality. Figure 3.2 shows the geographical distribution of democratized countries during the 1990s. It reveals that democratized countries are not concentrated in a particular region, which ensures the comparability of democratized and non-democratized countries in terms of geographical factors. Columns (1) and (2) in Table 3.2 show how comparable the two groups of countries are in terms of country-level variables that are likely to be associated with infant mortality. Differences in the means of these variables are never statistically significant at the conventional level.

3.2.2 Micro Data on Infant Mortality

The data on infant mortality at the individual level is obtained from the Demographic and Health Surveys (DHS), conducted by ORC Macro in various developing countries since the late 1980s with funding from the U.S. Agency for International Development (USAID).[15] The DHS questionnaire consists of standardized compo-

[14]There are three countries in which democratization was followed by coups within the sample period (the Comoros, Lesotho, and Niger). I do not treat these cases differently for two reasons. First, in each case, a fresh multiparty election for executive office immediately followed (often due to international pressure). Second, treating these cases differently could cause the selection bias: the remaining "permanent" democratizations are permanent because they are successful in bringing about benefits to the population while "broken-down" democratizations broke down because they failed to do so. Limiting attention to only those "permanent" democratization may cause an overestimation of the beneficial effect of democratization.

[15]See http://www.measuredhs.com (the DHS survey website) for more details and for downloading data files. The DHS data is widely used by demographers and public health researchers. Economic research using the DHS data includes Pitt (1997), Dow, Philipson, and Sala-i-Martin (1999), and, most recently, Young (2005).

Table 3.2: Comparability of Different Groups of Countries in Sub-Saharan Africa

Group of countries:	(1) Democratized	(2) Non-democratized	(3) Sample	(4) All
Per Capita Income in 1990	1657	2020	1877	2182
(1996 constant int'l dollars)	(2078)	(2036)	(2022)	(2353)
	11	17	28	42
Average Years of Schooling	2.81	2.92	2.87	2.93
in 1990	(1.79)	(1.05)	(1.33)	(1.51)
(for those aged 15 or over)	7	11	18	30
Average Years of Schooling	2.42	2.19	2.28	2.37
in 1990	(1.92)	(0.94)	(1.36)	(1.61)
(for female aged 15 or over)	7	11	18	30
Ethnic Fractionalization Index	0.640	0.709	0.682	0.659
(0 to 1)	(0.269)	(0.159)	(0.207)	(0.233)
	11	17	28	46
British Legal Origin	0.455	0.353	0.393	0.383
(dummy variable)	(0.522)	(0.493)	(0.497)	(0.491)
	11	17	28	47
European Settler Mortality	987	369	587	556
(per 1000 mean strengths)	(1205)	(213)	(758)	(693)
	6	11	17	23
Malaria Ecology Index	10.53	12.96	12.00	11.38
(0 to more than 30)	(10.31)	(8.67)	(9.24)	(7.98)
	11	17	28	46
HIV infection rate in 2001	9.71	7.45	8.29	9.05
(% of adults aged 15-49)	(10.06)	(6.58)	(7.93)	(9.86)
	10	17	27	38
% of years of armed conflicts	14.68	16.54	15.81	21.52
from 1951 or independence	(23.30)	(24.85)	(23.83)	(29.65)
to 2004	11	17	28	47

Sources: Penn World Table 6.1 for per capita income; Barro and Lee (2000) for years of schooling; Alesina et al. (2003) for ethnic fractionalization; La Porta et al. (1999) for British legal origin; Acemoglu et al. (2001) for European settler mortality; Kiszewski et al. (2004) for malaria ecology; the World Development Indicators 2005 for the HIV infection rate; and Armed Conflict Dataset Version 3-2005b (Gleditsch et al. 2002) for armed conflicts.

Notes: In each cell, the mean, the standard deviation (in parentheses), and the number of countries are reported at the top, the middle, and the bottom row, respectively. Column (1) includes 11 democratized countries; column (2) 17 non-democratized countries; column (3) 28 countries with the DHS surveys available; column (4) all the countries in Sub-Saharan Africa (excluding Eritrea). Eritrea is excluded because it became independent in 1993, and data in 1990 is therefore not available.

Figure 3.2: Democratization in the Sample Countries over Time

Notes: Black-colored countries are democratized; gray-colored ones are the other countries in the sample. In 1990, the Comoros was democratized but due to its small area size it is not visible.

nents and country-specific ones. Using the standardized part of the questionnaire allows researchers to compile cross-country micro datasets.

In each DHS survey, a nationally representative sample of women of child-bearing age (15 to 49) are interviewed about the survival of almost *all* the children they gave birth to in the past, including those who died by the time of the interview.[16] From this recall data, I construct a panel dataset of mothers where the time dimension is the year of child birth given by each mother. Therefore, as long as at least one round of survey was conducted in a country, a panel dataset of mothers is available for that country.[17]

To investigate the effect of democratization on infant mortality in sub-Saharan Africa, I select 28 DHS surveys, one for each sub-Sahara African country, conducted

[16]The maximum number of children for each interviewed mother in the dataset is 20. In the sample, however, there is only one mother giving birth to more than 20 children.

[17]An issue with the recall data is its accuracy. The DHS survey interviewers conduct a number of probes to ensure the quality of birth history data based on interviewees' memory. See page 14 of ORC Macro (2006).

since 1996.[18] If there are more than one surveys available in a country during this period, I select the latest survey to maximize the number of post-democratization years covered in the sample.[19] See Table 3.3 for the list of surveys used in the analysis.[20]

The 28 DHS surveys provide a sample of 693,495 children born to 171,110 mothers with the year of birth of children spanning from 1958 through 2005. From this, the following observations are dropped: (i) children born before the year of independence of their country and (ii) children born within 12 months before their mother's interview. Children of type (i) are excluded in order to prevent the effect of colonial rule from muddling the comparison of dictatorship and democracy. Children of type (ii) might have died before reaching the age of one even if they were alive at the time of their mother's interview, which results in measurement error. Dropping these observations results in the base sample of 643,846 children born to 161,876 mothers with the year of birth of children spanning from 1960 and 2004.

To measure individual-level infant mortality, a dummy for whether a child dies before turning the age of one year is constructed. As the literature suggests that determinants of infant death within the first month of life (known as neonatal mortality) differ from those for the rest of the first year of life,[21] a dummy for whether a child dies before turning the age of one *month* is also constructed. These two dummy variables are the dependent variables in the following analysis. Other characteristics of babies used in the analysis below are their sex, whether or not they are born in multiple birth (i.e. twins, triplets, etc.), their birth order, the age of their mother at their birth, the preceding birth interval (how many months have passed when they

[18] I thank Bernard Barrere for granting access to Mauritania DHS survey results. The 28 countries in the sample are fairly representative for the whole of sub-Saharan Africa. Columns (3) and (4) in Table 3.2 compare the means of various country-level variables that are likely to be associated with infant mortality between the 28 sample countries and all the countries in the region. There is no systematic difference between the two.

[19] One exception is Senegal, for which I use the 1997 survey instead of the latest survey in 1999, because the 1999 survey data is not recoded and the codebook is written in French.

[20] Five more African countries (Botswana, Burundi, Central African Republic, Liberia, and Sudan) conducted the DHS survey before 1996. Given that democratization in Africa took place mostly in the early 1990s, however, these surveys are not useful to investigate the effect of democratization. In addition, Eritrea conducted the DHS surveys in 1995 and in 2002. However, access to survey results is restricted and I have not managed to gain permission.

[21] See, for example, Razzaque, Alam, Wai, and Foster (1990).

Table 3.3: Years of DHS surveys used in the analysis

Country	Infant Mortality Analysis	Pathway Analysis
Benin	2001	2001, 1996
Burkina Faso	2003	2003, 1998, 1992
Cameroon	2004	2004, 1998, 1991
Chad	2004	
Comoros	1996	
Cote d'Ivoire	1998	
Ethiopia	2000	
Gabon	2000	
Ghana	2003	2003, 1998, 1993, 1988
Guinea	1999	
Kenya	2003	2003, 1998, 1993, 1989
Lesotho	2004	
Madagascar	1997	1997, 1992
Malawi	2000	2000, 1992
Mali	2001	2001, 1995, 1987
Mauritania	2000	
Mozambique	2003	2003, 1997
Namibia	2000	2000*, 1992*
Niger	1998	1998, 1992
Nigeria	2003	2003, 1999, 1990
Rwanda	2000	2000, 1992
Senegal	1997	1997, 1992
South Africa	1998	
Tanzania	2004	2004, 1999, 1996, 1992
Togo	1998	1998, 1988
Uganda	2000	2000, 1995, 1988
Zambia	2001	2001, 1996, 1992
Zimbabwe	1999	1999, 1988

Notes: If a survey was completed in the following year, the year in the table refers to the one in which the survey began.

* Namibia surveys are not used for analysis of tetanus toxoid injections because the 2000 survey does not collect information on it, leaving only one round of survey available.

are born since their mother gave birth to the previous child), the ownership of consumer durable goods by their household at the survey date, how many years their mother has lived in the surveyed community when she is interviewed, the level of their mother's education, the area of residence (urban or rural), and their mother's ethnicity.

Note that, due to the nature of retrospective data, children born to the mothers who are dead or not eligible to be surveyed (i.e. 50 years old or over) at the time of the survey are missing in the sample. If the impact of democratization is systematically different between these missing children and those in the sample, all the results in this chapter will suffer from sample selection bias. However, there is no a priori reason for why the impact of democratization differs between these two types of children.

3.2.3 Summary Statistics

Table 3.4 shows summary statistics for variables used in the analysis. Column (1) provides sample means for all countries in the sample; column (2) for babies born in democratized countries until the year of democratization; column (3) for babies born in democratized countries after the year of democratization; column (4) for babies born in non-democratized countries. The infant mortality rate is 10 percent of live births on average for all the 28 countries in the sample. The neonatal mortality rate is 4.7 percent, indicating that nearly half of infant deaths occur within the first month after birth.

Figure 3.3 plots sample mean infant mortality rates by year for democratized and non-democratized countries. It reveals that non-democratized countries consistently have lower infant mortality rates than democratized countries, with the gap widening in the early 1980s. This gap, however, dramatically disappears by the mid-1990s, when most of the 11 democratization episodes already took place. Figure 3.3 also shows that infant mortality has been on the decline for both groups of countries with non-democratized countries having a steeper downward trend. This difference in the trend between the two groups of countries will bias the democracy coeffi-

Table 3.4: Summary Statistics

Countries:	(1) All	(2) Democratized Before	(3) Democratized After	(4) Non-democratized
Baby-level Variables				
Infant death				
(All)	0.100	0.116	0.100	0.091
	643846	197891	79805	366150
(Educated)	0.080	0.086	0.086	0.076
	287387	81284	37267	168836
(Uneducated)	0.116	0.138	0.111	0.104
	356450	116600	42538	197312
(Dictator's ethnicity)	N/A	0.121	0.112	N/A
		37800	18365	
(Other ethnicity)	N/A	0.124	0.100	N/A
		89028	37987	
Neonatal death				
(All)	0.047	0.054	0.046	0.043
	643846	197891	79805	366150
(Educated)	0.036	0.038	0.039	0.035
	287387	81284	37267	168836
(Uneducated)	0.055	0.065	0.053	0.049
	356450	116600	42538	197312
(Dictator's ethnicity)	N/A	0.121	0.112	N/A
		37800	18365	
(Other ethnicity)	N/A	0.124	0.100	N/A
		89028	37987	
Girl	0.491	0.487	0.494	0.492
	643846	197891	79805	366150
Multiple birth	0.032	0.029	0.037	0.032
	643846	197891	79805	366150
Mother's age at birth 20-29	0.534	0.541	0.506	0.537
	643846	197891	79805	366150
Mother's age at birth 30-39	0.200	0.168	0.261	0.203
	643846	197891	79805	366150
Mother's age at birth 40-49	0.018	0.008	0.040	0.018
	643846	197891	79805	366150
Short birth spacing	0.292	0.333	0.237	0.282
	483880	146213	62589	275078
Mother-level Variable				
Number of births	4.028	4.059		4.005
	(2.686)	(2.754)		(2.634)
	161876	68602		93274

Notes: In each cell, the sample mean is reported at the top row; the number of observations at the bottom row. For number of births, which refers to the birth order of the youngest child in the sample, standard deviations are reported in parentheses at the middle row. Column (2) reports means for children born in democratized countries until the year of democratization; Column (3) for children born in democratized countries after the year of democratization; Column (4) for children born in non-democratized countries.

cient upwards, going against the finding that democratization has reduced infant mortality.

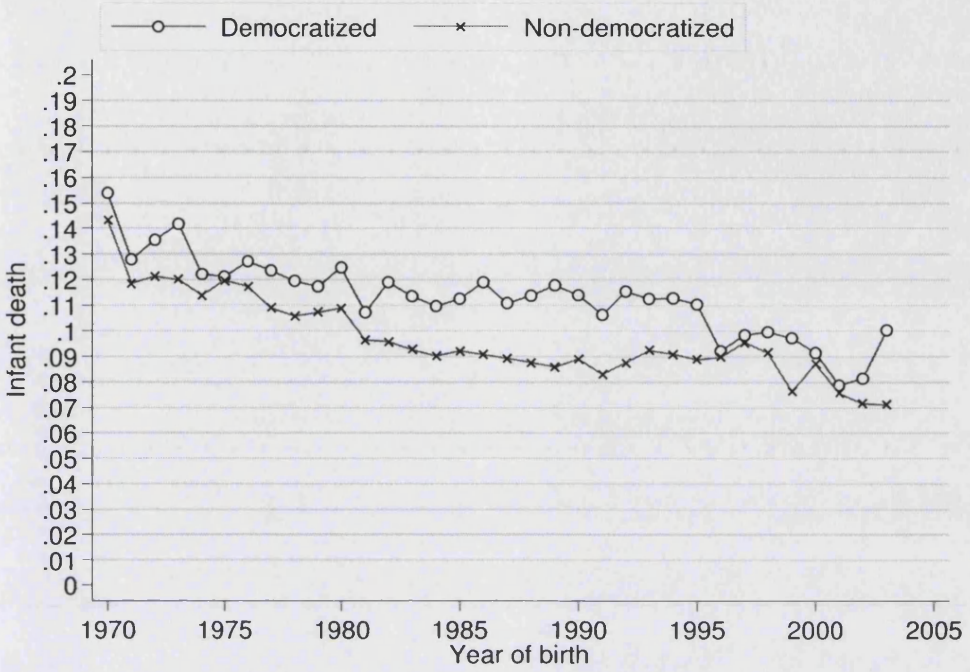

Figure 3.3: Sample mean infant mortality rates by year for democratized and non-democratized countries

Notes: Plotted are sample mean infant mortality rates by year for democratized and non-democratized countries. Year 1970 includes children born in the 1960s; year 2003 includes children born in 2004. See Table 3.1 for the list of democratized and non-democratized countries.

Figures 3.4 and 3.5 show sample mean infant mortality rates by year for each country. While the overall infant mortality has been on the decline as shown in Figure 3.3, each country exhibits its own trend in infant mortality.

3.3 Empirical Analysis

3.3.1 Method

To investigate whether democratization has reduced infant mortality, I estimate the following equation:

$$y_{imct} = \alpha_m + \beta_t + \gamma D_{ct} + \delta_c TREND_{ct} + \mathbf{X}_{imct}\theta + \varepsilon_{imct}, \tag{3.1}$$

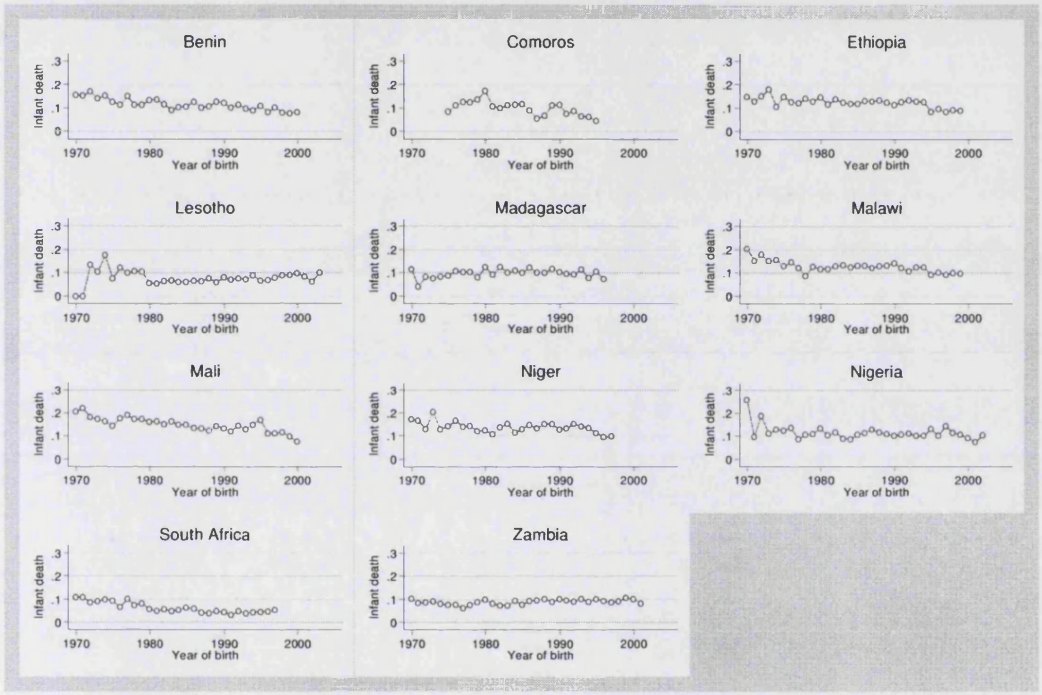

Figure 3.4: Sample Mean Infant Mortality Rates Over Time by Country for Democratized Countries

Notes: Plotted are sample mean infant mortality rates by year for each of the 11 democratized countries. Year 1970 includes children born in the 1960s; year 2003 includes children born in 2004.

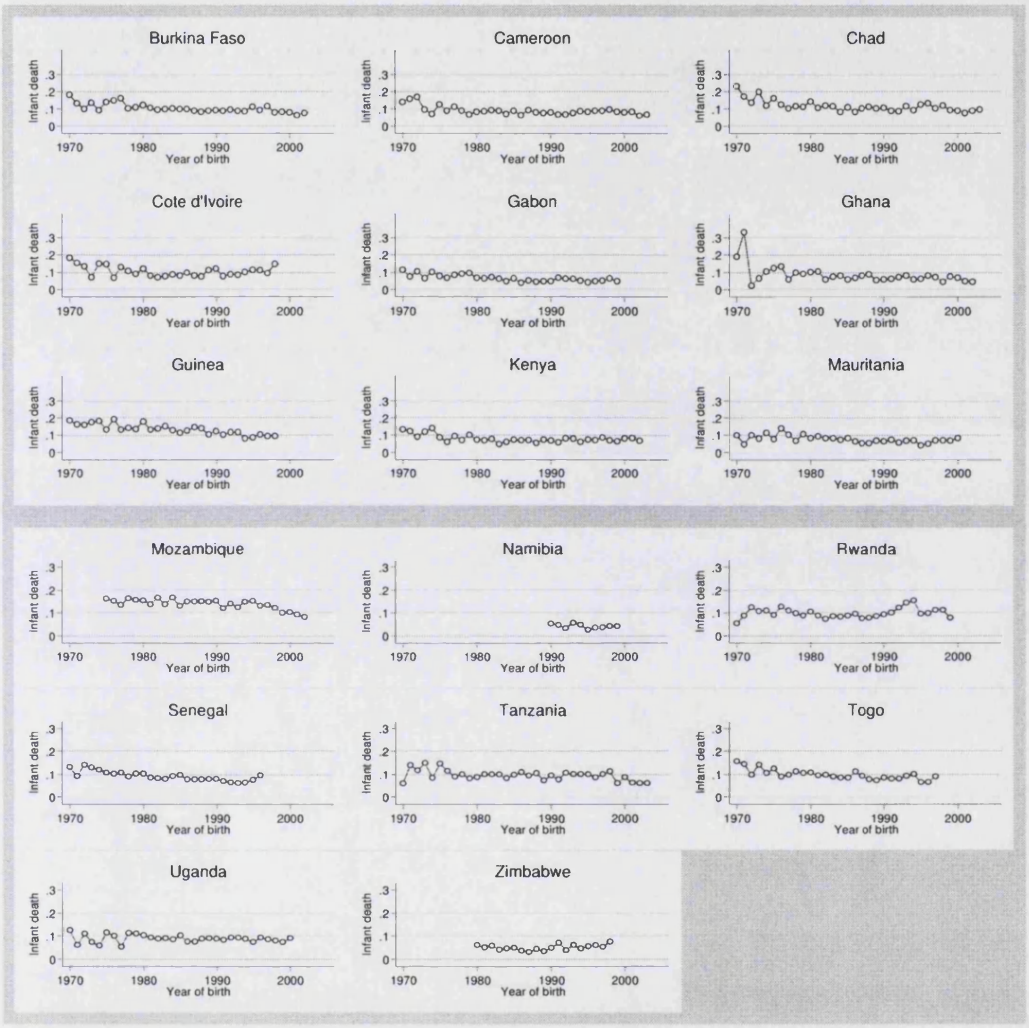

Figure 3.5: Sample Mean Infant Mortality Rates Over Time by Country for Non-democratized Countries

Notes: Plotted are sample mean infant mortality rates by year for each of the 17 non-democratized countries. Year 1970 includes children born in the 1960s; year 2003 includes children born in 2004.

where y_{imct} is a dummy equal to one if baby i who is born to mother m in country c in year t dies before reaching the age of one year (or one month if the outcome of concern is neonatal mortality), α_m is a mother fixed effect, and β_t is a birth-year fixed effect. D_{ct} is a dummy variable equal to one if country c is democratized by the beginning of year t. The term $\delta_c TREND_{ct}$ represents a linear time trend specific to country c.[22] $\mathbf{X}_{imct}$ is a vector of exogenous covariates. In the base regression, $\mathbf{X}_{imct}$ includes dummies for baby girls and for multiple birth (i.e. twins, triplets, or quadruplets). The sex of babies may affect their survival if the return to raising children for their parents is different between boys and girls.[23] Multiple birth results in an unexpected reduction in the amount of available household resources per child, which may increase the likelihood of infant death.[24] Although there is no a priori association between democratization and the likelihood that female babies or twins are born, controlling for these exogenous characteristics of babies reduces the error variance, and thus increases the precision of estimation of coefficients of interest. Standard errors are clustered at the country level to take into account any arbitrary correlations of the error term ε_{imct} across babies born in country c in year t and over time in country c.[25]

The parameter of interest, γ in equation (3.1), measures the average difference in changes in the probability of the death of babies born to the same mother between those countries that are democratized and those that are not. Under the assumption that, after controlling for mother and year fixed effects, country-specific linear trends, and exogenous covariates, changes in infant mortality in non-democratized countries provide a counterfactual for democratized countries (i.e. changes in infant mortality that would occur if there were no democratization), γ represents the ef-

[22] As there are plenty of observations before democratization (compare columns 1 and 9 in Table 3.1), linear trends are unlikely to pick up the post-democratization trend (Wolfers 2006).

[23] There is mixed evidence on gender bias in infant and child mortality in sub-Saharan Africa. See Klasen (1996) and references therein.

[24] Pison (1992) reports that in sub-Saharan Africa twins are 3 to 4 times as likely to die within the first year of life as singletons are.

[25] I specify the linear probability model. Conditional fixed effects logit estimation yields similar results in terms of the sign and statistical significance of the estimated democracy coefficient. However, its consistency requires no serial correlation in the error term, which is unlikely to hold in the present context (see Zenger 1993, for example). In addition, the coefficient estimates in fixed effects logit models are difficult to interpret.

fect of democratization on infant mortality. Specifically, the error term, ε_{imct}, must satisfy the following equation:

$$E(\varepsilon_{imct}|\mathbf{D}_{mc}, \mathbf{D}_t, \alpha_m, \beta_t, \delta_c, \mathbf{X}_{mc}, \mathbf{X}_t) = 0, \tag{3.2}$$

where $\mathbf{D}_{mc}$ and $\mathbf{X}_{mc}$ are the vectors containing D_{ct} and $\mathbf{X}_{imct}$, respectively, for all t in which mother m gives birth, and $\mathbf{D}_t$ and $\mathbf{X}_t$ the vectors containing D_{ct} and $\mathbf{X}_{imct}$ for all c. Due to the presence of mother and year fixed effects as controls, ε_{imct} must be uncorrelated not only with the contemporary status of democracy D_{ct} but also with the past and future status of democracy when the same mother gives birth to another child, and with all other countries' status of democracy in year t.

Unobservable "prerequisites for democracy" plague all empirical studies that try to identify the effect of democracy. Unlike cross-country regression analysis, however, unobservable time-invariant characteristics of countries such as geography, history and culture are not the source of violation of the identifying assumption represented by equation (3.2) because the set of mother fixed effects in each country captures such country fixed effects. Among time-variant prerequisites at the country level, one of the major factors that may drive both democracy and infant mortality is the level of education among adults.[26] However, change in the stock of education in the adult population does not affect equation (3.2) because the effect of mothers' education on infant mortality is captured by mother fixed effects.[27] This is the main advantage of using individual-level data instead of country-level data in the investigation of the effect of democracy. In the country-level regression analysis, controlling for a time-variant measure of education such as the average years of schooling in the adult population does not help identification because it is correlated

[26]See Strauss and Thomas (1996, section 3.3) for a survey on the effect of parental education on child health. For a classical account of education as the main drive for democracy, see Lipset (1959). For the latest debate on this issue, see Acemoglu, Johnson, Robinson, and Yared (2005a) and Glaeser, Ponzetto, and Shleifer (2006).

[27]Among babies with their mother's years of schooling available, there are 2,351 babies who are not the only child and born before the year of completion of their mother's study (calculated as the number of years of schooling plus 6, assuming that primary school begins at the age of 6). There are 6,896 babies whose mother's years of schooling is not available. Therefore, the level of maternal education differs across different babies born to the same mother only for at most 1.4 percent of the sample observations.

with the error term by some lags. For example, an improvement in child health that also boosts educational attainment (e.g. Miguel and Kremer 2004) leads to an increase in the stock of education some years later. This breaks down the strict exogeneity assumption on the error term for consistency in fixed effects estimation.

Another time-variant factor that may drive both democracy and infant mortality is income.[28] Due to the lack of data on earnings of each mother's household over time, this remains a major concern for identification in this analysis. In section 3.3.3, I deal with this issue in a couple of ways.

3.3.2 Main Results

Table 3.5 reports estimated coefficients on the democratization dummy by adding controls one by one. Column (1) only controls for year fixed effects. The democracy coefficient is positive but not significantly different from zero. Column (2) additionally controls for country fixed effects. The democracy coefficient becomes negative and statistically significant. Given that non-democratized countries have lower infant mortality rates on average than democratized countries (see Table 3.4 and Figure 3.3), the coefficient estimate in column (1) picks up such cross-country variation, offsetting within country variation shown in column (2).

Column (3) controls for mother fixed effects instead of country fixed effects. The democracy coefficient becomes larger in absolute terms. This result indicates that the composition of mothers changes after democratization with their characteristics worsening in relation to infant mortality. A possible explanation is that women becoming mothers after democratization are less healthy because they were born in the 1980s, when economic recessions may have impoverished their parents, and grew up with insufficient nutrients. Economic recessions may have led to democratization in the early 1990s in the democratized countries.[29] The country fixed effects

[28] See Strauss and Thomas (1996, section 3.4) for a survey on the effect of income on child health. A recent empirical investigation of the income-democracy link is found in Acemoglu, Johnson, Robinson, and Yared (2005b).

[29] Bratton and van de Walle (1997) find that democratization in Africa followed frequent political protests, which were in turn more frequent the more often the government adopted structural adjustment programs in the 1980s.

Table 3.5: Infant Mortality Drops After Democratization

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Infant Death	Infant Death	Infant Death	Infant Death	Infant Death	Neonatal Death
Democratization	0.009	-0.011*	-0.017**	-0.017**	-0.018**	-0.010**
	[0.008]	[0.005]	[0.006]	[0.006]	[0.006]	[0.003]
Girl					-0.014**	-0.011**
					[0.001]	[0.001]
Multiple birth					0.231**	0.163**
					[0.012]	[0.009]
Year FE	YES	YES	YES	YES	YES	YES
Country FE	NO	YES	NO	NO	NO	NO
Mother FE	NO	NO	YES	YES	YES	YES
TREND	NO	NO	NO	YES	YES	YES
# of Countries	28	28	28	28	28	28
# of Mothers	161876	161876	161876	161876	161876	161876
Observations	643846	643846	643846	643846	643846	643846
Adjusted R^2	0.001	0.008	0.060	0.061	0.077	0.080

Notes: Standard errors clustered at the country level are reported in brackets. Infant death is death before turning the age of 1 year; neonatal death is death before turning the age of 1 month. Adjusted R^2 refers to variation explained by all regressors including any fixed effects.

* significant at 5%; ** significant at 1%.

estimation, therefore, picks up such omitted factors, yielding the biased estimate for the democracy coefficient.

Column (4) additionally controls for country-specific linear trends. The democracy coefficient remains almost the same and statistically significant. This result shows that the coefficient estimate in column (3) does not reflect a steeper declining trend in infant mortality in democratized countries than in non-democratized countries.[30]

Finally, column (5) adds exogenous covariates (dummies for female babies and for multiple births) in the set of control variables. Democratization is followed by a reduction in the infant mortality rate by 1.8 percentage points, which is as much as 18 percent of the sample mean. To gauge the magnitude of this fall, recall Figure 3.1. The 1.8 percentage point decline roughly corresponds to the fall in infant mortality in the whole of Sub-Saharan Africa between 1980 and 2000.

[30]Controlling for quadratic or cubic country-specific trends makes the democracy coefficient estimate smaller and insignificant, suggesting that the effect of democratization is not a sudden change in infant mortality.

Column (6) reports the result for neonatal death in the same specification as in column (5). The probability that a mother sees her baby die within the first month of life falls after democratization by 1 percentage point, 21 percent of the sample mean. A sizable portion of the fall in mortality within the first year of life is therefore due to the fall in mortality within the first month of life.

The democracy coefficient estimates in columns (5) and (6), however, may not reflect the effect of democracy. Given that democratization in Africa often followed economic stagnation, it may be the case that infant mortality temporarily went up due to impoverishment of their mothers before democratization. If this is the case, the democratization coefficient is estimated to be negative even if democratization has no impact. Alternatively, infant mortality may begin to drop some years before democratization due to changes in some socio-economic prerequisites for democracy. We then spuriously attribute such an effect to the one of democratization. To deal with these concerns, I estimate the dynamics of infant mortality before and after democratization. I replace D_{ct} in equation (3.1) with the set of year-wise dummy variables which are equal to 1 if n years have passed since the year of democratization, where $-5 \leq n \leq 3$, and another dummy variable equal to 1 if 4 years or more have passed since the year of democratization.[31] Figure 3.6 plots the estimated coefficients on these dummies (see also Table 3.6) and shows the 95 percent level confidence intervals.[32] These are interpreted as percentage point changes in infant mortality, relative to changes in non-democratized countries, compared to the period until 6 years before democratization. There is no statistically significant change in infant mortality until the year of democratization. This result supports the interpretation of estimated democracy coefficients in columns (5) and (6) of Table 3.5 as the effect of democratization.

Figure 3.6 also indicates that infant mortality drops immediately after democratization and continues to fall subsequently. The immediate fall in infant mortality

[31] I lump together 4 or more years after democratization because three of the 11 democratized countries (Madagascar, Nigeria, and South Africa) have observations only until 3 years after democratization. Therefore, estimated change in infant mortality from three years after democratization to four or more years after can be due to change in the composition of countries in the sample.

[32] This type of analysis is increasingly common in labor economics. See Jacobson, LaLonde, and Sullivan (1993), Autor (2003), and Wolfers (2006).

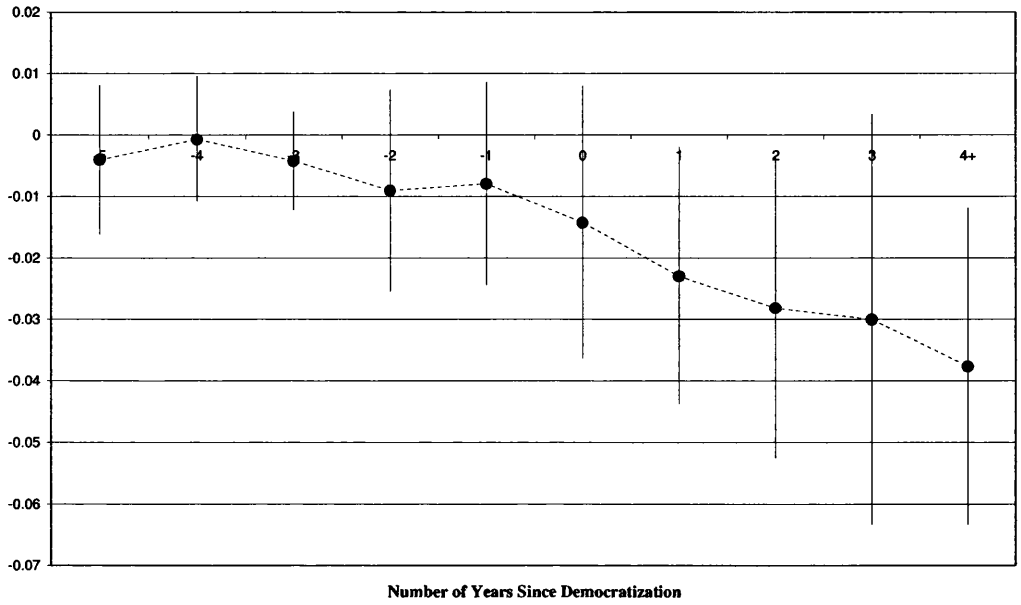

Figure 3.6: Dynamics of Infant Mortality Before and After Democratization
Notes: Plotted are estimated coefficients reported in Table 3.6. Vertical bands represent 95 percent level confidence intervals of the estimated coefficients.

may reflect the promotion of awareness among mothers on healthy behavior such as hand-washing. The subsequent additional decline in infant mortality may indicate that health infrastructure such as sanitation facilities and health clinics are now put in place after a couple of years of preparation. These interpretations assume that health policy changes immediately after democratization. If democratic policy-making tends to be slow because mustering support from the majority of legislators takes time, this assumption is unlikely to hold. However, given that the chief executives of government have large discretion over policy-making in Africa, as the literature on African politics suggests, the immediate change in health policy after democratization is not entirely implausible.

The estimation results have so far concerned the aggregate effects. The effects of democratization, however, may not be homogeneous among the population. Two characteristics of mothers are likely to yield heterogeneity in changes in infant mortality after democratization: their level of education and their ethnicity. The effect

Table 3.6: Dynamics of Infant Mortality Before and After Democratization
(The Dependent Variable: Death before turning the age of one year)

5 Years Before	-0.004
	[0.006]
4 Years Before	-0.001
	[0.005]
3 Years Before	-0.004
	[0.004]
2 Years Before	-0.009
	[0.008]
1 Year Before	-0.008
	[0.008]
Year of Democratization	-0.014
	[0.011]
1 Year After	-0.023*
	[0.010]
2 Years After	-0.028*
	[0.012]
3 Years After	-0.030
	[0.016]
4 Years or More After	-0.038**
	[0.013]
F-test	0.44
p-value	*0.817*
Controls:	
Girl	YES
Multiple Birth	YES
Mother FE	YES
Year FE	YES
TREND	YES
# of Countries	28
# of Mothers	161876
Observations	643846
Adjusted R^2	0.077

Notes: Robust standard errors clustered at the country level are reported in brackets. The null for F-test is that five coefficients on dummies for years before democratization are all zero. Adjusted R^2 refers to variation explained by all regressors, including any fixed effects.

* significant at 5%; ** significant at 1%.

of democratization may be stronger for uneducated mothers, if the democratized government provides knowledge on health to tackle infant mortality and if educated mothers are already aware of it. Mothers who do not share their ethnicity with the dictator who ruled the country until democratization may also benefit more from democracy. Under dictatorship, they may have been excluded from policy-making process. Their desire for the survival of their babies, therefore, may not be heard by the government.[33] After democratization, these mothers gain the right to vote in contested elections for executive office. As a result, the government has an incentive to help their babies survive. On the other hand, mothers from the dictator's ethnic group may enjoy public health interventions even under dictatorship. Consequently, the effect of democratization on the reduction of infant mortality is likely to be stronger for babies born to mothers from ethnic groups not in power under dictatorship.[34]

The use of micro data allows me to investigate these possibilities. Table 3.7 reports the estimated impacts of democratization on infant and neonatal mortality by mothers' education level and ethnicity. In columns (1) and (2), I interact the democratization dummy with indicator variables for uneducated mothers (those who never went to school) and for educated mothers (those who at least attended primary school). For both infant mortality and neonatal mortality, it is uneducated mothers who benefit the most from democratization. Babies born to uneducated mothers are less likely to die within the first year (month) of life after democratization than before by 2.3 (1.2) percentage points. The difference in the estimated coefficients of democratization between uneducated and educated mothers (1.4 percentage point for infant mortality and 0.6 for neonatal mortality) is statistically significant at 1

[33]African countries are known to be highly heterogeneous in terms of ethnicity (Easterly and Levine, 1997), and it is often argued that political leaders favor their own ethnic groups against the others (see, for example, Bates 1983). Chapter 5 of this thesis takes this issue seriously.

[34]The same argument may explain Almond, Chay, and Greenstone (2003)'s finding that infant mortality among black people converged to the level of infant mortality for white people in the United States from 1965 to 1971 via improved access to hospitals for black people. Although Almond et al. (2003) attribute this infant mortality convergence to the prohibition of racial discrimination in hospital care by a U.S. Appeals Court decision in 1963 and Title VI of the 1964 Civil Rights Act, the federal Voting Rights Act of 1965, which eliminated poll taxes and literacy tests that had effectively disenfranchised black people (see Besley, Persson, and Sturm 2005), may have also contributed by the logic described here.

percent level. To gauge the economic significance of these results, note that the difference in the sample average infant (neonatal) mortality between babies born to educated and uneducated mothers is 3.6 (1.9) percentage points (see column (1) of Table 3.4). Therefore, after democratization, inequality in health in terms of infant mortality between the two groups of babies declines by 39 percent. For neonatal mortality, it is a 32 percent fall in the gap.[35]

The finding that uneducated mothers benefit more from democratization might be driven by the fact that there are more uneducated mothers in rural areas than in urban areas and that democratization has corrected what is often called "urban-bias". Bates (1981) points out that African governments in the 1960s and 1970s — the period when they were more or less autocratic — favored urban residents against rural ones in terms of the allocation of public resources.[36] To explore this possibility, I create four dummies for uneducated mothers living in urban areas, educated mothers in urban areas, uneducated mothers in rural areas, and educated mothers in rural areas.[37] These four dummies are interacted with the democratization dummy.

Columns (3) and (4) report the results. Uneducated mothers benefit from democratization equally between those living in urban and rural areas, though the estimated coefficient is larger in absolute terms and more precise for rural mothers. The difference between educated mothers living in urban areas and in rural areas is also small. An F-test cannot reject the null hypothesis that there is no difference in the democracy coefficient between urban and rural areas both for uneducated mothers and for educated mothers. These results indicate that uneducated mothers benefit from democratization irrespective of where they live.[38]

[35]These results, however, do not suggest that democratization has no impact for educated mothers. The coefficient on the interaction term between democratization and educated mothers reflects a difference between educated mothers in democratized countries and all mothers in non-democratized countries. If I restrict the sample to babies born to educated mothers and estimate equation (3.1), then the democracy coefficient is significantly negative, suggesting that educated mothers also benefit from democratization.

[36]Majumdar, Mani, and Mukand (2004) suggest that even a democracy creates urban bias: voters in urban areas are better at observing policy outcomes, and thus more responsive to policy change, than those in rural areas, creating an incentive for policy-makers to favor urban people in the allocation of public resources.

[37]Note that areas of residence refer to mothers' residence at the survey date. For mothers who migrated from rural to urban areas or vice versa, this results in measurement error. If I drop such mothers as I do for column (8) of Table 3.8 (see section 3.3.3 below), I obtain similar results.

[38]If I include only urban and rural dummies (without interaction with education), the difference

Table 3.7: Impact of Democratization by Mother's Education and Ethnicity

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Infant Death	Neonatal Death	Infant Death	Neonatal Death	Infant Death	Neonatal Death
Democratization interacted with						
Educated	-0.009	-0.006				
	[0.006]	[0.003]				
Uneducated	-0.023**	-0.012**				
	[0.007]	[0.003]				
Educated			-0.005	-0.004		
& Urban			[0.007]	[0.005]		
Educated			-0.011	-0.006		
& Rural			[0.007]	[0.004]		
Uneducated			-0.018	-0.004		
& Urban			[0.012]	[0.009]		
Uneducated			-0.024**	-0.014**		
& Rural			[0.007]	[0.003]		
Dictator's					-0.008	-0.004
ethnic group					[0.008]	[0.005]
Other					-0.017*	-0.012**
ethnic groups					[0.006]	[0.004]
F-test	7.94	8.46	0.78	0.81	17.16	6.79
p-value	0.009	0.007	0.469	0.454	0.001	0.018
Girl	YES	YES	YES	YES	YES	YES
Multiple birth	YES	YES	YES	YES	YES	YES
Mother FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
TREND	YES	YES	YES	YES	YES	YES
# of Countries	28	28	28	28	19	19
# of Mothers	161873	161873	161873	161873	114324	114324
Observations	643837	643837	643837	643837	460952	460952
Adjusted R^2	0.077	0.080	0.309	0.311	0.074	0.077

Notes: Standard errors clustered at the country level are reported in brackets. Infant death (the dependent variables in odd-numbered columns) is death before turning the age of 1 year. Neonatal death (the dependent variables in even-numbered columns) is death before turning the age of 1 month. Adjusted R^2 refers to variation explained by all the regressors, including any fixed effects. The nulls for F-tests are: for columns (1) and (2), coefficients on the two interaction terms between democratization and mothers' education level are the same; for columns (3) and (4), coefficients on the two interaction terms of democratization and educated mothers with areas of residence are the same and coefficients on the two interaction terms of democratization and uneducated mothers with areas of residence are the same; for columns (5) and (6), coefficients on the two interaction terms between democratization and mothers' ethnicity are the same.

* significant at 5%; ** significant at 1%.

In columns (5) and (6), I interact the democratization dummy with dummies for the dictator's ethnic group and the other ethnic groups. To create ethnicity dummies, from various sources I identify the ethnicity of the dictator who ruled the country until the year of democratization and match it with the list of ethnic groups in the DHS surveys.[39] Ethnic groups that are different from the former dictator's benefit more from democratization. The difference in the magnitude of the democratization effect is statistically significant for both infant and neonatal mortality. On the other hand, the former dictator's ethnic group does not see a statistically significant change in infant and neonatal mortality though the point estimates are negative. A newly elected chief executive, therefore, does not appear to retaliate against the ethnic group in power until democratization. In other words, democratization in Africa does not worsen ethnic conflict.[40]

3.3.3 Robustness Checks

The previous subsection reveals that infant mortality falls after democratization. This finding, however, does not necessarily reflect the effect of democratization on public health policy-making, as argued in section 3.2, because other factors may have changed at the same time as democratization.

One such factor is mothers' income. Even though democratization does not affect any government health policy, mothers may have become richer after democratization, because democratization, for example, brings about political stability and hence an increased investment. Then they become healthier and thus give birth to healthier babies, and/or babies can afford sufficient nutrient intake, leading to a reduction in infant mortality.

As the DHS surveys do not collect information on earnings by mothers or their

in estimated coefficients on these two dummies interacted with democratization is not statistically significant.

[39]See Appendix B for details. Nine countries are dropped from the sample in this analysis because the DHS surveys in these countries do not ask respondents about their ethnicity.

[40]To deal with a concern that there are more educated mothers among the dictator's ethnic group and that this drives the result, I estimated coefficients on the interaction terms of ethnic groups and educational status, like what I did in columns (3) and (4) of Table 3.7. I cannot reject the null that coefficients for each type of ethnic groups are the same across educational status.

household members over time, I cannot directly control for income at the individual level. An indirect way of controlling for change of mothers' income over time is to control for real GDP per capita available in the Penn World Table 6.2. Column (1) of Table 3.8 reports the estimation result when the logarithm of per capita real GDP and its one-year lag are controlled for. An increase in per capita GDP seems to reduce infant mortality concurrently but not one year after, though both coefficient estimates are not significantly different from zero. The democratization coefficient, on the other hand, remains statistically significant and its size is almost the same as in column (5) of Table 3.5. This result suggests that the estimated effect of democratization in Table 3.5 is not driven by the concurrent move in per capita income at the country level.

Another way of checking the robustness to the income hypothesis is to restrict the sample to those babies born to mothers with no assets at the time of the interview. As these mothers are poor at the time of the survey, the only possible trajectories of their personal income in the past are either that they have always been poor since their first child birth or that they used to be better off but have become poorer over time. Therefore, the bias to the democracy coefficient due to unobserved personal income change over time will be, if anything, upward for this subsample of babies. If we still see a significantly negative coefficient on the democracy dummy, then the income hypothesis is less likely to be an alternative explanation of the result found in Table 3.5, at least for babies born to asset-poor mothers.

The DHS surveys ask the possession of the following consumer durables: radio, television set, refrigerator, bicycle, motorcycle, and car. If a baby's mother owns none of these items, such a baby is retained in the sample. Column (2) of Table 3.8 reports coefficient estimates for this subsample of babies born to asset-poor mothers. Although it slightly loses precision, the estimated coefficient on the democracy dummy does not change substantially. This result encourages the interpretation of the results in Table 3.5 as not picking up the effect of change in personal income after democratization.[41]

[41] In section 3.4.3 below, the possibility that growth in personal income drives the results will be revisited.

Table 3.8: Robustness Checks
(The Dependent Variable: Death before turning the age of one year)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample:	PWT6.2	Born to Poor Mothers	Until 2003	Since 1961	All	All	All but First-born	Without Migration
Democratization	-0.017**	-0.018*	-0.018**	-0.018**	-0.018**	-0.016**	-0.015*	-0.017*
	[0.006]	[0.007]	[0.006]	[0.006]	[0.006]	[0.006]	[0.007]	[0.006]
Log per capita GDP	-0.032							
	[0.017]							
Log per capita GDP (1-year lag)	0.004							
	[0.014]							
War			0.004					
			[0.004]					
Foreign Aid				0.000				
(million US$, 2004 prices)				[0.000]				
Foreign Aid (1-year lag)				0.000				
(million US$, 2004 prices)				[0.000]				
HIV infection rates					0.021			
among pregnant women					[0.069]			
Short birthspacing							0.039**	
(less than 24 months)							[0.004]	
Girl	YES	YES	YES	YES	YES	YES	YES	YES
Multiple birth	YES	YES	YES	YES	YES	YES	YES	YES
Mother FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
TREND	YES	YES	YES	YES	YES	YES	YES	YES
Additional Controls	NO	NO	NO	NO	NO	YES	NO	NO
# of Countries	28	28	28	28	28	28	28	25
# of Mothers	161858	47910	161864	161876	161876	161876	129343	116259
Observations	643532	203027	643791	643843	643846	643846	483880	414767
Adjusted R^2	0.077	0.091	0.077	0.077	0.077	0.079	0.072	0.067

Notes: Standard errors clustered at the country level are reported in brackets. In columns (1), (3), (4), and (7), some observations are dropped due to the unavailability of control variables. Column (2) restricts the sample to babies born to mothers having no consumer durable good at the survey date; Column (8) drops babies born before one year has passed since their mother migrated to the surveyed community and babies whose mother's information on migration is not available. In Column (6), birth order dummies and mothers' age-at-birth category dummies are additionally controlled for. Adjusted R^2 refers to variation explained by all regressors, including any fixed effects.
* significant at 5%; ** significant at 1%.

Another time-variant factor that may confound the effect of democratization on health policy-making is the incidence of a war. Democratization may just bring about peace. Therefore, babies no longer die due to battle-related causes, or the government can now deliver health services for those living in areas previously controlled by rebels. To deal with this concern, column (3) of Table 3.8 controls for a war dummy which is equal to one if there is at least 1,000 battle-related deaths per year in a country, obtained from the Armed Conflict Database Version 3-2005b (Gleditsch et al. 2002). The democracy coefficient remains almost the same as in column (5) of Table 3.5, suggesting that the estimated effect of democracy does not pick up the effect of peace.

Yet another confounding factor may be foreign aid. Donor countries may become willing to provide more financial resources for democratized countries, but not for non-democratized countries. This increased foreign aid may simply expand the budget set for policy-makers who are always willing to provide public health interventions to reduce infant mortality irrespective of political regimes. Column (4) of Table 3.8 deals with this concern by additionally controlling for the amount of disbursed official development assistance (in million US dollars, 2004 prices) each country receives in each year, obtained from the OECD Donor Assistance Committee Database 2005. The democracy coefficient remains almost the same as in column (5) of Table 3.5, suggesting that change in foreign aid does not drive the effect of democratization on infant mortality.[42]

Democratization in sub-Saharan Africa took place in the 1990s, when the HIV epidemic began to spread in the region. Although the spread of HIV/AIDS is unlikely to affect democratization, the coincidence of timing of the two in Africa may bias the democracy coefficient estimate. Bobat et al. (1999) report that about one-third of children born to HIV-infected mothers become infected as well and that about a third of the infected children die within the first year of life. A crude calculation suggests that a 10 percent increase in the HIV infection rate among

[42]Controlling for the amount of foreign aid committed to the health sector, water supply and sanitation, developmental food aid, or emergency food aid (obtained from the OECD Creditor Reporting System Database 2005) does not change the result, either.

pregnant women leads to a 1.1 percent increase in the infant mortality rate. It may be the case that the estimated coefficients on democratization reported in Table 3.5 are biased because mothers who gave birth before democratization subsequently become infected with HIV and give birth to another child after democratization. Column (5) of Table 3.8 controls for United States Census Bureau's estimates of annual HIV-infection rates amongst pregnant women at the country level, used by Young (2005).[43] I fill missing values with zero because the estimates are missing before the outbreak of HIV infection in the late 1970s and the early 1980s.[44] The HIV infection rate among pregnant women at the country level is positively correlated with infant mortality though it is not statistically significant. The point estimate for the democracy coefficient as well as its precision does not change much, indicating that the spread of HIV infection does not significantly bias the estimation results.

Column (6) in Table 3.8 deals with another concern for the consistency of the estimation of the effect of democracy. As the source of identification of the democracy effect comes from democratization, not from the collapse of democracy, ignoring the effects of birth order and the mother's age at birth may result in estimation bias. Children of higher birth orders may be more likely to die because he or she needs to compete with many other children for household resources.[45] Alternatively, children of lower birth orders, especially the first child, may be more likely to die because mothers are not experienced in child-bearing or because labor tends to be prolonged during the first birth-giving, predisposing to birth injury and respiratory distress syndrome of babies. In addition, the demographic literature finds that babies born to very young mothers are associated with higher infant mortality (e.g. Da Vanzo et al. 1983). If babies born later are more likely to survive irrespective of democracy, I will find a spurious association between democracy and infant mortality. To deal with this concern, I extract information on birth order and the age of mothers at

[43]I thank Alwyn Young for sharing the HIV data.

[44]Note that the estimates are missing for the Comoros, Madagascar, and Mauritania because the Census Bureau does not consider these countries as generalized epidemics (i.e. HIV is firmly established in the general population). I assign a series of zeros to these three countries. The result does not essentially change if I drop these three countries from the sample.

[45]Behrman (1988) finds that parents favor older children in the allocation of nutrients in rural India.

birth from the DHS surveys. I create dummies for each birth order from the second to the ninth as well as the tenth or higher with the first birth as the omitted category. For the age of mothers, I create dummies for whether the mother is aged at her child birth in their 20s, in their 30s, or in their 40s with giving birth under the age of 20 as the reference category. Column (6) in Table 3.8 reports the result after controlling for these dummies. The democracy coefficient becomes slightly smaller in absolute terms, suggesting that some of the estimated democracy effect captures the effect of birth order and mothers' age. But the size of the coefficient remains sizable and statistically significant.

Another potentially confounding factor is fertility. After democratization, the government may have launched population control campaign, leading to longer birth spacing. The demographic literature finds that a child who has a sibling born within the preceding two years is associated with higher infant mortality (e.g. Hobcraft et al. 1985). Column (7) of Table 3.8 controls for a dummy equal to one if the preceding birth interval obtained from the DHS surveys is less than 24 months. Consistent with the literature, short birth spacing is associated with higher infant mortality. The democracy coefficient, however, remains statistically significant though its size becomes slightly smaller. This result indicates that the effect of democratization on infant mortality is not totally driven by change in population control policy.

Finally, the estimated effect of democratization in Table 3.5 may simply pick up the effect of migration of mothers to places where better health care provision is available around the time of democratization. If this is the case, then infant mortality can fall without any change in public health intervention after democratization. To deal with this concern, column (8) of Table 3.8 restricts the sample to babies conceived in the surveyed community, by dropping those babies who were born before one year had passed since their mother migrated to the surveyed community and those babies whose mother does not provide information on her migration.[46] Babies born during the first year since their mother's migration are dropped because their survival may be affected by poor antenatal care provision during their

[46]As the DHS surveys for Chad, Cote d'Ivoire, and Guinea do not ask any respondent how many years she has lived in the surveyed community, these three countries are dropped from the sample.

mother's pregnancy at the previous place of residence. For this subsample of babies, the democratization coefficient is almost the same as the one in column (5) of Table 3.5, suggesting that the estimated effect of democratization does not pick up the effect of migration to places with better health care.

3.3.4 What Type of Democracy Matters?

As discussed in section 3.2, I measure democratization in a specific way. Then I find that it has reduced infant mortality. However, the measurement of democracy in this chapter may be a noisy measure of the exact features of democracy that really drive infant mortality down.

In section 3.2, I mentioned that it is an empirical question whether the replacement of the chief executive is necessary for the introduction of contested elections with universal suffrage to reduce infant mortality. Column (1) of Table 3.1 lists the year of the introduction of multiparty elections with universal suffrage for executive office, based on the information I collect. Non-democratized countries except Namibia, Rwanda, Senegal, and Zimbabwe also introduced multiparty elections in the 1990s. To see if the introduction of multiparty elections for executive office alone is sufficient to reduce infant mortality, I create a dummy variable which is equal to one for 13 non-democratized countries after the year of the first multiparty election in the 1990s listed in column (1) of Table 3.1. Then I estimate equation (3.1) with this dummy variable included as an additional regressor. Column (1) of Table 3.9 reports that the multiparty election dummy coefficient is not statistically different from zero while the democracy coefficient remains significant. The equality of coefficients on these two dummies is rejected at 5 percent level. This result implies that the introduction of multiparty elections per se does not affect infant mortality. The chief executive needs to be replaced for multiparty elections to bite.

On the other hand, the estimated effect of democratization may pick up the effect of leadership change per se, irrespective of whether the change is due to the introduction of multiparty elections or not. To deal with this concern, I identify seven episodes of non-democratic leadership change in the late 1980s and the early

Table 3.9: Robustness to Other Dimensions of Democracy
(The Dependent Variable: Death before turning the age of one year)

	(1)	(2)	(3)	(4)	(5)
Democratization	-0.018**	-0.018**	-0.021**	-0.019**	-0.015*
	[0.006]	[0.006]	[0.006]	[0.006]	[0.007]
Multiparty Elections	-0.002				
	[0.004]				
Leadership Change		-0.002			
		[0.006]			
Executive Constraints			0.002		
			[0.001]		
Civil Liberty Restriction				-0.001	
				[0.001]	
Free Press					-0.005
					[0.009]
Partly Free Press					0.000
					[0.003]
F-test	5.76	3.85			
p-value	0.024	0.060			
Girl	YES	YES	YES	YES	YES
Multiple birth	YES	YES	YES	YES	YES
Mother FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
TREND	YES	YES	YES	YES	YES
# of Countries	28	28	28	28	28
# of Mothers	161876	161876	160184	161629	157709
Observations	643846	643846	611866	634011	552397
Adjusted R^2	0.077	0.077	0.076	0.077	0.076

Notes: Standard errors clustered at the country level are reported in brackets. Adjusted R^2 refers to variation explained by all regressors, including any fixed effects. The nulls for F-test are: for column (1) coefficients on democratization and on multiparty elections are the same; for column (2) coefficients on democratization and on leadership change are the same.

* significant at 5%; ** significant at 1%.

1990s among the 17 non-democratized countries (see Appendix B for the list of such episodes). These changes are either due to a military coup or to the death or voluntary resignation of a dictator. Then the new chief executives stay in office until the end of the sample period. I create a dummy variable which is equal to one for years after these seven non-democratic changes in the chief executives. Column (2) additionally controls for this dummy to equation (3.1). It shows that non-democratic leadership change does not significantly affect infant mortality while the estimate of the democratization effect remains the same. The equality of coefficients on these two dummies is rejected at 10 percent level.[47] This result indicates that the estimated effect of democratization does not solely reflect the effect of leadership change. The introduction of multiparty elections and the replacement of the chief executive are complementary in reducing infant mortality.

Columns (3) to (5) of Table 3.9 check if the estimated effect of introducing multiparty elections with the replacement of the chief executive captures the effect of other features of democracy. Column (3) controls for the degree of executive constraints taken from the POLITY IV dataset. This variable takes values from 1 to 7 with 7 as the highest degree of constraint. The coefficient on this variable is not statistically different from zero while the democracy coefficient remains significantly negative.[48] This result suggests that unlike its effect on property rights enforcement (North and Weingast 1989; Acemoglu, Johnson, and Robinson 2001), constraints on the chief executive do not matter for infant mortality.

Columns (4) and (5) explore the possibility that the measurement of democracy in this chapter may capture the degree of human rights protection. Column (4) additionally controls for the degree of civil liberty restriction (scaled from 1 to 7) taken from Freedom House's *Freedom in the World*, an annual survey of political

[47]The large standard error for the non-democratic leadership change dummy is due to Rwanda: infant mortality went up sharply before leadership change in 1994 (see Figure 3.5). If I drop Rwanda from the sample, the equality of coefficients on the democracy and leadership change dummies is rejected at 1 percent level.

[48]As the POLITY IV dataset does not measure the degree of executive constraints for year 2004 and for country-years in which a country is occupied by foreign powers, the central political authority collapses, or a country is undergoing the transition of a political regime, about 32,000 observations are dropped from the sample. Change in the size of the democracy coefficient is mainly due to this change in the sample.

rights and civil liberties since 1972. Column (5) controls for two dummies which are equal to one if press freedom is rated as "Free" and as "Partly Free", respectively, as oppose to "Not Free" by Freedom House's *Freedom of the Press*, an annual survey of press freedom since 1980. Both columns show that what matters for infant mortality is not human rights protection or press freedom but the way in which the chief executive of the government is chosen.[49]

Finally, Table 3.10 provides estimation results when I measure the year of democratization based on widely used democracy indicators: the POLITY2 score from the POLITY IV dataset and Freedom House's Political Rights Index. These two indicators assign a score (-10 to 10 for the POLITY2 score and 7 to 1 for the Political Rights Index) for each country-year by aggregating different dimensions of democracy.[50] An implicit assumption underlying the construction of these democracy indicators is that each element of democracy is a substitute for each other. This assumption may not hold true depending on which outcome we expect democracy to have an impact on. Section 3.2 above, for example, discusses the complementarity of contested elections and universal suffrage in relation to public health policy-making.

Columns (2) to (7) of Table 3.1 show the list of years of democratization in the 1990s by using either of these two democracy indicators with different cut-off points.[51] I create a democratization dummy equal to one for years after the year of democratization listed in Table 3.1 for each cut-off value of each indicator. As both indicators suggest that some countries became non-democratic after they were democratized in the 1990s, I also create a dummy variable which is equal to one for years after the collapse of democracy in the 1990s, in order to check if the effect of democratization on infant mortality persists even after democracy collapses.

Columns (1) to (6) of Table 3.10 show the estimated coefficients on these democratization dummies for infant mortality. Two main results emerge. First, the

[49]The smaller size (in absolute terms) of the democracy coefficient in column (5) is due to change in the sample. The press freedom variables are not available before 1980.

[50]Note that Freedom House's Political Rights Index becomes smaller if a country becomes more democratic. The opposite is true for the POLITY2 score.

[51]When choosing the cut-off points for the POLITY2 score, I follow the literature: score 0 is used by works summarized in Persson and Tabellini (2006); score 4 by Glaeser, Ponzetto, and Shleifer (2005). Political scientists often regard a country as democratic if its POLITY2 score is seven or higher (e.g. Epstein et al., 2003).

Table 3.10: Different Measures of Democracy
(The Dependent Variable: Death before turning the age of one year)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Measure of Democracy:	PR<3	PR<4	PR<5	POLITY2>6	POLITY2>4	POLITY2>0	EXREC≥7 & PARCOMP≥3
Democratization	-0.008	-0.011	-0.011*	-0.012	-0.011	-0.014**	-0.015**
in the 1990s	[0.008]	[0.007]	[0.005]	[0.009]	[0.006]	[0.005]	[0.005]
Collapse of Democracy	-0.021**	-0.021	-0.014	-0.025	-0.018	-0.046	-0.022
in the 1990s	[0.007]	[0.013]	[0.011]	[0.014]	[0.015]	[0.026]	[0.014]
F-test	6.65	1.21	0.15	1.84	0.36	1.46	0.36
p-value	0.016	0.280	0.701	0.187	0.551	0.238	0.554
Girl	YES	YES	YES	YES	YES	YES	YES
Multiple birth	YES	YES	YES	YES	YES	YES	YES
Mother FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
TREND	YES	YES	YES	YES	YES	YES	YES
# of Countries	28	28	28	28	28	28	28
# of Mothers	161521	161521	161521	161864	161864	161864	161864
Observations	629573	629573	629573	643791	643791	643791	643791
Adjusted R^2	0.077	0.077	0.077	0.077	0.077	0.077	0.077

Notes: Standard errors clustered at the country level are reported in brackets. In columns (1), (2), and (3), a country-year is regarded as democratic if Freedom House's Political Rights Index is less than 3, 4, or 5, respectively; in columns (4), (5), and (6), a country-year is democratic if POLITY IV's POLITY2 score is more than 6, 4, or 0, respectively. In column (7), a country-year is democratic if POLITY IV's variable EXREC is 7 or higher and if another POLITY IV variable PARCOMP is 3 or higher. Adjusted R^2 refers to variation explained by all regressors, including any fixed effects. The null for F-tests is that coefficients on democratization and the collapse of democracy are the same.

* significant at 5%; ** significant at 1%.

democracy coefficient becomes statistically significant only when the cut-off point for a country to be democratic is the most generous (5 for the Political Rights Index and 0 for the POLITY2 score). This result suggests that the minimal level of democracy is sufficient to reduce infant mortality, although what constitutes such a minimal level of democracy is unclear due to the nature of these democracy indicators. Second, the coefficient on the collapse of democracy is negative and not statistically different from the democracy coefficient (except for column 1). This second result may be interpreted in two ways. Health infrastructure and clinics brought in place by democratization do not disappear even after the collapse of democracy, at least not so quickly. Another interpretation is that the way African countries were democratized is different from the way some of them experienced the collapse of democracy. If some elements of democracy have an impact on infant mortality but others do not, it is natural to see this asymmetric effect between democratization and the collapse of democracy.

Unlike Freedom House, which makes public disaggregated scores of democracy only from 2006, the POLITY IV dataset does provide disaggregated indicators of democracy for all years available in the dataset, allowing researchers to aggregate them in a way that is consistent with theory in their mind. I use variables EXREC and PARCOMP to construct a democracy dummy that is as close as possible to the definition of democracy adopted in this chapter. Specifically, a country-year is treated as democratic if EXREC is 7 or 8 *and* if PARCOMP is 3 or higher. The first condition roughly corresponds to the requirement of multiparty elections for executive office while the second is largely consistent with universal suffrage and the existence of legal opposition parties.[52] Column (8) of Table 3.1 lists the years of democratization in the 1990s based on the above criteria. It is very similar to the years of democratization based on the POLITY2 score being positive though it completely ignores the degree of executive constraints, one component of the POLITY2 score. I again create a democratization dummy which is equal to one for years after these years of democratization as well as the dummy for the collapse

[52]See Appendix B for more details.

of democracy. Column (7) of Table 3.10 reports the estimation result when I use these dummies as regressors. The estimated coefficient on the democracy dummy is significantly negative, indicating that democratization reduces infant mortality by 1.5 percentage points. The point estimates for the democracy coefficient in columns (1) to (6) are smaller than this or the one in column (5) of Table 3.5, suggestive of attenuation bias due to measurement error.

3.4 Pathways

Estimation results in the previous section show that democratization has reduced infant mortality in sub-Saharan Africa. In this section, I provide some evidence on the mechanisms in which democratization has affected the survival of babies. Tables 3.11 and 3.12 provides summary statistics for dependent variables used in this section.

3.4.1 Maternal Health Care

One key mechanism is likely to be improvements in maternal health care provision. Recall that a sizable portion of the reduction in infant mortality after democratization comes from a fall in the probability of death within the first month of life (Columns (5) and (6) in Table 3.5). The public health literature finds that, among others, the following two health interventions affect the survival of babies in their first month of life: tetanus toxoid injections to pregnant mothers and child delivery assistance by skilled health professionals. The injection of tetanus toxoid transfers immunity against neonatal tetanus from a mother to her baby in her womb, which has proved to be effective (see Demicheli, Barale, and Rivetti (2005) for a comprehensive review on evidence from randomized trials).[53] Having a skilled birth attendant

[53]In addition to the direct effect of tetanus toxoid injections, Dow, Philipson, and Sala-i-Martin (1999) empirically show that, in four sub-Sahara African countries during 1986 to 1994, the birth weight of babies born to mothers who received tetanus toxoid is larger than those born to mothers who did not. The birth weight is known as a significant predictor of early childhood survival (e.g. Da Vanzo et al. 1983; Black, Devereux, and Salvanes 2007). Dow et al. (1999) argue that this is because mothers who received tetanus toxoid injections expect better access to vaccination for her child, thus increasing complementary investments in child health during pregnancy.

Table 3.11: Summary Statistics for Health Inputs

Countries:	(1) All	(2) Democratized Before	(3) Democratized After	(4) Non-democratized
Tetanus Toxoid				
(All)	0.700	0.572	0.615	0.764
	195564	34196	40053	121315
(Educated)	0.812	0.774	0.754	0.836
	98158	15639	17327	65192
(Uneducated)	0.587	0.401	0.510	0.680
	97384	18554	22724	56106
Delivery Assistance				
(All)	0.445	0.412	0.436	0.456
	231645	32153	54428	145064
(Educated)	0.578	0.621	0.552	0.577
	117787	14682	23217	79888
(Uneducated)	0.307	0.235	0.349	0.307
	113836	17468	31209	65159
Ever Breastfed				
(All)	0.975	0.976	0.977	0.975
	228567	31551	53507	143509
(Educated)	0.974	0.976	0.979	0.973
	116584	14455	23020	79109
(Uneducated)	0.977	0.977	0.975	0.977
	111961	17093	30485	64383
Access to Toilets				
(All)	0.049	0.052	0.053	0.047
	57111	6539	16054	34518
(Educated)	0.082	0.109	0.095	0.074
	29574	2760	7091	19723
(Uneducated)	0.014	0.011	0.020	0.012
	27532	3779	8962	14791

Notes: In each cell, the sample mean is reported at the top row; the number of observations at the bottom row. Column (2) reports means for children born in democratized countries until the year of democratization; Column (3) for children born in democratized countries after the year of democratization; Column (4) for children born in non-democratized countries.

Table 3.12: Summary Statistics for Consumer Durables and Access to Electricity

Countries:	(1) All	(2) Democratized	(3)	(4) Non-democratized
		Before	After	
Radio				
(All)	0.552	0.520	0.573	0.548
	57121	6527	16048	34546
(Educated)	0.592	0.605	0.570	0.598
	29578	2755	7090	19733
(Uneducated)	0.509	0.458	0.575	0.482
	27538	3772	8957	14809
Television				
(All)	0.096	0.132	0.099	0.088
	57121	6527	16048	34546
(Educated)	0.142	0.220	0.151	0.127
	29578	2755	7090	19733
(Uneducated)	0.047	0.067	0.057	0.036
	27538	3772	8957	14809
Fridge				
(All)	0.052	0.079	0.045	0.051
	54084	5702	13851	34531
(Educated)	0.088	0.150	0.091	0.080
	27599	2306	5571	19722
(Uneducated)	0.015	0.031	0.014	0.012
	26480	3396	8279	14805
Bicycle				
(All)	0.355	0.228	0.388	0.364
	57097	6518	16054	34525
(Educated)	0.297	0.195	0.331	0.299
	29565	2747	7093	19725
(Uneducated)	0.417	0.252	0.432	0.450
	27527	3771	8960	14796
Motorcycle				
(All)	0.086	0.119	0.117	0.065
	55970	6520	16044	33406
(Educated)	0.065	0.126	0.082	0.049
	28637	2747	7086	18804
(Uneducated)	0.109	0.114	0.145	0.086
	27328	3773	8957	14598
Car				
(All)	0.035	0.052	0.030	0.034
	55037	6518	16032	32487
(Educated)	0.052	0.080	0.045	0.051
	28061	2745	7084	18232
(Uneducated)	0.016	0.032	0.018	0.012
	26971	3773	8947	14251
Electricity				
(All)	0.137	0.208	0.116	0.134
	56081	6531	16031	33519
(Educated)	0.206	0.339	0.186	0.195
	29018	2759	7086	19173
(Uneducated)	0.063	0.112	0.062	0.052
	27058	3772	8944	14342

Notes: See notes for Table 3.11.

present during labor and delivery ensures clean child delivery and, if necessary, resuscitation of newborns. Clean delivery — keeping clean the birth attendant's hands and instruments to cut the umbilical cord — avoids death from neonatal tetanus, and resuscitation prevents death from birth asphyxia (see Bhutta et al. 2005, Table 20, for a review on available evidence).

The literature also finds that more educated mothers are associated with a higher probability of receiving these maternal health care services, suggesting that the valuation of such services is higher for educated mothers than for uneducated ones.[54] If democratically elected governments lower the cost of health care services, either by charging lower fees, by creating more health clinics to reduce the transportation cost, or by educating mothers about the benefits of such services, an impact will be larger for uneducated mothers, consistent with earlier findings that a fall in neonatal mortality is larger for babies born to uneducated mothers (Column (2) of Table 3.7).

To see if maternal health care provision is one key mechanism in which democratization has reduced infant mortality in sub-Saharan Africa, I construct a repeated cross-section sample of live birth episodes for 19 sub-Sahara African countries where the DHS survey was conducted more than once since the late 1980s (see Table 3.3 for the list of surveys used).[55] The DHS survey asks a nationally representative sample of women aged 15 to 49 about their live birth episodes during the last few (usually five) years. Each respondent provides information on whether she received tetanus toxoid injections during pregnancy and on who assisted her child delivery. By treating each live birth episode as a single observation, I create the samples of 235,516 and 285,739 live birth episodes for tetanus vaccination and delivery assistance, respectively.[56] From this I drop live birth episodes for women who are visitors

[54]See, for example, Akin, Griffin, Guilkey, and Popkin (1986) for a cross-sectional evidence from the Philippines.

[55]Chad and Cote d'Ivoire are dropped from the sample though two rounds of the DHS surveys are available, because one of the two surveys for each country lacks information on the migration of mothers, making it impossible to match babies and mothers from different rounds of survey by region of residence without an error. For the same reason, I do not use Zimbabwe 1994 survey. If I include these surveys in the sample by ignoring the lack of information on migration, the result does not change substantially.

[56]I drop Namibia from the sample for tetanus vaccination because its 2000 survey does not ask whether the respondent received tetanus toxoid injections, leaving only one round of survey for the country. An additional difference in the number of observations between the two samples results

to the surveyed community or do not provide information on their migration as well as episodes of live birth before women of concern migrated to the surveyed community. Dropping these observations ensures that estimated change in maternal care provision is not due to mothers' migration to areas with better health care services.[57] The resulting sample consists of 198,567 and 232,809 observations (including those for which outcome variables are missing) for tetanus vaccination and delivery assistance, respectively, with years of live births spanning between 1982 and 2005 inclusive.

In the estimation of changes in the take-up of maternal health care services before and after democratization, I control for fixed effects of mother categories defined by where mothers live (which administrative regions and whether urban or rural areas), their level of education (whether they attended at least primary school or did not go to school at all), and their birth cohort (the year of birth), in order to make this analysis as comparable as possible to the previous infant mortality analysis.[58] Specifically, I estimate the following equations:

$$y_{jrct} = \alpha_r + \beta_t + \gamma D_{c,t-1} + \varepsilon_{jrct}, \tag{3.3}$$

for tetanus vaccination, and

$$y_{jrct} = \alpha_r + \beta_t + \gamma D_{ct} + \mathbf{X}_{jrct}\theta + \varepsilon_{jrct}, \tag{3.4}$$

for delivery assistance, where j refers to a live birth episode, r refers to a mother category by area-education-cohort (as described above), t refers to the year of live birth. α_r is a mother-category fixed effect and β_t is a birth-year fixed effect. $\mathbf{X}_{jrct}$ is a dummy variable for multiple birth. Standard errors are clustered at the country level. The democracy dummy, defined in the same way as in the infant mortality

from the fact that recent DHS surveys collect information on tetanus toxoid injections only for the *last* live birth while information on delivery assistance is collected for *all* live births during the past few years.

[57] In addition, observations for Namibia before independence (1990) are dropped for the delivery assistance sample.

[58] For example, I control for a fixed effect for educated mothers, born in 1970, living in urban areas of the Ashanti region of Ghana.

analysis above, is lagged one year for tetanus vaccination because mothers receive tetanus toxoid injections during the pregnancy. I control for the multiple birth dummy for delivery assistance regression because pregnant women may know they will give birth to twins before delivery and therefore change their valuation for delivery assistance.[59] Note that this analysis does not aim to estimate the causal effect of democratization on the take-up of maternal health care. The objective is to find a correlation that is consistent with the findings in the infant mortality analysis.

Table 3.13 shows the estimation results. In columns (1) and (2), I re-estimate equation (3.1) for neonatal mortality by restricting the sample to the 19 countries where maternal health care information is available. The finding that democratization has reduced neonatal mortality, especially for babies born to uneducated mothers, holds for this subsample of countries. In column (3), I estimate equation (3.3). In column (4), I interact $D_{c,t-1}$ in equation (3.3) with dummies for educated and uneducated mothers. Although the take-up for receiving tetanus vaccination did not significantly go up on average after democratization, uneducated mothers became more likely to be vaccinated after democratization by 10 percentage points (significant at 10 percent level), 17 percent of the sample mean for uneducated mothers. Columns (5) and (6) report estimation results for delivery assistance. Similarly, although the probability of having a skilled birth attendant present during delivery did not increase significantly after democratization on average, uneducated mothers became more likely to be attended by health professionals after democratization by 7.6 percentage points (significant at 5 percent level), 25 percent of the sample mean for uneducated mothers. These results suggest that one key mechanism in which democratization has reduced neonatal mortality, especially for babies born to uneducated mothers, is improvements in maternal health care provision.

3.4.2 Breastfeeding and Sanitation

Another key mechanism in which democratization has reduced infant mortality in sub-Saharan Africa may be the promotion of breastfeeding. The public health litera-

[59] I thank Miyuki Horiuchi for pointing this out.

Table 3.13: Maternal Health Care

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Neonatal Death	Neonatal Death	Tetanus Toxoid	Tetanus Toxoid	Delivery Assistance	Delivery Assistance
Democratization	-0.010**		0.041		0.049	
	[0.003]		[0.049]		[0.032]	
Democratization		-0.007+		-0.024		0.021
interacted with Educated		[0.004]		[0.036]		[0.026]
Democratization		-0.012**		0.100+		0.076*
interacted with Uneducated		[0.003]		[0.048]		[0.034]
Multiple birth	0.164**	0.164**			0.071**	0.071**
	[0.009]	[0.009]			[0.007]	[0.007]
F-test		8.65		17.31		6.20
p-value		0.009		0.001		0.023
Girl	YES	YES	NO	NO	NO	NO
Mother FE	YES	YES	N/A	N/A	N/A	N/A
Mother category FE	N/A	N/A	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
TREND	YES	YES	NO	NO	NO	NO
# of Countries	19	19	18	18	19	19
# of Mothers	118010	118007	N/A	N/A	N/A	N/A
# of Mother categories	N/A	N/A	23255	23240	23786	23771
Observations	475995	475986	195564	195542	231645	231623
Adjusted R^2	0.081	0.081	0.237	0.238	0.396	0.396

Notes: Robust standard errors clustered at the country level are reported in brackets. Neonatal death is death before turning the age of 1 month. Adjusted R^2 refers to variation explained by all the regressors, including any fixed effects. The null for F-tests is that coefficients on the two interaction terms between democratization and mothers' education level are the same.
+ significant at 10%;* significant at 5%; ** significant at 1%.

ture identifies breastfeeding as being associated with lower infant mortality through the prevention of death from diarrhea and acute respiratory infection (WHO Collaborative Study Team 2000; Arifeen et al. 2001).[60] The effect of promoting breastfeeding on infant mortality is likely to be immediate, compared to other public health interventions. This immediate impact is consistent with the finding that infant mortality starts dropping immediately after the year of democratization (Figure 3.6).

The provision of sanitation facilities may also be a mechanism in which democratization has reduced infant mortality. The public health literature finds that access to sanitation facilities is associated with a lower child mortality due to diarrhea.[61] Death from diarrhea is estimated to account for 20 percent of under-5 child mortality in sub-Saharan Africa in 1990 (Murray and Lopez 1996, Appendix Table 6f).

To investigate whether breastfeeding is more likely to be practiced after democratization, I use the same repeated cross-sectional sample of live births episodes as the one used for delivery assistance. The DHS surveys ask the respondent if she ever breastfed each of her children born during the last few years. From this information, I construct a dummy variable equal to one if the mother ever breast-feeds her baby. To assess whether sanitary conditions for infants are improved after democratization, I create a repeated cross-sectional sample of babies born within the past one year before the DHS survey was conducted, including those who died before the survey, and match each baby with information on their household's access to toilets.[62] The original sample includes 66,244 babies in total. From this, I drop the following observations: babies whose mother is a visitor to the surveyed community; babies born within the first 12 months after their mother moved to the surveyed community; and babies whose mother does not provide information on how many

[60] According to Murray and Lopez (1996, Appendix Table 6f), diarrhea and lower respiratory infections accounted for 38 percent of 4.03 million deaths of children under 5 years old in sub-Saharan Africa in 1990.

[61] See Esrey et al. (1991) for a survey of available evidence.

[62] By "toilets" I mean the term "flush toilets" in the DHS surveys. According to a commentary on the DHS model questionnaire (Institute for Resource Development and Macro International 1990, p. 6), the term flush toilet is defined as "a facility where the toilet is separated from the refuse disposal system by a water seal." This definition of flush toilet "does not distinguish between whether the water seal is maintained by water dumped from a bucket or a plumbing system or whether the disposal system is a pit, septic tank or public sewer system." To avoid the misinterpretation of the term flush toilet, I use the word "toilets" in this chapter instead.

years she has lived in the surveyed community. Dropping these observations ensures that estimation results reflect change in public health service delivery in the same place over time. The final sample consists of 57,634 observations (including those for which information on access to toilets is missing) with survey years spanning between 1987 and 2004 inclusive.

For breastfeeding, equation (3.4) is estimated with $\mathbf{X}_{jrct}$ including not only the multiple birth dummy but also the girl dummy, because mothers may change their breastfeeding practice depending on the sex of their babies. For access to toilets, I estimate the following equation:

$$y_{ircs} = \alpha_r + \beta_s + \gamma D_{cs} + \varepsilon_{ircs}, \tag{3.5}$$

where i refers to babies born within one year before the survey date, r refers to mother categories by area-education-cohort (as described above), and s refers to five-year spells (1985-89, 1990-94, 1995-99, 2000-04) in which the DHS survey was conducted. α_r is a mother-category fixed effect and β_s is a five-year period fixed effect (the DHS survey is usually conducted every fifth year with the exact year of survey different from country to country). The democracy dummy, D_{cs}, is set to be one if country c is democratized *before* the DHS survey was conducted during spell s.[63] As each country has conducted at most four surveys, the standard errors are clustered at the country-year level because its underestimation due to serial correlations in the error term is likely to be negligible. Again note that these regressions do not intend to establish the causal effect of democratization on outcome variables. The aim is to see if there is a correlation between democratization and improvements in health inputs that is consistent with the finding that democratization has an negative impact on infant mortality.

Table 3.14 shows estimation results. Columns (1) and (2) re-estimate equation (3.1) for infant mortality for the subsample of the 19 countries with more than one

[63]Consequently, for example, D_{cs} is zero for Niger during 1990-94 even though its year of democratization (1993) falls into the same five-year spell, because the DHS survey was conducted in 1992.

DHS surveys conducted. They show that the main results hold for this subsample. Column (3) estimates equation (3.4) with the breastfeeding dummy as the dependent variable. The probability that a mother ever breast-feeds her child goes up by 1.1 percentage points after democratization (significant at 5 percent level). The magnitude of this change is not very large, however, because the sample mean probability of breastfeeding is 97.5 percent. Therefore, the promotion of breastfeeding alone does not seem to explain the whole immediate effect of democratization on infant mortality found in Figure 3.6. It may be that other health practices beneficial for the survival of babies are also promoted along with breastfeeding. Column (5) reports the result for access to toilets. After democratization, the probability that an infant's household has access to toilets goes up by 1.6 percentage points (significant at 5 percent). The size of this increase is large relative to the sample mean access rate of 4.9 percent. Columns (4) and (6) show that the size of changes in breastfeeding practice and access to toilets is not significantly larger for uneducated mothers than for educated mothers. For access to toilets, however, this result can be still consistent with the larger reduction in infant mortality for babies born to uneducated mothers because there is some evidence that maternal education and sanitary facilities are substitutes: Using data collected in Malaysia in the 1970s, Esrey and Habicht (1988) report that the effect of having toilets on a reduction in infant mortality is larger for illiterate mothers.[64]

3.4.3 Affluence

Finally, I provide evidence that the effect of democratization on infant mortality is unlikely to be due to an increase in affluence of mothers. Using the repeated cross-sectional sample of infants used for estimating changes in access to toilets, I check

[64]Barrera (1990) finds an opposite result for child's height for age: the effects of maternal education and toilet facilities are complementary. Looking at the result (Table 4, column 5) carefully, however, the type of toilet facilities and its interaction with maternal education does not enter significantly for height for age of children aged under 2 years — the most relevant health outcome to my analysis. The reason for this is probably because the absence of excreta and its interaction with maternal education are included as regressors. Coefficients on these two variables show that sanitation and maternal education are substitutes, a result in line with Esrey and Habicht (1988).

Table 3.14: Breastfeeding and Sanitation

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	Infant Death	Infant Death	Ever Breastfed	Ever Breastfed	Access to Toilets	Access to Toilets
Democratization	-0.020*		0.011*		0.016*	
	[0.007]		[0.004]		[0.007]	
Democratization		-0.012		0.009		0.022
interacted with Educated		[0.008]		[0.006]		[0.015]
Democratization		-0.025*		0.012*		0.013*
interacted with Uneducated		[0.009]		[0.005]		[0.005]
Girl	-0.014**	-0.014**	0.005**	0.004**		
	[0.002]	[0.002]	[0.001]	[0.001]		
Multiple birth	0.229**	0.229**	-0.067**	-0.067**		
	[0.013]	[0.013]	[0.006]	[0.006]		
F-test		5.90		0.08		0.42
p-value		0.026		0.776		0.519
Mother FE	YES	YES	N/A	N/A	N/A	N/A
Mother category FE	N/A	N/A	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	NO
5-year period FE	NO	NO	NO	NO	YES	YES
TREND	YES	YES	NO	NO	NO	NO
# of Clusters	19	19	19	19	50	50
# of Mothers	118010	118007	N/A	N/A	N/A	N/A
# of Mother categories	N/A	N/A	23730	23715	16212	16207
Observations	475995	475986	228567	228545	57111	57106
Adjusted R^2	0.077	0.077	0.035	0.035	0.402	0.402

Notes: Robust standard errors clustered at the country level (columns (1) to (4)) or at the country-year level (columns (5) and (6)) are reported in brackets. Infant death is death before turning the age of 1 year. The number of clusters refers to the number of countries in columns (1) to (4) and to the number of country-year cells in columns (5) and (6). Adjusted R^2 refers to variation explained by all the regressors, including any fixed effects. The null for F-tests is that coefficients on the two interaction terms between democratization and mothers' education level are the same.

+ significant at 10%; * significant at 5%; ** significant at 1%.

if an infant's household is more likely to own either of the six consumer durables (radio, television, refrigerator, bicycle, motorcycle, and car) or to have access to electricity after democratization.

Table 3.15 reports results from estimating equation (3.5) with dummies for owning each of the consumer durables or having access to electricity as the dependent variables. Columns (1) to (6) show that there is no evidence that an infant's household is more likely to own any of the six consumer durables after democratization than before. If anything, an infant who was born to an uneducated mother is *less* likely to live in a household with a television set and a refrigerator after democratization (columns (2) and (3) of panel B). If the ownership of a television set and a refrigerator signifies affluence, uneducated mothers have got poorer since democratization. If infant mortality is primarily determined by affluence, this finding cannot explain the earlier result that babies born to uneducated mothers are more likely to survive after democratization. This result also suggests that the estimated increases in access to toilets and in the take-up of maternal health care services by uneducated mothers after democratization are unlikely to be a result from an increase in affluence. Column (7) reports that there is no change in access to electricity before and after democratization, suggesting that democratically elected governments prioritized public health interventions over the electrification of households.

3.5 Conclusions

By comparing babies born to the same mother before and after democratization, I find that democratization has reduced infant mortality in sub-Saharan Africa. Various pieces of evidence, taken together, may suggest the following story. After a new chief executive assumes office by winning contested elections under universal suffrage, the government immediately starts promoting practices beneficial for the survival of babies, including breastfeeding. Infant mortality starts dropping. The government also makes maternal health care more accessible. Uneducated women start using it, resulting in a reduction in neonatal mortality, especially for babies

Table 3.15: Impact of Democratization on Asset Ownership and Access to Electricity

Dependent variable:	(1) Radio	(2) Television	(3) Refrigerator	(4) Bicycle	(5) Motorcycle	(6) Car	(7) Electricity
Panel A							
Democratization	-0.027	-0.019	0.002	-0.010	-0.006	0.001	0.004
	[0.022]	[0.014]	[0.009]	[0.030]	[0.008]	[0.005]	[0.018]
Mother category FE	YES	YES	YES	YES	YES	YES	YES
5-year period FE	YES	YES	YES	YES	YES	YES	YES
# of Clusters	50	50	48	50	49	48	48
# of Mother categories	16214	16214	14933	16206	16185	15866	15903
Observations	57121	57121	54084	57097	55970	55037	56081
Adjusted R^2	0.148	0.352	0.313	0.292	0.193	0.156	0.520
Panel B							
Democratization interacted with							
Educated	-0.031	0.005	0.030	-0.004	0.001	0.008	0.006
	[0.025]	[0.024]	[0.029]	[0.033]	[0.011]	[0.010]	[0.023]
Uneducated	-0.025	-0.033**	-0.013*	-0.0130	-0.010	-0.004	0.003
	[0.023]	[0.012]	[0.006]	[0.034]	[0.010]	[0.004]	[0.019]
F-test	0.08	3.31	2.08	0.09	0.50	1.96	0.02
p-value	0.773	0.075	0.156	0.771	0.482	0.168	0.887
Mother category FE	YES	YES	YES	YES	YES	YES	YES
5-year period FE	YES	YES	YES	YES	YES	YES	YES
# of Clusters	50	50	48	50	49	48	48
# of Mother categories	16209	16209	14928	16201	16180	15861	15898
Observations	57116	57116	54079	57092	55965	55032	56076
Adjusted R^2	0.148	0.353	0.313	0.292	0.193	0.157	0.520

Notes: Reported in brackets are standard errors clustered at the country-year level. Panels A and B correspond to different regressions for each column. Mothers are categorized by administrative regions of residence, urban/rural areas of residence, education level, and age cohort to control for mother-category fixed effects. 5-year period fixed effects are those for 1985-89, 1990-94, 1995-99, and 2000-04. The number of clusters refers to the number of country-year cells. Adjusted R^2 refers to variation explained by all regressors, including any fixed effects. The null for F-test in Panel B is that coefficients on the two interaction terms between democratization and mothers' education level are the same.

+ significant at 10%; * significant at 5%; ** significant at 1%.

born to uneducated mothers. Finally, the government starts investing in the provision of better sanitation facilities. Its effect materializes a couple of years after democratization, pushing infant mortality further down.

In this paper I focus on the post-Cold War democratization in sub-Saharan Africa. Future research needs to look at whether democratization during the Cold War period had a difference consequence.

These empirical findings convey a powerful message: democratization may be an important means to improve the quality of government and to promote development in some of the poorest countries in the world. To corroborate this implication, future empirical research needs to examine other outcomes and other developing regions. These studies will benefit from exploiting cross-country individual-level panel data on outcomes as this chapter does. Otherwise we cannot disentangle the effect of democracy from country-level confounding factors.

More generally, the use of micro panel data can also be applied to estimate the effects on development of other national political institutions and country-wide political events, including decolonization and leadership change under dictatorship. Such studies promise to be a fruitful direction of empirical research in the political economy of development.

Chapter 4

Making Autocracy Work

co-authored with Timothy Besley

4.1 Introduction

One of the goals of political economy is to understand how institutional arrangements shape policy outcomes and human well-being. A large literature has now emerged which studies aspects of this. For the most part this has concentrated on studying democratic institutions where elections are the main institution that shapes policy choices. However, throughout most of human history, elections have served a fairly modest role. Far more common are systems based on coercive power – such as monarchies, military dictatorships or one party rule where elections are either a veil or non-existent.

Recent history has seen a significant move towards open and free elections as a means of determining who should hold power. The case for such institutional arrangements is partly based on liberal values that emphasize the political freedoms that such institutions embody. Indeed, this intrinsic case for democracy, emphasized by Sen (1999), would stand regardless of whether it delivered concrete policy benefits to its citizens. But the case for democracy would be cemented further if there were demonstrable benefits in terms of outcomes.

A key observation which motivates this chapter is that autocratic government is

not always a disaster in economic terms. Indeed, throughout history there has been growth and development in autocratic systems of government. For example, the British industrial revolution predates the introduction of free and fair elections with mass participation. Modern China is also a case in point with a spectacular growth performance in a non-democratic setting. Whether these observations damage the instrumental case for democracy is moot. After all, it is the counter-factual that matters – growth and development might have preceded at a greater pace were democracy present. But it is equally clear that whether one looks at democracy or autocracy there is a great deal of heterogeneity in their performance that cries out for explanation.

This fact is illustrated in Figure 4.1, which shows estimated density functions for real GDP per capita growth rates among autocratic and democratic regimes that lasted five full calendar years or longer.[1] A "regime" is defined as a period in which authority characteristics of a country stay the same, according to the POLITY IV data set.[2] Regimes are democratic if the Polity score is positive, and autocratic if it is non-positive.[3] The striking fact that we will explore in more detail is that the distribution of autocracies has fatter tails—there are more very good autocracies and more very bad autocracies compared to democracies.[4]

The key challenge for students of political economy is to extract lessons from historical and contemporary experience about what makes government work in the general interest of its citizens. There is very little doubt that building infrastructure, managing macro-economic policy, facilitating private trade and investment and protecting the vulnerable are all facilitated by effective government. In this chapter, we will focus somewhat narrowly on the issue of why autocracy can sometimes be successful. This project is not intended as a defense of autocracy, but as means

[1]The density functions are estimated by using the Gaussian kernel and the bandwidth that minimizes the mean integrated squared error. Including regimes that lasted less than five years does not change the distributions substantially except for the inclusion of democratic regimes that existed less than 3 years, which tend to perform very badly (growth rates less than -1 percent).

[2]Section 4.4 provides details.

[3]The shapes of the two estimated density functions are similar if we define a democratic regime as its Polity score being more than 5, as Fearon (2006) does.

[4]Rodrik (1997, 2000), Almeida and Ferreira (2002), and Glaeser et al. (2004, Table 8) make similar observations although the unit of observation in their analysis is a country rather than a regime.

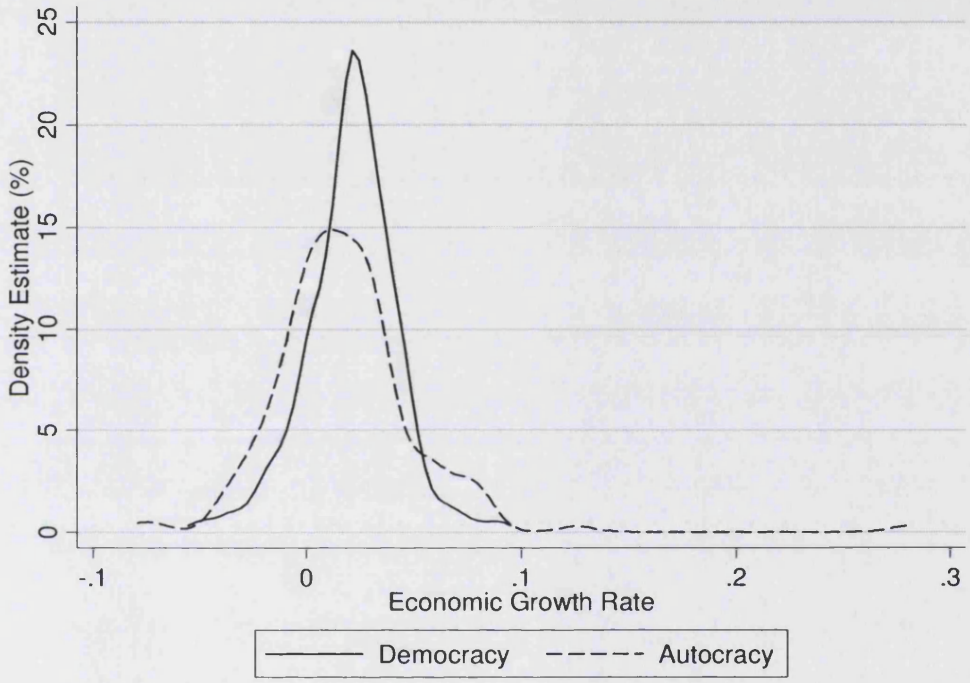

Figure 4.1: **Economic Growth Distributions among Democracies and Autocracies**

Sources: Penn World Table 6.2 and POLITY IV (version 2004)

Notes: Plotted are the density functions estimated by using the Gaussian kernel and the bandwidth that minimizes the mean integrated squared error (the *kdensity* command in STATA with the *gaussian* option).

of gaining further insights into the institutional basis of good government. It also contributes to broader discussion about the differences in policy and performance between democracies and autocracies.

The main focus of the chapter is on the institutions that make government accountable – specifically finding a means of removing poorly-performing leaders from office. Democracies organize this through regularized contests for power in elections. However, the means of achieving accountability are more murky in autocratic settings. The analysis emphasizes accountability from a "selectorate" comprising insiders who have the ability to depose a leader.[5] We show that autocratic government works well when the power of the selectorate does not depend on the existing leader remaining in office. The framework can be used to contrast the performance of autocracy and democracy in terms of accountability of leaders.

We then turn to identifying successful autocracies empirically. We look at a variety of methods and use these to pick out regimes that are robustly high performers. This sample of regimes provides a structured basis for some case study analysis. It also enables us to look statistically at the patterns of successful autocracies across countries. We then examine the idea that successful autocracies are able to generate accountability mechanisms in the absence of open contests for power.

The remainder of this chapter is organized as follows. In the next section, we review some of the voluminous literature on autocracy and democracy by both economists and political scientists to set our chapter in context. Section 4.3 develops the model. In section 4.4, we look empirically at successful autocracies and how far their incidence can be explained. Section 4.5 explores links between the theory and the characteristics of successful autocracies. Section 4.6 offers some concluding remarks.

[5]The term "selectorate" is borrowed from Bueno de Mesquita et al. (2003).

4.2 Background

The background to this chapter is a large body of studies on the way in which government and the economy interact. The key question for this research program known as political economy (or sometimes political economics) is to understand how policy choices are shaped by institutions. One important institutional category is whether a country's political institutions are deemed to be democratic. While the effect of democratic institutions on policy choices has been studied for a long time, there has been a surge in interest among economists in recent years.

Whether the analysis is theoretical or empirical, a precondition for investigating whether democracy or autocracy matters is to find some way of characterizing their differences. From a theoretical point of view, a lot of attention has been paid to whether a country uses elections to determine who governs. The literature focuses on two main roles of elections: determining the pattern of representation (i.e. which groups of citizens hold political power) and holding politicians to account (i.e. whether the incumbents are punished for bad policy).

The influential work by Acemoglu and Robinson (2005) takes the first view, focusing on who controls political office and modeling autocracy as a dictatorship of the rich and democracy as a dictatorship of the poor or middle classes. As a result, income redistribution is greater under democracy compared to dictatorship. The second perspective is taken in Bueno de Mesquita et al. (2002, 2003) who are the first to model accountability in a framework applicable to non-democratic government. In their theory, given the total amount of government expenditures, the larger is the selectorate whose support is required for the government to stay in power, the higher the level of public goods provided by the government. Elections imply that the government requires the support from a large number of citizens to stay in power. Hence, democracy increases public goods provision. We follow them in putting weight on the role of the selectorate in shaping policy incentives. However, our theory gives greater emphasis to the interplay of accountability and representation issues in making government work.

Elections are conducted differently depending on who can vote, who is eligible to stand and whether there is open access to institutions like the media. The widely used Polity data base provides a more continuous measure of democracy in several categories: how competitive and open the recruitment of chief executives is; to what extent the chief executive is constrained institutionally; and how competitive and regulated political participation is. These continuous measures are then aggregated into the single Polity score, measuring the degree of democracy.[6] It is commonplace to use this Polity score to create a discrete cutoff between democracies and autocracies. For example, Persson and Tabellini (2006a, 2007) use a cutoff of zero with democracies being those with a positive Polity score. However, Fearon (2006) prefers a cutoff of five. Since discrete transformations of continuous data series are always somewhat arbitrary, it is important to test the robustness of specific empirical results to alternative definitions.[7]

While elections are a central institution in democracies, there are other important institutions. One of the indicators in the Polity data set is concerned with the checks and balances on a leader. The executive constraints variable "refers to the extent of institutionalized constraints on the decision-making powers of chief executives" (Marshall and Jaggers 2005, p.23). The political economy literature has so far focused on the role of executive constraints in conflict of interest between policymakers and citizens (e.g. property rights enforcement against government expropriation) and used the executive constraints variable in that context (e.g. Acemoglu and Johnson 2005, Acemoglu, Johnson, and Robinson 2005). However, it could also affect how distributional issues are resolved among citizens.

Mindful of the importance of institutional variation in democracies, Persson and Tabellini (2000, 2003) have explored how institutional variations matter *within* democracies. The main differences that they focus on are parliamentary versus presidential forms of government and proportional representation versus majoritarian electoral rules. They explore theoretical differences between these regimes in terms

[6]See Marshall and Jaggers (2005) for more detail.

[7]See Munck and Verkuilen (2002) for a critical comparison on different democracy datasets including the Polity data base.

of representation and accountability. They also show that policies differ across forms of democracy empirically.

The early theoretical political economy literature on autocracy attempts to explain different economic performances among autocracies in a model in which an autocrat maximizes his private consumption subject to the probability of staying in power. One recurring theme in this literature is what is known as the "stationary bandits" theory of dictatorship, first formalized by McGuire and Olson (1996).[8] The theory argues that if a dictator expects to stay in power for a long period of time, he has an incentive to promote economic development because he will then increase his private consumption through increased tax revenues resulting from economic growth. This mechanism has been incorporated into some subsequent studies of autocracy.[9] Our theory does not incorporate the stationary bandits theory in a strict sense; the dictator in our model has no private gain from choosing welfare-enhancing policies *per se*. However, successful autocracies emerge in our model if the ruling group of citizens are secure in power. In this sense, we incorporate one feature of the stationary bandits theory—the importance of political stability.

One contentious issue in this literature is how welfare-enhancing policies affect the probability of a dictator's survival. Grossman and Noh (1994) and Overland et al. (2005) assume that a dictator's survival is more likely if he adopts welfare-enhancing policies. Grossman and Noh (1994) additionally assume that the probability of survival depends on non-economic factors, arguing that successful autocracies are those whose survival does not depend significantly on non-economic factors. Overland et al. (2005) propose that the dictator's survival chance increases with the level of capital accumulation (and therefore depends on growth-enhancing policies). As a result, autocracies with a low level of initial capital do not perform well because the dictator will be removed anyway, failing to reap the benefit from increased tax

[8]See also section VI of Barro (1990).

[9]Examples include Overland, Simons, and Spagat (2005) and Acemoglu and Robinson (2006a), as discussed below. What Acemoglu (2006) calls "revenue extraction" corresponds to this mechanism. Paltseva (2006) incorporates the stationary bandit theory into the theory of democratization. Azam, Bates, and Biais (2005) argue that autocrats may refrain from predation to build up their reputation as benevolent so that the gain from predation in the future will be larger due to increased economic productivity. Caselli (2006) uses this mechanism to explain the natural resource curse.

revenues through economic growth. Acemoglu and Robinson (2006a) assume that welfare-enhancing policies directly reduce the dictator's survival prospects while they also increase the survival chance through competition for power with a challenger. Consequently, successful autocrats are either those who are secure enough (so that the stationary bandits theory applies) or those who face tough competition from a challenger. In the intermediate level of survival chance, autocrats fail to adopt welfare-enhancing policies because such policies increase the chance that the autocrat is overthrown.

Our theoretical model will show that whether welfare-enhancing policies increase the probability of a dictator's survival depends on the institutional features of autocracy. Autocracy with a strong selectorate as modeled here has some features in common with the notion of a "consensually strong state" of Acemoglu (2005). We emphasize the role of institutions that organize accountability of leaders in the absence of elections.

The political economy literature on autocracy discussed so far fails to explain why poorly-performing autocrats can stay in power for a long period of time (e.g. Mobutu in former Zaire). Acemoglu, Robinson, and Verdier (2004) develop such a theory, arguing that autocrats can exacerbate the collective action problem involved in the ousting of leaders, by bribing loyalists and punishing coup plotters. This implies that autocracy performs poorly if natural resource abundance or foreign aid provision allows dictators to buy off the pivotal group of people. Padro-i-Miquel (2006) offers an alternative explanation, assuming that only the ruling group of citizens can replace the leader and that once the leader is replaced, there is a chance for citizens outside the ruling group to seize power. Consequently, autocrats expropriate citizens outside the ruling group, and the ruling group cannot replace poorly-performing autocrats for fear of losing power and being expropriated under new leadership. Our theoretical model below assumes away the collective action problem in leadership replacement, but incorporates Padro-i-Miquel (2006)'s insight and therefore derives an equilibrium in which poorly-performing autocrats nevertheless stay in power.

While the above studies treat autocracy as a unitary form of government, more recent studies have focused on the internal organization of autocracy. Egorov and Sonin (2006) and Debs (2007) explore the incentive for an autocrat to keep incompetent cabinet ministers in his government while Acemoglu, Ticchi, and Vindigni (2007) examine why rich people in autocratic regimes may want to support a bloated bureaucracy. Myerson (2006) and Svolik (2006) investigate under what condition an autocrat seeks support from members of the political elite instead of establishing personal rule. Egorov, Guriev, and Sonin (2006) examine an autocrat's incentive to restrict media freedom. These studies all try to endogenize autocratic institutions.[10]

More sociological approaches in political science have long been aware of institutional heterogeneity among autocracies.[11] However, these are not easily translated into the kind of empirical differences which can be used for statistical analysis. Moreover, they are poorly tied into the kinds of theoretical categories that shape policy incentives which can inform measurement.[12]

The literature on the "developmental state" (Deyo 1987, Amsden 1989, Haggard 1990, Wade 1990, Evans 1995) can also be seen as focusing on autocratic institutions which are successful in achieving economic growth. These studies identify two seemingly contradictory institutional features as key for understanding economic success: autonomy of the state and constraints that prevent predatory behavior of the state. Our theory may explain why these two features of the developmental state can coexist in autocracy: the state is autonomous only from opposition groups

[10]One study close to our model in spirit is Egorov and Sonin (2005), which study how the types of autocracy (hereditary versus non-hereditary) affect the mode of leadership succession. Wintrobe (1990, 1998) is an early attempt of formal modeling to compare different types of autocracy. Dixit (2006) investigates how the type of an autocrat (benevolent or predatory) affects how public goods are provided.

[11]This political sociology literature has produced a wide array of terminology to classify autocratic regimes. Examples include totalitarianism (Linz 2000), one-party systems (Huntington and Moore 1970), bureaucratic authoritarianism (O'Donnell 1979), sultanistic regimes (Chehabi and Linz 1998), neopatrimonialism (Bratton and van de Walle 1997, chapter 2), the rentier state (Beblawi and Luciani 1987), and, perhaps most recently, competitive authoritarianism (Levitsky and Way 2002). Geddes (1999) classifies autocracies into personal, military, and single-party rules to investigate how the type of autocracy affects its duration and the way it terminates. Haber (2006) attempts to bridge the gap between this political sociology literature and the political economy approach by classifying autocracies into three types according to the way dictators stay in power: terror, cooptation, and organizational proliferation.

[12]An exception is Gandhi and Przeworski (2006), who try to find the determinants of institutional choices in autocracy by linking a theory of autocracy to data.

while the ruling group disciplines the state to avoid it from becoming predatory.

There is a growing empirical literature asking whether democracy or autocracy is superior in terms of economic outcomes. The evidence that democracy promotes prosperity is neither strong nor robust. Przeworski and Limongi (1993) review early empirical research on the effect of democracy on economic growth, concluding that the correlation is weak and not robust. Persson and Tabellini (2006a) try a novel econometric approach finding some support for the proposition that persistent democracy is associated with improvements in economic performance. Papaioannou and Siourounis (2005) and Rodrik and Wacziarg (2005) find that democratization is associated with subsequent growth. Jones and Olken (2005) find that economic growth rates change significantly when autocratic leaders are unexpectedly removed from office while such changes are less clear under democracy. Persson and Tabellini (2007) find evidence of heterogeneity with transitions out of democracy being damaging to growth, while transitions into democracy out of autocracy are less clearly marked by improved growth performance.

Which aspects of policy making and human well-being are promoted by democracies is also a subject of debate. For example, Mulligan et al. (2004) find few cross-country differences between socio-economic policies enacted in democracies and autocracies. On the other hand, Persson (2005) finds that, conditional on country fixed effects, democracy with a parliamentary system of government or a proportional representation electoral system enacts more open trade policy than autocracies. In Chapter 2 of this thesis, we find that there is a strong and robust cross-country correlation between democracy and life expectancy while this correlation is not very robust to controlling for country fixed effects. Chapter 3 of this thesis, in turn, finds that the mortality of infants born to the same mother drops after democratization in sub-Saharan Africa in the 1990s.

Pretty much all prior empirical efforts to contrast the performance of democracy and autocracy treat the latter as a homogeneous institution.[13] But, as we have seen,

[13]An important exception is Gandhi (2003a,b), who finds that autocracies with legislatures and/or political parties, compared to those without, have better economic performance, more spending on education and less on the military. The finding that a certain degree of institution-

heterogeneity in the working of autocratic institutional arrangements comes out of a broad range of theoretical treatments. A key aim of this essay is to explore one dimension of this.

4.3 The Model

We lay out a simple agency model of autocracy which studies the incentives of an incumbent policy maker to implement a costly action that yields benefits to all citizens. It differs from a standard model of democracy as in Besley (2006, chapter 3) in that there is no regularized contest for public office. We begin by assuming that such contests only arise when the ruling group replaces its leader. We will show that this institutional feature can lead to autocracy working in the interests of all citizens (section 4.3.1). After discussing the robustness of our results (section 4.3.2), we compare the outcome of this model with a stylized representation of democracy where power is contested regularly (section 4.3.3).

The world comprises N citizens each of whom belongs to either group A or B. Group A comprises a fraction β of the population. There are two time periods denoted by $t \in \{1,2\}$. In each period, there is a policy maker in office who is a member of one of the two groups of citizens. Without loss of generality, we assume that the period one policy maker is from group A.[14]

The policy maker in office in period t makes two policy decisions. The first is a discrete "general interest" policy denoted by $e_t \in \{0,1\}$. This could be thought of as a wealth creation decision for the citizens which requires the policy maker to forgo private benefits such as bribery by a special interest. The payoff to citizens and the policy maker from this policy depends on a state of the world, $s_t \in \{0,1\}$, which is only observed by the policy maker. Each state occurs with equal probability. Citizens and the policy maker receive a payoff Δ if $e_t = s_t$ and zero otherwise.

The second policy decision is purely distributive. This divides an exogenous

alization of autocracy yields better development policies and outcomes is broadly consistent with our theory.

[14]Whether group A is in the majority does not affect our analysis.

revenue of size T between the groups. Let $\sigma_{Jt} \in [\underline{\sigma}, \bar{\sigma}]$ denote the fraction of this revenue allocated to group $J \in \{A, B\}$ in period t. In the most extreme case $\bar{\sigma} = 1$ and $\underline{\sigma} = 0$. However, institutionalized checks and balances may limit this possibility.

As well as having a group identity, each policy maker is either good or bad. This is not observed by the citizens. Let π be the probability that a randomly picked individual from either group is good.[15] Both types of policy makers receive Δ as a citizen if they choose $e_t = s_t$. However, a good policy maker gets the payoff of 0 by choosing $e_t \neq s_t$. We think of this as having a moral stance so that they get no utility from earning rents. Hence, a good politician will always act in the interests of all citizens on the general interest issue. A bad politician gets a private benefit of r from picking $e_t \neq s_t$, where r is drawn independently each period from a distribution whose cumulative distribution function is $G(r)$ with $E(r) = \mu$, $G(\Delta) = 0$, and $G(r) > 0$ for $r > \Delta$.[16] Denote the realized value of the rent available in period t by r_t.

A fraction of the citizens in each group is enfranchised, i.e. are endowed with the power to influence the choice of policy maker when there is a contest for power. Let $n \leq N$ be the total number of enfranchised citizens, of which a fraction ϕ belongs to group A. Enfranchised citizens from the ruling group (A) decide whether to retain the incumbent as the policy maker for period two. If they so choose, then the incumbent remains in power. However, if group A's enfranchised citizens decide to replace the incumbent, there is an "open" contest between two candidates, one from group A and the other from group B. Following Bueno de Mesquita et al. (2003), we refer to group A's enfranchised citizens as the *selectorate*.[17]

[15] We require that $\pi > 0$. However, π could be very small and many people plainly believe that it is in many practical settings. The key issue, however, is that the *possibility* of a good policy maker existing creates a role for signaling.

[16] We could think of r as embezzling public funds that are supposed to be spent on public goods provision. Making Δ the lower bound on rents guarantees that it is never possible to motivate a bad policy maker to act in the general interest on the basis of his personal payoff at the current period only.

[17] As we assume the same preference among citizens of each group, we do not allow a faction from the selectorate to join with the opposition to topple the regime. This possibility is interesting as a power struggle within the ruling elite in an autocracy is often cited as a force leading to democratization (see O'Donnell and Schmitter 1986).

Suppose that in the event of an open contest, group A's candidate has the support of a fraction κ of the enfranchised citizens. We allow for a uniformly distributed shock to the popularity of group B's candidate to affect the outcome which we denote by $\eta \in \left[-\frac{1}{2}, \frac{1}{2}\right]$. The group A candidate then wins if

$$\kappa > (1 - \kappa) + \eta.$$

Then the probability that a candidate from group A wins the contest, denoted by $\gamma(\kappa)$, is:

$$\gamma(\kappa) = \begin{cases} 1 & \text{if } \kappa > \frac{3}{4} \\ 2\kappa - \frac{1}{2} & \text{otherwise} \\ 0 & \text{if } \kappa < \frac{1}{4}. \end{cases}$$

This model conveniently nests the standard probabilistic voting model of democracy in which all citizens are enfranchised and each citizen has one vote. Then if all citizens vote along group identity lines, the probability that group A wins is $\gamma(\beta)$.[18]

In an autocratic world, not all citizens are enfranchised (e.g. as in South Africa during apartheid), in which case $\kappa = \phi$ if all enfranchised citizens support their own group's candidate. We also allow for group B's enfranchised citizens being repressed by being denied access to polling stations or because group A monopolizes coercive forces. We represent this simply by a repression parameter ($\upsilon \geq 1$) with $\kappa = \upsilon\phi/(\upsilon\phi + (1 - \phi)) \geq \phi$. If most enfranchised citizens are from group A (a large ϕ) or if there is strong repression (large enough υ), then $\gamma(\kappa) = 1$, i.e. group A is certain to hold onto power in the second period. This represents the case of an effectively institutionalized autocracy along the lines of (say) modern day China.

Finally, if the period one policy maker is removed from office, he receives a period two payoff as a citizen from group A.

The timing of the game is as follows:

[18]The purpose of making the contest outcome probabilistic is to allow the probability of group A's candidate winning to be between 0 and 1 even if the size of support for candidate A exceeds that for B. With a finite number of citizens in our model, group A's winning probability can be a step function of κ. This does not affect our analysis because κ only changes discretely in response to the period one policies in our model (see below).

1. Nature determines (s_1, r_1) and whether the period one policy maker is good or bad. These are private information to the policy maker.

2. The policy maker picks $(\sigma_{A1}, \sigma_{B1}, e_1)$ and period one payoffs are realized.

3. Members of the selectorate decide whether to retain the policy maker.

4. If the policy maker is removed from office, then nature determines whether two candidates in an open contest are good or bad. An open contest then ensues in which enfranchised citizens of groups A and B decide which candidate to support. The group A candidate wins with probability $\gamma(\kappa)$.

5. Nature determines (s_2, r_2).

6. The period two policy maker chooses $(\sigma_{A2}, \sigma_{B2}, e_2)$ and period two payoffs are realized.

A key feature of the model is that there is a contest for power only if the selectorate of group A chooses to replace the current leader. It is the absence of a guaranteed contest at the end of period one that characterizes autocracy in the model. Below, we contrast this with a situation where there is an election at the end of period one as in the standard agency model of democracy.

4.3.1 Equilibrium

We solve for the perfect Bayesian equilibrium of our model. This requires that, in every period, each type of policy maker behaves optimally given the contest rule in place. Members of the selectorate use Bayes rule to update their beliefs on the type of the period one policy maker accordingly and decide optimally whether to replace the policy maker at the end of period one.

It is very easy to work out the equilibrium behavior of policy makers in period two. In terms of the general interest policy, every kind of policy maker takes his short term optimal action. Thus $e_2 = s_2$ for a good politician and $e_2 = 1 - s_2$ for a bad politician. In terms of the distributive policy, the policy maker of group J

chooses $\sigma_{J2} = \bar{\sigma}$ and $\sigma_{K2} = \underline{\sigma}$ for $K \neq J$, i.e. giving the biggest reward that he can to his own group.

Given these period two policy choices, consider the decision of enfranchised citizens in an open contest between two randomly chosen candidates from groups A and B. As the type of candidates is unknown to them, both candidates will produce Δ with probability π if elected. Group J citizens prefer their own group's candidate who will choose $\sigma_{J2} = \bar{\sigma}$ to the other group's candidate who will choose $\sigma_{J2} = \underline{\sigma}$. Therefore, all group A enfranchised citizens support the group A candidate while all group B enfranchised citizens support the group B candidate, implying that the share of support that a group A candidate receives is $\upsilon\phi/(\upsilon\phi + (1-\phi))$. The probability that group A retains power in an open contest is therefore:

$$\gamma(\upsilon\phi/(\upsilon\phi + (1-\phi))) \equiv \Gamma(\phi, \upsilon).$$

This probability is key to understand whether autocracy is successful.

Turning now to period one, the distributive policy is again straightforward. As the period one policy maker is a member of group A, he will set $\sigma_{A1} = \bar{\sigma}$ and $\sigma_{B1} = \underline{\sigma}$. Good policy makers always make the right decision on the general interest policy so that $e_1 = s_1$. The only issue concerns how bad policy makers behave. To work out the bad policy maker's incentive to produce Δ, we must compare his payoffs from the good and bad actions. If he stays in power, his expected period two payoff is $\mu + \bar{\sigma}T$. If he is removed from office, then he will get the payoff of a group A citizen: $\pi\Delta + \bar{\sigma}T$ with probability $\Gamma(\phi, \upsilon)$, and $\pi\Delta + \underline{\sigma}T$ with probability $1 - \Gamma(\phi, \upsilon)$.

Let $\rho(\delta)$ be the probability that the period one policy maker will stay in office if he produces a payoff of $\delta \in \{0, \Delta\}$ from the general interest policy. The bad policy maker's period two payoff from producing a payoff of δ to the citizens in period one

is:[19]

$$\rho(\delta)(\mu + \bar{\sigma}T) + (1 - \rho(\delta))[\pi\Delta + \Gamma(\phi, \upsilon)\bar{\sigma}T + (1 - \Gamma(\phi, \upsilon))\underline{\sigma}T].$$

Using this, it is easy to see that the bad policy maker will produce the good action in period one if:

$$[\rho(\Delta) - \rho(0)][\mu - \pi\Delta + (1 - \Gamma(\phi, \upsilon))(\bar{\sigma} - \underline{\sigma})T] + \Delta > r_1.$$

Consequently, the probability that a bad policy maker chooses the right general interest action in period one, denoted by λ, is

$$\lambda = G([\rho(\Delta) - \rho(0)][\mu - \pi\Delta + (1 - \Gamma(\phi, \upsilon))(\bar{\sigma} - \underline{\sigma})T] + \Delta).$$

The bad politician is motivated to choose the right general interest policy by two sources of future rents. The first is the personal rent μ that he earns. The second is the group specific rent $(\bar{\sigma} - \underline{\sigma})T$. The latter is relevant only if his group may lose office in an open contest, i.e. if $\Gamma(\phi, \upsilon) < 1$.

To understand $\rho(\Delta) - \rho(0)$, we need to examine the behavior of the group A selectorate. Observe that if the policy maker generates Δ, then it is always optimal to retain him. He creates higher group specific rents from the redistributive policy (strictly so if $\Gamma(\phi, \upsilon) < 1$), and there is a higher probability of good behavior than would arise in an open contest. To see the second point, the posterior probability that the incumbent policy maker is good having produced the good outcome in period one (by Bayes rule) is:

$$\frac{\pi}{\pi + (1 - \pi)\lambda},$$

which is at least as large as π. Therefore, we have $\rho(\Delta) = 1$. If the policy maker

[19]Note that $\Gamma(\phi, \upsilon)$ does not depend on δ. This is because in an open contest both candidates are equally likely to be good. Group B enfranchised citizens, therefore, only care about the distributional policy and always support their own candidate regardless of δ. This is no longer the case if an open contest ensues even when the selectorate of group A prefers keeping the incumbent in office. See section 4.3.3 below.

does not generate Δ, then the selectorate will fire him if:

$$(1-\Gamma(\phi,v))(\bar{\sigma}-\underline{\sigma})T<\pi\Delta.$$

Thus $\rho(0)=0$. Poor quality policy makers will be fired as long as the selectorate has a sufficient grip on power so that they will keep their group specific rents if they decide to replace the policy maker. Otherwise $\rho(0)=1$.[20]

For notational simplicity, define $\tau\equiv(\bar{\sigma}-\underline{\sigma})T$, which captures the degree of salience of the distributional policy. The above discussion then leads us to the following result:

Proposition 1 *In the unique perfect Bayesian equilibrium, the probability that a bad policy maker picks the right general interest action in period one is given as follows:*

1. *If* $(1-\Gamma(\phi,v))\tau<\pi\Delta$ *then:*

$$\lambda=G(\mu-\pi\Delta+(1-\Gamma(\phi,v))\tau+\Delta). \tag{4.1}$$

2. *If* $(1-\Gamma(\phi,v))\tau\geq\pi\Delta$ *then:*

$$\lambda=0. \tag{4.2}$$

This result says that the selectorate will be able to discipline policy makers in autocracy leading to a good general interest policy choice if their grip on power is sufficiently strong. If not, they will fear that removing the policy maker will trigger a contest in which the other group can seize power.[21] This suggests that successful autocracies will tend to be those with strong selectorates who can commit to removing bad leaders.

[20] We assume that if

$$(1-\Gamma(\phi,v))(\bar{\sigma}-\underline{\sigma})T=\pi\Delta,$$

then the selectorate chooses to retain the incumbent.

[21] Padro-i-Miquel (2006) uses the same logic to analyze why African dictators have implemented inefficient policies.

The case where $\Gamma(\phi, \upsilon) = 0$ is interesting here and could be thought of as a case of personal rule where the selectorate's grip on power is dependent on the specific policy maker remaining in power. If $\tau \geq \pi\Delta$, then personal rule in this sense will always result in $\lambda = 0$. This is because the accountability mechanism via the selectorate has no bite. This accords with intuition and often-made empirical claim that personal rule is not conducive to good government. We develop a case study to illustrate this in section 4.5.3 below.

The role of checks and balances $(\bar{\sigma} - \underline{\sigma})$ in disciplining autocrats turns out to be subtle. First, if group A retains power for sure $(\Gamma(\phi, \upsilon) = 1)$, there is no role for constraints on the distributional policy making in improving the quality of government. The complete lack of checks and balances could still lead to good policy outcomes if the selectorate is securely in power. Otherwise, improvements in checks and balances have a non-monotonic impact on the incentive of autocrats to make a good policy. On one hand, improvements in checks and balances make the case of successful autocracies more likely. On the other hand, once checks and balances start disciplining bad politicians, further improvements in checks and balances actually undermine their incentive to take the good action. This is because a high level of checks and balances makes an autocrat less concerned about the seizure of power by group B as a result of his bad performance. Finally, if we compare two autocracies with the same level of checks and balances, we could see a stark difference in performance between the two, depending on how salient the distributional issue is due to the size of T.

As we observed above, a key feature of our model is the assumption that a contest for power is triggered only if there is a decision to replace the leader in period one. The role of this assumption can now be assessed. Suppose instead that there is a probability ξ that a contest ensues even if the selectorate chooses to retain the incumbent. The incumbent then competes with a challenger from group B for office in period two. This does not change the optimal strategy of enfranchised citizens in the contest if $(1 - \pi)\,\Delta < \tau$.[22] However, it weakens the incentive of the leader in

[22]This condition implies that the policy maker's group membership is the salient issue if there

case 1 of the Proposition since we would now have:

$$\lambda = G\left([\xi\Gamma(\phi, v) + (1 - \xi)][\mu - \pi\Delta + (1 - \Gamma(\phi, v))\tau] + \Delta\right)$$

which is decreasing in ξ. Thus the model predicts that, conditional on having an effective selectorate disciplining the leader, political stability (low ξ) is an asset. This offers a perspective on autocracy that is reminiscent of Olson (1993) who put weight on the power of longer time horizons in improving the quality of government within autocracy.[23] However, the exact mechanism in which political stability induces a better quality of autocratic government is different. In Olson (1993)'s theory, political stability allows an autocrat to internalize the benefit from good economic policies through an increased amount of tax revenue. In our model, political stability allows the selectorate to discipline an autocrat who otherwise chooses bad policies for his private gains.

4.3.2 Repression and Bribery of the Selectorate

The basic model assumes that the selectorate is powerful enough to replace the leader if they want to. But autocratic leaders frequently take actions to entrench their power. If such actions were costless, then the leader would always would stay in office while setting $\lambda = 0$. However, in reality, such tactics – whether repression by force or bribery – are costly. We now explore the implications of this to illustrate how the good performance of autocracy in Proposition 1 is dependent on limits on actions by incumbents to entrench their power.

Assume that the period one policy maker can pay a cost $b > 0$ to repress the selectorate when the latter wishes to remove him from power. If $(1 - \Gamma(\phi, v))\tau < \pi\Delta$, then the bad policy maker prefers repression to choosing the bad policy and

is a contest for power. Were this not the case, then the group B enfranchised citizens would be content to support a group A incumbent who had taken the good general interest action in period one if there were a contest for power at the end of period one. Thus a guaranteed contest would strengthen incentives for good behavior in an autocracy as it does in the analysis of democracy with low polarization presented below.

[23] This idea is later formalized in McGuire and Olson (1996).

being ousted as long as the cost of repression is not too high, specifically:

$$b < \mu - \pi\Delta + (1 - \Gamma(\phi, v))\tau.$$

Under this condition, the bad policy maker will choose repression if:

$$r_1 - b > \Delta.$$

As a result, the probability that the bad leader chooses the good policy is

$$\lambda = G\left(\Delta + \min\left\{b, \mu - \pi\Delta + (1 - \Gamma(\phi, v))\,\tau\right\}\right).$$

It is clear from this that possibility of repression (weakly) reduces the incidence of good period one behavior under autocracy. Thus if $b = 0$ (costless repression), then $\lambda = 0$ and we are back to the case of bad autocracy (case 2 in Proposition 1).

Bribery to stay in office is also a possibility. Suppose that the policy maker can make a transfer to each member of the selectorate in exchange for supporting him to stay in office after he has taken the bad action. Then he may prefer this strategy to taking the good action if the bribe that he would have to pay is small enough. The total cost of bribing the selectorate is:

$$n\phi\left[\pi\Delta - (1 - \Gamma(\phi, v))\,\tau\right].$$

The policy maker prefers bribery to taking bad action if:

$$\left[\pi\Delta - (1 - \Gamma(\phi, v))\,\tau\right](1 + n\phi) < \mu.$$

This is more likely to be satisfied when the selectorate is small – the result in Proposition 1 still holds for large enough $n\phi$. This case, in particular, emphasizes that it need not be the benevolence of the selectorate that drives good autocracy but having a large enough group to make bribery unattractive.

This extension further emphasizes the need for an effective group to manage

leadership transitions. To the extent that prevention of repression and bribery can be institutionalized, we expect autocracy to work better. This analysis also makes clear that μ (the future value of staying in office) is important in shaping incentives. Severe punishments for poorly performing leaders after they leave office are doubled-edged. On one hand, they improve incentives if repression and bribery are absent. On the other, they increase the incentive to use malign tactics to stay in office. Thus the model shows why negotiating attractive exit arrangements for bad leaders could sometimes improve policy outcomes.

4.3.3 Comparison with Democracy

We now contrast the model above with a stylized representation of democracy. This is a non-trivial comparison since it is well-known from the literature on political agency models (see, for example, Besley 2006) that elections are an imperfect way of providing incentives for good policies.

Now assume that all citizens are enfranchised with each having one vote: $n = N$, $\phi = \beta$, and $\upsilon = 1$.[24] The key feature of democracy that we model here is a guaranteed contest for power at the end of period one even when group A citizens prefer retaining the incumbent policy maker. The timing of the game is the same except for steps 3 and 4, which are now as follows:

3. Citizens from group A decide whether to support the incumbent policy maker or a randomly picked citizen from group A whose type (good or bad) is unobservable to citizens (i.e. a primary election).

4. All citizens decide which candidate to support, the group A candidate chosen in step 3 or a randomly picked citizen from group B whose type (good or bad) is unobservable to citizens. The group A candidate wins with probability $\gamma(\kappa)$.

[24] If $\upsilon > 1$, the model of democracy in this subsection can be that of what Levitsky and Way (2002) call competitive authoritarianism, a regime in which elections with universal suffrage are regularly held with opposition groups systematically harassed so that the number of effective votes per person is less than one for opposition groups.

The remaining structure of the game is otherwise the same as before.

If group A citizens decide not to support the incumbent in a primary election, the electoral outcome that follows is exactly the same as that of an open contest in the model of autocracy with group A's winning probability being $\Gamma(\beta, 1) = \gamma(\beta)$. The difference comes from a case in which group A citizens decide to support the incumbent in a primary election. This case emerges if the incumbent takes a good action in period one, because otherwise group A citizens are strictly better off by replacing the incumbent with a randomly picked candidate.[25] A key issue in a democracy concerns whether citizens from group B reward the group A incumbent for taking the general interest action. This depends on how salient is the general interest policy relative to the distributional policy.

We first look at the case in which the distributional policy is more salient:

$$(1 - \pi)\,\Delta < \tau.$$

This condition says that group B voters will always support a candidate from their own group even if the group A candidate is known to be good. In this case, the share of votes the incumbent undertaking a good action in period one obtains will be $\kappa = \beta$. Consequently, if a bad incumbent chooses a good policy so that group A citizens support him in a primary election, his expected period two payoff is

$$\gamma(\beta)(\mu + \bar{\sigma}T) + (1 - \gamma(\beta))(\pi\Delta + \underline{\sigma}T).$$

[25] To see this, let $\gamma(\kappa')$ be the probability that the incumbent who did not produce Δ wins in an election, and $\gamma(\kappa'')$ be the probability that a randomly picked group A candidate wins. Group A citizens' expected period two payoff is

$$\gamma(\kappa')\bar{\sigma}T + (1 - \gamma(\kappa'))(\pi\Delta + \underline{\sigma}T)$$

if they let the incumbent run for re-election, and

$$\pi\Delta + \gamma(\kappa'')\bar{\sigma}T + (1 - \gamma(\kappa''))\underline{\sigma}T$$

if they support a randomly picked candidate. Therefore, they prefer kicking out the incumbent in a primary election if

$$\gamma(\kappa')\pi\Delta + [\gamma(\kappa'') - \gamma(\kappa')](\bar{\sigma} - \underline{\sigma})T > 0.$$

$\gamma(\kappa'')$ is always equal to $\gamma(\beta)$. $\gamma(\kappa')$ is also equal to $\gamma(\beta)$ if group A never supports group B candidate (i.e. $\pi\Delta < (\bar{\sigma} - \underline{\sigma})T$). If group A prefers group B candidate to a bad group A politician (i.e. $\pi\Delta \geq (\bar{\sigma} - \underline{\sigma})T$), $\gamma(\kappa') = 0$. Therefore, the above inequality always holds.

If he chooses a bad policy, he will be removed in a primary election and his expected period two payoff is therefore

$$\gamma(\beta)(\pi\Delta + \bar{\sigma}T) + (1 - \gamma(\beta))(\pi\Delta + \underline{\sigma}T).$$

Comparing these two payoffs, it is straightforward to see that the probability that a bad incumbent chooses a good action is

$$\lambda = G\left(\gamma(\beta)(\mu - \pi\Delta) + \Delta\right). \tag{4.3}$$

Since group B citizens are not responsive to the policy maker's reputation, only private rents motivate good behavior. This is because the distribution of group specific rents does not depend on which general interest policy is adopted in period one. In addition, private rents are discounted by the probability of re-election, $\gamma(\beta)$, which can be less than one. The regularized contest for power coupled with the lack of responsiveness by group B citizens even undermines the motivation of policy makers stemming from private gains.

We next turn to a situation where the general interest policy is more salient:

$$(1 - \pi)\Delta \geq \tau$$

We will look at the best performance of democracy that can be sustained in this case. Suppose that all group B citizens will support a candidate from group A who takes the good action in period one. Then, the outcome is equivalent to the good autocracy case in section 4.3.1. It is straightforward to see that

$$\lambda = G\left(\mu - \pi\Delta + (1 - \gamma(\beta))\tau + \Delta\right). \tag{4.4}$$

Good behavior by the period one policy maker is now rewarded with personal rents in period two for sure and by an increase in the probability of retaining group specific rents. This will be an equilibrium consistent with Bayes rule provided that at this

value of λ:

$$\pi\left[\frac{(1-\pi)(1-\lambda)}{\pi+(1-\pi)\lambda}\right]\Delta > \tau,$$

which will always hold for a sufficiently low value of τ.[26]

We now compare the performance of autocracy and democracy in terms of the probability of disciplining the bad incumbent. Table 4.1 shows which political system is better in each of four main parameter regions. When the distributional issue is of little importance (a very small τ as in the top-left cell), democracy performs better as long as $\gamma(\beta) < \Gamma(\phi, \upsilon)$ (compare equations (4.1) and (4.4)), i.e. power is more contestable in a democracy. Thus democracy is better in so far as it strengthens the power of the opposition and increases the group specific rent that motivates a bad politician to stay in office.

Table 4.1: Comparison of Autocracy and Democracy

	Good Democracy: $\tau \leq (1-\pi)\Delta$	Bad Democracy: $\tau > (1-\pi)\Delta$
Good Autocracy: $(1-\Gamma(\phi,\upsilon))\tau < \pi\Delta$	Democracy if $\Gamma(\phi,\upsilon) > \gamma(\beta)$	Autocracy
Bad Autocracy: $(1-\Gamma(\phi,\upsilon))\tau \geq \pi\Delta$	Democracy	Democracy if $\gamma(\beta) > 0$

When the distributional issue is very important (a very large τ as in the bottom-

[26]If this condition does not hold, then there will be a mixed strategy equilibrium with a lower level of λ. This is a little tricky as it is not entirely obvious how to put mixed strategies together with probabilistic voting. However, define:

$$\pi\left[\frac{(1-\pi)\left(1-\hat{\lambda}\right)}{\pi+(1-\pi)\hat{\lambda}}\right]\Delta = \tau$$

Then we require that $\hat{\lambda}$ is a fixed point of the mapping

$$\hat{\lambda} = G\left(\psi\left(\hat{\lambda}\right)(\mu - \pi\Delta) + \left(\psi\left(\hat{\lambda}\right) - \gamma(\beta)\right)\tau] + \Delta\right)$$

where $\psi(\lambda) < 1$ is the probability of re-election given that the incumbent has produced Δ. Since all group B voters are, by construction, indifferent between group A and group B candidates at $\hat{\lambda}$, we suppose that a proportion ζ of the group B voters support the group A candidate ex ante (i.e. before the aggregate shock takes place) so that:

$$\psi\left(\hat{\lambda}\right) = \gamma\left(\beta + \zeta(1-\beta) - (1-\zeta)(1-\beta)\right).$$

The key observation is that any equilibrium where $\lambda = \hat{\lambda}$, must have less good behavior by the leader so that the equilibrium behavior in (4.4) is an upper bound on the performance of democracy consistent with the level of checks and balances in place.

right cell in Table 4.1), we see, by comparing equations (4.2) and (4.3), that democracy performs better as long as democratic competition does not entirely prevent group A from holding power ($\gamma(\beta) > 0$). When the distributional issue is very salient, the selectorate in autocracy is unable to discipline the policy maker. However, in democracy the fact that group A citizens regularly face competition from group B allows them to discipline a bad politician.

Which of the off-diagonal cells in Table 4.1 is the relevant parameter region depends on the size of $\Gamma(\phi, \upsilon)$. If $(1-\pi)(1-\Gamma(\phi,\upsilon)) \geq \pi$, then the bottom-left cell is relevant. In this case, democracy always performs better (compare (4.2) and (4.4)). In this case, $\Gamma(\phi, \upsilon)$ is not large enough for the selectorate to credibly threaten to remove a bad politician if he behaves badly. On the other hand, in democracy, group B citizens are responsive to the policy maker's good behavior, giving the incumbent an incentive to behave well. Broader political participation in a democracy is beneficial in this case.

If $\Gamma(\phi, \upsilon)$ is large enough so that $(1-\pi)(1-\Gamma(\phi,\upsilon)) < \pi$, we are in the top-right cell in which autocracy performs better than democracy (compare (4.1) and (4.3)). In this case, the distributional issue is relatively important, making group B citizens unresponsive to the good action by the incumbent. In a democracy, this unresponsiveness undermines a bad politician's incentive for good action. In an autocracy, however, group B has very little influence on leadership selection due to a high $\Gamma(\phi, \upsilon)$. This exclusion of group B from political participation creates an incentive for a bad politician to undertake good policy because group A does not fear losing power after replacing the leader.

The above analysis suggests that, as long as the selectorate has a strong hold over power, autocracy is a better form of government if the distributional issue is neither too salient nor too irrelevant. In all other cases, however, democracy is a better form of government, at least under the plausible condition that $0 < \gamma(\beta) < \Gamma(\phi, \upsilon)$. Thus, while the approach that we have taken shows why successful autocracy is a possibility, it may also be thought of as showing why democracy is broadly superior in terms of promoting general interest policies.

While the analysis is very simple indeed, it gives a novel take on the difference between autocracy and democracy in delivering policies. There is no easy ranking between democracy and autocracy—it depends on the institutional setting and the environment in which system of government is implemented. For a given level of the salience of the distributional issue (a fixed τ), the model suggests a natural ordering among a cross-section of democracies and autocracies in terms of implementation of general interest policies. Best of all is responsive democracy where general interest policies are salient (a large Δ). Second best is successful autocracy, requiring an effective selectorate. Next is polarized democracy where elections do not reward good general interest policies. Worst of all is bad autocracy where leaders are able to hold on to power regardless of their performance while in office. This could explain the longer lower tail of the performance distribution among autocracies, as seen in Figure 4.1.

However, Figure 4.1 also shows that autocracy has a longer upper tail in the performance distribution. Our model can explain this by assuming that the extent of constraints on distributional issues (as proxied by $(\bar{\sigma} - \underline{\sigma})$) is lower in a political system without regularized contests for power. Comparing equations (4.1) and (4.4) reveals that even if $\gamma(\beta) < \Gamma(\phi, \upsilon)$, autocracy can perform better because the policy maker is motivated more by group specific rents. The lack of constraints on autocratic leaders in making distributional policies may explain why some autocracies perform better than the best of all democracies. Thus there are likely to be important interaction effects between the different dimensions of government institutions as measured in data sets like POLITY IV.

4.3.4 Discussion

Padro-i-Miquel (2006) is many ways the closest contribution to this chapter. Although it is not discussed explicitly, his model also predicts that secure power of the selectorate (high $\Gamma(\phi, \upsilon)$) improves the policy-maker's performance. What distinguishes our model from his is the effect of institutionalizing participation by the opposition group in leadership selection. In Padro-i-Miquel (2006)'s model, the

institutionalized participation by the opposition prevents an autocrat from expropriating them at his will, which in turn reduces the ruling group's fear of losing power and allows them to discipline the autocrat. In our model, allowing the opposition to participate in leadership selection may not improve the policy choice if the distributional policy is more salient. The difference stems from our assumption that distributional policy making depends on checks and balances and the group identity of the policy maker. Moreover, the contest for power does not discipline the incumbent in this policy dimension.

The model has deliberately focused on the incidence of common interest policy decisions in democracy and autocracy. This makes sense as the performance metric that it invokes is uncontroversial. However, it is clear that the distributional outcomes under all the cases that we have studied may be quite different. Thus, there could be a preference for one regime or another on distributional grounds. For example, in the case of successful autocracy, power is monopolized by group A and this may not be good from a social point of view. A more complete treatment of the issues would clearly have to widen the perspective that we have taken here by taking a stance on a welfare criterion that pays attention to distributional issues.

One important assumption in our model is the exogeneity of the selectorate membership. The policy maker in office may, howevere, be able to select members of the selectorate from group A citizens. Endogenous membership of the selectorate may change the equilibrium probability that bad politicians take good action. Suppose, for example, that there are two types of citizens, good and bad, just like policy-makers in our model. Assume further that good citizens do not accept bribery from the policy maker while bad citizens do. The bad policy-maker then has an incentive to select only bad citizens as the selectorate members, reducing the probability of good action. In future work, it must be understood under what condition the policy maker can affect the membership of the selectorate and how such endogenous membership affects the equilibrium outcomes.

We also assumed that the fraction of good politicians π is fixed in comparing across political regimes. However, the model makes clear that π can affect the

quality of government, both directly in determining whether good actions are taken and indirectly by changing the political equilibrium. Besley (2005) emphasizes the importance of selection mechanisms in political regimes both in history and comparing contemporary political regimes. More open access to political life could be an important difference between autocracy and democracy which would affect the comparison in a way that is not modeled in our baseline case.[27]

Perhaps the most interesting possibility for future work is to appraise the way in which this framework predicts the evolution of institutional choices over time. We should expect autocracy and democracy to prevail when they are successful. Thus there should be a bias (among long-lived regimes) towards cases where (in terms of the model) the equilibrium policy outcomes are (4.1) and (4.4). But for that democracy requires good checks and balances with general interest policies being more salient. Equally, successful autocracy requires a strong, hard-to-repress or hard-to-bribe, selectorate. However, coping with weak checks and balances (and polarization) should be less of an issue for producing general interest actions in autocracy.

Perhaps the main attraction of the approach taken here is that it gets the focus on institutional features that shape policy incentives. Within the confines of institutional variants such as autocracy and democracy, we have emphasized the sources of heterogeneous outcomes which are typical of the data.

4.4 Successful Autocracies?

In this section, we look at autocracies empirically. This analysis serves two purposes. The first is to show that there are indeed cases of successful autocracies according to objective criteria. Although we have some sense of which autocracies are more successful than others (e.g. the Chinese communist regime versus African dictatorships), to the best of our knowledge, there has been no systematic analysis to identify good autocracies empirically. The second aim of this section is to identify

[27]Rauch (2001) can be seen as an attempt to endogenize π in our model in the context of autocratic regimes.

the cases of successful autocracy which we will use to investigate the validity of our theory in the next section. By relying on objective criteria to identify successful autocracies, we avoid arbitrarily selecting only cases that are consistent with our theory.

To identify successful autocracies, we first need to decide how to define an autocracy empirically. Ideally, the definition should closely follow the characterization of autocracy in our theory: the absence of regularized contest for leadership. In addition, to capture heterogeneous institutional features among autocracies, we should separate periods of autocratic rule by the degree of constraints on the executive in making distributional policy ($\bar{\sigma} - \underline{\sigma}$), the proportion of the selectorate among enfranchised citizens (ϕ), and the way enfranchised citizens exercise their power (υ).

Due to lack of such data covering a long period of time, however, we rely on the Polity data base (POLITY IV, version 2004) because its coverage of the sample period is the longest among appropriate datasets. We adopt the following procedure to divide country-years into autocratic and democratic regimes. First, for each country, we divide years from 1800 or independence until 2004 between democratic and autocratic periods according to the Polity score. The Polity score, ranging from -10 to 10, measures the degree of democracy.[28] If the Polity score is positive, we treat such a year as democratic. Years with a non-positive Polity score are autocratic.[29] To capture heterogeneity among autocracies and democracies, we further divide consecutive democratic and autocratic years into different regimes if there is a change in authority characteristics according to the Polity data set: the method of chief executive recruitment (EXREC), the constraint on chief executive (EXCONST), and political participation (POLCOMP). These three dimensions of authority characteristics measured in the Polity data base loosely correspond to institutional features of autocracy in our model: EXREC for the presence of regularized contest for executive power, EXCONST for checks and balances on the distributional policy, and POLCOMP for the probability that the selectorate stays

[28]If the Polity score is either -66 (foreign occupation), -77 (anarchy), or -88 (regime transition periods), we see it as a year without a regime.

[29]See below for the robustness to choosing a different cut-off value.

in power when the incumbent is replaced ($\Gamma(\phi, \upsilon)$).

In sum, we define a "regime" as consecutive years with the same authority characteristics. A regime is autocratic if its POLITY score is non-positive. Below, we restrict our attention to regimes that lasted at least five full calendar years. Autocratic regimes of shorter length may perform very well simply because of luck or just by "inheriting" a good performance from the previous regime.

In the following subsections, we first identify autocracies successful in achieving economic growth. We then turn to autocracies successful in human development: health and education. These two investigations identify the core set of successful autocracies, successful in at least two dimensions of performance among the three (growth, health, and education). We check the robustness of the selection of these autocracies to alternative definitions of autocracy. Finally, we show that "standard" exogenous characteristics of countries identified by the literature on the quality of government and institutions do not fully predict whether a country has a successful autocracy.

4.4.1 Economically Successful Autocracies

We measure each regime's economic performance as follows. Suppose that a regime starts in year s and ends in year t. We calculate the regime's annual economic growth rate as

$$\frac{\ln Y_{t-1} - \ln Y_s}{t-1-s}, \tag{4.5}$$

where Y_t is real GDP per capita in year t, taken from the Penn World Table version 6.2 (the variable RGDPCH).[30]

We then obtain the 80th percentile of the distribution of annual growth rates among all regimes, including democratic ones (313 in total). We regard an autocratic regime as successful if its annual growth rate exceeds this 80th percentile of the

[30]We choose $t-1$ rather than t as the end year for calculating annual growth rate because Y_t may reflect an economic turmoil caused by the regime change and/or the succeeding regime. In a few cases where the succeeding regime starts on January 1 of the next year, we use Y_t instead of Y_{t-1}. If GDP observations are not available for the entire period of a regime, we use the first and/or the last observation to calculate the growth rate. In doing so, we drop regimes with less than five years of GDP observations.

distribution.[31]

Table 4.2 shows the list of economically successful autocracies obtained by the above procedure. There are 35 autocratic regimes whose annual growth rate is above the 80th percentile of the distribution. The list includes East Asian autocracies well-known for high economic growth such as China, Indonesia, Singapore, South Korea, Taiwan, and Thailand. Dictatorships in southern Europe are also in the list. On the other hand, there are lesser-known autocracies as well: a couple of African countries in the 1960s (Gabon and Togo), those in the Middle East (Iraq in the 1970s, Syria in the 1960s), communist regimes in East Europe (Poland, Romania), and a few Latin American countries (Ecuador in the 1970s, Peru and Venezuela in the 1950s). Overall, the table shows that there are indeed successful autocracies in terms of economic growth.

Measuring success based on annual growth rates may not be an accurate way of assessing economic performance of regimes, however. One concern is that a regime's growth rate may pick up the effect of country characteristics. Whatever regime may exist, it can be that a country's economy grows anyway. Another concern is that an economy under a certain regime may grow rapidly solely due to the convergence effect if the regime starts with very low per capita GDP. Finally, a regime may perform well simply because it succeeds the previous regime which devastated the economy.

To deal with these concerns, we conduct three alternative assessments of success. First, we subtract the *country*'s annual economic growth rate from each regime's growth rate, obtain the 80th percentile of the demeaned growth rates among all regimes, and check whether autocratic regimes in Table 4.2 are above the 80th percentile. This procedure removes "country fixed effects" from the measure of performance of each regime. Second, we group regimes into five quintiles according to their initial GDP per capita (Y_s in equation (4.5)), obtain each quintile's average growth rate, subtract it from each regime's growth rate, calculate the 80th percentile of the demeaned growth rates among all regimes, and check whether autocratic

[31] Note that this procedure would yield very few successful autocracies if most regimes in the top quintile of the growth distribution were democratic.

Table 4.2: Economically Successful Autocracies

Regime	Years of Observations	Annual Growth	Robustness 1	2	3
Equatorial Guinea(1996-2004)	1996-2003	28.04%	Y	Y	Y
Rwanda(1994-2000)	1994-1999	12.56%	Y	Y	N
Gabon(1960-1968)	1960-1967	8.59%	Y	Y	-
Belarus(1996-2004)	1996-2003	8.15%	N	Y	-
Liberia(1997-2003)	1997-2002	7.94%	Y	Y	Y
China(1976-2004)	1976-2004	7.87%	Y	Y	-
Greece(1967-1974)	1967-1973	7.85%	Y	Y	Y
Ecuador(1972-1979)	1972-1978	7.73%	Y	Y	Y
Romania(1948-1977)	1960-1976	7.63%	Y	Y	-
South Korea(1981-1987)	1981-1986	7.23%	Y	Y	Y
Azerbaijan(1998-2004)	1998-2003	7.15%	Y	Y	Y
Taiwan(1975-1987)	1975-1986	6.81%	N	Y	-
Niger(1974-1981)	1974-1981	6.27%	Y	Y	N
Iraq(1968-1979)	1970-1978	6.17%	Y	Y	-
Taiwan(1949-1975)	1951-1974	5.98%	N	Y	-
Brazil(1965-1974)	1965-1973	5.89%	Y	Y	Y
Spain(1939-1975)	1950-1974	5.77%	Y	Y	-
Poland(1947-1980)	1970-1979	5.76%	Y	Y	-
Portugal(1930-1974)	1950-1973	5.75%	Y	Y	-
Togo(1960-1967)	1960-1966	5.68%	Y	Y	-
South Korea(1973-1981)	1973-1980	5.50%	N	Y	Y
Thailand(1958-1968)	1958-1967	5.34%	Y	Y	Y
Venezuela(1941-1958)	1950-1957	4.93%	Y	Y	-
Singapore(1965-2004)	1965-2004	4.80%	N	Y	-
Indonesia(1967-1998)	1967-1997	4.56%	Y	Y	-
Vietnam(1976-2004)	1989-2003	4.47%	N	Y	-
Bhutan(1953-2004)	1970-2003	4.28%	N	Y	-
China(1969-1976)	1969-1975	4.04%	N	Y	N
Iran(1955-1979)	1955-1978	4.01%	Y	Y	-
Tunisia(1971-1981)	1971-1980	3.86%	N	N	Y
Syria(1963-1970)	1963-1969	3.82%	Y	Y	Y
North Korea(1966-2004)	1970-2003	3.75%	N	Y	-
Peru(1950-1956)	1950-1955	3.73%	Y	N	-
Pakistan(1977-1985)	1977-1984	3.70%	Y	Y	Y
UAE(1971-2004)	1971-2003	3.70%	N	N	-

Notes: "Years of Observations" indicate the period for which the annual economic growth rate is calculated. Robustness 1 is "Y" if the regime's growth rate minus the country average is above the 80 percentile of the distribution; "N" otherwise. Robustness 2 is "Y" if the regime's growth rate minus the average among regimes in the same initial income quintile is above the 80 percentile; "N" otherwise. Robustness 3 is "Y" if the growth rate during the 3-year period preceding the regime is positive; "N" if negative; and "-" either if the regime lasted 10 years or longer or if there is no data on GDP for the preceding period.

regimes in Table 4.2 are above the 80th percentile. As a result, the convergence effect is removed from each regime's performance measure.[32] Finally, we discount a regime's success if it does not survive ten years or longer *and* if it follows a three-year period of negative growth (i.e. $Y_s - Y_{s-3} < 0$), because such a regime can perform well simply due to a "reconstruction" effect.[33]

The three columns to the right in Table 4.2 show the results from these three robustness checks. Among the 35 successful autocracies, 21 survive all the robustness checks that are applicable. The first robustness check turns out to be tough for East Asian autocracies since these countries grew consistently over time. Notwithstanding, China since 1976, South Korea in the 1980s, Thailand in the 1960s, and Indonesia since 1967 survive this test, proving to be very successful autocracies.

4.4.2 Autocracies Successful in Human Development

We now turn to human development. To measure success in this sphere, we first remove the effect of real GDP per capita by obtaining the residuals from the following equation estimated for each cross-section of countries in year t:

$$H_t = \alpha + \beta Y_t + \gamma (Y_t)^2 + \varepsilon_t, \tag{4.6}$$

where H_t is either life expectancy at birth in year t, obtained from *World Development Indicators* (September 2006 edition), or the gross primary school enrollment ratio in year t obtained from UNESCO Institute for Statistics (through the EdStats web site maintained by the World Bank).[34] We include the squared term of per capita income as a regressor because health and education exhibit a strong non-

[32] Grouping regimes into ten or twenty categories according to initial income instead to remove the convergence effect does not yield substantially different results.

[33] Note that this procedure is not applicable to regimes for which Y_{s-3} is not available in the data.

[34] For life expectancy, years 1960, 1962, 1967, 1970, 1972, 1977, 1980, 1982, 1985, 1987, 1990, 1992, 1995, 1997, 2000, 2002, 2003, and 2004 are chosen because data for a sizable number of countries is available for these years. For primary school enrollment ratio, years 1970, 1975, 1980, 1985, 1990-1996, and 1999-2004 are chosen for the same reason. For Taiwan, we use data taken from the 1987 (for health), 1994 (for education), and 2005 (for both) issues of *Statistical Yearbook of the Republic of China.*

linear relationship with income in a cross-section of countries.[35] We can interpret the residuals as partly reflecting government efforts to promote human development through public health interventions and developing schooling systems.

We average the residuals for each regime and calculate the 80th percentile of its distribution among all regimes (307 for health and 275 for education).[36] We also perform the first of the three robustness checks that we conducted for economic performance (i.e. removing "country fixed effects"). Tables 4.3 and 4.4 list successful autocracies in terms of health and education, respectively. Communist regimes in China, Cuba, Poland, Romania, and Vietnam appear in these tables. For health, regimes in the Middle East and North Africa enter the list (Algeria, Iraq, Jordan, Morocco, Syria, Tunisia) while the list for education includes a number of African regimes.

Figures 4.2 and 4.3 show the distributions of the mean residuals across democratic and autocratic regimes for health and education, respectively. Figure 4.2 confirms the finding in Chapter 2 that democracies have higher life expectancy than autocracies conditional upon income per capita. In addition, both figures show that the performance of autocracies is more heterogeneous than that of democracies for human development.[37]

4.4.3 Robustness

In order to identify autocracies that are successful in at least two dimensions of performance among the three (economic growth, health production, and education), we assign the score of success to each regime which is equal to the number of the league tables in which a regime appears. If a regime passes all the applicable robustness check in each table, one more point is added to the score in each case.

[35]Preston (1975) finds this non-linear relationship for health. It turns out that a similar non-linear relationship can be found for primary school enrollment.

[36]In calculating the average residual for each regime, we exclude the residuals in the first year of each regime because they may reflect political instability caused by regime change or the achievement by the previous regime.

[37]The lower tail of the distribution for democracies in Figure 4.2 (below -15 years) only includes two regimes: South Africa (since 1994) at -19.3 years and Botswana (since 1997) at -30 years, both of which suffer severely from HIV epidemics.

Table 4.3: Autocracies Successful in Health Production

Regime	Years of Observations	Conditional Life Expectancy	Robustness	Economic Success
Cuba(1961-1976)	1970-1972	17.48	Y	N
Romania(1948-1977)	1960-1972	17.48	Y	Y
Taiwan(1949-1975)	1960-1972	16.34	Y	Y
China(1969-1976)	1970-1972	13.89	N	Y
Poland(1947-1980)	1970-1977	12.68	Y	Y
China(1976-2004)	1977-2004	12.43	N	Y
Paraguay(1954-1967)	1960-1962	12.28	Y	N
Syria(1970-2000)	1972-1997	11.89	N	N
Azerbaijan(1998-2004)	2000-2003	11.83	N	Y
Vietnam(1976-2004)	1990-2003	11.49	N	Y
North Korea(1966-2004)	1970-2003	11.35	N	Y
Cuba(1977-2004)	1980-2003	11.22	N	N
Panama(1969-1978)	1970-1977	11.03	Y	N
Thailand(1958-1968)	1960-1967	10.69	Y	Y
Taiwan(1975-1987)	1977-1985	10.08	Y	Y
Jordan(1992-2004)	1995-2003	9.67	Y	N
Morocco(1998-2004)	2000-2003	8.73	Y	N
Paraguay(1967-1989)	1970-1987	8.49	N	N
Kyrgyzstan(1991-2004)	1995-2002	8.09	N	N
Greece(1967-1974)	1970-1972	7.88	Y	Y
South Korea(1973-1981)	1977-1980	7.80	Y	Y
Chile(1973-1981)	1977-1980	7.67	Y	N
Uzbekistan(1991-2004)	1997-2003	7.58	N	N
Spain(1939-1975)	1960-1972	6.80	Y	Y
Morocco(1992-1998)	1995-1997	6.79	Y	N
Syria(1963-1970)	1967	6.39	N	Y
Portugal(1930-1974)	1960-1972	6.15	Y	Y
Tunisia(1987-1993)	1990-1992	6.08	N	N
Algeria(1995-2004)	1997-2003	6.00	Y	N
Iraq(1979-2003)	1980-1997	5.85	N	N
Tunisia(1993-2002)	1995-2000	5.82	N	N

Notes: "Years of Observations" indicate the first and last years of observations on life expectancy at birth for each regime. "Conditional Life Expectancy" is the number of years in life expectancy at birth unexplained by the Preston curve (the quadratic function of per capita real GDP). "Robustness" is "Y" if the regime is above the 80 percentile of the distribution of conditional life expectancy minus the country average; "N" otherwise. "Economic Success" is "Y" if the regime appears in Table 4.2; "N" otherwise.

Table 4.4: Autocracies Successful in Education

Regime	Years of Observations	Conditional Enrollment Ratio	Robust-ness	Economic Success
Equatorial Guinea(1969-1993)	1990	81.55	Y	N
Congo-Brazzaville(1963-1979)	1970-1975	57.44	Y	N
Congo-Brazzaville(1979-1991)	1980-1990	50.68	Y	N
Cuba(1961-1976)	1970-1975	48.13	Y	N
Brazil(1965-1974)	1970	42.25	Y	Y
Uganda(1996-2004)	1999-2003	40.87	Y	N
China(1969-1976)	1970-1975	38.01	N	Y
Romania(1948-1977)	1970-1975	34.27	Y	Y
Madagascar(1975-1991)	1980-1990	32.39	Y	N
Mongolia(1952-1990)	1970-1985	31.72	Y	N
China(1976-2004)	1980-2004	30.98	N	Y
Panama(1969-1978)	1970-1975	29.78	Y	N
Spain(1939-1975)	1970	29.58	Y	Y
Lesotho(1973-1986)	1975-1985	29.40	N	N
Peru(1968-1976)	1970-1975	28.87	N	N
Philippines(1972-1981)	1975-1980	28.59	N	N
Togo(1979-1991)	1980-1990	28.12	N	N
Laos(1975-2004)	1980-2003	27.62	N	N
Equatorial Guinea(1996-2004)	1999-2002	26.74	N	Y
Mexico(1930-1977)	1970-1975	25.41	Y	N
South Korea (1973-1981)	1975-1980	24.98	Y	Y
Ecuador(1972-1979)	1975	24.60	N	Y
Gabon(1991-2004)	1999-2004	24.52	N	N
Dominican Republic(1966-1978)	1970-1975	24.41	Y	N
Mexico(1977-1988)	1980-1985	23.96	Y	N
Zimbabwe(1987-2000)	1990-1999	23.77	N	N
Tunisia(1981-1987)	1985	23.77	Y	N
Indonesia(1967-1998)	1970-1996	23.64	N	Y
Chile(1973-1981)	1975-1980	23.15	Y	N
Togo(1993-2004)	1994-2004	22.77	N	N
Paraguay(1967-1989)	1970-1985	22.29	N	N
Vietnam(1976-2004)	1990-2003	22.13	N	Y
Cameroon(1966-1972)	1970	21.82	Y	N
Syria(1970-2000)	1975-1999	21.03	N	N

Notes: "Years of Observations" indicate the first and last years of observations on gross primary school enrollment ratio for each regime. "Conditional Enrollment Ratio" is the percentage points in gross primary school enrollment ratio unexplained by the quadratic function of per capita real GDP. "Robustness" is "Y" if the regime is above the 80 percentile of the distribution of conditional enrollment ratio minus the country average; "N" otherwise. "Economic Success" is "Y" if the regime appears in Table 4.2; "N" otherwise.

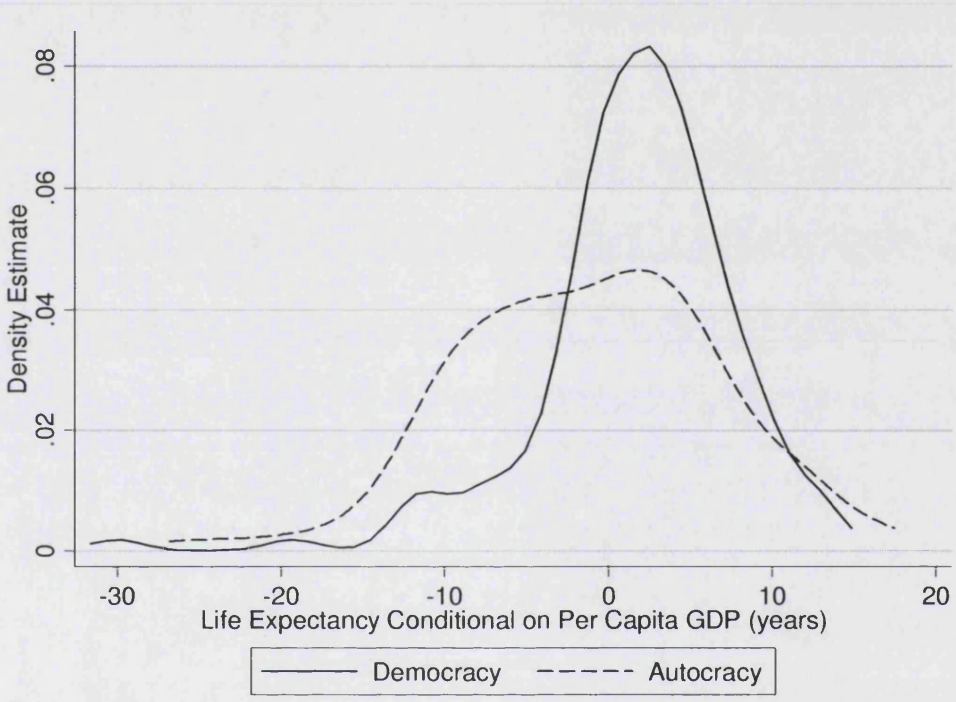

Figure 4.2: **Health Performance Distributions among Democracies and Autocracies**

Sources: World Development Indicators (September 2006), Penn World Table 6.2, Statistical Yearbook of the Republic of China (1987, 2005), and POLITY IV (version 2004)

Notes: See Figure 4.1.

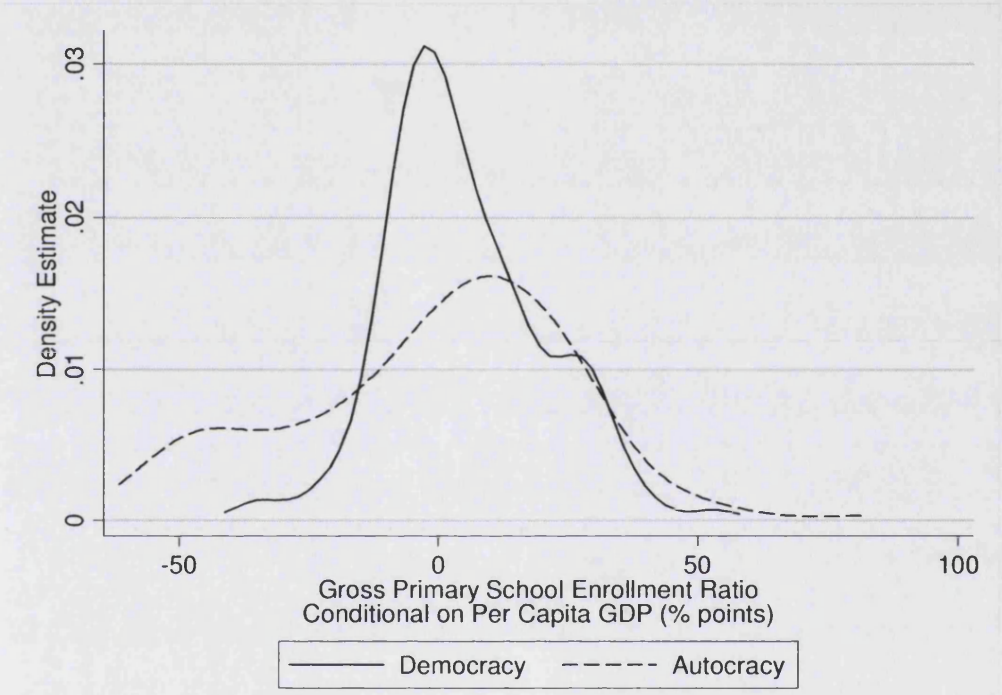

Figure 4.3: **Education Performance Distributions among Democracies and Autocracies**

Sources: UNESCO Institute of Statistics, Penn World Table 6.2, Statistical Yearbook of the Republic of China (1994, 2005), and POLITY IV (version 2004)

Notes: See Figure 4.1.

The highest score is, therefore, six. We choose four as the cut-off because this ensures success in at least two dimensions and at least one robust success. Table 4.5 shows the list of autocracies whose score is four or higher. The list includes dictatorships in southern Europe (Greece, Portugal, and Spain), communist regimes in China, Cuba, Poland, and Romania, and military dictatorships in Latin America (Brazil, Chile, and Panama) and in East Asia (South Korea and Thailand).

Table 4.5: Core Set of Successful Autocracies

Regime	Score	Economic Growth		Health		Education	
		Success?	Robust?	Success?	Robust?	Success?	Robust?
Romania(1948-1977)	6	Y	Y	Y	Y	Y	Y
Spain(1939-1975)	6	Y	Y	Y	Y	Y	Y
South Korea(1973-1981)	5	Y	N	Y	Y	Y	Y
Brazil(1965-1974)	4	Y	Y	N	-	Y	Y
Chile(1973-1981)	4	N	-	Y	Y	Y	Y
China(1976-2004)	4	Y	Y	Y	N	Y	N
Cuba(1961-1976)	4	N	-	Y	Y	Y	Y
Greece(1967-1974)	4	Y	Y	Y	Y	N	-
Panama(1969-1978)	4	N	-	Y	Y	Y	Y
Poland(1947-1980)	4	Y	Y	Y	Y	N	-
Portugal(1930-1974)	4	Y	Y	Y	Y	N	-
Thailand(1958-1968)	4	Y	Y	Y	Y	-	-

Notes: For each performance measure (Economic Growth, Health, Education), "Success?" is "Y" if the regime's performance is above the 80 percentile, "N" if not, and "-" if data is unavailable. For Economic Growth, "Robust?" is "Y" if the regime does not fail to pass the three robustness checks shown in Table 4.2, "N" if it does, and "-" if "Success?" is "N". For Health and Education, "Robust?" is "Y" if the regime passes the robustness check of subtracting the country average (see Tables 4.3 and 4.4), "N" if it does not, and "-" if "Success?" is "N". "Score" is calculated as the number of "Y" in each row.

Below, we check the robustness of this list to alternative definitions of autocratic regimes.

Definition of Regimes

Our definition of a "regime" entirely depends on the coding in the Polity data base. As the original aim of the Polity data set is to analyze the duration of regimes (see Marshall and Jaggers 2005, p. 3), we have much confidence in the coding of regime change timing in the data set. However, defining the beginning and end of regimes in a different way may yield a different list of successful autocracies. To check this possibility, we use an alternative definition of regimes. We first divide years for each country between democratic and autocratic periods according to the Polity variable as we did above. For autocratic periods, we then divide them into different regimes

if chief executives of government are different according to the Archigos data set (version 2.5).[38] In other words, an autocratic regime terminates either if a country is democratized or if a different person assumes executive power. Consequently, each autocratic regime now represents one dictator. For a democratic period, we treat it as one regime, because leadership changes are so frequent in democracies that many democratic regimes would not survive five full calendar years or longer if we divided them by leadership changes.

With this definition of a regime, we conduct exactly the same analysis as in the previous subsections. Table 4.6 lists dictators under whose rule annual economic growth exceeds the 80th percentile of the growth distribution among all regimes. The table also reports whether human development performances are above the 80th percentile of the distribution and whether each autocrat passes the robustness checks. The majority of successful autocratic regimes identified in Table 4.5 also appear in this table and perform well in health and/or education, too. Brazil (1965-74) and Thailand (1958-68) do not appear here because both regimes have relatively frequent leadership changes and are therefore split into multiple regimes of less than five full calendar years. Chile (1973-81) and Cuba (1961-76) are dropped because these regimes are part of a dictator's long-lived rule (Pinochet and Castro) and these dictators perform less successfully during the rest of their rule.

As our theory in Section 4.3 emphasizes the role of leadership changes under the fixed parameters of regime characteristics, we prefer the definition of regimes according to the authority characteristics coded by the Polity data set, which allows leadership changes to happen within each autocratic regime. However, Table 4.6 shows that the definition of regimes does not affect the list of successful autocratic regimes substantially.

Definition of Democracy

We define democracies as regimes with their Polity score being positive. As Fearon (2006) argues, however, this definition allows some dubious cases to be classified

[38] Jones and Olken (2007) use this dataset, which is downloadable at Hein Goemans's website: http://mail.rochester.edu/~hgoemans/data.htm.

Table 4.6: Successful Autocrats

Country	Years	Name of Autocrat	Annual Growth	Robust for Growth?	Health		Education	
					Success?	Robust?	Success?	Robust?
Rwanda	1994-2004	Paul Kagame	10.19%	N	N	-	N	-
China	1980-1997	Deng Xiaoping	8.51%	Y	Y	Y	Y	N
Equatorial Guinea	1969-1979	Macias Nguema	8.07%	Y	N	-	-	-
Liberia	1997-2003	Charles Taylor	7.94%	Y	N	-	N	-
Greece	1967-1973	Papadopoulos	7.90%	Y	Y	Y	N	-
South Korea	1972-1979	Park Chung Hee	7.74%	Y	Y	Y	Y	Y
Belarus	1995-2004	Lukashenko	7.23%	N	N	-	N	-
China	1997-2003	Jiang Zemin	7.20%	Y	Y	N	Y	N
Portugal	1968-1974	Caetano	7.03%	Y	Y	Y	N	-
Equatorial Guinea	1979-2004	Nguema Mbasogo	7.02%	N	N	-	Y	N
South Korea	1980-1987	Chun Doo Hwan	6.61%	Y	N	-	N	-
Taiwan	1978-1988	Chiang Ching-Kuo	6.25%	N	Y	N	N	-
Iraq	1968-1979	Hassan Al-Bakr	6.17%	Y	N	-	N	-
Swaziland	1968-1982	Subhuza II	6.14%	Y	N	-	N	-
Taiwan	1950-1975	Chiang Kai-shek	5.98%	N	Y	Y	-	-
Nicaragua	1947-1956	Anastasio Somoza Garcia	5.91%	Y	-	-	-	-
North Korea	1948-1994	Kim Il-Sung	5.83%	Y	Y	N	-	-
Spain	1939-1975	Franco	5.77%	Y	Y	Y	Y	Y
Singapore	1965-1990	Lee Kuan Yew	5.77%	N	N	-	N	-
Poland	1970-1980	Gierek	5.76%	Y	Y	Y	N	-
Romania	1965-1989	Ceausescu	5.68%	Y	Y	N	Y	Y
Vietnam	1991-1997	Do Muoi	5.55%	N	Y	N	Y	Y
Portugal	1932-1968	Salazar	5.01%	N	Y	Y	-	-
Venezuela	1950-1958	Perez Jimenez	4.93%	Y	-	-	-	-
Qatar	1995-2004	Amad Al Thani	4.87%	Y	N	-	N	-
Bhutan	1972-1998	Jigme Singye Wangchuck	4.83%	N	N	-	-	-
Mexico	1976-1982	Lopez Portillo	4.63%	Y	N	-	Y	Y
Indonesia	1966-1998	Suharto	4.30%	N	N	-	Y	N
Iran	1989-1997	Rafsanjani	4.17%	Y	N	-	N	-
Congo-Brazzaville	1969-1977	Ngouabi	4.16%	Y	N	-	Y	Y
Iran	1955-1979	Mohammad Reza	4.01%	N	N	-	N	-
Pakistan	1977-1988	Zia	3.78%	Y	N	-	N	-
Nigeria	1966-1975	Gowon	3.73%	Y	N	-	N	-
Peru	1950-1956	Odria	3.73%	N	-	-	-	-
UAE	1971-2004	An-Nahayan	3.70%	N	N	-	N	-
Panama	1968-1981	Torrijos Herrera	3.68%	N	Y	Y	Y	Y
Mexico	1952-1958	Ruiz Cortines	3.65%	N	-	-	-	-

Notes: Included in the list are autocrats under whose rule annual growth rate exceeds the 80 percentile of the distribution. "Years" indicate the period in which an autocrat rules the country non-democratically. "Robust for Growth?" is "Y" if an autocrat's rule does not fail to pass the three robustness checks described in the note for Table 4.2. For columns titled Health and Education, see notes for Table 4.5.

as democracies. It also does not strictly coincide with the presence of regularized contest for executive power as our model characterizes democracy. Table 4.7 shows the list of regimes whose Polity score is between 1 and 5 inclusive and whose growth rate is above the 80th percentile of the distribution of all regimes. Ten more regimes now enter the league table for economic growth. Among them, South Korea (1963-1972) and Greece (1949-1967) join the core set of successful autocracies in Table 5.

Table 4.7: Successful Regimes with their Polity Score between 1 and 5

Regime	Annual Growth	Robust for Growth?	Health		Education	
			Success?	Robust?	Success?	Robust?
South Korea(1963-1972)	6.57%	Y	Y	Y	Y	Y
Greece(1949-1967)	5.33%	Y	Y	Y	-	-
Pakistan(1962-1969)	4.66%	Y	N	-	-	-
Malaysia(1971-1995)	4.63%	N	N	-	N	-
Turkey(1954-1960)	4.55%	Y	-	-	-	-
France(1958-1969)	4.27%	Y	N	-	-	-
Cambodia(1998-2004)	4.14%	Y	N	-	Y	N
Brazil(1947-1958)	3.77%	N	-	-	-	-
Sri Lanka(1982-2001)	3.62%	N	Y	N	Y	N
Thailand(1978-1988)	3.59%	N	Y	N	N	-

Notes: Listed in the table are regimes with their Polity score between 1 and 5 inclusive whose annual economic growth exceeds the 80 percentile of the distribution. See also notes for Table 4.5 for the last five columns in the table.

We further check the robustness of our definition of democracy to the use of a completely different democracy data set, the one by Przeworski et al. (2000).[39] We define a regime as a period in which three aspects of political institutions remain the same: (1) how the chief executive is elected (directly, indirectly, or not elected by popular elections); (2) how the legislature is elected (elected by popular elections, not elected, non-existent); and (3) the number of legal political parties (more than one, one, none).[40] A regime is democratic if all of the following five conditions are met: (1) the chief executive is elected directly or indirectly; (2) the legislature is elected by popular elections; (3) there is more than one legal political party; (4) the current chief executive will not establish non-party or one-party rule or unconstitutionally

[39]The dataset was obtained from Jose Cheibub's website in December, 2005.

[40]These three aspects correspond to variables EXSELEC, LEGSELEC, and PARTY in their dataset, respectively.

close legislature in subsequent years; and (5) there was, or will be, partisan power alternation via elections.[41] Otherwise a regime is autocratic.

Table 4.8 provides the list of successful autocracies when we define democratic and autocratic regimes in this way. Since Przeworski et al. (2000)'s data ends in 1990, all the autocracies since the 1990s do not appear in this table.[42] Autocracies in Romania, Spain, South Korea, China, Panama, Portugal, and Thailand appear in this table as well though, except for South Korea, the robustness of their good performances is more tenuous than in Table 4.5. Brazil and Greece drop because these two regimes are split into multiple autocracies according to Przeworski et al. (2000)'s coding. Chile and Poland drop because the less successful period of autocracy (the 1980s) is now integrated into the same regime. Cuba drops due to the lack of Przeworski et al. (2000)'s coding.

The last three columns in Table 4.8 show three institutional features of these successful autocracies according to the coding by Przeworski et al. (2000). Successful autocracies do not seem to share institutional characteristics in terms of the way executive office and legislature seats are filled and the number of legal political parties.

4.4.4 Correlates of Successful Autocracies

In what kind of countries do successful autocracies tend to emerge? In this subsection, we seek exogenous characteristics of countries that are correlated with the incidence of successful autocracies. It turns out that exogenous country characteristics often used in the literature to explain socioeconomic performances, on the whole, do not seem to explain (in a statistical sense) the emergence of successful autocracies.

We estimate the following probit regression for the sample of autocratic regimes (defined by the Polity data set), to see if any country characteristics predict suc-

[41] See Chapter 1 of Przeworski et al. (2000) for details.

[42] The updated versions of Przeworski et al. (2000)'s data by Boix and Rosato (2001) or by Cheibub and Gandhi (2004) do not provide information on disaggregated aspects of political institutions. Therefore, we cannot exploit heterogeneity across autocracies in terms of institutional characteristics.

Table 4.8: Successful Autocracies defined by Przeworski et al. (2000)

Regime	Annual Growth	Robust for Growth?	Health		Education		Executive Selection	Legislature Selection	Number of Parties
			Success?	Robust?	Success?	Robust?			
Botswana(1966-1990)	7.90%	N	Y	N	N	-	Indirect	Elective	2+
Ecuador(1972-1979)	7.73%	Y	N	-	N	-	Non-elective	No legislature	2+
South Korea(1981-1988)	7.67%	Y	N	-	N	-	Direct	Elective	1
South Korea(1973-1980)	7.41%	Y	Y	Y	Y	Y	Indirect	Elective	2+
Jordan(1955-1966)	7.21%	Y	N	-	N	-	Non-elective	Elective	0
Singapore(1965-1981)	7.05%	N	N	-	N	-	Indirect	Elective	1
Iraq(1963-1980)	6.77%	Y	Y	N	N	-	Non-elective	No legislature	1
South Korea(1963-1972)	6.57%	N	Y	Y	Y	Y	Direct	Elective	2+
Taiwan(1952-1990)	6.20%	N	Y	N	N	-	Indirect	Elective	2+
Portugal(1951-1974)	5.60%	Y	N	-	N	-	Indirect	Elective	1
Romania(1961-1990)	5.31%	N	Y	N	N	-	Non-elective	Elective	1
China(1961-1990)	5.18%	N	Y	N	Y	N	Non-elective	Elective	1
Spain(1951-1977)	5.01%	N	N	-	N	-	Non-elective	Non-elective	1
Niger(1974-1983)	4.96%	N	N	-	N	-	Non-elective	No legislature	0
Morocco(1956-1963)	4.85%	Y	N	-	N	-	Non-elective	No legislature	2+
Thailand(1957-1969)	4.71%	N	Y	Y	N	-	Non-elective	No legislature	0
Togo(1961-1967)	4.70%	Y	N	-	N	-	Indirect	Elective	1
Panama(1978-1984)	4.67%	Y	Y	N	N	-	Indirect	Elective	0
Pakistan(1962-1969)	4.66%	Y	N	-	N	-	Indirect	Elective	2+
Singapore(1981-1990)	4.35%	N	N	-	N	-	Indirect	Elective	2+
Malaysia(1971-1990)	4.31%	N	Y	N	N	-	Indirect	Elective	2+
Iran(1963-1979)	4.28%	N	N	-	N	-	Non-elective	Elective	1
Uruguay(1976-1982)	4.11%	Y	N	-	N	-	Non-elective	No legislature	0
Indonesia(1971-1990)	4.02%	N	N	-	Y	N	Indirect	Elective	1
Lesotho(1970-1984)	3.95%	N	N	-	Y	N	Non-elective	Non-elective	1
Philippines(1972-1978)	3.93%	N	N	-	Y	Y	Direct	No legislature	0
Syria(1963-1970)	3.82%	Y	Y	N	N	-	Non-elective	No legislature	1
Egypt(1979-1990)	3.34%	N	N	-	N	-	Direct	Elective	2+
Successful in Human Development only									
Panama(1969-1978)	2.59%	-	Y	Y	Y	Y	Non-elective	No legislature	0
Togo(1979-1990)	-3.76%	-	Y	Y	Y	Y	Direct	Elective	1

Notes: Listed in the table are autocracies, as defined by Przeworski et al. (2000), whose annual economic growth exceeds the 80 percentile of the distribution. Also included are autocracies successful in human development only (the last two rows). "Executive Selection" indicates how the chief executive is chosen (Non-elective: assuming power without elections; Indirect: elected by legislature; Direct: elected by popular votes); "Legislative Selection" indicates how legislative members are chosen (No legislature: there is no legislature; Non-elective: appointed by the executive or hereditary succession; elective: elected by popular votes); "Number of Parties" indicates the number of legal political parties. These three columns are obtained from Przeworski et al. (2000). For the rest of the columns, see notes for Table 4.5.

cessful autocracies:

$$\Pr(SUCCESS_{ic}^{k} = 1) = \Phi(\alpha + \mathbf{X}_c\beta + \mathbf{Z}_{ic}\gamma), \tag{4.7}$$

where $SUCCESS_{ic}^{k}$ is 1 if an autocratic regime i in country c appears in the list in Table $k \in \{2, 3, 4, 5\}$ and 0 otherwise, $\Phi(\cdot)$ is the cumulative distribution function of the standard normal distribution, α is a constant, and $\mathbf{Z}_{ic}$ is a vector of controls including region dummies[43] and dummies for decades (1960s, 1970s, 1980s, 1990s) in which regime i emerges. $\boldsymbol{X}_c$ is a vector of exogenous characteristics of country c that are known as determinants of the quality of government and institutions in the literature (ethnic fractionalization, legal origins, European settlers' mortality).

Table 4.9 shows the results from this analysis. Columns (1) to (3) look at success in economic growth ($k = 2$). Column (1) shows that ethnic fractionalization, which Alesina et al. (2003) identify as a significant determinant of economic growth, does not predict the emergence of successful autocracies. Column (2) shows that European settlers' mortality, which Acemoglu et al. (2001) argue affects the degree of secure property rights and thus the level of economic development today, does not predict the economic success of autocracies, either.

In column (3), we deal with a concern that economically successful autocracies simply reflect oil booms. Autocratic regimes in oil producing countries like Ecuador, Equatorial Guinea, Gabon, Indonesia, Iran, Iraq, UAE, and Venezuela appear in Table 4.2. It may be the case that these successful autocracies simply coincide with periods of high oil prices. We first identify net oil exporting countries in 2003 according to *International Energy Annual 2004* (Table 3.1).[44] Next, we create a dummy variable which is equal to one if a country's net oil export is more than 100 barrels per day.[45] We also obtain the world crude oil prices (in US dollars per

[43]East Asia and Pacific, Eastern Europe and Central Asia, South Asia, Middle East and North Africa, Sub-Saharan Africa, and Latin American and the Caribbean (with Western Europe - Greece, Portugal, and Spain - omitted). We follow the World Bank's classification of regions.

[44]See http://www.eia.doe.gov/iea. We calculate net oil exports by subtracting the sum of "crude oil imports" and "total imports of refined petroleum products" from the sum of "crude oil exports" and "total exports of refined petroleum products".

[45]We do not use time-variant oil exporter dummies because oil export data does not date back to the 1950s. The amount of oil export is also likely to be endogenous over time.

Table 4.9: Exogenous Country Characteristics and Successful Autocracy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable:	Growth	Growth	Growth	Health	Health	Education	Education	Core	Core
Ethnic Fractionalization	-0.12			-0.54**		-0.01		-0.35	
	[0.16]			[0.25]		[0.19]		[0.47]	
Log European Settlers' Mortality		-0.0270							0.0377
		[0.0336]							[0.1599]
French Legal Origin					-0.10		0.12	0.89***	
					[0.25]		[0.09]	[0.11]	
Socialist Legal Origin					0.52*		0.40	0.98***	
					[0.28]		[0.30]	[0.02]	
German Legal Origin					0.59***		-0.16	0.78***	
					[0.15]		[0.11]	[0.08]	
Oil Price Boom			-0.02**						
			[0.01]						
Constant	YES	YES	YES	YES	YES	YES	YES	YES	YES
Decade dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	176	74	170	89	90	148	149	38	19
Pseudo R^2	0.25	0.15	0.30	0.19	0.22	0.16	0.20	0.32	0.12

Notes: Reported are the marginal effect for continuous regressors and the discrete change in the probability of success for dummy regressors (legal origins), both evaluated at the mean of all regressors. Robust standard errors are reported in brackets. The unit of observation is an autocratic regime. The dependent variables are: a dummy for success in economic growth (included in Table 4.2) in columns (1)-(3); a dummy for success in health production (included in Table 4.3) in columns (4)-(5); a dummy for success in education (included in Table 4.4) in columns (6)-(7); and a dummy for being included in the core set of successful autocracies (Table 4.5) in columns (8)-(9). "Decade dummies" refer to dummies indicating the decade in which the regime begins (1960s, 1970s, 1980s, 1990s, with decades before 1960 omitted). "Region dummies" include East Asia and Pacific, Eastern Europe and Central Asia, South Asia, Middle East and North Africa, Sub-Saharan Africa, and Latin America and the Caribbean (with Western Europe omitted). Depending on the specification, some dummies perfectly predict the dependent variable, which causes reductions in the number of observations. * significant at 10%; ** significant at 5%; *** significant at 1%.

barrel) from *International Financial Statistics* (March 2007),[46] and deflate them by the World Bank's Manufactures Unit Value Index (100 in 1990).[47] We then calculate the average deflated oil price for each autocratic regime and subtract the average deflated oil price during the period between 1960 and 2004 to measure the extent to which each autocratic regime enjoys an oil price boom. Finally, we interact the oil exporter dummy with the regime-specific oil price deviation from the 1960-2004 average, and replace $\mathbf{X}_c$ in equation (4.7) with this interaction term. If the coefficient on this interaction term is positive, then successful autocracies simply reflect the oil price boom that these regimes enjoy. Column (3) shows that the coefficient is significantly *negative*, suggesting that oil price booms actually make autocracies less likely to be successful.[48] If we interpret oil export revenues as the source of distributional conflict (a large T in our model), this finding is consistent with our theory though we cannot exclude alternative explanations such as Caselli (2006).[49]

In columns (4) and (5), we look at success in health production ($k = 3$). La Porta et al. (1999) find that ethnic fractionalization and the French legal origin are positively correlated with infant mortality. Column (4) shows that autocratic regimes successful in health production tend to be in countries with lower ethnic fractionalization. Thus the performance of autocracies in terms of health partly reflects the effect of ethnic homogeneity. However, as a low value of the Pseudo R^2 indicates, it is not the whole story. Column (5) shows that the French legal origin does not explain success of autocracies in health production. Countries with the socialist legal origin tend to have autocracies successful in terms of health. This result may be in line with our theory to the extent that communist regimes tend

[46]The average prices of UK Brent (light), Dubai (medium), and West Texas Intermediate crude oil (line number 00176AAZZF).

[47]See http://go.worldbank.org/VDQ5AA3VP0. The Index measures the price of developing country imports of manufactures in U.S. dollar terms. We follow Deaton (1999), who uses this index to deflate commodity export price indices.

[48]The standard deviation of the deflated oil price is 12.4 US dollars per barrel. Therefore, one standard deviation of the oil price decreases the probability of economic success by 24.8 percentage points for autocracies in oil-exporting countries.

[49]If we choose the cut-off of 500 barrels per day to create the oil exporter dummy, the coefficient on the interaction term becomes larger in magnitude. If we choose the cut-off of 0 barrel per day instead, the coefficient is no longer significant. However, a small amount of oil exports is unlikely to push up GDP per capita substantially during the period of oil price booms.

to have a strong selectorate. The positive correlation of German legal origin and success in health is difficult to interpret because only regimes in South Korea and Taiwan have German legal origin in the sample.

The dependent variable in columns (6) and (7) is success in education ($SUCCESS^4_{ic}$). La Porta et al. (1999) also find that ethnic fractionalization and the French legal origin are negatively correlated with school enrollment. We do not find these two exogenous country characteristics are correlated with success in education among autocracies, either.[50]

Finally, columns (8) and (9) investigate whether the core set of successful autocracies identified in Table 4.5 have any particular characteristics ($k = 5$). Since the number of successful autocracies is very limited in these regressions, a large number of observations are dropped because some decade dummies and region dummies perfectly predict success. Neither ethnic fractionalization nor European settlers' mortality is significantly correlated with success. Compared to the British legal origin, countries with the French legal origin are *more* likely to see successful autocracies, contrary to the negative correlation between the French legal origin and the quality of government, found by La Porta et al. (1999). Countries with the socialist and German legal origins are also more likely to have successful autocracies than those with the British legal origin. Indeed, only Thailand has the British legal origin among the countries listed in Table 4.5.

A positive correlation between socialist legal origin and the likelihood of successful autocracy might seem counter-factual. Our theory implies that communist regimes are successful to the extent that the ideology of communism ensures the secure hold of power by the selectorate (typically top communist party officials). Perhaps communism encourages groups of citizens outside the regime to accept au-

[50]If we re-define $SUCCESS^k_{ic}$ for $k = 2, 3, 4$ by making it zero if regime i's success is not robust, results for economic and educational success do not substantially change. For health success, the coefficient on ethnic fractionalization is no longer significant. If we run OLS regressions with economic growth rates, conditional life expectancy or school enrollment ratio as the dependent variable, results for educational success do not change. Ethnic fractionalization and the French legal origin are now negatively correlated with economic growth and health performance, respectively. These results imply that aside from top performers, the negative effect of ethnic fractionalization on economic growth and that of the French legal origin on health outcomes persist among autocratic regimes. The correlation between the oil price boom and economic success and between ethnic fractionalization and health success, on the other hand, is no longer significant.

tocratic rules while opposition groups in dictatorships without any ideology find it hard to accept such rule and thus pose a significant threat to the selectorate. Alternatively, the presence of ideology such as communism may enhance coordination among members of the ruling group to establish an effective repression mechanism to suppress the opposition. Either way, our model does not predict that communism *per se* breeds success. The later years of Ceausescu's rule in Romania (see Section 4.5.1 below) is an example where a communist regime can be transformed into personal rule.

These results suggest that the previous literature on the quality of government and institutions cannot fully explain why some autocracies are successful in achieving high economic growth, better health, and better education. A theory to explain successful autocracies is necessary to make further progress. We now investigate how well institutional features identified in our model relate to cases of successful autocracy as identified by this empirical exercise.

4.5 Link to the Theory

The previous section identified the core set of successful autocracies. In this section, we link these autocracies to our theory in Section 4.3. We first provide several case studies of successful autocracies to motivate the institutional context suggested by our theory. Next, we provide evidence that autocracies are more likely to be successful if the rate of leadership change is high, which is consistent with our theory. Finally, we exploit the natural death of leaders as a natural experiment to see if the selectorate's grip on power is indeed secure in successful autocracies, as predicted by our theory.

4.5.1 The Selectorate in Successful Autocracies: Some Case Studies

A core idea in our model is the role of the selectorate in organizing leadership contests *within* regimes in successful autocracies. We begin by looking at five case studies

suggested by Table 4.5. Of these, we will argue that Brazil (1965-1974), China (1976-2004), and Romania (1948-1977) appear to be consistent with our theory. On the other hand, Spain (1939-1975) does not seem to match very well with our theoretical predictions. Finally, we consider South Korea (1973-1981). Although this does not seem to fit with our theory either, the advent of this autocratic regime can be explained by our theoretical framework.

Brazil (October 1965 - January 1974) According to the Polity data set, the Brazilian military dictatorship from 1964 to 1985 went through three regime changes in 1965, 1974, and 1982. Tables 4.2 and 4.4 reveal that the second phase was successful in economic development and primary school enrollment. During this period, Humberto Castelo Branco, Artur da Costa e Silva, and Emilio Grrastazu Medici were the chief executives (Presidents) according to the Archigos data set.

The *de facto* selectorate of this regime was the armed forces. The national legislature (Congress) had the formal right to elect President.[51] However, it was only allowed to rubber-stamp the sole presidential candidate presented by the military both when the presidential term for Castelo Branco came to an end in 1967 and when Costa e Silva was incapacitated due to a stroke in 1969. In both cases, top military officers chose a candidate behind whom the armed forces could be united (Skidmore 1988, pp. 18-21, 51-53; Stepan 1971, pp. 248-252).

The replacement of Castelo Branco in 1967 appears to be consistent with our theoretical prediction that the selectorate can oust a poorly-performing incumbent in a successful autocracy. Kaufman (1979, pp. 172-3) argues that Castelo Branco's economic policy resulted in only a moderate reduction in inflation and that the recession in the industrial southeast showed few signs of abating. Castelo Branco was determined to step down in 1967 (see Stepan 1971, p. 248), but he tried to nominate his successor and prevent Costa e Silva from assuming office (see Skidmore 1988, pp. 51-2). It appears that he failed to do so in part due to the unpopularity of his economic policies among military officers. Upon assuming presidency, Costa e

[51] *Keesing's Contemporary Archives*, pp. 21063, 21939, 23706.

Silva appointed Delfim Neto as finance minister, under whose economic management the Brazilian economy grew rapidly.

The presidential succession after the incapacitation of Costa e Silva also shows that the Brazilian armed forces' grip on power was secure. Although the Constitution stipulated that vice-president would succeed the incapacitated president, the military did not allow Vice President Pedro Aleixo, a veteran Congressman, to take office. Those outside the regime, including Congressmen, had no say in leadership selection.

This episode is consistent with our theory in that successful autocracies are those with the selectorate whose power is secure in the case of a leadership replacement.

China (since September 1976) Since the death of Mao Zedong, who had been Communist Party Chairman since the proclamation of People's Republic of China in 1949, China has been a stable autocratic regime according to the Polity data set. As Tables 4.2 to 4.4 show, the communist regime of China during this period has been successful in economic and human development (though success in human development is less spectacular than in Mao's era). According to the Archigos data set, Hua Guofeng, Deng Xiaoping, Jiang Zemin, and Hu Jintao were the chief executives under this regime.

Members of the Politburo of the Chinese Communist Party appear to correspond to the selectorate in our theory. Formally, the Party's leader (Party Chairman until 1982 and General Secretary afterwards) is elected by the Central Committee of the Party whose several hundreds members are in turn elected by the Party Congress. However, members of the Central Committee are *de facto* appointed by around 20 members of the Politburo.[52]

After the death of Mao Zedong, Hua Guofeng assumed party chairmanship by the Politburo's appointment.[53] During the subsequent years until his resignation as Party Chairman in June of 1981, Hua's power was gradually transferred to Deng Xioaping, apparently because the Politburo members were dissatisfied with Hua's

[52]See Lieberthal (2004, pp. 173-5) for the formal organizational structure of the Party.
[53]See *Keesing's Contemporary Archives*, pp. 28205-7 and 28719.

attempt to continue Mao's policies (Lieberthal 2004, pp. 125-7). This gradual power transfer paralleled with the replacement of Hua's supporters with Deng's in the Politburo membership.[54]

As Deng never assumed leadership formally, it is hard to tell whether members of the Politburo disciplined him during his rule. However, the selection of General Secretary of the Party does appear to have been in the hands of the Politburo. Hu Yaobang, Deng's designated successor and General Secretary since 1982, resigned in January of 1988, when several members of the Politburo were dissatisfied with his economic policies and tolerance on pro-democracy student protests.[55] Zhao Ziang, who succeeded Hu as General Secretary, was in turn dismissed by the Politburo for similar reasons in May of 1989.[56]

The handover of power from Deng to Jiang Zemin, who was appointed as General Secretary in June of 1989, took place gradually.[57] Jiang was formally re-elected as General Secretary by the Central Committee in October of 1992 and September of 1997. Given that Central Committee members are effectively appointed by the Politburo, the re-election of Jiang implies that the Politburo supported him. In November of 2002, Hu Jintao became General Secretary. Lieberthanl (2004, p. 156) notes that "Jiang reportedly tried to convince his colleagues to allow him to stay on as General Secretary". But he failed, indicating that members of the Politburo supported Hu's succession.

In every case of leadership succession over this period, the opposition to the Communist Party rule did not manage to participate in leadership selection. In our model's term, $\Gamma(\phi, \upsilon)$ was close to one because the opposition group is effectively dis-

[54]Deng's supporters (Chen Yun, Deng Yingchao, Hu Yaobang, and Wang Zhen) joined the Politburo in December of 1978 (*Keesing's Contemporary Archives*, p. 30488). Lieberthal (2004, p. 126) regards Wang Dongxing, Wu De, Ji Dengkui, and Chen Xilian as Politburo members supporting Hua. All of them resigned from the Politburo in February of 1980 (*Keesing's Contemporary Archives*, p. 30498).

[55]See the account by Ruan (1994, pp. 165-9, 175-6), who was Hu's friend.

[56]*Keesing's Record of World Events*, p. 36640. An immediate reason for Zhao's dismissal was his support for pro-democracy student protests in Tiananmen Square. However, Zhao's support had already waned since late 1988 due to his too radical economic reform causing inflation. Also, Zhao's sons were alleged to be corrupt businessmen in Guangdon Province. See Gilley (1998, pp. 129-31) and Lieberthal (2004, pp. 144-5).

[57]By the end of 1995, Deng was effectively incapacitated and no longer commented on policies (Gilley 1998, p. 288).

enfranchised ($\phi \approx 1$) and/or their voice counts little ($v \approx 0$). When Zhao Ziang was dismissed in May of 1989, for example, there had been student-led anti-government demonstrations in Beijing since April. The communist government, however, managed to stay in power by mobilizing the army to suppress the demonstrations (the Tiananmen Square massacre).[58]

Overall, China since 1976 fits well with our model of autocracy and case 1 of Proposition 1.

Romania (January 1948 - January 1977) Since the proclamation of People's Republic of Romania until Nicolae Ceausescu consolidated his personal rule, Romania's communist rule is coded as one regime by the Polity data set. According to the Archigos data set, Gheorghe Gheorghiu-Dej and Nicolae Ceausescu were the rulers during this period. As Tables 4.2 to 4.4 show, the regime's performance is impressive in all the three dimensions of development.

Top officials in the communist party are clearly the selectorate under this regime. At a meeting in October of 1945, the party's central committee secretaries agreed that Gheorghiu-Dej became general secretary, the top position to lead the party (Tismaneanu 2003, p. 121). At the central committee plenum in March of 1956, two members of the Politburo (Iosif Chisinevschi and Miron Constantinescu) openly challenged Gheorghiu-Dej's authority. When Gheorghiu-Dej died of lung cancer in March of 1965, members of the Politburo chose Ceausescu as his successor (*Ibid.*, pp. 185-6).

It appears that Gheorghui-Dej decided to promote industrialization after his Stalinist background became the source of criticism due to Khrushchev's Secret Speech, denouncing Stalinism, in 1956. In this context, the leadership challenge by Chisinevschi and Constantinescu, mentioned above, took place. Determined to promote industrialization, he even resisted Khrushcev's plan to transform Romania into the agricultural base in the Soviet bloc.[59]

[58] *Keesing's Record of World Events*, pp. 36587, 36640, 36720.

[59] See Tismaneanu (2003, pp. 142-180) for a series of events from the Secret Speech to the adoption of industrialization plans.

Ceausescu continued this effort of industrialization. By the time this centrally-planned industrialization caused economic problems in the late 1970s, however, Ceausescu managed to consolidate his power and established his personal cult, appointing his wife as the number two in the communist party hierarchy and promoting his son as heir-apparent.[60] The selectorate's grip on power appears to have become dependent on Ceausescu, unable to discipline his devastating economic policies in the 1980s.

Spain (April 1939 - November 1975) Franco ruled Spain during this period (from the end of the Civil War until his death). Although the regime began in 1939, the data that we used to identify Franco as an successful autocrat comes from the 1950s at the earliest.

We are unable to find any characteristics of Franco's regime consistent with our theory. The formal rule of leadership succession (Law of Succession), adopted in a popular referendum on July 6, 1947, stipulated that Spain was a monarchy which Franco would govern until his death and that Franco had the right to appoint his successor.[61] Therefore, there was no selectorate, at least formally.

Franco's regime supporters consist of *Falangists* (Spanish fascists), the military, the Catholic church, and monarchists. These groups might be seen as the selectorate, but there is little evidence that any of them seriously challenged Franco's leadership (Grugel and Rees 1997, pp. 30-43, 51-8). Franco's balancing act looks like the divide-and-rule tactic, which Acemoglu, Robinson, and Verdier (2004) identify as the source of long-lasting kleptocracy.

Given this personal-rule characteristics of the regime, Franco's flexibility on economic policies is remarkable. When the policy of an autarky and import-substitution industrialization ended up with government deficits, inflation, and current-account

[60]See Fischer (1989) for a series of events leading to the consolidation of Ceausescu's power. It is perhaps not just a coincidence that Ion Gheorghe Mauer and Emil Bondras, two members of the politburo instrumental to the appointment of Ceausescu as Gheorghiu-Dej's successor in 1965 (Tismaneanu 2003, pp. 185-6), voluntarily resigned from the politburo and died in office, respectively, in the mid-1970 (*Ibid.*, p. 193), after which Ceausescu's rule became out of control of any member of the communist party.

[61]See Payne (1987, pp. 372-5), Grugel and Rees (1997, pp. 42-3), and Fusi (1987, pp. 66-7) for the background of the adoption of the Law of Succession.

imbalances by the mid-1950s, culminating in strikes and student protests, Franco shuffled the cabinet, appointing two technocrats, Alberto Ullastres and Mariano Navarro Rubio, to economic ministers in 1957. When the two ministers proposed the abandonment of the autarky policy and the plan for macroeconomic stabilization, Franco accepted the proposal even though this was against Franco's ideology (Payne 1987, p. 470). We cannot relate this policy change to the selectorate's pressure on Franco. If any, there appears to have been the pressure from the opposition outside the regime—protesting workers and students in the 1950s. Weirdly enough, the logic of successful democracy in our model seems to apply here, if not through regularized elections but through strikes and protests. Alternatively, Franco might have been a good policy maker in the terms of our model.

South Korea (February 1973 - March 1981) According to the Polity data set, South Korean military dictatorship, initiated by a coup in 1961, went through four changes of authority characteristics (1963, 1972, 1973, 1981).[62] We have identified the fourth regime as the most successful.[63] During this period, Archigos identifies four leaders ruling the country: Park Chung Hee until his assassination in 1979, Choi Kyu Hah from 1979 to 1980, Park Chung Hun briefly in 1980, and Chun Doo Hwan from 1980, who continued to rule the country until 1988.

Formally, the selectorate was an electoral college, the *National Conference for Unification* (NCU), whose members were elected by popular votes on a non-partisan basis. The Constitution (proposed by Park Chung Hee and approved in a referendum in November of 1972) stipulated that the NCU would elect the President for six years with no term limits. Elections for the NCU took place in December of 1972 (5,876 candidates contested the 2359 seats with 225 unopposed in their constituencies) and in May of 1978 (boycotted by opposition parties), both followed by the re-election

[62]Park Chung Hee staged a military coup and became president in 1961; held multiparty presidential elections and won in 1963; disbanded the national legislature, banned political parties temporarily, and introduced the indirect presidential election by non-partisan electoral college (see below for more detail) in 1972; and held multiparty legislative elections for the two-thirds of the seats in 1973 (the remaining one-third is appointed by the president). In 1981, members of the electoral college were allowed to be affiliated with political parties.

[63]Table 4.6 shows that, if we define democracy as a regime with its Polity score larger than 5, the second phase (1963-1972) is also a successful autocracy.

of Park as President.[64] After Park's assassination, the NCU elected Choi Kyu Hah, who had been Prime Minister since 1975, as new President in December of 1979. After the resignation of Choi in August of 1980, the NCU elected Chun Doo Hwan as new President in the same month.[65] It is not entirely clear whether members of the NCU had any influence on leadership selection, however.[66]

Informally, the Korean CIA (KCIA), the regime's secret police organization, could have been the selectorate. It was the KCIA chief who assassinated Park in 1979. However, the assassin's predecessors as the KCIA chief were repeatedly purged by Park (Clifford 1998, pp. 80-90). There is little evidence that anyone within the regime credibly threatened to oust Park.

A threat does appear to have come from those outside the regime, especially the opposition party leader Kim Dae-Jung.[67] He ran for the presidency in the 1971 election, only narrowly defeated by Park, even though Park's export-led industrialization policy since the mid-1960s had been successful. This electoral result appears to have prompted Park to abolish multiparty direct presidential elections in 1972.[68] We can interpret this series of events in terms of our model. South Korea in the early 1970s could have been the case of high polarization where $(1-\pi)\Delta < \tau$. Although the economy grew rapidly and therefore the size of the pie to share among the population, T, became larger, workers did not benefit much from it due to wage suppression by the regime.[69] The opposition group, therefore, would never reward the incumbent's good behavior. Park's supporters including the business community—and Park himself if he was a good policy maker in the terms of our model—therefore preferred the autocratic regime in which the selectorate could discipline the incumbent (or Park as a good policy maker could keep choosing a good

[64] See *Keesing's Contemporary Archives*, pp. 25747, 29795).

[65] Chun Doo Hwan seized the control of the military in December of 1979 and imposed martial law in May 1980, shortly after which he became the head of an advisory body (consisting of military officers) to President Choi. See Clifford (1998, pp. 143-163).

[66] We are unable to find any scholarly research on the NCU, which Korea specialists appear to dismiss as a rubber-stamping organization.

[67] Clifford (1998, p. 86) notes that, according to a former KCIA director, Park feared two things: Kim Dae Jung and the U.S. Congress.

[68] Sohn (1989, pp. 31-2) quotes Park's remark on the 1971 electoral result: "... I have done my best to get rid of poverty. ... [D]o I deserve only this margin against Kim Dae Jung?"

[69] See the account on worker protests in the early 1970s by Sohn (1989, pp. 34-6).

policy without being ousted).

4.5.2 Turnover

Our theory predicts that autocracies are successful if the selectorate can credibly remove poorly-performing leaders. This implies that an autocratic regime with a high rate of leadership change is more likely to be successful on average than those with less turnover.[70]

To test this empirical implication, we obtain the number of leadership changes for each autocratic regime, from the Archigos data set.[71] We then calculate the number of leadership changes per year for each regime. The raw data support the idea that there are turnover differences in successful and unsuccessful autocracies (as identified in the base case of section 4.4.1 above). The probability of turnover in a successful autocracy is 13% compared to 7% in an unsuccessful autocracy (the difference being statistically significant at 5%). This implies that leaders in successful autocratic regimes spend on average seven and half years in office compared to nine years for unsuccessful autocratic regimes. Interestingly, this contrasts with a much higher rate of annual turnover of leaders (26%) in regimes classified as democracies implying an average leadership tenure of just over four years.

To examine this further, we estimate equation (4.7) where $\mathbf{X}_c$ is replaced with the number of leadership changes per year for regime i. Table 4.10 shows the estimated marginal effect of the rate of leadership changes. The dependent variable in column (1) is a dummy indicating economic success (whether an autocratic regime is listed in Table 4.2). The higher rate of leadership changes is significantly associated with

[70]Note that if we look at the *same* successful autocratic regime over time, our theory predicts the opposite: leadership change follows a bad performance. This prediction is *not* what we try to provide empirical support for here. Also note that leadership turnover and regime performance are jointly determined in our theoretical model. The aim of empirical analysis in this subsection is, therefore, not to establish causality but to show correlations which are consistent with our theory.

[71]We match POLITY IV and Archigos on a daily basis to avoid assigning leadership changes to regimes that emerge later in the same year. If a leadership change and the emergence of a new regime take place on the same date, we assign the leadership change to the preceding regime. Finally, if the Archigos data set indicates that there is no national leader, we regard only the beginning of such a period as a leadership change rather than counting two leadership changes at the beginning and the end, because we are interested in whether the selectorate can replace the incumbent.

a higher likelihood of economic success, consistent with our theoretical prediction. One standard deviation of the number of leadership changes per year (0.11) changes the probability of economic success by around 11 percentage points.

If we restrict economic success to robust cases, the significant positive correlation between leadership turnover and success remains (column (2)). For success in health and education, however, columns (3) to (6) show no significant correlation between the rate of leadership changes and regime performance. In column (7), the dependent variable is a dummy indicating whether an autocratic regime is in the core set of successful ones identified by Table 4.5. There is no correlation for this group either.[72]

In sum, this evidence suggestively supports a key idea from our theory when economic success is used as the outcome. The results on health and education suggest that the selectorate in autocracy is less responsive to leadership performance in human development, perhaps because members of the selectorate can privately afford better health and education.

4.5.3 Death of Leader as a Natural Experiment

Our theory predicts that an autocracy is successful if the selectorate's grip on power is secure ($\Gamma(\phi, v)$ is high). More specifically, an autocrat is disciplined by the selectorate if overthrowing him does not lead to the seizure of power by citizens outside the selectorate.

Observing $\Gamma(\phi, v)$ for each autocratic regime is not an easy task. We may observe a leadership change in a poorly-performing autocracy with the selectorate remaining in power afterwards. This may be interpreted as an unsuccessful autocracy with a high $\Gamma(\phi, v)$ which is apparently inconsistent with our theory. However, it can also be interpreted as an equilibrium outcome of our model where the policy maker chooses the bad policy and thus gets removed from office by the selectorate with a high $\Gamma(\phi, v)$. The problem here is that leadership changes are endogenous to the regime performance.

[72]These results are robust to excluding leadership changes due to natural causes (natural deaths, resignation for health reasons, and suicides) from the calculation of the rate of leadership turnover.

Table 4.10: Leadership Turnover and Successful Autocracies

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Success in Growth	Robust Success in Growth	Success in Health	Robust Success in Health	Success in Education	Robust Success in Education	Core Success
# of leadership changes per year	0.99***	0.61***	-0.22	-0.34	-0.29	0.08	0.09
	[0.28]	[0.20]	[0.57]	[0.58]	[0.38]	[0.28]	[0.96]
Constant	YES	YES	YES	YES	YES	YES	YES
Decade dummies	YES	YES	YES	YES	YES	YES	YES
Region dummies	YES	YES	YES	YES	YES	YES	YES
Observations	177	177	90	84	149	149	38
Pseudo R^2	0.31	0.26	0.15	0.20	0.17	0.12	0.23

Notes: Reported are the marginal effect evaluated at the mean of all regressors. Robust standard errors are reported in brackets. The unit of observation is an autocratic regime. The dependent variables are: in column (1), a dummy for being included in Table 4.2; in column (2), a dummy for being included in Table 4.2 and not failing to pass any robustness checks; in column (3) a dummy for being included in Table 4.3; in column (4), a dummy for being included in Table 4.3 and passing the robustness check; in column (5) a dummy for being included in Table 4.4; in column (6), a dummy for being included in Table 4.4 and passing the robustness check; in column (7), a dummy for being included in Table 4.5. See Table 4.9 for details on decade and region dummies. * significant at 10%; ** significant at 5%; *** significant at 1%.

However, if a leader dies or becomes incapacitated due to natural causes, whether the selectorate remains in power afterwards does indicate $\Gamma(\phi, \upsilon)$. Our theory, therefore, predicts that an autocratic regime performs well if a random death or incapacitation of the leader does not lead to the loss of power by the selectorate. It also should be the case that after a poorly-performing dictator dies due to natural causes, the selectorate is likely to change afterwards.[73]

Table 4.11 shows the list of autocratic regimes (with data on either growth, health, or education) under which the chief executive died in office due to natural causes, according to the Archigos data set. Among the core set of successful autocracies identified in Table 4.5, regimes in China, Poland, Portugal, Romania, Spain, and Thailand went through a natural death of the leader. We already saw above that the deaths of Deng Xiaoping in China and Gheorghe Gheorghiu-Dej in Romania did not lead to the loss of power by the selectorate, indicating that these two regimes had a high value of $\Gamma(\phi, \upsilon)$ and this might have allowed the selectorate to discipline their leader. We find that Portugal and Thailand are also consistent with our theory.[74] To see whether unsuccessful autocracies confronted with a random death reveal a poorly entrenched selectorate, we also look at Guinea.

We proceed as follows. For each autocratic regime, we (i) describe the performance of an autocrat who died in office; (ii) identify the selectorate under the dead leader's rule; and (iii) investigate whether the selectorate remained in power after the death.

Portugal (July 1930 - April 1974) Prime Minister Oliveira Salazar suffered a cerebral thrombosis and hemorrhage, lapsing into a coma on September 16 of 1968.[75] Salazar had been premier since 1932. His rule was successful in economic

[73] Jones and Olken (2005) first exploit the random death of leaders as a natural experiment. Their research question is whether who is in power makes a difference in economic growth. They compare economic growth rates before and after the random death of leaders to check if causality runs from leadership change to growth. In our case, looking at the random death of leaders reveals the underlying parameter $\Gamma(\phi, \upsilon)$. We then check if the uncovered $\Gamma(\phi, \upsilon)$ positively correlates with economic growth and other outcomes under the naturally-dead leaders.

[74] A random death in Poland occurred before we observe performance measures. The death of Franco in Spain does not fit with our theory as it led to democratization.

[75] Salazar was alive until 1970. Wiarda (1977, footnote 3 in Chapter 9) notes, however, that "he no longer made decisions and ... had no impact on the policies of the new government."

Table 4.11: Autocratic Regimes with Leader's Natural Death

Regime	Year of Leader's Death	Score	Annual Growth	Economic Growth Success?	Economic Growth Robust?	Conditional Life Expectancy	Health Success?	Health Robust?	Conditional Enrollment Ratio	Education Success?	Education Robust?
Romania(1948-1977)	1965	6	7.63%	Y	Y	17.48	Y	Y	34.27	Y	Y
Spain(1939-1975)	1975	6	5.77%	Y	Y	6.80	Y	Y	29.58	Y	Y
China(1976-2004)	1997	4	7.87%	Y	Y	12.43	Y	N	30.98	Y	N
Poland(1947-1980)	1956	4	5.76%	Y	Y	12.68	Y	Y	19.82	N	-
Portugal(1930-1974)	1968	4	5.75%	Y	Y	6.15	Y	Y	8.46	N	-
Thailand(1958-1968)	1963	4	5.34%	Y	Y	10.69	Y	Y		-	-
China(1969-1976)	1976	3	4.04%	Y	N	13.89	Y	N	38.01	Y	N
Taiwan(1949-1975)	1975	3	5.98%	Y	N	16.34	Y	Y		-	-
Taiwan(1975-1987)	1978	3	6.81%	Y	N	10.08	Y	Y	5.56	N	-
Vietnam(1976-2004)	1986	3	4.47%	Y	N	11.49	Y	N	22.13	Y	N
Gabon(1960-1968)	1967	2	8.59%	Y	Y	-26.81	N	-		-	-
Jordan(1992-2004)	1999	2	0.89%	N	-	9.67	Y	Y	-6.92	N	-
Morocco(1998-2004)	1999	2	1.19%	N	-	8.73	Y	Y	2.24	N	-
North Korea(1966-2004)	1994	2	3.75%	Y	N	11.35	Y	N		-	-
Syria(1970-2000)	2000	2	2.18%	N	-	11.89	Y	N	21.03	Y	N
Bhutan(1953-2004)	1972	1	4.28%	Y	N	0.92	N	-		-	-
Lao PDR(1975-2004)	1992	1	1.35%	N	-	-3.72	N	-	27.62	Y	N
Algeria(1965-1989)	1978	0	1.35%	N	-	-0.75	N	-	4.01	N	-
Egypt(1952-1976)	1970	0	1.29%	N	-	-0.20	N	-	-3.77	N	-
Guinea(1958-1984)	1984	0	-0.67%	N	-	-14.59	N	-	-44.54	N	-
Haiti(1961-1971)	1971	0		-	-	-3.24	N	-	-15.74	N	-
Iran(1982-1997)	1989	0	0.86%	N	-	1.78	N	-	11.13	N	-
Kenya(1969-1979)	1978	0	-0.47%	N	-	3.66	N	-	12.64	N	-
Kuwait(1965-1971)	1965	0		-	-	2.25	N	-	8.57	N	-
Liberia(1909-1980)	1971	0	-1.13%	N	-	-9.03	N	-	-35.24	N	-
Mauritania(1962-1991)	1979	0	-0.19%	N	-	-5.44	N	-	-42.17	N	-
Nepal(1962-1981)	1972	0	0.49%	N	-	-4.75	N	-	-18.18	N	-
Nicaragua(1936-1979)	1966	0	2.45%	N	-	-7.86	N	-	-6.87	N	-
Saudi Arabia(1926-2004)	1953,1982	0	0.20%	N	-	-12.30	N	-	-40.52	N	-
Swaziland(1973-1993)	1982	0	3.31%	N	-	-9.63	N	-	10.28	N	-

Notes: Listed are autocratic regimes under which the chief executive died in office due to natural causes. "Year of Leader's Death" indicates the year of such death. For the rest of the columns, see notes for Tables 4.3 to 4.5.

growth and health production as seen in Table 4.6.

The selectorate under Salazar's rule appears to be the armed forces.[76] Before Salazar became prime minister in 1932, the armed forces had controlled the government since its seizure of power in 1926. The Constitution of 1933 stipulated that the ceremonial president had the power to appoint and remove premiers, and the post of presidency was consistently given to military men (Wiarda 1977, pp. 100, 122-3).

The armed forces retained the control of the country after Salazar's incapacitation (Wiarda 1977, pp. 253-4). President Americo Thomaz, a retired admiral, summoned the Council of State, a constitutional advisory body consisting of the nation's prominent figures, and also met with other powerful figures of the regime. On September 26, Thomaz announced publicly that he released Salazar from his post and appointed Marcello Caetano as prime minister. Caetano remained in power until 1974.[77]

This sequence of events after the incapacitation of Salazar indicates that the selectorate's grip on power was rather secure. Salazar, whose rule could be seen as personal rule, may have actually been disciplined by the military, and thus had an incentive to promote economic development and improve people's health.

Thailand (October 1958 - February 1968) Prime Minister Sarit Thanarat died from heart and lung ailments on December 8, 1963 (Lentz 1994, p. 749). Sarit, a military officer, seized power in a bloodless coup in October of 1958. His dictatorial rule since then performed well in economic growth and health production.[78]

The selectorate under Sarit's regime appears to be King Bhumibol Adulyadej and the military. In February of 1959, Sarit was formally elected prime minister by the

[76]Maxwell (1986, p. 112) provides an alternative view, however, by noting that "[t]he Portuguese dictatorship was preeminently civilian and legalistic."

[77]Maxwell (1986, p. 112) notes that the appointment of Caetano as premier was conditional on his acceptance of the military's position on what to do with Portugal's territories in Africa. This further suggests that the selectorate was the military.

[78]Thailand's economic growth rate from 1958 to 1962 is 5.5 percent. Life expectancy at birth conditional on real GDP per capita is 11.4 years (the average of 1960 and 1962), comparable to the whole regime performance (see Table 4.3). Sarit does not enter Table 4.6 because his rule did not last more than five full calendar years.

Constituent Assembly whose members were appointed by royal decree.[79] According to Chaloemtiarana (2007, p. 187), 152 out of the 220 members of the Assembly were military officers. Chaloemtiarana (2007, chapter 6) argues that Sarit needed the support from the military and the king. The support from the king appears to have been the most crucial for Sarit, as he "accorded the throne much more power and prestige than [his] predecessors had" to seek the military regime's legitimacy (*Ibid.*, p. 205).

After the death of Sarit, the selectorate remained the same. The king's influence got even stronger. Thanom Kittikachorn, a military officer who had been Deputy Minister and Defence Minister since 1959, succeeded Sarit by King Bhumibol's appointment.[80] Thanom "turned increasingly to the king for support and advice" (*Ibid.*, p. 217). The military had the last say in keeping Thanom in power. When Thanom's government faced student demonstrations in 1973, the military refused to suppress them, forcing Thanom to flee the country (Nelson 2001, p. 262).[81]

The above episode suggests that the selectorate – the king and the military – had a tight grip on power. Our theory implies that this allowed them to credibly threaten to oust Sarit or Thanom in the case of a poor performance. Impressive performance of the Thai military regime by Sarit and Thanom on economic growth and health may have been due to the discipline imposed by the king and the military.

Guinea (October 1958 - April 1984) On March 26 of 1984, President Ahmed Sekou Toure died in an US hospital to which he was taken by air from Guinea after suffering a heart attack on the day before.[82] Sekou Toure ruled Guinea since its independence. As Table 4.11 shows, the performance of his rule is miserable: a negative economic growth rate (-0.67%), lower life expectancy and lower primary school enrollment compared to countries with the same level of real GDP

[79] *Keesing's Contemporary Archives*, p. 16691.
[80] *Keesing's Contemporary Archives*, p. 19814.
[81] Although the Polity dataset codes 1968 as the end of Thai military regime, Thanom remained in power by holding multiparty parliamentary elections in which his party won. He then dissolved the parliament and banned political parties in 1971, restoring the military dictatorship.
[82] *Africa Research Bulletin*, March 1-31, 1984, p. 7178.

per capita.[83]

The ruling selectorate appears to have been members of the political bureau of the sole legal party, the *Parti Democratique de Guinea* (PDG).[84] By Constitution, the political bureau of the PDG would meet to choose a new leader within 45 days after the incapacitation of the president.[85]

After the death of Sekou Toure, Prime Minister Lansana Beavogui became interim president and was supposed to succeed formally by the appointment of the PDG political bureau.[86] On April 3, however, young military officers staged a bloodless coup with Colonel Lansana Conte becoming a new president. The PDG was then dissolved.

This episode indicates that the selectorate, the PDG political bureau, stayed in power solely due to Sekou Toure's presence. They plausibly expected that they would lose power if they removed Sekou Toure ($\Gamma(\phi, v) \approx 0$). This lack of secure power on the part of the selectorate may explain why Sekou Toure performed so badly while remaining in office.[87]

4.5.4 Summary

This tour of the evidence conducted through the lens of our model is sketchy. However, it does breathe life into the institutional setting that we modeled. The case studies suggest that the power of the selectorate and their role in disciplining poorly performing leaders could be a force in shaping the performance of autocracy in the absence of an electoral sanction. This leads to more turnover on average in successful

[83]Kaba (1977, p. 40) lists Sekou Toure's failures in health production: the shortage of hospital beds in the capital city, the appointment of inexperienced individuals to hospital administration, medicine shortage, and Sekou Toure's denial of a cholera epidemic in 1973.

[84]Sekou Toure was a founding-member of the PDG and became Secretary General of the Party in 1952 (Johnson 1970, p. 350). In 1957, the PDG won multiparty elections for the Territorial Assembly under French rule. In November of 1958, one month after independence, the PDG became the sole legal party by Constitution (see Brune 1999).

[85]*Keesing's Record of World Events*, p. 32955.

[86]According to Momoh (1984, p. 757), "[t]he powerful Toure family including the ambitious Minister of Mines and Geology, Ismael Toure, had persuaded ... Beavogui to accept the post of acting president. (...) Beavougui, as it was understood, would have held the post for two or three years because ... the Political Bureau ... would elect him to carry on."

[87]According to Jackson and Rosberg (1982, p. 210), Guinea under Sekou Toure's rule saw "persistent attempts by the government to hold to the ruler's ideological approach while ignoring the lessons to be learned from economic and planning failures."

autocracies than in unsuccessful ones.

4.6 Conclusion

This chapter is a contribution to on-going debates about the institutional basis of successful government. It tries to understand differences between good and bad autocracies in terms of the forces that shape accountability in the absence of regularized elections. It does so in three steps. The first has been to develop a simple model of incentives to generate good policy when the decision to retain the leader is vested in a selectorate comprising citizens from some ruling "group". Second, it has identified "successful autocracies" using objective empirical criteria. Third, it has used the group of autocracies identified from this exercise as a basis for case studies in successful autocracy with a view to matching the theory to real world experience.

Our modeling approach makes clear that democracies can be better or worse than autocracies in terms of accountability although it suggests a presumption in favor of democracy on this basis. This is consistent with the raw data. In our model, successful autocracies are those where poor quality leadership leads to removal of leaders from office. While it is asking too much of a simple theory to do justice to the richness of the real world experience, we find some suggestive evidence that the forces shaping leadership replacement in the way that the model suggests may be at work in successful autocracies. Leadership turnover is greater in successful compared to unsuccessful autocracies. Moreover, studying the sample of successful autocracies that handled leadership deaths from natural causes reinforces the view that successful autocracies are those where the ruling group has a hold over power.

The analysis in this chapter is a first step in a wider project. It seems essential in collecting data that characterizes differences in political regimes to be guided by what theory suggests could be important. Among the large array of impressive data collection exercises, there is very little that provides a persuasive mapping between things that shape political incentives and outcomes. For a broad category like autocracy, it is essential to bridge this gap more in future work to understand

the lessons for the genesis of good government.

This chapter provides a complement to other on-going work in this area. The approach emphasizes the value of rooting our understanding in simple theoretical models, not least as a lens to focus empirical exercises. It also suggests a way of applying agency models to the democracy-autocracy comparison which may have other fruitful applications. While it is evident that much remains to be done to bring theory and data together in understanding the forces that shape the quality of government, the theoretical tools that are being developed in political economy and the rich data now available provide a secure starting point for this endeavor.

Chapter 5

Ethnic Favoritism: Micro Evidence from Guinea

5.1 Introduction

Ethnic diversity is empirically associated with low economic growth (Easterly and Levine 1997; Alesina et al. 2003), poor quality of government (La Porta et al. 1999), and civil wars (Montalvo and Reynal-Querol 2005).[1] Investigations on the mechanism of this association have so far concerned collective action problems exacerbated by ethnic diversity (e.g. Miguel and Gugerty 2005). Another possible mechanism largely ignored in the economics literature is ethnic favoritism by the government. A conventional wisdom has it that policy-makers favor their own ethnic groups in the allocation of public funds. As a result, citizens support politicians from their own ethnic group even if these politicians may be less honest or less able than those from other ethnic groups (Banerjee and Pande 2007). As which ethnic group is in power is salient, citizens even resort to violence to have their co-ethnics in power.[2] However, there is a lack of systematic evidence that ethnic groups in power are indeed better off. This chapter aims to test this conventional wisdom on ethnic favoritism in a systematic and convincing way, in order to provide the basis for any discussions on

[1] See Alesina and LaFerrara (2005) for a survey.

[2] Tishken (1994), in his review of a book on ethnic conflict, lists ethnic favoritism in state resource allocations as one reason for why many conflicts take on an ethnic dimension.

ethnic conflicts due to government patronage.

Evidence on ethnic favoritism by the government in the literature is largely anecdotal.[3] When statistics is provided, it is often the government expenditure by ethno-region (e.g. Barkan and Chege 1989). Given that government expenditures often do not reach the end-users of public goods in poor countries (Reinikka and Svensson 2004), it is not clear whether ethnic groups in power really benefit from more budget allocations to their regions. This chapter looks at infant mortality as a measure of welfare each ethnic group actually enjoys.

Comparing each ethnic group's welfare cross-sectionally does not allow us to disentangle the effect of government favoritism from heterogeneity in unobservable characteristics across ethnic groups. To empirically show whether it matters which ethnic group is in power, we need to exploit change in the ethnicity of political leadership and compare changes in welfare across ethnic groups. However, change in the ethnicity of leadership may be endogenous to change in each ethnic group's welfare. It could be the case that ethnicity in power changes because a certain group accumulates economic power which allows it to seize political power as well. Then we would wrongly attribute improvements in welfare for the ethnic group gaining power to the effect of having a co-ethnic in power. Alternatively, ethnicity in power may change because an ethnic group discriminated by the government seizes power out of grievance. As a result, the ethnic group newly in power becomes better off after the leadership change though this change in welfare has nothing to do with ethnic favoritism per se.

In order to ensure the exogeneity of ethnicity in power, we need to look at a case where ethnicity in power is determined independently of relative welfare changes across ethnic groups. For this purpose, this chapter focuses on Guinea, a country in West Africa with high ethnic diversity. The president ruling this country since independence in 1957 unexpectedly died in office in 1984. Only eight days later, a group of military officers who were excluded from political power until then seized power with the officer most senior in rank becoming a new president. He is from a

[3]Bates (1983) cites several examples from Africa.

different ethnic group than his predecessor's. As discussed in detail in section 5.3.1 below, the ethnicity of a new president after the sudden death of the predecessor was unlikely to be determined by relative change in welfare across ethnic groups. Therefore, changes in welfare, measured by infant mortality, after the leadership change for the new president's ethnic group relative to other groups give an unbiased estimate of the effect of having a co-ethnic in power.

I estimate the effect of having a co-ethnic as president at two levels of disaggregation. First, I investigate whether Guineans in districts with the new president's ethnic group accounting for more than half the population improve their welfare after the leadership change. Second, I examine whether the new president's ethnic group benefits more from the leadership change than other ethnic groups within the same district. These two levels of analysis shed light on why ethnicity matters in politics. If ethnicity matters only due to its correlation with local administrative districts, ethnic favoritism brings about a difference in welfare at the district level, but not within districts. If ethnicity matters as an excluding devise, then a difference in welfare within districts should be affected by leadership change.

Empirical results obtained in this chapter do not provide evidence for ethnic favoritism taking place in Guinea. Districts where the new president's ethnic group predominates do not see a larger drop in infant mortality than other districts after the leadership change. Mothers from the new president's ethnic group do not see their babies less likely to die compared to other ethnic groups in the same district after having their co-ethnic in power, either. Due to several data limitations, these empirical results cannot entirely exclude alternative interpretations. However, they do suggest that individual welfare does not hugely depend on which ethnic group is in power, at least in the context of child survival in Guinea.

The only systematic evidence on ethnic favoritism in the literature that I am aware of is Kasara (2007), who shows that African leaders tax their co-ethnics *more* heavily than other ethnic groups, by exploiting time-series variation within each subnational ethno-region across 30 African countries.[4] Although her study has

[4]More precisely, she controls for country-crop fixed effects. As "both crop production and ethnic

more external validity than this chapter in terms of countries covered in the study, the endogeneity of changes in the ethnicity of leaders is not explicitly dealt with. In addition, unlike this chapter, she does not directly look at welfare as an outcome or investigate the possibility of ethnic favoritism within region by using individual-level data.

This chapter also relates to the theoretical literature on ethnic politics. Bates (1983) argues that ethnicity matters in politics because ethnic groups are spacially clustered and because the provision of local public goods such as roads, schools, and clinics has a spatial aspect. I investigate the district-level favoritism to see if this argument can be supported by systematic empirical evidence.

Fearon (1999) and Caselli and Coleman (2006) propose an alternative theoretical reason for the salience of ethnicity in politics.[5] They argue that ethnicity functions as an excluding device in the allocation of public funds. By restricting access to public funds by ethnicity which people cannot easily change, those in power can avoid the dilution of each one's share of the spoils such as tax revenues from natural resource exports. This argument implies that ethnic favoritism occurs at the individual level even in the same area. Therefore, I also examine within-district favoritism and see if the ethnic group in power is better off than other groups within the same area.

The chapter is organized as follows. The next section provides the background to this study. Section 5.3 describes identification strategy and data. Sections 5.4 and 5.5 show empirical results on ethnic favoritism at the district level and within districts, respectively, followed by the concluding section.

5.2 Background

This section provides background information on Guinea and its ethnic groups. After a brief discussion on the representativeness of Guinea for sub-Saharan Africa as a whole, I show how Guinean ethnic groups differ from each other and that the

groups are geographically concentrated" (Kasara 2007, p. 160) in Africa, country-crop combinations correspond to ethnic groups in each country.

[5]Bates (1983, p. 158) also mentions this mechanism briefly.

conflict among them is a persistent feature of the Guinean history to date. These pieces of information confirm that Guinea is an appropriate country to study on ethnic favoritism. Finally, I explain why we would expect ethnic favoritism to affect infant mortality, the outcome under investigation in this chapter, in Guinea after 1984.

5.2.1 Ethnic Groups in Guinea

Guinea is a country in West Africa with the population of over 7 million. Its GDP per capita in purchasing power parity terms is close to the average of 48 sub-Saharan African countries in 2000 though economic growth between 1960 and 2000 is among the worst in the region.[6] Infant mortality per 1,000 live births has always been above the African average.[7] Ethnic diversity is also higher than the African average.[8] These statistics suggest that what we see in Guinea is likely to represent the basket case even by African standards.[9]

Guinea has six major ethnic groups: Sousou, Peulh, Malinke, Kissi, Toma, and Guerze, with the last three groups often grouped together as "Foresters".[10] According to O'Toole and Baker (2005, p. 163), the estimated ethnic composition in 2000 was 40 percent Peulh, 30 percent Malinke, 20 percent Sousou, and 10 percent other groups.

Members of each group speak different languages though the Sousou, Malinke, Toma, and Guerze languages are more similar to each other (belonging to the Mande

[6]Guinea's real GDP per capita is 2,546 US dollars in purchasing power parity terms in 2000 while the African average is 2,633 dollars. The Guinean economic growth rate between 1960 and 2000 is -0.47 percent, which is the fourth lowest among 33 African countries with data available. All the figures are based on Penn World Table 6.2.

[7]Infant mortality per 1,000 live births for Guinea and for the African average is 215 versus 160 in 1960, 162 versus 105 in 1985, and 112 versus 95 in 2000 (World Development Indicators, September 2006).

[8]The ethnic fractionalization index (Alesina et al. 2003) is 0.74 for Guinea and 0.66 on average for 47 sub-Saharan African countries. Guinea's ethnic polarization index (Montalvo and Reynal-Querol 2005) is the highest in sub-Saharan Africa (0.84).

[9]Indeed, the 2007 Failed State Index, compiled by the Fund for Peace and *Foreign Policy* magazine, ranks Guinea as the 9th most fragile state in the world (see "The Failed State Index 2007," *Foreign Policy*, July/August 2007, pp. 54-63).

[10]There are various spellings for the names of ethnic groups in Guinea (Susu or Sosso for Sousou; Fulbe, Fula, Fulani, or Peul for Peulh; Maninka, Mandinka, or Manding for Malinke; Loma for Toma; Kpelle for Guerze). I follow the spelling in the codebook of the Demographic and Health Survey conducted in Guinea in 1999 (the dataset used in this chapter).

language group) than to the rest. Although French is the official language of Guinea, only about 20 percent of the population understand French (O'Toole and Baker 2005, p. 93). One can identify each other's ethnicity from their surname to some extent.[11]

Sousou, Peulh, Malinke, and "Foresters" each predominate in one of the four topographical regions: Lower Guinea (or Guinee Maritime), Middle Guinea (or Futa Jalon), Upper Guinea (or Haute Guinee), and Forest Guinea (or Guinee Forestiere), respectively. Each region has a slightly different climate pattern and thus people cultivate different crops, implying that a simple cross-sectional comparison of ethnic groups in terms of welfare can be misleading.

The six ethnic groups in Guinea are socially and culturally distinctive.[12] Peulh is particularly different from the rest. Its subsistence economy depends on animal husbandry a lot more than the other groups in Guinea. Core membership of Peulh kin groups is confined to a single community while lineages for the other groups comprise residents of more than one community. Settlement patterns differ, too. For Peulh, a community comprises a nucleated village or town with outlying homesteads or satellite hamlets. For other groups, a community is just a nucleated village or town only. Finally, Peulh traditional society is more politically complex: there is a jurisdictional level above local communities. For other ethnic groups, each community is traditionally independent.

Non-Peulh ethnic groups also exhibit differences. In terms of family organization, Sousou, Malinke, and Kissi have large extended families while Toma and Guerze families are independent. Polygyny is general for all groups, but co-wives live together for Sousou and Guerze, but occupy separate quarters for the rest. For rules for inheritance of real property, all groups are patrilineal. But a man's property is inherited by his sons in Kissi and Guerze societies while the other groups designate other patrilineal heirs than sons. In Kissi society, the inheritance is equally distributed among all sons. In Guerze, on the other hand, the senior son inherits

[11] Guineans with family names such as Bah, Balde, Barry, Diallo, Sow, Tall, and Thiam are generally Peulh while family names Camara, Conde, Diawara, Fofana, Kante, Kourouma, Kouyate, Soumaoro, and Traore indicate the Malinke people (O'Toole and Baker 2005, pp. 96 and 139).

[12] The following two paragraphs are derived from entries in columns 7, 14, 20, 30, 32, 74, and 76 for Af2 (Kissi), Af11 (Toma), Af15 (Kpelle), Ag6 (Futajakonke), Ag9 (Malinke), and Ag26 (Susu) in tables of Murdock (1967).

real property. For inheritance of movable property, all but Sousou follow the same rule as for real property. Sousou society now allows a man's sons to equally inherit.

Do these ethnic groups in Guinea differ in socio-economic characteristics today? Tables 5.1, 5.2, and 5.3 show the shares of women aged 15-49 in 1999 who have attended primary school, own a television set, and have access to electricity, respectively, calculated for each of the four ethnic groups (Kissi, Toma, and Guerze are grouped together as Foresters) by district. In 24 out of 38 districts, at least one ethnic group is statistically different from the other groups in terms of the proportion of educated women. For the ownership of a television set and the access to electricity, 12 and 13 districts see a statistically significant difference in the prevalence across ethnic groups. In particular, all five communes in Conakry, which are much smaller areas than the other 33 districts, show significant socio-economic differences across ethnic groups in at least one dimension, suggesting that ethnicity, rather than the area of residence, makes a difference in socio-economic outcomes. At the country level, every ethnic group is significantly different from each other (except for Malinke and Foresters in the level of education).

5.2.2 History of Ethnic Rivalries

Ethnic groups in Guinea have a long history of rivalry. During pre-colonial days, Peulh rulers oppressed Sousou people while Foresters fought against the invasion by Malinke people.[13] Under the French colonial rule starting at the end of the 19th century, the four ethnic groups could not agree on the location of a new secondary school financed by the colonial authority in 1947.[14] Most political parties formed after 1945 were ethnically-based.[15] Prior to independence, there were riots against Peulh people, especially by Sousou people.[16]

Guinea became independent from France in 1958 after Guineans voted for independence in a referendum.[17] Ahmed Sekou Toure, a Malinke, became president and

[13]See O'Toole and Baker (2005), pp. xxxvii, xxxvix, 81-2.
[14]See Adamolekun (1976), p. 125.
[15]See O'Toole and Baker (2005), p. 160.
[16]See *ibid.*, pp. xl-xli, and Adamolekun (1976), p. 125.
[17]In this referendum, Peulh people are said to have voted against independence, and because of

Table 5.1: Shares of Educated Women by Ethnicity and District

District	Sousou	Peulh	Malinke	Foresters	Total
		Prefectures in Lower Guinea			
Boffa	11%	16%	50%	100%***	13%
Boke	15%	9%	11%	38%	13%
Coyah	23%	14%	36%	100%**	24%
Dubreka	5%	0%	4%		4%
Forecariah	4%	17%	4%	0%*	5%
Fria	5%	13%	0%	100%***	7%
Kindia	5%	4%	15%	100%***	6%
Telimele	0%*	3%	11%		3%
		Prefectures in Middle Guinea			
Dalaba		4%**	0%**		3%
Gaoual		9%	13%	0%	9%
Koubia		3%			3%
Koundara	40%***	13%	10%	0%*	13%
Labe	100%***	16%	9%		16%
Lelouma		1%***	6%***		2%
Mali	100%***	6%	0%		6%
Mamou	20%	0%	15%		1%
Pita		2%			2%
Tougue	0%*	6%*			6%
		Prefectures in Upper Guinea			
Dabola	100%***	1%	4%		3%
Dinguiraye	0%	2%	8%		6%
Faranah	4%	0%	9%*		7%
Kankan		36%	7%*	63%***	9%
Kerouane	100%***	8%	11%	33%	12%
Kouroussa			3%***	100%***	4%
Mandiana		0%*	7%	100%***	7%
Siguiri		13%	5%		5%
		Prefectures in Forest Guinea			
Beyla			2%		2%
Gueckedou	100%***	4%*	19%	12%	13%
Kissidougou	0%***	4%***	18%*	36%*	25%
Lola		0%	3%	9%	8%
Macenta		5%	7%	7%	7%
Nzerekore		11%	9%	13%	12%
Yomou		86%***	67%	12%**	17%
		Communes in Conakry			
Dixinn	44%	38%	56%		42%
Kaloum	48%	42%	73%	24%***	49%
Matam	62%	46%*	65%	100%***	60%
Matoto	44%	48%	53%	74%*	48%
Ratoma	41%	30%*	59%*	74%***	41%
Total	22%***	9%***	12%	16%	13%

Sources: Guinea Demographic and Health Survey in 1999.

Notes: Shown in this table are the sample shares of women who went to primary school among all women aged between 15 to 49 by ethnicity and district. Stars indicate whether the share is significantly different from the other three ethnic groups altogether. Difference in samplling probabilities across clusters and the two-stage sampling procedure is taken into account in the calculation. * significant at 10% level, ** 5%, *** 1%.

Table 5.2: Shares of Women Owning a Television by Ethnicity and District

District	Sousou	Peulh	Malinke	Foresters	Total
		Prefectures in Lower Guinea			
Boffa	0%	4%	100%***	0%	4%
Boke	7%	9%	22%***	38%	10%
Coyah	25%	54%	92%**	50%	36%
Dubreka	1%	0%	0%		1%
Forecariah	5%	0%	0%	65%***	7%
Fria	14%*	28%*	0%	0%	17%
Kindia	3%	6%	24%	0%*	6%
Telimele	0%	0%	0%		0%
		Prefectures in Middle Guinea			
Dalaba		3%	0%		3%
Gaoual		1%	0%	0%	1%
Koubia		0%			0%
Koundara	0%	0%	0%	0%	0%
Labe	0%	12%	9%		12%
Lelouma		1%	0%		1%
Mali	0%	0%	0%		0%
Mamou	100%***	1%	6%		2%
Pita		0%			0%
Tougue	0%	0%			0%
		Prefectures in Upper Guinea			
Dabola	0%	0%	0%		0%
Dinguiraye	0%	0%	0%		0%
Faranah	17%	0%	8%		9%
Kankan		0%	3%	0%	3%
Kerouane	0%	0%	2%	0%	1%
Kouroussa			0%	0%	0%
Mandiana		0%	1%	0%	1%
Siguiri		0%	0%		0%
		Prefectures in Forest Guinea			
Beyla			1%		1%
Gueckedou	0%	1%	0%	1%	1%
Kissidougou	0%	0%	4%	0%	2%
Lola		0%	3%	1%	1%
Macenta		0%	0%	0%	0%
Nzerekore		0%	14%	3%	5%
Yomou		71%**	56%*	5%**	9%
		Communes in Conakry			
Dixinn	71%*	43%***	95%***		57%
Kaloum	59%	53%	73%	67%	61%
Matam	58%	46%	79%*	100%***	59%
Matoto	44%	42%	62%*	20%**	47%
Ratoma	59%	43%*	70%	70%	55%
Total	23%***	7%***	8%	3%***	10%

Sources: Guinea Demographic and Health Survey in 1999.

Notes: Shown in this table are the sample shares of women whose household owns a television set among all women aged between 15 to 49 by ethnicity and district. Stars indicate whether the share is significantly different from the other three ethnic groups altogether. Difference in samplling probabilities across clusters and the two-stage sampling procedure is taken into account in the calculation. * significant at 10% level, ** 5%, *** 1%.

Table 5.3: Shares of Women with Access to Electricity by Ethnicity and District

District	Sousou	Peulh	Malinke	Foresters	Total
		Prefectures in Lower Guinea			
Boffa	11%	4%	100%***	100%***	14%
Boke	19%	25%	30%	45%	23%
Coyah	48%	88%	92%	100%	59%
Dubreka	4%	0%	71%*		6%
Forecariah	6%	30%***	0%	65%***	10%
Fria	17%	40%	0%	100%**	23%
Kindia	7%	15%	47%*	0%	12%
Telimele	0%	1%	0%		1%
		Prefectures in Middle Guinea			
Dalaba		4%	0%		3%
Gaoual		2%	0%	0%	2%
Koubia		0%			0%
Koundara	0%	5%	18%	0%	7%
Labe	0%	7%	9%		7%
Lelouma		3%	0%		3%
Mali	0%	0%	0%		0%
Mamou	100%***	2%	6%		3%
Pita		0%			0%
Tougue	0%	0%			0%
		Prefectures in Upper Guinea			
Dabola	100%***	5%	15%		11%
Dinguiraye	0%	0%	0%		0%
Faranah	17%	17%	23%		21%
Kankan		0%	4%	0%	4%
Kerouane	0%	0%	6%	0%	5%
Kouroussa			1%	0%	1%
Mandiana		0%	3%	0%	3%
Siguiri		25%	2%		2%
		Prefectures in Forest Guinea			
Beyla			0%		0%
Gueckedou	100%***	1%	0%	1%	2%
Kissidougou	0%*	0%*	11%	2%	6%
Lola		0%	0%	0%	0%
Macenta		0%	0%	0%	0%
Nzerekore		0%	0%	1%	1%
Yomou		71%**	56%*	5%**	9%
		Communes in Conakry			
Dixinn	89%	77%	97%*		83%
Kaloum	60%	73%	100%	100%	69%
Matam	79%	89%	79%	100%**	81%
Matoto	62%	68%	79%	74%	68%
Ratoma	75%	58%*	85%	56%	70%
Total	33%***	12%**	12%*	4%***	15%

Sources: Guinea Demographic and Health Survey in 1999.

Notes: Shown in this table are the sample shares of women whose household has access to electricity among all women aged between 15 to 49 by ethnicity and district. Stars indicate whether the share is significantly different from the other three ethnic groups altogether. Difference in samplling probabilities across clusters and the two-stage sampling procedure is taken into account in the calculation. * significant at 10% level, ** 5%, *** 1%.

established one-party rule immediately after independence. He was accused of ignoring Middle Guinea (and thus Peulh people living there) in the first development plan for 1960 to 1962.[18] His ethnic group, Malinke, was allegedly overrepresented in the army and in top leadership.[19] In 1976, Peulh leaders were alledged to attempt a coup against President Toure.[20]

Sekou Toure died in office unexpectedly on March 26, 1984, at the age of 62.[21] Upon Sekou Toure's sudden death, Lansana Beavogui, a Toma who had been prime minister under Toure's rule since 1972, became interim president. Only eight days later, Colonel Lansana Conte, a Sousou, staged a coup against the interim government and became president. (It is this leadership change that I exploit in the empirical analysis below.) His presidential guards were said to be mostly Sousou.[22] When Diara Traore, a Malinke military officer who was number two in Conte's military government, attempted a coup in 1985, there was looting against Malinke people in the capital city of Conakry.[23]

In 1990, when the first local elections were held, violent clashes between ethnic factions errupted in some areas.[24] When opposition parties were legalized in 1992, most newly formed political parties were ethnically based.[25] In 1993, the first multiparty presidential election since independence was held in which Lansana Conte won with 52 percent of valid votes (Brune 1999, p. 457). Conte was re-elected in 1998 and 2003, and as of July of 2007, he is still in power. Today, with President

this they suffered some discrimination after independence (see, for example, "Guinea: Breaking the Circle," *Africa Confidential*, September 24, 1976, p. 4). However, Brune (1999, p. 454) shows that the only 4.8 percent of the votes cast were against independence while Peulh people were accounted for about 30 percent of the population in 1955 (Riviere 1977, p. 31).

[18]See Adamolekun (1976), p. 132.

[19]See *ibid.*, pp. 131-2, 172-3. See also Everett (1985), p. 23. According to Yansane (1990, footnote 48), however, "Toure certainly did not favor any ethnic group except for his family." As his family members are, by definition, all Malinke, this "family" favoritism may have been seen as ethnic favoritism.

[20]See O'Toole and Baker (2005), p. 96.

[21]Adamolekun (1976) and Riviere (1977) argue that Sekou Toure was successful in integrating ethnic groups in Guinea. Gardinier (1988), however, points out that it is not clear how Toure managed to integrate Guineans while his education policy led to a situation where "primary and secondary school classes were taught only in local dialects" (Everett 1985, p. 23).

[22]See Schissel (1986), p. 23.

[23]See O'Toole and Baker (2005), p. 203. Presumably, non-Malinke citizens in Conakry saw this coup as Malinke's attempt to seize power back. As will be discussed in Section 5.3.1 below, though, a closer look reveals that this attempted coup does not appear to be ethnically motivated.

[24]See *ibid.*, p. xlvi.

[25]See *ibid.*, p. 161.

Conte's ailing health conditions, there is fear of civil wars between ethnic groups after his death. Peulh people are reported to demand presidency after almost five decades of rules by other ethnic groups.[26]

The above description of Guinean history shows that ethnicity appears to have been salient in this country for a long time. Whether or not the ethnicity of the president matters for each ethnic group's welfare, however, is an empirical question which this chapter aims to answer.

5.2.3 Health Care System in Guinea

To estimate the impact of leadership ethnicity change, I look at infant mortality as an outcome. An obvious question is why we expect infant mortality to change as a result of ethnic favoritism. A plausible mechanism in the context of Guinea in the mid-1980s is a selective revamp of primary health care systems.

By the end of Sekou Toure's rule, health systems in Guinea collapsed severely. Kaba (1977, p. 40) reports that despite a rapid population growth of Conakry, no new hospital was constructed in the city. Inexperienced individuals were appointed to hospital administration. Medicine shortage was endemic. Toure even denied a cholera epidemic in 1973. Knippenberg et al. (1997, pp. S30-S31) describes the state of the Guinean health system right after the death of Toure in 1984. Storage and distribution of vaccine and drugs was inadequate due to scarcity of spare parts for refrigerators and of fuel for vehicles. The lack of financial resources due to Toure's economic mismanagement exacerbated the unavailability of drugs. Access to health services was limited due to a long distance to clinics. Health staff could not travel to villages for outreach activities because of lack of transport or fuel. The quality of health service, if provided, was perceived as poor by Guineans.

After seizing power, Lansana Conte initiated the revitalization of health systems in 1986 by formulating a new health policy (World Bank 2005, p. 1) and by developing primary health care centers throughout the country with an emphasis on child and maternal care (Glik et al. 1989, p. 423). Primary health care in Guinea

[26]See Sillah (2007).

is organized at the level of 38 health districts (33 prefectures and 5 communes in the capital city).[27] Therefore, Conte could have deliberately allocated public funds and human resources for health care preferentially to districts where his co-ethnics predominate. In addition, district health system managers may have needed to target Sousou-dominated towns and villages within their district in the improvement of health care systems, in order to show their loyalty to the president. Given the extremely poor conditions of the health care system after the death of Sekou Toure as described above, such selective attempts to improve the system in favor of Sousou people could have resulted in an immediate change in infant mortality.

5.3 Identification Strategy and Data

5.3.1 Exogenous Change in President's Ethnicity?

As indicated above, there have been only two presidents in Guinea since independence, and the president's ethnicity changed from Malinke to Sousou in 1984.

I exploit this change in the ethnicity of the president of Guinea in 1984 to estimate the effect of having a co-ethnic as president on individual welfare measured by infant mortality. An obvious issue on this identification strategy is whether the seizure of power by Conte, a Sousou military officer, is exogenous to changes in determinants of the welfare of Sousou people, or Guineans in Sousou-dominated districts, over time.

The welfare of Sousou people is unlikely to be correlated with the fact that Conte seized power and stayed in office for four reasons. First, Conte had not been politically powerful before the coup. Momoh (1984, p. 756) describes him as belonging to "the less privileged sector of Guinean armed forces". As a result, it is unlikely that he accumulated economic and political power of Sousou people by using his position in the government and that this allowed him to seize power.

Second, the military coup does not seem to have been ethnically motivated, suggesting that Sousou's economic power was unlikely to be crucial for Conte to

[27] See Millimouno et al. (2006, p. 17).

seize power. Several non-Sousou military officers participated in the military coup. As mentioned above, the number two figure in Conte's government, Diara Traore, is a Malinke.[28] Among the other 16 original members of the military junta (Comite Militaire de Redressment National), one major, two captains, and one lieutenant are Peulh, and four majors are Malinke, judging from their surnames.[29] Another member of the military junta, Captain Jean Traore, is from Forest Guinea, where 'Foresters' (Kissi, Toma, Guerze) reside, and he is thought to be one of the closest to Conte.[30] On the other hand, the only Sousou politician among top political leaders under Toure's rule, N'Famara Keita (see Adamolekun 1976, pp. 173-4), was arrested after the coup and died in prison a year after.[31]

Third, the 1985 attempted coup by Traore does not appear to have been a clash between Sousou and Malinke ethnic groups, suggesting that Sousou's economic power was unlikely to be decisive for Conte to stay in power. Ousmane Sow, whose surname indicates that he is a Peulh (O'Toole and Baker 2005, p. 96), led a battalion to first counter-attack Diara Traore's soldiers during the 1985 coup attempt. In addition, not all Malinke officers supported Traore.[32]

Finally, Conte became president because he was the most senior in rank among the coup plotters (Hodonou 2004), and the reason for his senior position does not appear to have been his ethnic background but his military talent. He was a sergeant at the time of independence. In 1970, when Portugal invaded Conakry, the capital city, to attack the headquarters of the independence movement for Guinea-Bissau and Cape Verde (which were Portuguese colonies at that time), Conte was in charge of the defense of Conakry and successful to repel the Portuguese invasion. Afterwards, he was named captain for the exceptional service to his country.[33] Conte may have been able to lead the military junta because of this military background.

I cannot entirely exclude the possibility that Conte seized power because the

[28] According to Kaba (1985, p. 178), Traore was the "main force" behind the coup.

[29] See Momoh (1984) for the list of members of the military junta. I rely on O'Toole and Baker (2005, pp. 96, 117, and 139) for which surname is typical for which ethnic group.

[30] *Africa Contemporary Record*, 1984-1985, p. B470; O'Toole and Baker (2005), p. 203.

[31] See *Keesing's Record of World Events*, p. 33710 (July 1985) and O'Toole and Baker (2005, p. 124).

[32] See "Guinea: Diarra Traore's Attempted Comeback," *West Africa*, 15 July 1985, pp. 1412-3.

[33] See O'Toole and Baker (2005, pp. 55 and 164-5).

Sousou-dominated region was becoming relatively better-off than others, however. Lower Guinea, where the Sousou predominates and his home village is located, has major bauxite mines in operation during the 1970s and the 1980s (see Campbell 1991, pp. 34-39). Given that Guinea possesses about one-third of the world's highest-grade bauxite deposits and has been the world's leading exporter, bauxite mining could have been a huge source of economic power though it is not clear to what extent local people benefited from bauxite mines as local processing of bauxite was limited (Campbell 1991). In addition, Conte was a commander of the Boke military region in Lower Guinea (Hodonou 2004), where there was one bauxite mine in operation since 1973. He might have accumulated personal wealth from bauxite export, which could have allowed him to buy support for his presidency. In fact, the military's support for Conte, which is likely to be crucial for political survival in non-democratic politics, appears to have been based on the improvements in living conditions among officers and soldiers in the army.[34] This might not have been possible if Conte's regional base was a poor area.

To partly deal with this concern, I will control for district-specific linear trends in infant mortality in the analysis of district-level favoritism. When I look at within-district level favoritism, however, the above concern is minimal as I control for district-year fixed effects to allow any arbitrary trends in infant mortality at the district level.

5.3.2 Data

The data source used in this chapter is the Demographic and Health Survey (DHS) conducted in Guinea during May and June of 1999. In the survey, a nationally representative sample of women aged 15 to 49 (6,753 in total) are interviewed on, among others, their ethnicity and their children's birth date and, if applicable, age at death in months. From these interview results, I construct a panel dataset of

[34] According to Momoh (1984, p. 757), under Sekou Toure's rule, "[w]ages for the armed forces had been poor while housing was short and mostly in deplorable conditions." On the other hand, Conte ensured that the army would be shielded from the public sector payroll cut under the structural adjustment (*Africa Contemporary Record*, 1984-85, p. B473).

mothers with the time dimension being the birth year of their children. From this sample, I drop babies born within 12 months before the survey, because these babies may die before their first birthday, causing measurement error. The resulting sample contains 21,739 babies born to 5,183 women. The earliest year of birth in the sample is 1961.

I drop babies born to foreign women (252 in total) as we are interested in individual-level favoritism among Guineans.

Although the surveyed mothers are nationally representative, babies in the constructed panel data are not, because babies born to women who are over 49 years old or dead at the survey date are missing from the sample. If the survival of these missing babies is systematically different from those in the sample, then my estimation results would be biased. I will come back to this issue below.

From information on the age at death, I create a dummy variable for infant death (death within the first year of life) as the dependent variable in the following analysis. For exogenous controls, I also create dummy variables for baby girls and babies born in multiple birth (twins, triplets, and quadruplets) because baby girls are known to be less likely to die for biological reasons and babies born in multiple birth are more likely to die. These variables are included as regressors to increase the precision of coefficient estimates.

To identify Sousou-dominated districts, I obtain the share of Sousou people in the population by district in the following way. I calculate the sample share of Sousou women among all women aged between 15 and 49 in each district in 1999, by using the sample of all surveyed women, including those who do not give any birth in the past. Table 5.4 shows the share of Sousou women in each district obtained this way. If the share exceeds 50 percent, I treat such districts as Sousou-dominated. Prefectures in Lower Guinea except for Boke and Telimele, and two out of five communes in Conakry turn out to be Sousou-dominated.

These obtained sample shares of Sousou women may differ from the actual shares of Sousou people relevant to ethnic favoritism because the share of Sousou men is not taken into account and because the ethnic group distribution in each district

Table 5.4: Shares of Sousou Women by District

District Name	Sousou share
Prefectures in Lower Guinea	
Boffa	87.5%
Boke	46.4%
Coyah	67.1%
Dubreka	86.9%
Forecariah	73.8%
Fria	74.3%
Kindia	56.3%
Telimele	0.9%
Prefectures in Middle Guinea	
Dalaba	0.0%
Gaoual	0.0%
Koubia	0.0%
Koundara	3.3%
Labe	0.6%
Lelouma	0.0%
Mali	0.6%
Mamou	1.0%
Pita	0.0%
Tougue	1.5%
Prefectures in Upper Guinea	
Dabola	0.9%
Dinguiraye	0.9%
Faranah	19.2%
Kankan	0.0%
Kerouane	0.9%
Kouroussa	0.0%
Mandiana	0.0%
Siguiri	0.0%
Prefectures in Forest Guinea	
Beyla	0.0%
Gueckedou	0.9%
Kissidougou	0.9%
Lola	0.0%
Macenta	0.0%
Nzerekore	0.0%
Yomou	0.0%
Communes in Conakry	
Dixinn	26.4%
Kaloum	64.9%
Matam	67.3%
Matoto	41.5%
Ratoma	36.2%

Notes: Shown in this table are the sample shares of Sousou women among all women aged between 15 to 49 by district. See Appendix C for details on how these figures are obtained.

may be different between in the late 1980s and in 1999. In addition, the surveyed women may not be representative for each district because sampling is stratified not by district but by five regions (Lower Guinea, Middle Guinea, Upper Guinea, Forest Guinea, and Conakry). Due to the lack of data, however, this is the only way of obtaining ethnicity shares in each district. As I only exploit whether Sousou people's share is over 50 percent of the population, this procedure is unlikely to yield a substantial misclassification of Sousou-dominated districts.

The survey results provide where interviewed mothers live at the survey time. However, there is no information on whether and when these mothers migrated to the surveyed place. As a result, I inevitably misallocate some babies to the places where they were not actually born. This could bias the estimation of the impact of leadership change because after Lansana Conte seized power, some of more than one million Guineans (which is up to 20 percent of the population) who had fled the country due to the repressive nature of Sekou Toure's rule returned to Guinea, though the number of such returnees is not very large (O'Toole and Baker 2005, p. 171). This issue will be discussed below where appropriate.

5.3.3 Summary Statistics

Table 5.5 shows the average infant mortality rates by period and subsample. Overall, 12.3 percent of live births lead to death within the first year of life in Guinea, and the rate has been on the decline from 15.4 percent until 1984 to 11.1 percent since 1985. Districts where the majority of women are Sousou have a lower infant mortality rate on average than the other districts (10.8 versus 12.7 percent). The decline in infant mortality is quicker in Sousou majority districts (5.5 versus 4.1 percentage points), suggesting the possibility that the government treats these districts better after 1984. Babies born to Sousou mothers are less likely to die within the first year of life than those born to women of the other ethnic groups (10.2 versus 12.9 percent). However, the fall of infant mortality is quicker for non-Sousou babies than for Sousou babies (4.5 versus 3.6 percentage points). Of course, these raw statistics may, for example, reflect change in the composition of mothers over time which

has nothing to do with the change in the ethnicity of the president. The following sections deal with such concerns.

Table 5.5: Sample Average Infant Mortality Rates

Sample	All Years	Until 1984	From 1985
All	12.3%	15.4%	11.1%
	(21739)	(6406)	(15333)
Sousou majority districts	10.8%	14.6%	9.1%
	(3861)	(1191)	(2670)
Other districts	12.7%	15.6%	11.5%
	(17878)	(5215)	(12663)
Sousou mothers	10.2%	12.7%	9.1%
	(4315)	(1366)	(2949)
Other mothers	12.9%	16.1%	11.6%
	(17424)	(5040)	(12384)

Notes: The numbers of observations are in parentheses.

5.4 Favoritism at the District Level?

First, we look at whether Lansana Conte favors districts where his ethnic group, Sousou, accounts for the majority of the population. The following equation is estimated:

$$y_{imdt} = \alpha_m + \beta_t + \gamma D_d * 1(t > 1984) + \delta D_d * 1(t > 1993) + \boldsymbol{X}_{imdt}\boldsymbol{\theta} + \varepsilon_{imdt}. \quad (5.1)$$

The dependent variable, y_{imdt}, is a dummy indicating whether baby i born to mother m in district d in year t dies within the first year of life.[35] α_m and β_t are a mother fixed effect and a birth-year fixed effect, respectively. D_d is a dummy equal to 1 if Sousou accounts for the majority of the population in district d, and $1(\bullet)$ is an indicator function which is 1 if the argument in parentheses is true and 0 otherwise. A vector of exogenous controls, $\boldsymbol{X}_{imdt}$, includes dummies for whether baby i is a girl and for whether baby i is born in multiple birth.

[35]Throughout the empirical analysis in this chapter, babies born until 1970 are treated as born in the same year. There are only 516 such babies (2.4 percent of the sample), and estimating year fixed effects (or district-year fixed effects in Section 5) for each single year until 1970 is computationally demanding and may yield inaccurate estimates of fixed effects.

Coefficient γ measures changes in infant mortality for babies of a mother in Sousou-majority districts, relative to babies for a mother in the other districts, after Conte seized power. I additionally control for $D_d * 1(t > 1993)$ to allow the pattern of regional favoritism to change after multiparty elections are introduced in 1993.[36] Therefore, coefficient γ measures the impact of Conte's power until multiparty elections were introduced. In the estimation, standard errors are clustered at the district level to take into account serial and spatial correlations in each district.

The identifying assumption for consistent estimation of γ is that the error term, ε_{imdt}, is strictly exogenous to $D_d * 1(t > 1984)$ and $D_d * 1(t > 1993)$ conditional on mother and year fixed effects and exogenous covariates. As mother fixed effects are controlled for, changes in the composition of mothers over time for each district do not affect this identifying assumption. If economic conditions in Sousou majority districts were improving around 1984 while there was no such improvement in other areas of Guinea, however, this assumption breaks down. In some specifications, I partly deal with this concern by replacing year fixed effects with region-year fixed effects where regions include Lower Guinea, Middle Guinea, Upper Guinea, Forest Guinea, and Conakry. Since Sousou majority districts are located in either Lower Guinea or Conakry (see Table 5.4), this specification exploits variation within these two regions only, minimizing the difference in the trajectory of the error term between Sousou-majority districts and others. Also, I additionally control for district-specific linear trends to take into account the possibility that Sousou-majority districts exhibit a steeper linear declining trend in infant mortality over time, perhaps due to bauxite mining as discussed in Section 5.3.1.

Table 5.6 shows the results of estimating equation (5.1). Column (1) shows that infant mortality drops by 2.3 percentage points for mothers living in Sousou-majority districts after 1984, and this result is statistically significant at 10 percent level. Column (2) controls for region-year fixed effects instead of year fixed effects. The estimate becomes noisier, but the magnitude of the coefficient becomes larger. Column (3) additionally controls for district-specific linear trends. Now the sign of

[36] See Posner (2005, 2007) for the impact of political regime change on ethnic politics.

the coefficient flips, and it is not statistically significant. These results suggest that Sousou-majority districts have a steeper declining trend in infant mortality than the other districts over time, casting doubt on the interpretation that the coefficient estimates in columns (1) and (2) reflect the effect of Conte seizing power. Columns (4) and (5) restrict the sample to mothers in urban and rural areas, respectively, with the same specification as in column (3). As health care provisions to rural areas require an extra effort for health professionals (e.g. outreach activities), it might be the case that regional favoritism affects the welfare for urban people only. Alternatively, if health care provision in urban areas had already reached a certain level before 1984, regional favoritism might only affect the welfare for those in rural areas. Estimation results in columns (4) and (5) suggest that neither of these hypotheses appears to be the case. Interestingly, urban areas in Sousou-majority districts became worse off after multiparty elections were introduced in 1993.

To investigate further whether results in columns (1) and (2) are solely due to a steeper declining trend in infant mortality in Sousou-majority districts, I estimate the following equation:

$$y_{imdt} = \alpha_m + \beta_t + \sum_{j=1975}^{1993} \gamma_j D_d * 1(t = j) + \delta D_d * 1(t > 1993) + \boldsymbol{X}_{imdt}\boldsymbol{\theta} + \varepsilon_{imdt}. \quad (5.2)$$

Coefficient γ_j measures changes in infant mortality in year j compared to the period until 1974. Estimated γ_j's in the three specifications (year fixed effects, region-year fixed effects, and region-year fixed effects with district-specific linear trends) are shown in Table 5.7 and plotted in Figure 5.1. The figure does not show clearly that infant mortality in Sousou-majority districts relative to the other districts has dropped since 1984.

There are three data issues that may cause estimation bias in the above results. As discussed in Section 5.3.2, some Guineans in exile during Sekou Toure's rule returned home after 1984. If these people had lived a better life in exile than they did after coming home and mainly returned to Sousou-dominated districts—relatively better-off areas in Guinea as seen in Table 5.5—the estimation of coefficient

Table 5.6: Ethnic Favoritism at the District Level
(The Dependent Variable: Death within the first year of life)

	(1)	(2)	(3)	(4)	(5)
sample:	all	all	all	urban	rural
Sousou-majority*Post1984	-0.023*	-0.031	0.027	0.041	0.019
	[0.012]	[0.020]	[0.029]	[0.042]	[0.051]
Sousou-majority*Post1993	-0.007	-0.013	0.026	0.079***	-0.004
	[0.016]	[0.020]	[0.021]	[0.017]	[0.029]
Year fixed effects	YES	NO	NO	NO	NO
Region-year fixed effects	NO	YES	YES	YES	YES
District-specific linear trends	NO	NO	YES	YES	YES
Number of Districts	38	38	38	28	33
Number of Mothers	5183	5183	5183	1560	3623
Observations	21739	21739	21739	5938	15801
Adjusted R^2	0.069	0.070	0.070	0.024	0.082

Notes: Robust standard errors clustered at the district level are reported in brackets. In all columns, a dummy for baby girls, a dummy for babies born in multiple birth, and mother fixed effects are controlled for. "Sousou-majority" is a dummy indicating whether a baby's mother lives in a district with Sousou women accounting for more than half the female population aged 15 to 49 in 1999; "Post1984" and "Post1993" are dummies for whether a baby is born after 1984 and 1993, respectively. Columns (1) to (3) include all babies in the sample; column (4) only babies born to women living in urban areas in 1999; column (5) only babies born to women living in rural areas in 1999.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5.7: Dynamics of Infant Mortality Changes in Sousou-dominated Districts
(The Dependent Variable: Death within the first year of life)

	(1)	(2)	(3)
1975	-0.044	-0.051	-0.011
	[0.062]	[0.096]	[0.122]
1976	0.04	0.035	0.083
	[0.113]	[0.127]	[0.177]
1977	0.009	-0.154***	-0.095
	[0.072]	[0.055]	[0.106]
1978	-0.083	-0.026	0.046
	[0.065]	[0.077]	[0.143]
1979	-0.045	-0.091	-0.007
	[0.068]	[0.063]	[0.148]
1980	-0.028	-0.084	0.009
	[0.074]	[0.075]	[0.175]
1981	-0.03	-0.04	0.063
	[0.031]	[0.058]	[0.214]
1982	0.002	-0.003	0.114
	[0.038]	[0.030]	[0.196]
1983	-0.037	-0.062	0.063
	[0.041]	[0.054]	[0.236]
1984	-0.015	-0.108*	0.03
	[0.054]	[0.062]	[0.217]
1985	-0.028	-0.043	0.105
	[0.046]	[0.047]	[0.249]
1986	-0.06	-0.082	0.08
	[0.041]	[0.053]	[0.293]
1987	-0.03	-0.072	0.099
	[0.059]	[0.056]	[0.311]
1988	-0.073*	-0.106	0.078
	[0.040]	[0.066]	[0.342]
1989	-0.025	-0.063	0.133
	[0.041]	[0.065]	[0.345]
1990	-0.025	-0.089*	0.118
	[0.045]	[0.049]	[0.327]
1991	-0.046	-0.097*	0.122
	[0.048]	[0.048]	[0.376]
1992	-0.066*	-0.148**	0.082
	[0.035]	[0.057]	[0.403]
1993	-0.039	-0.074	0.166
	[0.039]	[0.053]	[0.413]
1994+	-0.051	-0.103***	0.17
	[0.040]	[0.037]	[0.445]
Year fixed effects	YES	NO	NO
Region-year fixed effects	NO	YES	YES
District-specific linear trends	NO	NO	YES
Number of Districts	38	38	38
Number of Mothers	5183	5183	5183
Observations	21739	21739	21739
Adjusted R^2	0.068	0.070	0.070

Notes: Robust standard errors clustered at the district level are reported in brackets. In all columns, a dummy for baby girls, a dummy for babies born in multiple birth, and mother fixed effects are controlled for. Estimated coefficients on the interaction between the Sousou-majority district dummy and the dummy for the year indicated are reported.

* significant at 10%; ** significant at 5%; *** significant at 1%.

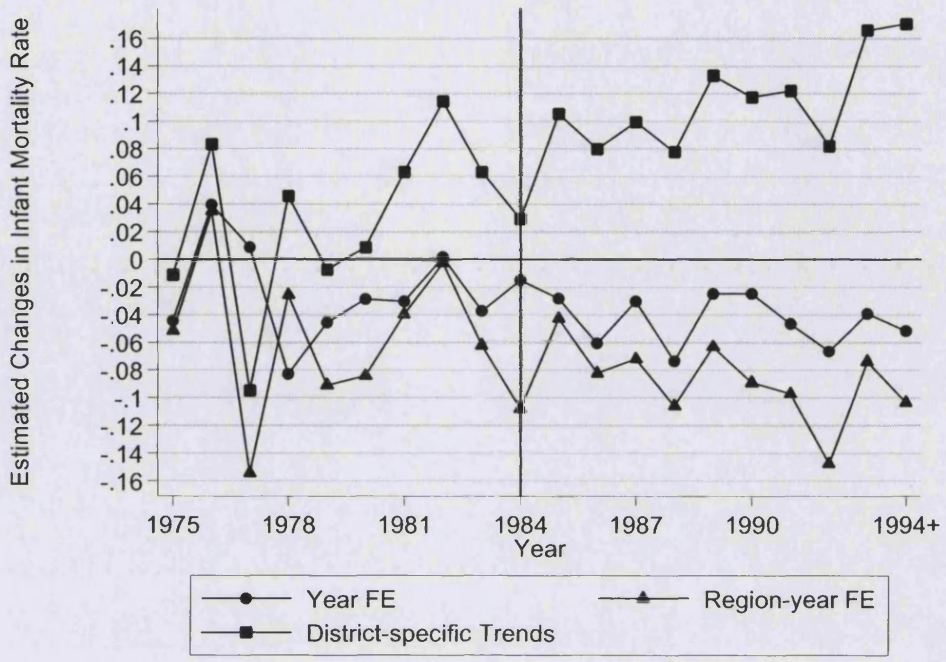

Figure 5.1: Dynamics of Infant Mortality in Sousou-majority Districts

Notes: Plotted are estimated coefficients reported in Table 5.7. The series "Year FE" corresponds to column (1) in Table 5.7; "Region-year FE" column (2); and "District-specific Trends" column (3). See Table 5.7 for more details.

γ in equation (5.1) will be biased upwards. Alternatively, if Guineans in exile lived a worse life and they returned to districts where Sousou people were a minority, coefficient γ will be estimated with upward bias.

In addition, sample selection due to the fact that babies born to women who are not alive at the survey time may also cause underestimation of the effect of ethnic favoritism. If the survival rate of babies improves with birth order for healthy mothers and worsens for unhealthy mothers, and if unhealthy mothers are more likely to survive in Sousou-dominated districts due to a better health system as a result of favoritism than in other districts, then a difference in differences in infant mortality between Sousou-dominated and other districts will be underestimated.

Finally, misclassifying Sousou-dominated districts may cause the underestimation of the impact of ethnic favoritism. If non-Sousou people have been migrating to Sousou-dominated districts since 1984 because the government treats these districts better, using the sample share of Sousou women in 1999 may misclassify Sousou-

dominated districts in the late 1980s as non-Sousou dominated. This misclassification then biases the point estimate towards zero. However, choosing different cut-off values to define Sousou-dominated districts does not yield substantially different results (not reported), suggesting that this concern appears to be minimal.

To conclude this section, there is no clear evidence that Lansana Conte favored districts where many members of his ethnic group reside, though the data issues mentioned above may cause this result.

5.5 Favoritism within Districts?

To investigate the possibility of individual-level favoritism within each district, I estimate the following equation:

$$y_{imdt} = \alpha_m + \chi_{dt} + \psi E_m * 1(t > 1984) + \omega E_m * 1(t > 1993) + \boldsymbol{X}_{imdt}\boldsymbol{\theta} + \upsilon_{imdt}, \quad (5.3)$$

where χ_{dt} is a district-year fixed effect and E_m is a dummy indicating whether mother m is a Sousou. To allow multiparty elections to change the impact of ethnic favoritism, I control for $E_m * 1(t > 1993)$. Coefficient ψ measures the difference in changes in infant mortality after 1984 (until 1993) between Sousou and the other ethnic groups conditional on any district-level yearly factor affecting infant survival such as weather and district-level macroeconomic conditions. If favoritism by the government targets Sousou individuals within each district, we should see $\psi < 0$. Standard errors are clustered at the district-ethnicity level. In this analysis, I drop babies born to foreign women (252 in total) as we are interested in individual-level favoritism among Guineans.

The identification assumption for consistent estimation of ψ is that the error term, υ_{imct}, is uncorrelated with all the values of $E_m * 1(t > 1984)$ and $E_m * 1(t > 1993)$ for mother m in years when mother m gives birth and for all babies born in district d in year t, because mother fixed effects and district-year fixed effects are controlled for. This assumption is immune to the possibility that districts dominated by Sousou citizens have improved their health care system or macroeconomic

conditions since 1984. If, however, an overall improvement in health care or macroeconomy at the district level differentially affects Sousou people and the other ethnic groups because, for example, Sousou people benefit more due to their superior educational background,[37] then we would see a statistically significant estimate of ψ even if the government does not intentionally target Sousou people in its policy reforms. Unfortunately, I cannot disentangle this possibility from ethnic favoritism at the individual level.

The first three columns in Table 5.8 shows the estimated ψ and ω in equation (5.3). Column (1) shows that there is no statistically significant difference in changes in infant survival rates between Sousou and the other ethnic groups in the same district. Columns (2) and (3) restrict the sample to urban and rural areas, respectively. Sousou people appear to suffer more in urban areas and benefit more in rural areas, but neither is a statistically significant result. Interestingly, infant mortality for Sousou babies go up by 2.9 percentage points relative to babies of other ethnicity after 1993, which is statistically significant at 10 percent level.

Columns (4) to (6) allow ψ and ω to differ between Sousou-majority districts and the others, by interacting $E_m * 1(t > 1984)$ and $E_m * 1(t > 1993)$ with D_d and $(1 - D_d)$. As noted in Section 5.2.3, the central government allocates health expenditures at the district level. If the budget is preferentially allocated to Sousou majority districts, then Sousou people in these districts will only benefit from favoritism. The results obtained in columns (1) to (3) may be due to the attenuation caused by Sousou people in Sousou-minority districts.

The results in columns (4) to (6) show that in Sousou-majority districts, Sousou mothers are not significantly less likely to see their baby die within the first year of life than mothers from the other ethnic groups after 1984. However, the point estimate, especially for the rural sample, is very large compared to the sample mean mortality (12.3%), implying that the data does not have sufficient variation to identify the favoritism effect precisely. For districts where Sousou people are a

[37] In the sample of 3,034 Guinean women born before 1970 (so these women reached a childbearing age by 1984), 24 percent of Sousou women attended school while 12 percent of non-Sousou women went to school (the difference is statistically significant at 1 percent level).

Table 5.8: Ethnic Favoritism within Districts
(The Dependent Variable: Death within the first year of life)

	(1)	(2)	(3)	(4)	(5)	(6)
sample:	all	urban	rural	all	urban	rural
Sousou*Post1984	-0.004	0.029	-0.037			
	[0.025]	[0.028]	[0.034]			
Sousou-majority				-0.043	0.005	-0.074
*Sousou*Post1984				[0.037]	[0.054]	[0.060]
(1-Sousou-majority)				0.031	0.031	0.042
*Sousou*Post1984				[0.033]	[0.040]	[0.043]
Sousou*Post1993	0.029*	0.040**	0.022			
	[0.015]	[0.019]	[0.020]			
Sousou-majority				-0.004	-0.099***	0.047
*Sousou*Post1993				[0.017]	[0.024]	[0.030]
(1-Sousou-majority)				0.059***	0.086***	-0.038
*Sousou*Post1993				[0.016]	[0.019]	[0.050]
F-test				2.20	0.16	2.47
p-value				0.140	0.687	0.119
Number of Ethnicity-districts	134	90	98	134	90	98
Number of Mothers	5116	1526	3590	5116	1526	3590
Observations	21487	5819	15668	21487	5819	15668
Adjusted R^2	0.076	0.302	0.309	0.076	0.018	0.086

Notes: Robust standard errors clustered at the ethnicity-district level are reported in brackets. In all columns, a dummy for baby girls, a dummy for babies born in multiple birth, mother fixed effects, and district-year fixed effects are controlled for. "Sousou" is a dummy indicating whether a baby is born to a Sousou woman; see notes for Table 5.6 for the definition of "Post1984", "Post1993", and "Sousou-majority". Columns (1) and (4) includes all babies in the sample; columns (2) and (5) only babies born to women living in urban areas in 1999; columns (3) and (6) only babies born to women living in rural areas in 1999. The null for F-test is that the coefficient on Sousou-majority*Sousou*Post1984 and (1-Sousou-majority)*Sousou*Post1984 are the same. * significant at 10%; ** significant at 5%; *** significant at 1%.

minority, mortality for Sousou infants goes up after 1984 relative to other ethnic groups though the estimates are imprecise. As both point estimates are noisy, we cannot reject the null that changes in infant mortality for Sousou people are the same between the two types of districts.

After 1993, however, Sousou people in urban areas of the Sousou-majority districts appear to benefit significantly while those in the Sousou-minority districts seem to hurt. These results, however, should be interpreted with caution because the introduction of multiparty elections in 1993 may be endogenous to the relative welfare of Sousou people in each district.

As in the district-level analysis in Section 5.4, migration and mortality selection of mothers may drive these results. The estimate of ψ will be biased upwards if Sousou mothers in exile living in a country more favorable for child survival than Guinea returned home after 1984 while exiled mothers from other ethnic groups did not because the new president is not their co-ethnic, for example. Also, if the survival of unhealthy mothers became more likely for Sousou people but not for other ethnic groups due to favoritism, and if the survival of babies born to unhealthy mothers are more difficult to ensure, then the impact of ethnic favoritism will be underestimated.

5.6 Conclusion

This chapter exploits an exogenous change in the president's ethnicity in Guinea in 1984 to empirically test a conventional wisdom that the ethnic group in power is better off than others. Estimation results do not support this claim. After the president's ethnicity changes, welfare measured by infant mortality does not improve for districts where the new president's ethnic group predominates relative to other districts. The new president's ethnic group does not see an improvement in welfare compared to other groups within the same district, either.

Data limitations might explain these findings. The inclusion of babies born to migrating women in the sample, and the exclusion of babies whose mother died

before 1999 from the sample, might attenuate the estimated impact of ethnic favoritism. Still, empirical results in this chapter suggest that the impact of ethnic favoritism is not large enough to survive the attenuation due to such data limitations. Caution needs to be taken against assuming, without solid evidence, that the ethnicity of political leaders makes a difference to each ethnic group's welfare. Theoretical arguments on ethnic politics incorporating this conventional wisdom should be heard carefully.

One reason why there was no substantially large impact of ethnic favoritism on welfare in Guinea could be that Guinea had not been a democratic country, at least until 1993. Before the leadership change in 1984, opposition parties were banned. The new president did not hold national elections until 1993. Bates (1983) argues that politicians rely on ethnic appeal to seek political support because, due to the correlation between ethnicity and space, one ethnic group predominates in each constituency. In democracy, obtaining the support from a majority of people in each constituency is crucial to stay in power. In non-democracy, however, what needs to stay in power may be just the support from people in the capital city or in the military, where in the case of Guinea, no single ethnic group predominates. How political regimes affect ethnic favoritism need to be understood in future research.[38]

[38]See Posner (2005, 2007) for an example of research in this direction.

Appendix A

Data Appendix to Chapter 2

A.1 Dependent Variables

Life expectancy at birth (in years) is obtained from *World Development Indicators* (September 2005). We only use the data for every fifth year between 1962 and 2002 as observations for a large number of countries are available in these years. (We do not use the data for years 1990 and 2003, in which a large number of observations are also available, in order to maintain consistency in the data structure.)

Infant mortality (per 1,000 live births) is obtained from *World Development Indicators* (September 2005). For the same reason as for life expectancy, we only use the data for every tenth year between 1960 and 2000. (We do not use the data for 1995 and 2003 despite the availability for a large number of countries for the same reason as above.)

Sanitation (in percentage of the population with access to improved sanitation facilities) and clean water (in percentage of the population with access to improved water sources) are obtained from *World Development Indicators* (September 2005). The data is only available for 1990 and 2002.

DPT and measles immunization (in percentage of children aged 12 to 23 months who received vaccination before reaching the age of one) are obtained from *World Development Indicators* (September 2005). The data is available annualy from 1980 through 2003. We calculate the averages over five-year periods beginning in 1981,

throwing away the data for 1980, 2001, 2002, and 2003.

Government health expenditures per capita (in constant 1996 international dollars) are obtained as follows. The data in current international dollars is obtained from *World Health Reports* 2002 (Annex Table 5 for 1996 figures), 2004 (Annex Table 6 for 1997), and 2005 (Annex Table 6 for 1998 to 2000), all downloaded at the World Health Organization website (http://www.who.int/whr/annexes/en/index.html). In order to separate the effect of inflation, these figures are deflated by the GDP deflator obtained from the Penn World Table 6.1 (by dividing nominal GDP per capita (variable CGDP) by real GDP per capita (variable RGDPCH)). These drop some observations of government health expenditures due to the lack of GDP data in the Penn World Table. Then the average over 1996-2000 is calculated.

A.2 Democracy Variables

A country-year is treated as democratic if variable POLITY2 in the POLITY IV dataset version 2003[1] is more than zero[2]. This variable is missing if a country is not independent or occupied by foreign forces (for example, Bosnia and Herzegovina since 1995, Cambodia during 1979-87, Lebanon since 1990, Syria during 1958-1960). We treat such a case as a colony, excluded from the sample,[3] although we use this information when we construct a political history variable (see below). Also note that the POLITY IV data excludes countries with the population of less than 500,000. This drops some countries with life expectancy observations (e.g. small island nations in the Caribbean).

We make adjustments to the POLITY2 variable for the following countries.

1. Burundi: Assign the value of 0 in 2002. POLITY 2 is missing for Burundhi in 2002 due to the regime transition.[4] We treat it as non-democratic.

[1]Downloaded at http://www.cidcm.umd.edu/inscr/polity

[2]Persson (2005) and Persson and Tabellini (2006a) adopt the same definition of democracy. Epstein et al. (2003) define country-years with POLITY2 equal to 8 or higher as "full democracies" and those with POLITY2 larger than 0 and less than 8 as "partial democracies".

[3]Data on life expectancy and infant mortality is available for some countries during the pre-independence years or foreign occupation. We do not use such observations in the analysis in order to avoid confounding the effects of autocracy and colonial rules.

[4]See page 16 of Marshall and Jaggers (2002).

2. Peru: Assign the value of 5 in 2000. This is simply a data entry error by the POLITY IV.

3. Former Soviet Union republics: Assign the values of Soviet Union before their independence in the early 1990s. For three Baltic countries, we do not replace their POLITY2 values during their independence from around 1920 through 1944.

4. Czech and Slovak Republics: Assign the values of Czechoslovakia before 1993.

5. Former Yugoslav republics: Assign the values of Yugoslavia before their independence in the early 1990s.

6. Eritrea: Assign the values of Ethiopia during 1952-1992. We do not extend this modification beyond the year of 1952 because Eritrea was an Italian colony until 1941, a British colony from 1941 to 1945, and then a United Nations protectorate until Ethiopia officially federated it in 1952.

7. Bangladesh: Assign the values of Pakistan before independence in 1972.

8. Vietnam: Assign the values of North Vietnam before the unification in 1976. The choice of North Vietnam instead of South Vietnam does not matter as both Vietnams were always autocratic.

9. North Korea and South Korea: Assign the POLITY2 values of Korea during 1900-1910.

Our short-term democracy measure for year t (DEMOCRACY since t-4 or d_{srt} in equation (1)) is constructed by dividing the number of democratic years between years $t-4$ and t by five. Note that in this calculation, the years under colonial rules are included in the denominator. If a country became independent in, say, year $t-1$ and has been democratic for two years till year t, then DEMOCRACY since $t-4$ takes a value of 0.4.

The long-term democracy measure for year t (DEMOCRACY since 1956 or D_{srt} in equation (1)) is constructed by dividing the sum of democratic years between years

1956 and t by $t - 1955$. Note that for countries that have been democratic since its independence in the middle of the sample period (e.g. Papua New Guinea, which became independent in 1975) this measure is not 1 because they were not democratic but a colony until the year of independence. Note also that the long-term democracy measure is missing for Germany because East Germany was non-democratic while West Germany was democratic since 1956 until the unification in 1990.[5]

The alternative democracy measure is obtained from Boix and Rosato (2001). Variable DEMOCRACY in their dataset is a dummy equal to 1 if a country-year is democratic. We drop observations if variable SOVEREIGN (a dummy for independence) is 0.[6] We make the same adjustment to variable DEMOCRACY for former Soviet Union republics, Czech and Slovak Republics, former Yugoslav republics, Eritrea, Bangladesh, Vietnam, North Korea and South Korea as described above. Then the short-term and long-term democracy measures are constructed exactly in the same way as above.

Forms of democracy variables used in Columns (1) and (2) of Table 2.6 are constructed as follows. For the period between 1956 and 2002, each country-year with variable POLITY2 being positive is assigned with forms of government and electoral systems according to Table 4 of Persson (2005). As Persson (2005) only code countries experiencing constitutional reforms during 1962 to 1998, we then use Table A1 of Persson and Tabellini (2004) for coding non-reforming countries as long as their POLITY2 variable is positive. This leaves several country-years uncoded. For these cases, we rely on the Database of Political Institutions version 2004 (Beck et al. 2001), downloaded from Philip Keefer's website.[7] Specifically, a country-year is coded as presidential if variable SYSTEM is 0 or 1, as parliamentary if variable SYSTEM is 2, as majoritarian if HOUSESYS is 1, and as proportional if HOUSESYS is 0. This still leaves some country-years uncoded. In such cases, we use Table A1 of Cheibub et al. (2004) for forms of government and Golder (2005)'s electoral

[5]Yemen avoids this problem as both North Yemen and South Yemen were non-democratic or under colonial rules between 1956 and the unification in 1990. The same holds true for Vietnam.

[6]Variable DEMOCRACY in Boix and Rosato (2001) is 0 either if a country is independent and nondemocratic or if a country is not independent.

[7]http://econ.worldbank.org/staff/pkeefer

system dataset, downloaded at Matt Golder's website,[8] for electoral systems. Based on the latter dataset, we code a country-year as majoritarian if variable ELECSYSTEM_TYPE is 1 and as proportional if ELECSYSTEM_TYPE is 2 or 3. In the end, we are unable to code the following country-years: Benin from 1960 to 1962, the Comoros in 1975, Equatorial Guinea in 1968, Nepal in 1959, Niger from 1999 to 2002 for the electoral system, Pakistan from 1956 to 1957, Syria from 1956 to 1957, and East Timor in 2002 for the electoral system. We treat them as non-democratic in the analysis of columns (1) and (2) of Table 2.6. As in the construction of democracy measures, coding for Pakistan and Czechoslovakia is used for pre-independence years of Bangladesh and Czech and Slovak Republics, respectively.

The above coding procedure gives four dummy variables (two for forms of government, and two for electoral systems). Then for each of the four variables, we construct the long-term (since 1956) measures just as we did for the democracy measures (see above).

Dimensions of democracy variables used in Column (3) of Table 2.6 are constructed from the POLITY IV dataset. First, variables EXREC, XCONST, and POLCOMP are adjusted for Bangladesh and Czech and Slovak Republics as we did for variable POLITY2 (see above). We then make these variables missing if they are -66 (foreign occupation) so that missing country-years for these variables are the same as for variable POLITY2.[9] From these three variables, we construct three dummy variables as follows. EXECUTIVE COMPETITION is a dummy variable coded as 1 if variable EXREC is 6 or higher. EXECUTIVE CONSTRAINT is a dummy variable equal to 1 if variable XCONST is 4 or higher. POLITICAL PARTICIPATION is a dummy variable equal to 1 if variable POLCOMP is 7 or higher. Note that each of the three conditions for creating the dummy variables corresponds to the addition of a positive number to variable POLITY2.[10] As we define democracy as having a positive POLITY2 score, this is likely to be the best, albeit admittedly crude, way of decomposing the measure of democracy by the POLITY

[8] http://homepages.nyu.edu/~mrg217/elections.html

[9] See page 16 of Marshall and Jaggers (2002).

[10] See Marshall and Jaggers (2002), especially pages 13-15 and tables 3.1 and 3.2.

IV dataset. Then for each of the three dummy variables, we construct the long-term measures in the same way as we did for the democracy measures.

A.3 Political History Variables

Political history variables are constructed by using the POLITY IV dataset for years 1900 to 1955. Note that these variables are missing for Germany and Yemen. East Germany had a different political history from West Germany during 1949 to 1955. North Yemen became independent in 1918 while the year of independence for South Yemen is 1967.

DEMOCRACY for 1900-1955 is obtained for each country by dividing the sum of democratic years between 1900 and 1955 inclusive by 56.

COLONY for 1900-1955 is obtained for each country by dividing the sum of colonial years (defined as years for which POLITY2 is missing) during 1900 to 1955 inclusive by 56.

A.4 Other Controls

INCOME, defined as real GDP per capita averaged over years $t-4$ to t (in thousand constant 1996 international dollars), is constructed as follows. Variable RGDPCH in the Penn World Table 6.1[11] is divided by 1000 to match with life expectancy, which is always a two-digit figure, and then averaged over years $t-4$ to t. Unless observations are missing for all the five years, we keep observations and add them up and divide it by the number of available observations.[12]

SCHOOLING, the average years of schooling in the population aged over 15, in 1960 is obtained from Barro and Lee (2000)'s dataset.[13] The variable name in the original dataset is TYR15.[14]

[11]Downloaded at http://pwt.econ.upenn.edu

[12]Several countries in the Penn World Table 6.1 have observations only in 1996. For such countries, INCOME is not missing for years 1996 to 2000, with its value equal to per capita income in 1996.

[13]Downloaded at http://www.cid.harvard.edu/ciddata/ciddata.html

[14]We do not use the panel data set format file downloadable on the website, because it drops

Legal origin dummies (British, German, Scandinavian, Socialist) are obtained from La Porta et al. (1999).[15] In addition, we treat the legal origin of East Timor (not included in La Portal et al (1999)'s analysis but included in our sample for Column (1) of Table 1) as French.[16]

Region dummies are constructed according to the World Bank's region classification (East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia, and Sub-Saharan Africa). For the list of countries in each region, see the World Bank's website (www.worldbank.org/countries). For countries not receiving the World Bank loans in 2005, we assign them into either of these six regions in the following way: Australia, Brunei, Japan, Myammar, New Zealand, North Korea, and Singapore are included in East Asia and Pacific; Bahamas, Barbados, and Cuba in Latin America and the Caribbean. The rest of the countries are grouped as Western Europe and North America. Note that the World Bank groups former Soviet bloc countries plus Turkey as Europe and Central Asia and that their definition of Middle East and North Africa includes Malta and Djibouti. We do not reclassify these countries.

Malaria ecology index due to Kiszewski et al. (2004) is downloaded at Jeffrey Sachs's website.[17] The index measures the potential intensity of malaria transmission, uncolored by clinical externalities. The higher the index, the more intense the potential malaria transmission. The minimum value is zero while the maximum is about 31.55 (Burkina Faso).

European settler mortality in the 19th century is obtained from Appendix Table A2 of Acemoglu et al. (2001). It measures the annualized number of deaths among 1,000 European settlers where each death is replaced with a new settler.

Ethnic fractionalization index due to Alesina et al. (2003) is downloaded at

some observations available in the original appendix tables of Barro and Lee (2000).

[15]The data file is downloaded at Andrei Shleifer's website (http://post.economics.harvard.edu/faculty/shleifer/data.html).

[16]As the income data is not available, East Timor drops from the sample for other regressions. According to CIA World Factbook 2005 (http://www.cia.gov/cia/publications/factbook), "UN-drafted legal system based on Indonesian law remains in place but will be replaced by civil and penal codes based on Portuguese law (2004)". Both Indonesia and Portugal are of French legal origin.

[17]http://www.earthinstitute.columbia.edu/about/director/malaria/index.html

William Easterly's website.[18] It measures the probability that two randomly chosen persons in a country belong to different ethnic groups.

Incidence of wars is a dummy variable equal to 1 if the government of a country is a primary actor in a war (defined as armed conflicts with at least 1000 battle-related deaths per year). The data source is the Armed Conflict Dataset Version 3-2005b (see Gleditsch et al. (2002) and Strand et al. (2005)), downloaded at its website.[19] The dummy variable is created so that it is equal to 1 if variable LOCATION in the monadic dataset is 3.

Mineral exporters is a dummy variable equal to 1 if the gross value of mineral exports as percentages of GDP averaged over 1960-2002 is larger than 8 percent. The gross value of mineral exports as percentages of GDP is constructed as follows by using data obtained from *World Development Indicators* (September 2005). Fuel exports and ores and metals exports (as percentages of merchandise export) are each multiplied by merchandise exports (in current US dollars) and divided by GDP (in current US dollars). For Singapore, fuel exports is set at 0.01, following Ross (2001).[20] Each of the resulting values is then averaged for each country over the period from 1960 (the earliest year in which the data is available) through 2002 whenever the data is available for at least one year. The mineral exporter dummy is set to be 1 if the sum of these two average values exceeds 8.

[18]http://www.nyu.edu/fas/institute/dri/Easterly/Research.html

[19]http://www.prio.no/cscw/armedconflict

[20]Ross (2001) also corrects fuel export figures for Trinidad and Tobago. Unlike Singapore, however, it does produce oil. (Its average net fuel export is around 20 percent).

Table A.1: Summary Statistics for Main Time-variant Variables

Variables	Whole Sample	INCOME Sample	INCOME Sample			
			1960s	1970s	1980s	1990s
Life Expectancy	60.68	60.48	54.77	57.75	61.22	64.12
	(12.05)	(12.38)	(12.33)	(11.64)	(11.36)	(12.03)
	1309	999	182	205	216	396
DEMOCRACY	0.40	0.51	0.45	0.40	0.43	0.63
since t-4	(0.47)	(0.47)	(0.47)	(0.46)	(0.48)	(0.45)
(by POLITY IV)	1309	999	182	205	216	396
INCOME		5.76	3.77	4.92	5.83	7.06
		(6.01)	(3.61)	(4.81)	(5.76)	(7.16)
		999	182	205	216	396

Notes: For each variable, the top row shows the mean, the middle row the standard deviation (in parentheses), and the bottom row the number of observations. "Whole Sample" is the sample used for Column (1) of Table 2.1; "INCOME Sample" the sample used for Column (2) of Table 2.1 and Columns (1) and (2) of Table 2.2. 1960s include years 1962 and 1967; 1970s years 1972 and 1977; 1980s years 1982 and 1987; 1990s years 1992, 1997, and 2002.

Table A.2: Summary Statistics for Other Time-variant Variables

	Mean	Standard Deviation	Observations	Minimum	Maximum
DEMOCRACY since 1956 (POLITY)	0.40	0.40	996	0	1
DEMOCRACY since t-4 (Boix and Rosato)	0.38	0.46	764	0	1
DEMOCRACY since 1956 (Boix and Rosato)	0.34	0.42	764	0	1
Infant Mortality	69.80	53.87	543	2.9	285
Sanitation	58.63	28.85	183	4	100
Clean Water	76.83	20.75	190	20	100
DPT Immunization	70.24	25.39	486	1.2	99
Measles Immunization	68.67	24.02	484	1	99
Health Spending	319.84	470.14	145	4.80	1914.06
Incidence of Wars	0.06	0.24	993	0	1
PRESIDENTIAL since 1956	0.14	0.27	996	0	1
PARLIAMENTARY since 1956	0.25	0.39	996	0	1
MAJORITARIAN since 1956	0.18	0.33	996	0	1
PROPORTIONAL since 1956	0.21	0.35	996	0	1
EXECUTIVE COMPETITION since 1956	0.41	0.40	996	0	1
EXECUTIVE CONSTRAINT since 1956	0.37	0.40	996	0	1
POLITICAL PARTICIPATION since 1956	0.32	0.39	996	0	1

Table A.3: Summary Statistics for Time-invariant Variables

	Mean	Standard Deviation	Number of Countries	Minimum	Maximum
DEMOCRACY for 1900-1955	0.19	0.32	144	0	1
COLONY for 1900-1955	0.53	0.43	144	0	1
SCHOOLING in 1960	3.63	2.52	92	0.12	9.73
Malaria ecology	3.97	6.81	143	0	31.55
Settler mortality	256.10	481.91	61	8.55	2940
Ethnic fractionalization	0.46	0.25	144	0	0.93
Mineral expoters	0.25	0.43	138	0	1

Appendix B

Data Appendix to Chapter 3

B.1 Democracy Data

B.1.1 Years of Democratization

To identify in which year the 28 countries in sub-Saharan Africa in the sample are democratized, I follow the procedure described below.

For each country, I code answers to the following questions for each year since independence or 1950:

1. Who is the chief executive at the beginning of the year? (This involves the judgment of whether a country has adopted a presidential or parliamentary system.)

2. Did he assume office (or was he confirmed as chief executive) by elections, or by constitutionally succeeding the predecessor who was elected in a contested election? If yes, go to question 3. If no, it is not democratic.

3. Were the elections contested by opposition parties? If yes, go to question 4. If no because all the opposition candidates/parties boycott, go to question 4.[1] If no because of other reasons, it is not democratic.

[1]One can argue that the boycott by all opposition parties means non-democratic because voters do not have choices. Still, as long as opposition parties are legal, the chief executive, after elected in the boycotted election, has reasons to think about re-election in a contested election because he does not know whether opposition parties will boycott again.

4. Were the elections conducted with universal suffrage? If yes, go to question 5. If no, it is not democratic.

5. Are opposition parties legal at the beginning of the year? If no, it is not democratic.[2]

This way, I identify the year in which answers to all the five questions above become yes. Then I check if the chief executive identified in question 1 differs before and after that year. If it does, it is democratization. Following the suggestion by Munck and Verkuilen (2002, p. 19), the detailed coding process and the disaggregated data (ie. answers to the five questions above) are publicly available on my website.[3] I have not conducted a test of inter-coder reliability, also suggested by Munck and Verkuilen (2002, p. 18). After finishing the data collection on my own, however, Lindberg (2003) came to my notice, who compiled the details of multiparty elections in Africa from 1989 to 2001. If I followed Lindberg (2003) for coding the year of the first multiparty election for executive office, it would be almost the same.[4] This partly serves as a test of inter-coder reliability.

The above procedure reveals that 11 countries, as listed in Table 3.1 and shown in Figure 3.2, were democratized in the 1990s without the reversion to autocracy in the subsequent years. In the following, I describe cases that need some justification.

In the Comoros, the dictator Ahmed Abdallah Abderamane was assassinated in November 1989, succeeded by Said Mohamed Djohar as interim president. Djohar then won the first multiparty presidential election in March 1990. I regard this as the replacement of the chief executive after the first multiparty election. Djohar was then deposed in a coup in September 1995. France, however, intervened to prevent the collapse of the constitutional order, followed by a fresh presidential election in March 1996. There was another coup in 1999, which is out of the sample period.

[2]This final step is similar to "the consolidation rule" adopted by Przeworski et al. (2000, pp. 20-21).

[3]The address: http://personal.lse.ac.uk/kudamats/research.htm.

[4]The only exception is Madagascar, in which "multiparty" elections have been held since the 1980s according to Lindberg (2003). Opposition parties in the 1980s, however, were restricted to those loyal to the regime (see Przeworski et al. 2000, p. 20, and Nohlen et al. 1999, p. 532).

In Ethiopia the rebel forces toppled the dictator in 1991 and then became the ruling political party, holding and winning the first multiparty parliamentary elections in 1995.[5] In the main analysis, I treat 1995 as Ethiopia's year of democratization. The estimation results are robust to coding Ethiopia as not democratized.

In Lesotho, there was a coup in 1994 and a military mutiny in 1998 against democratically elected governments. Each time foreign countries led by South Africa intervened to prevent the collapse of democracy. In the main analysis, 1993 is set to be the year of democratization for Lesotho. As Lesotho has adopted the parliamentary form of government, the first multiparty election for executive office is the same as that for legislature.

In Niger, there were coups against democratically elected governments in 1996 and 1999. Each time, the coup taker subsequently held multiparty presidential elections.

For Nigeria, there was a multiparty presidential election in June 1993, but the result was annulled by the military.

For South Africa, the first multiparty election for executive office took the form of elections for the Constitutional Assembly, which elected Nelson Mandela as president and became national legislature.

Tanzania might be regarded as a democratized country because in the first multiparty presidential election held in 1995, the incumbent president did not run though his successor from the same ruling party stood as a candidate and won. The estimation results are robust to treating 1995 as the year of democratization in Tanzania.

Ghana (twice), Nigeria, and Uganda were democratized in 1969 and 1979, 1979, and 1980, respectively. However, all of these cases led to the collapse of democracy within five years. In Chapter 3, I do not estimate the effect of these democratization episodes.[6] Cote d'Ivoire was also democratized in 2000, which is outside the sample period.

[5]As Ethiopia has adopted the parliamentary form of government, the first multiparty election for executive office is the same as that for legislature.

[6]If I create a dummy for these democratic years (Ghana, 1970-72 and 1980-81; Nigeria, 1980-83; Uganda 1980-85) and add it as an additional regressor in equation (1), the coefficient on this dummy is not significantly different from zero.

Several countries were also "democratized" by independence if we regard independence as the replacement of the chief executive. As it is difficult to disentangle the effect of democratization from that of independence in these cases, however, I do not estimate the effect of "democratization by independence", either. Therefore, Namibia and Zimbabwe, in which answers to the above five questions are always yes since independence, are not included in the group of democratized countries in the analysis.

B.1.2 Years of First Multiparty Elections

In Column (1) of Table 3.9, I use a dummy variable for multiparty elections. To construct this variable, I identify the year of the first multiparty elections for executive office in the 17 non-democratized countries as the year in which answers to all the five questions above become yes. In addition to the list of these years in Column (1) of Table 3.1, Burkina Faso (in 1978) and Ghana (in 1960) introduced multiparty elections with universal suffrage for executive office, followed by the collapse of the multiparty system within a few years. I do not include these two episodes in the construction of the multiparty election dummy. I also set the dummy to be zero for Senegal for all years even though this country introduced multiparty elections in 1978.[7]

The following cases need some justification:

Burkina Faso's presidential election in 1991 was boycotted by all opposition parties though they were legalized to participate. The next presidential election, held in 1998, was contested by all opposition parties. In the main analysis, I treat 1991 as the year of the first multiparty election. The estimation results are robust to coding 1998 instead as the year of democratization for Burkina Faso.

In Cote d'Ivoire, there was a coup in December 1999. As there is no baby who was born in Cote d'Ivoire after March 1999 in the sample, however, this does not affect my analysis.

[7]Setting the multiparty election dummy to be 1 for Senegal after 1978 does not change the estimation result in Column (1) of Table 3.9 substantially.

Madagascar held multiparty presidential elections in 1982 and 1989. But opposition parties were restricted to those loyal to the ruling party.

Uganda held an presidential election in May 1996 where opposition candidates were allowed to contest but on non-party basis. Political parties, however, de facto exist and support their favorite candidate.

B.1.3 Non-democratic Leadership Change

The dummy for non-democratic leadership change used in Column (2) of Table 3.9 is constructed as follows. Among the 17 non-democratized countries, I first identify the year in which the chief executive is replaced for the period since 1986. There are seven of such leadership changes: Burkina Faso (1987), Chad (1990), Cote d'Ivoire (1993), Mozambique (1986), Rwanda (1994), Tanzania (1995), and Uganda (1986). I create a dummy variable which is equal to one for these seven countries after the year of leadership change.

B.2 Demographic and Health Survey Variables

In this section, I describe which variables in the Demographic and Health Surveys I use to construct dependent variables and regressors and to restrict the sample. The construction of some dependent variables for pathway analysis is slightly different between for the DHS-I surveys (those DHS surveys conducted during the 1980s) and for the later rounds of surveys. This is because the structure of the questionnaire was slightly modified in the subsequent rounds of the DHS surveys.

B.2.1 Dependent variables

Infant Death (a dummy for death within the first year of life) is set to be 1 if B7 (the imputed age at death in months) is less than 12, and to be 0 otherwise. There is no missing observation for infant death.

Neonatal Death (a dummy for death within the first month of life) is set to be 1 if B7 is 0, and to be 0 otherwise. As for infant death, there is no missing

observation for neonatal death.

Tetanus Toxoid (a dummy for whether a mother was given tetanus toxoid injections during her pregnancy) is set to be 1 if M1 is either 1, 2, 3, 4, 5, 6, or 7; 0 if M1 is 0; missing if M1 is either 8 or 9.

Delivery Assistance (a dummy for whether a mother was assisted with the delivery of her child by health professionals — doctors, nurses, midwives, etc.) is, for the DHS-I surveys, set to be 1 if M3 is either 1, 2, or 3; 0 if M3 is either 0, 4, 5, 6, 7 or 8; and missing if M3 is 9. For the other surveys, it is set to be 1 if either M3A, M3B, M3C, M3D, or M3E is 1; 0 if either M3F, M3G, M3H, M3I, M3J, M3K, M3L, M3M, or M3N is 1; and missing otherwise. Delivery assistance by trained traditional birth attendant (variable M3F equal to 1) is not included as assistance by "health professionals" because the DHS-I surveys do not distinguish trained and not trained traditional birth attendants.

Ever Breastfed (a dummy for whether a baby is ever breastfed) is set to be 1 if M5 is less than 94; 0 if M5 is 94 (never breastfed); and missing otherwise.

Access to Toilet (a dummy for whether a baby's household has access to "flush toilets") is, except for the DHS-I surveys, set to be 1 if V116 for their mothers is either 11 or 12; 0 otherwise unless V116 is either 97 or 99, for which this variable is missing. For the DHS-I surveys, it is set to be 1 if V116 is 1; 0 otherwise unless V116 is 9, for which this variable is missing.

Radio (a dummy for whether a baby's household owns a radio) is set to be 1 if V120 is 1; 0 if V120 is 0; and missing if V120 is either 7, 9, or missing.

Television (a dummy for whether a baby's household owns a television set) is set to be 1 if V121 is 1; 0 if V121 is 0; and missing if V121 is either 7, 9, or missing.

Refrigerator (a dummy for whether a baby's household owns a refrigerator) is set to be 1 if V122 is 1; 0 if V122 is 0; and missing if V122 is either 7, 9, or missing.

Bicycle (a dummy for whether a baby's household owns a bicycle) is set to be 1 if V123 is 1; 0 if V123 is 0; and missing if V123 is either 7, 9, or missing.

Motorcycle (a dummy for whether a baby's household owns a motorcycle) is set to be 1 if V124 is 1; 0 if V124 is 0; and missing if V124 is either 7, 9, or missing.

Car (a dummy for whether a baby's household owns a car) is set to be 1 if V125 is 1; 0 if V125 is 0; and missing if V125 is either 7, 9, or missing.

Electricity (a dummy for whether a baby's household has access to electricity) is set to be 1 if V119 is 1; 0 if V119 is 0; and missing if V119 is either 7, 9, or missing.

B.2.2 Controls

Girl (a dummy for being a baby girl) is set to be 1 if B4 is 2, and to be 0 if B4 is 1. There is no missing observation for this variable.

Multiple Birth (a dummy for being born in a multiple birth) is set to be 1 if B0 is different from 0, and to be 0 if B0 is 0. There is no missing observation for this variable.

Birth order dummies are constructed from variable BORD. A dummy for the second birth is set to be 1 if BORD is 2; A dummy for the third birth is set to be 1 if BORD is 3; and so forth. A dummy for the 10th birth or higher is set to be 1 if BORD is 10 or higher. There is no missing observation for these variables.

Mothers' age-at-birth category dummies are created from B3 (the date of birth of a respondent's child in century month codes) and V011 (the date of birth of a respondent in century month codes).[8] A dummy for being born when his/her mother was in her 20s is set to be 1 if the difference between B3 and V011 divided by 12 is 20 or over and less than 30, and so forth.

Short birthspacing (a dummy for being born within 24 months after the previous birth) is set to be 1 if B11 is less than 24; 0 if B11 is 24 or over; and missing if B11 is missing. B11 is missing for first-born children including those born in a multiple birth.

[8] A century month code is the number of months since the start of the 20th century. Century month codes are, thus, equal to (YEAR-1900)*12+MONTH.

B.2.3 Variables interacted with the democracy dummy

Educated (a dummy for being born to a mother who attended primary school) is set to be 1 if V106 is either 1, 2, or 3; 0 if V106 is 0; and missing if V106 is either 4 or 9.[9]

Uneducated (a dummy for being born to a mother who never went to school) is set to be 1 if V106 is 0; 0 if V106 is either 1, 2, or 3; and missing if V106 is either 4 or 9.

Urban (a dummy for being born to a mother living in urban areas at the survey date) is set to be 1 if V102 is 1; and 0 if V102 is 2. There is no missing observation for this variable.

Rural (a dummy for being born to a mother living in rural areas at the survey date) is set to be 1 if V102 is 2; and 0 if V102 is 1. There is no missing observation for this variable.

See section B.3 below for **Dictator's ethnic group** and **Other ethnic groups**.

B.2.4 Sample restrictions

Children born before the year of independence of their country are identified by comparing B2 (year of birth) with the year of independence in each country.[10]

Children born within 12 months before their mother's interview are identified by taking the difference between V008 (date of interview in century month codes) and B3. If this difference is less than 12, I drop such babies from the infant mortality sample while I keep such babies in the sample for access to toilets, the ownership of consumer durable goods, and access to electricity (see below).

Children born to asset-poor mothers (column (2) of Table 3.8) are identified by variables V120, V121, V122, V123, V124, and V125. If all these variables are 0, then I retain such children in the sample with exceptions of Ethiopia, Malawi, and Mauritania. For Ethiopia and Malawi, I keep babies in the sample if V120,

[9]In the Tanzania 1996 survey, V106 takes a value of 4 if the highest education level attained is "Other". There are 13 such observations. I treat them as missing.

[10]Page 36 of *Africa South of the Sahara 2005* (London: Europa Publications), for example, provides the list of years of independence of African countries.

V121, V123, V124, and V125 are all zero because V122 is missing for all children in these two countries. For Mauritania, I keep children in the sample if V120, V121, V122, and V125 are all zero because V123 and V124 are missing for all babies in Mauritania. If some of these asset variables are missing and if the observed variables indicate no possession of consumer durables, I drop such observations because this does not entirely exclude the possibility that some of the assets are actually owned.

Children conceived in the surveyed community (column (8) of Table 3.8) are identified by variables V008, V104 (the number of years a respondent has lived in the surveyed community), and B3. If V104 is less than 95, I drop children in the sample if and only if $\text{V008} - \text{V104} * 12 > \text{B3} - 12$.[11] If V104 is either 96 (visitor to the surveyd community), 97 (inconsistent), 98 (don't know), 99 (not available), or missing (all babies in Chad, Cote d'Ivoire, and Guinea), I drop such children.

B.2.5 Sample Construction for Pathway Analysis

For tetanus vaccination, delivery assistance, and breastfeeding, the sample consists of children whose MIDX variable is not missing in surveys listed in Table 3.3. Note that this includes children who died before turning the age of one year.

For access to toilets, the ownership of consumer durable goods, and access to electricity, I create a repeated cross-section sample of babies born within the past one year before the survey date. These babies are identified by checking if V008-B3<12.[12]

B.2.6 Mother category fixed effects

I create mother categories in the following way. V102 is used for identifying areas of residence (urban or rural). *Educated* and *Uneducated* as defined above are used for the level of education. V011 is used for identifying the birth year cohort. For

[11] V104 is 95 if a respondent has always lived in the surveyed community.

[12] I use the retrospective fertility survey component of the DHS surveys to construct the sample of babies born within 12 months before the survey date. This ensures that those babies who are dead at the survey date are included in the sample. I do not use households as the unit of observations because change in access to health infrastructure for households without an infant is irrelevant to change in infant mortality.

administrative regions of residence, see "Data Appendix C: The Matching Sub-National Administrative Regions across Different Rounds of the DHS Surveys in sub-Saharan Africa" available on my website.[13]

B.2.7 Time dimension

The year of birth (t in equations (3.1), (3.3), and (3.4) is identified by variable B2. For the survey year period (s in equation (3.5)), I use the year of survey listed in Table 3.3.

B.3 Data on the dictator's ethnicity

The main source of information on the ethnicity of the dictator who ruled the country until democratization in the 1990s is Morrison et al. (1989).[14] For dictators whose ethnicity is not available or clear enough in Morrison et al. (1989), various other sources were consulted.

B.3.1 Benin

Betamaribe (v131=6). Mathieu Kerekou ruled the country until 1991, when he was defeated by Nicephore Soglo in the first multiparty presidential election. Kerekou's ethnicity is Somba according to Morrison et al. (1989, p. 368). Somba is also known as Betamaribe.[15]

B.3.2 Burkina Faso

Mossi (v131=7). Blaise Compaore has been in power since 1987 and was re-elected in multiparty presidential elections in 1991 and 1998. His ethnicity is Mossi (Englebert, 1996, p. 62 and p. 123).

[13] http://personal.lse.ac.uk/kudamats/research.htm.

[14] This is also used by Londregan, Bienen, and van de Walle (1995) in their analysis of ethnicity and leadership succession in Africa until the 1980s.

[15] See www.benintourism.com/en/interne.php?idrub=13&id=87 (the Official Website of Tourism in Benin) (accessed on 10 May 2006).

B.3.3 Cameroon

Beti (v131=44). Paul Biya has been in power since 1982 and was re-elected in multiparty presidential elections in 1992 and 1997. Nyamnjoh (1999, p. 108) indicates that Biya's ethnicity is Beti.

B.3.4 Chad

Gorane (v131=1). Idriss Deby has been in power since 1990 and was re-elected in the first multiparty presidential election in 1996. His ethnicity is Zaghawa, which is a subgroup of the Gorane people ("Chad: Idriss Deby", *Africa Research Bulletin: Political, Social and Cultural Series*, May 2006, p. 16645).

B.3.5 Comoros

Ethnicity data is not available in the 1996 DHS survey.

B.3.6 Cote d'Ivoire

Baoule (s119=20). Felix Houphouet-Boigny had been in power since independence until his death in 1993. He was re-elected in the first multiparty presidential election in 1990. His ethnicity is Baoule according to Morrison et al. (1989, p. 500).

B.3.7 Ethiopia

Amhara (v131=4). Mengistu Haile Mariam ruled the country until he was overthrown by rebel forces in 1991. Meles Zenawi became an interim president and was elected as prime minister after his party's victory in the 1995 multiparty parliamentary election. Mengistu's ethnicity is Amhara (Morrison et al., 1989, p. 446).

B.3.8 Gabon

Mbede-Teke (v131=3). Omar Bongo has been in power since 1967 and was re-elected in multiparty presidential elections in 1993 and 1998. His ethnicity is Teke

according to Morrison et al. (1989, p. 460).

B.3.9 Ghana

Ewe (v131=3). Jerry Rawlings had been in power since 1982, re-elected in multiparty presidential elections in 1992 and 1996, until his retirement in 2000. His ethnicity is Ewe (Morrison et al., 1989, p. 476).

B.3.10 Guinea

Sousou (v131=1). Lansana Conte has been in power since 1984 and was re-elected in multiparty presidential elections in 1993 and 1998. His ethnicity is Sousou ("Liberia: Cross-border Crisis", *Africa Confidential*, 21 July 2005, p. 1).

B.3.11 Kenya

Kalenjin (v131=2). Daniel arap Moi had been in power since 1978, re-elected in multiparty presidential elections in 1992 and 1997, until his retirement in 2002. Moi's ethnicity is Tugen (Fox 1996, p. 602), which is a subgroup of Kalenjin (Morrison et al., 1989, p. 506).[16]

B.3.12 Lesotho

Ethnicity data is not available in the 2004 DHS survey.

B.3.13 Madagascar

Ethnicity data is not available in the 1997 DHS survey.

B.3.14 Malawi

Chewa (v131=1). Hastings Kamuzu Banda ruled the country from independence until 1994, when he was defeated by Bakili Muluzi in the first multiparty presidential

[16]Morrison et al. (1989, p. 509) describes Moi's ethnicity as Kipsigis. However, other sources written by Kenyan specialists (e.g. Adar and Munyae 2001) say that Moi is a Tugen.

election. Banda's ethnicity is Chewa (Morrison et al., 1989, p. 542).

B.3.15 Mali

Bambara and Malinke (v131=1 and 2). Moussa Traore was in power from 1968 to 1991, when he was ousted in a military coup. A multiparty presidential election followed in the subsequent year. Traore's ethnicity is Mande, which consists of Bambara and Malinke (Morrison et al., 1989, p. 548 and p. 550).

B.3.16 Mauritania

Ethnicity data is not available in the 2000 DHS survey.

B.3.17 Mozambique

Ethnicity data is not available in the 2003 DHS survey.

B.3.18 Niger

Djerma (v131=2). Ali Saibou was in power from 1987 to 1993, when the first multiparty presidential election - in which Saibou did not run - gave presidency to Mahamane Ousamane. Saibou was born to a Djerma-Songhai family (Uwechue, 1996, p. 601).

B.3.19 Nigeria

Kanuri (s118=123), Tera (199), Bolawa (34), Karekare (124), Bade (12), Munga (163), Ngizim (169), Mandara (155). Sani Abacha ruled the country from 1993 until his death in 1998. A multiparty presidential election was held in the subsequent year in which Olusegun Obasanjo won. Abacha's parents are of the Kanuri ethnic group (Uwechue, 1996, p. 1). Morrison et al. (1989, pp. 584-5) indicate that the Kanuri group consists of the subgroups mentioned above.[17]

[17] I cannot match Mober and Koyam, which are subgroups of Kanuri according to Morrison et al. (1989), with ethnic groups listed in the 2003 DHS survey.

B.3.20 South Africa

White (v131=3). Frederick W. de Klerk was President from 1989 until 1994, when the elections for Constitutional Assembly - which became national legislature later - were held in which de Klerk's National Party lost to Nelson Mandela's African National Congress. De Klerk was the son of an Afrikaner (Uwechue, 1996, p. 175).

B.3.21 Tanzania

Ethnicity data is not available in the 2004 DHS survey.

B.3.22 Togo

Kabye-tem (v131=4). Gnassingbe Eyadema ruled the country since 1967, re-elected in multiparty presidential elections in 1993 and 1998, until his death in 2005. His ethnicity is "Kabre (Kabye)" according to Uwechue (1996, p. 212).

B.3.23 Uganda

Ethnicity data is not available in the 2000 DHS survey.

B.3.24 Zambia

Bemba (v131=1), Lunda (2), Lala (3), Bisa (4), Ushi (5), Chishinga (6), Ngumbo (7), Lamba (8), Kabende(9), Tabwa (10), Swawka (11), Shila (15), Unga (16), Bwile (17), Kunda (52), and Senga (60). Kenneth Kaunda ruled the country since independence until 1991, when he was defeated by Frederick Chiluba in the first multiparty presidential election. Kaunda's ethnicity is Bemba, which includes all the subgroups mentioned above (Morrison et al., 1989, p. 702 and p. 704).

B.4 Country-level Variables from Other Datasets

Log per capita GDP is taken from Penn World Table 6.2 (the logarithm of variable RGDPCH).[18]

War is a dummy variable equal to one if variable LOCATION is 3 in the Armed Conflict Database version 3-2005b.[19]

Foreign Aid is obtained from the OECD Development Assistance Committee Database: "Destination of Official Development Assistance and Official Aid - Disbursements (Table 2a)".[20]

Executive Constraints is taken from the POLITY IV dataset version 2003 (variable XCONST).[21] In the estimation (column (3) of Table 3.9), I drop country-years from the sample if XCONST is -66 (foreign occupation), -77 (central authority collapsed), -88 (regime transition), or missing.

Civil Liberty Restriction is the Civil Liberty Index taken from *Freedom In the World* by Freedom House (variable CL).[22] For South Africa in 1972, I use a value for black people. For 1981, I use values for January 1981 to August 1982. For 1982, I linearly interpolate values from the ones for January 1981 to August 1982 and for August 1982 to November 1983.[23] For 1983, I use values for August 1982 to November 1983.

Free Press is a dummy variable equal to one if the press freedom status is F in the Freedom of the Press Historical Data.[24] From 1980 to 1988, I use the freedom status for print press.

Partly Free Press is a dummy variable equal to one if the press freedom status is PF in the Freedom of the Press Historical Data.

[18]Downloaded at http://pwt.econ.upenn.edu/ (accessed on 20 September 2006).

[19]I use the Monadic Table Stata File downloaded from http://www.prio.no/cwp/ArmedConflict (accessed on 12 December 2005).

[20]ODA (OA) Total Net (variable number 206) in million US dollars (2004 Prices) is used. The data was downloaded at www.oecd.org/dac/stats/idsonline (accessed on 11 November 2006).

[21]Downloaded at http://www.cidcm.umd.edu/polity/ (accessed on 28 November 2005).

[22]Downloaded at http://www.freedomhouse.org/template.cfm?page=15 (accessed on 22 September 2006).

[23]It turns out that all countries in the sample do not have different values for the Civil Liberty Index between January 1981 to August 1982 and August 1982 to November 1983.

[24]Downloaded at http://www.freedomhouse.org/template.cfm?page=274 (accessed on 22 September 2006).

B.5 Democracy Dummies in Table 3.10

Democracy dummies and the dummies for the collapse of democracy used in Table 3.10 are constructed in the following way.

In columns (1), (2), and (3), the Political Rights Index from *Freedom In the World* by Freedom House (variable PR) is used. For column (1), the democracy dummy is constructed by setting it to be 1 for years since 1990 if the Political Rights Index for the previous year is less than 3. This variable is zero for all countries before 1990 even if the Index is less than 3. In addition, the dummy for the collapse of democracy is created by setting it to be 1 if the Political Rights Index is 3 or higher *and* if the democracy dummy is 1 for at least one year in the previous years. Columns (2) and (3) use 4 and 5, respectively, as the cut-off value and follow the same procedure. An exception to this is Senegal in column (3). As the Political Rights Index for Sengal has always been below 5 since 1978, I set the democracy dummy to be 0 for all years.

In columns (4), (5), and (6), variable POLITY2 in the POLITY IV dataset (version 2003) is used instead. For column (4), the democracy dummy is constructed by setting it to be 1 for years since 1990 if POLITY2 for the previous year is more than 6. The dummy for the collapse of democracy is created by setting it to be 1 if POLITY2 is 6 or lower *and* if the democracy dummy is 1 for at least one year in the previous years. Columns (5) and (6) use 4 and 0, respectively, as the cut-off value and follow the same procedure.[25] An exception to this is South Africa in column (6). As variable POLITY2 for South Africa has always been above 0 during the sample period, I set the democracy dummy to be 0 for all years.

In column (7), I use variables EXREC and PARCOMP from the POLITY IV dataset (version 2003) to construct a democracy dummy. The democracy dummy is set to be 1 for years since 1990 if EXREC in the previous year is 7 or 8 *and* if PARCOMP in the previous year is 3 or higher. The dummy for the collapse of democracy is created by setting it to be 1 if either EXREC or PARCOMP in the

[25]Score 0 is used as the cut-off point by works summarized in Persson and Tabellini (2006); score 4 by Glaeser, Ponzetto, and Shleifer (2005). Political scientists often regard a country as democratic if its POLITY2 score is seven or higher (e.g. Epstein et al., 2003).

previous year is below the threshold level *and* if the democracy dummy is 1 for at least one year in the previous years. The choice of threshold values for each varaible is justified as follows. Variable EXREC categorises the way of recruiting the chief executive into eight types (see Appendum A of Marshall and Jaggers 2002). It is 7 or 8 if the chief executive is chosen through elections matching candidates from at least two political parties. Therefore, requiring variable EXREC to be 7 or 8 roughly corresponds to the requirement of multiparty elections for executive office. Variable PARCOMP measures the extent to which "alternative preferences for policy and leadership can be pursued in the political arena" (*Ibid.*, p. 25). The legality of opposition parties along with universal suffrage appears to correspond to this variable being 3 or higher. PARCOMP is 2 if the government limits political competition in ways that "exclude substantial groups (20% of more of the adult population) from participation." Its sufficient evidence is "the banning of a political party which received more than 10% of the vote in a recent national election" (*Ibid.*, p. 26). PARCOMP is 3, on the other hand, if "parochial or ethnic-based political factions ... regularly compete for political influence" (*Ibid.*, p. 26).

Appendix C

Data Appendix to Chapter 5

The data used in Chapter 5 all comes from the Demographic and Health Survey (DHS) conducted in Guinea in 1999.[1] This Appendix describes how I construct variables used in the analysis from the original variables and restrict the sample from the original.[2]

C.1 Construction of variables

The dependent variable in Tables 5.6 and 5.7, a dummy for death within the first year of life, is set to be 1 if B7 (the imputed age at death in months) is less than 12, and to be 0 otherwise. There is no missing observation for this variable.

For exogenous controls, a dummy for baby girls is set to be 1 if B4 is 2, and 0 otherwise. A dummy for babies born in multiple birth (twins, triplets, and quadruplets) is set to be 1 if B0 is 1 or larger, and 0 otherwise. For these two variables, there is no missing observation.

The birth year of each baby is identified by B2. This is used to control for birth-year fixed effects and to create **Post1984** and **Post1993** in Tables 5.6 and 5.7 (dummies for babies born after 1984 and 1993, respectively). As there are few babies born each year before 1970 in the sample (361 in total), these babies are

[1]The dataset is downloadable at http://www.measuredhs.com after registration.

[2]In the original DHS dataset, with some exceptions, variables on mother characteristics begin with letter V followed by numbers, and variables on baby characteristics begin with letter B followed by numbers.

regarded as born in 1969 when birth-year fixed effects are controlled for, to ease computation.

Each baby's mother is identified by CASEID. This is used to control for mother fixed effects.

The district in which each baby's mother lives at the survey time is identified by ADM1CODE and ADM2CODE in the GPS data file. ADM1CODE is used for mothers living outside Conakry (ADM1CODE is not 12) to identify which prefecture they live in. ADM2CODE is used for mothers living in Conakry (ADM1CODE is 12) to identify which commune they live in. Combined with the birth year, this is used to control for district-specific linear trends in columns (3) to (5) of Table 5.6, and to control for district-year fixed effects in Table 5.8. It is also used to cluster standard errors in Tables 5.6 and 5.7.

The region in which each baby's mother lives at the survey time is identified by V101. Combined with the birth year, this is used to control for region-year fixed effects in columns (2) to (5) of Table 5.6. See Table 5.4 for which district belongs to which region.

Sousou (a dummy indicating whether a baby's mother is Sousou, used in Table 5.8) is set to be 1 if V131 is 1, and 0 otherwise.[3]

Sousou-majority (a dummy indicating whether a baby is born to a woman who lives in a district where Sousou people predominate in 1999, used in Tables 5.6 and 5.7) is constructed as follows. Using a cross-section sample of surveyed women, I first multiply a dummy for Sousou women (set to be 1 if V131 is 1, and 0 otherwise) with the sampling weight of each woman (V005 divided by 1,000,000), because the probability of selection differs between urban and rural clusters within each district. I then calculate the sum of this weighted dummy by each district. The resulting sum is then divided by the sum of the sampling weights for women in each district. Table 5.4 shows the result. If a baby's mother lives in a district where this sample share of Sousou women exceeds 50 percent, **Sousou-majority** is set to be 1, and 0 otherwise.

[3]Babies born to a woman for whom V131 is missing are dropped from the sample used in Table 5.8 (see below).

To cluster standard errors at the ethnicity-district level in Table 5.8, V131 is used to identify ethnicities (Sousou, Peulh, Malinke, Kissi, Toma, Guerze, and Others).

C.2 Sample restrictions

From all the babies born to the surveyed women (22,943 in total), I drop 1,204 babies born within 12 months before the survey date. For columns (4) and (5) of Table 5.6 and columns (2) and (3) of Table 5.8, V102 is used to restrict the sample to urban areas (V102 is 1) or to rural areas (V102 is 2). In Table 5.8, babies born to 92 foreign women (V131 is missing) are dropped from the sample.[4]

[4]Women for whom V131 is missing are all foreigners (S119 is not 1).

Bibliography

[1] Acemoglu, Daron. 2005. "Politics and Economics in Weak and Strong States," *Journal of Monetary Economics*, 52, pp. 1199-1226.

[2] Acemoglu, Daron. 2006. "Modeling Inefficient Institutions." in Richard Blundell, Whitney Newey, and Torsten Persson (eds.), *Advances in Economics and Econometrics: Theory and Applications, Ninth World Congress* (Volume I). Cambridge: Cambridge University Press.

[3] Acemoglu, Daron, and Simon Johnson. 2005. "Unbundling Institutions" *Journal of Political Economy*, 113:5, pp. 949-95.

[4] Acemoglu, Daron, and Simon Johnson. 2006. "Disease and Development: The Effect of Life Expectancy on Economic Growth." NBER Working Paper, no. 12269.

[5] Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*, 91:5, pp. 1369-1401.

[6] Acemoglu, Daron, Simon Johnson, and James A. Robinson. 2005. "The Rise of Europe: Atlantic Trade, Institutional Change, and Economic Growth." *American Economic Review*, 95:3, pp. 546-579.

[7] Acemoglu, Daron, Simon Johnson, James A. Robinson, and Pierre Yared. 2005a. "From Education to Democracy?" *American Economic Review*, 95:2, pp. 44-49.

[8] Acemoglu, Daron, Simon Johnson, James A. Robinson, and Pierre Yared. 2005b. "Income and Democracy." NBER Working Paper, no. 11205.

[9] Acemoglu, Daron, and James A. Robinson. 2000. "Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective." *Quarterly Journal of Economics*, 115, pp. 1167-99.

[10] Acemoglu, Daron, and James A. Robinson. 2005. *Economic Origins of Dictatorship and Democracy.* Cambridge: Cambridge University Press.

[11] Acemoglu, Daron, and James A. Robinson. 2006a. "Economic Backwardness in Political Perspective." *American Political Science Review*, 100, pp. 115-131.

[12] Acemoglu, Daron, and James A. Robinson. 2006b. "De Facto Political Power and Institutional Persistence." *American Economic Review*, 96:2, pp. 325-30.

[13] Acemoglu, Daron, James A. Robinson, and Thierry Verdier. 2004. "Kleptocracy and Divide-and-Rule: A Model of Personal Rule." *Journal of the European Economic Association*, 2:2-3, pp. 162-92.

[14] Acemoglu, Daron, Davide Ticchi, and Andrea Vindigni. 2007. "Emergence and Persistence of Inefficient States." Unpublished Paper.

[15] Adamolekun, 'Ladipo. 1976. *Sekou Toure's Guinea.* London: Methuen & Co.

[16] Adar, Korwa G., and Isaac M. Munyae. 2001. "Human Rights Abuse in Kenya under Daniel arap Moi, 1978-2001." *African Studies Quarterly*, 5:1. http://www.africa.ufl.edu/asq/v5/v5i1.htm (accessed 29 July 2007).

[17] Aghion, Philippe, Alberto Alesina, and Francesco Trebbi. 2004. "Endogenous Political Institutions." *Quarterly Journal of Economics*, 119, pp. 565-611.

[18] Akin, John S., Charles C. Griffin, David K. Guilkey, and Barry M. Popkin. 1986. "The Demand for Primary Health Care Services in the Bicol Region of the Philippines." *Economic Development and Cultural Change*, 34:4, pp. 755-782.

[19] Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. 2003. "Fractionalization." *Journal of Economic Growth*, 8, pp. 155-194.

[20] Alesina, Alberto, and Eliana La Ferrara. 2005. "Ethnic Diversity and Economic Performance." *Journal of Economic Literature*, 43, pp. 762-800.

[21] Almeida, Heitor, and Daniel Ferreira. 2002. "Democracy and The Variance of Economic Performance." *Economics and Politics*, 14:3, pp. 225-257.

[22] Almond, Douglas V., Kenneth Y. Chay, and Michael Greenstone. 2003. "Civil Rights, the War on Poverty, and Black-White Convergence in Infant Mortality in Mississippi." Unpublished Paper.

[23] Amsden, Alice H. 1989. *Asia's Next Giant: South Korea and Late Industrialization.* New York: Oxford University Press.

[24] Arifeen, Shams, Robert E. Black, Gretchen Antelman, Abdullah Baqui, Laura Caulfield, and Stan Becker. 2001. "Exclusive Breastfeeding Reduces Acute Respiratory Infection and Diarrhea Deaths Among Infants in Dhaka Slums." *Pediatrics*, 108:4, E67. (DOI: 10.1542/peds.108.4.e67)

[25] Autor, David H. 2003. "Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing." *Journal of Labor Economics*, 21:1, pp. 1-41.

[26] Azam, Jean-Paul, Robert H. Bates, and Bruno Biais. 2005. "Political Predation and Economic Development." CEPR Discussion Paper, no. 5062.

[27] Banerjee, Abhijit V., and Esther Duflo. 2006. "Addressing Absence." *Journal of Economic Perspectives*, 20:1, pp. 117-32.

[28] Banerjee, Abhijit V. and Rohini Pande. 2007. "Parochial Politics: Ethnic Preferences and Political Corruption." BREAD Working Paper, no. 152.

[29] Barkan, Joel D. and Michael Chege. 1989. "Decentralizing the State: District Focus and the Politics of Reallocation in Kenya." *Journal of Modern African Studies*, 27:3, pp. 431-453.

[30] Barrera, Albino. 1990. "The Role of Maternal Schooling and its Interaction with Public Health Programs in Child Health Production." *Journal of Development Economics*, 32, pp. 69-91.

[31] Barro, Robert J. 1973. "The Control of Politicians: An Economic Model." *Public Choice*, 14, pp. 19-42.

[32] Barro, Robert J. 1990. "Government Spending in a Simple Model of Endogenous Growth." *Journal of Political Economy*, 98:5, pp. S103-S125.

[33] Barro, Robert J., and Jong-Wha Lee. 2000. "International Data on Educational Attainment: Updates and Implications." Harvard University Center for International Development Working Paper, no.42.

[34] Bates, Robert H. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies.* Berkeley: University of California Press.

[35] Bates, Robert H. 1983. "Modernization, Ethnic Competition, and the Rationality of Politics in Contemporary Africa." in Donald Rothchild and Victor A. Olunsorola. (eds.) *State versus Ethnic Claims: African Policy Dilemmas.* Boulder: Westview Press.

[36] Beblawi, Hazem, and Giacomo Luciani. (eds.) 1987. *The Rentier State.* London: Croom Helm.

[37] Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh. 2001. "New Tools in Comparative Political Economy: The Database of Political Institutions." *World Bank Economic Review*, 15:1, pp. 165-176.

[38] Behrman, Jere R. 1988. "Nutrition, Health, Birth Order and Seasonality." *Journal of Development Economics*, 28, pp. 43-62.

[39] Besley, Timothy. 2005. "Political Selection." *Journal of Economic Perspectives*, 19:3, pp. 43-60.

[40] Besley, Timothy. 2006. *Principled Agents? The Political Economy of Good Government.* Oxford: Oxford University Press.

[41] Besley, Timothy, Torsten Persson, and Daniel Sturm. 2005. "Political Competition and Economic Performance: Theory and Evidence from the United States." NBER Working Paper, no. 11484.

[42] Bhutta, Zulfiqar A., Gary L. Darmstadt, Babar S. Hasan, and Rachel A. Haws. 2005. "Community-based Interventions for Improving Perinatal and Neonatal Health Outcomes in Developing Countries: A Review of the Evidence." *Pediatrics*, 115, pp. 519-617.

[43] Black, Sandra E., Paul J. Devereux, and Kjell G. Salvanes. 2007. "From the Cradle to the Labor Market? The Effect of Birth Weight on Adult Outcomes." *Quarterly Journal of Economics*, 122, pp. 409-439.

[44] Bobat, R., H. Coovadia, D. Moodley, and A. Coutsoudis. 1999. "Mortality in a Cohort of Children Born to HIV-1 Infected Women from Durban, South Africa." *South African Medical Journal*, 89:6, pp. 646-8.

[45] Boix, Carles, and Sebastián Rosato. 2001. "A Complete Data Set of Political Regimes, 1800-1999." Unpublished Dataset.

[46] Bratton, Michael. 1998. "Second Elections in Africa." *Journal of Democracy*, 9:3, pp. 51-66.

[47] Bratton, Michael, and Nicolas van de Walle. 1997. *Democratic Experiments in Africa: Regime Transitions in Comparative Perspective.* New York: Cambridge University Press.

[48] Brune, Stefan. 1999. "Guinea." in Dieter Nohlen, Michael Krennerich, and Bernhard Thibaut. (eds.) *Elections in Africa: A Data Handbook.* Oxford: Oxford University Press.

[49] Bueno de Mesquita, Bruce, James D. Morrow, Randolph M. Siverson, and Alastair Smith. 2002. "Political Institutions, Policy Choice and the Survival of Leaders." *British Journal of Political Science*, 32, pp. 559-590.

[50] Bueno de Mesquita, Bruce, Alastair Smith, Randolph M. Siverson, and James D. Morrow. 2003. *The Logic of Political Survival.* Cambridge, MA: MIT Press.

[51] Campbell, Bonnie K. 1991. "Negotiating the Bauxite/Aluminium Sector under Narrowing Constraints." *Review of African Political Economy*, 51, pp. 27-49.

[52] Caselli, Francesco. 2006. "Power Struggles and the Natural Resource Curse", Unpublished Paper.

[53] Caselli, Francesco, and Wilbur John Coleman, II. 2006. "On the Theory of Ethnic Conflict." CEPR Discussion Paper, no. 5622.

[54] Chaloemtiarana, Thak. 2007. *Thailand: The Politics of Despotic Paternalism.* Ithaca: Southeast Asia Program Publications.

[55] Chattopadhyay, Raghabendra, and Esther Duflo. 2004. "Women as Policy Makers: Evidence from a Randomized Policy Experiment in India." *Econometrica*, 72:5, pp. 1409-43.

[56] Chaudhury, Nazmul, Jeffrey Hammer, Michael Kremer, Karthik Muralidharan, and F. Halsey Rogers. 2006. "Missing in Action: Teacher and Health Worker Absence in Developing Countries." *Journal of Economic Perspectives*, 20:1, pp. 91-116.

[57] Chehabi, H. E., and Juan J. Linz. (eds.) 1998. *Sultanistic Regimes.* Baltimore: Johns Hopkins University Press.

[58] Cheibub, Jose Antonio, and Jennifer Gandhi. 2004. "Classifying Political Regimes: A Six-Fold Measure of Democracies and Dictatorships." Unpublished Paper.

[59] Cheibub, Jose Antonio, Adam Przeworski, and Sebastian M. Saiegh. 2004. "Government Coalitions and Legislative Success Under Presidentialism and Parliamentarism." *British Journal of Political Science*, 34, pp. 565-587.

[60] Clifford, Mark L. 1998. *Troubled Tiger: Businessmen, Bureaucrats, and Generals in South Korea* (Revised Edition). Armonk, NY: M. E. Sharpe.

[61] Da Vanzo, Julie, W. P. Butz, and J. P. Habicht. 1983. "How Biological and Behavioural Influences on Mortality in Malaysia Vary during the First Year of Life." *Population Studies*, 37, pp. 381-402.

[62] Deaton, Angus. 1999. "Commodity Prices and Growth in Africa." *Journal of Economic Perspectives*, 13:3, pp. 23-40.

[63] Deaton, Angus. 2004. "Health in an Age of Globalization," in Susan Collins and Carol Graham. (eds.) *Brookings Trade Forum.* Washington, DC.: The Brookings Institute, pp. 83-130.

[64] Debs, Alexandre. 2007. "The Wheel of Fortune: Agency Problems in Dictatorship." Unpublished Paper.

[65] Demicheli, V., A. Barale, and A. Rivetti. 2005. "Vaccines for Women to Prevent Neonatal Tetanus." *Cochrane Database of Systematic Reviews*, 2005:4, Art. No.: CD002959. (DOI: 10.1002/14651858.CD002959.pub2)

[66] Deyo, Frederic C. (eds.) 1987. *The Political Economy of the New Asian Industrialism.* Ithaca: Cornell University Press.

[67] Dixit, Avinash. 2006. "Predatory States and Failing States: An Agency Perspective." Unpublished Paper.

[68] Dow, William H., Tomas J. Philipson, and Xavier Sala-i-Martin. 1999. "Longevity Complementarities under Competing Risks." *American Economic Review*, 89:5, pp. 1358-71.

[69] Easterly, William, and Ross Levine. 1997. "Africa's Growth Tragedy: Policies and Ethnic Divisions." *Quarterly Journal of Economics*, 112, pp. 1203-50.

[70] Egorov, Georgy, Sergei Guriev, and Konstantin Sonin. 2006. "Media Freedom, Bureaucratic Incentives, and the Resource Curse." Unpublished Paper.

[71] Egorov, Georgy, and Konstantin Sonin. 2005. "The Killing Game: Reputation and Knowledge in Non-Democratic Succession." Unpublished Paper.

[72] Egorov, Georgy, and Konstantin Sonin. 2006. "Dictators and Their Viziers: Agency Problems in Dictatorships." Unpublished Paper.

[73] Englebert, Pierre. 1996. *Burkina Faso: Unsteady Statehood in West Africa.* Boulder, Colorado: Westview Press.

[74] Epstein, David L., Robert Bates, Jack Goldstone, Ida Kristensen, and Sharyn O'Halloran. 2003. "Democratic Transitions." Unpublished Paper.

[75] Esrey, Steven A., and Jean-Pierre Habicht. 1988. "Maternal Literacy Modifies the Effect of Toilets and Piped Water on Infant Survival in Malaysia." *American Journal of Epidemiology*, 127:5, pp. 1079-87.

[76] Esrey, S. A., J. B. Potash, L. Roberts, and C. Shiff. 1991. "Effects of Improved Water Supply and Sanitation on Ascariasis, Diarrhoea, Dracunculiasis, Hookworm Infection, Schistosomiasis, and Trachoma." *Bulletin of the World Health Organization*, 69:5, pp. 609-621.

[77] Evans, Peter. 1995. *Embedded Autonomy: States and Industrial Transformation.* Princeton: Princeton University Press.

[78] Everett, Richard. 1985. "Guinea: A Tough Road Ahead." *Africa Report*, 30:4, pp. 19-24.

[79] Fearon, James D. 1999. "Why Ethnic Politics and "Pork" Tend to Go Together." Unpublished Paper.

[80] Fearon, James. 2006. "Self-Enforcing Democracy." Unpublished Paper.

[81] Ferejohn, John. 1986. "Incumbent Performance and Electoral Control." *Public Choice*, 50, pp. 5-25.

[82] Fischer, Mary Ellen. 1989. *Nicolae Ceausescu.* Boulder: Lynne Rienner Publishers.

[83] Fox, Roddy. 1996. "Bleak Future for Multi-Party Elections in Kenya." *Journal of Modern African Studies*, 34:4, pp. 597-607.

[84] Franco, Alvaro, Carlos Álvarez-Dardet, and Maria Teresa Ruiz. 2004. "Effect of Democracy on Health: Ecological Study." *British Medical Journal*, 329, pp. 1421-23.

[85] Fusi, J. P. 1987. *Franco: A Biography.* London: Unwin Hyman.

[86] Gandhi, Jennifer. 2003a. "Dictatorial Institutions and Their Impact on Economic Performance." Unpublished Paper.

[87] Gandhi, Jennifer. 2003b. "Dictatorial Institutions and Their Impact on Policies." Unpublished Paper.

[88] Gandhi, Jennifer, and Adam Przeworski. 2006. "Cooperation, Cooptation, and Rebellion under Dictatorships." *Economics and Politics*, 18:1, pp. 1-26.

[89] Gardinier, David E. 1988. "Book Review: Historical Dictionary of Guinea, Second Edition, by Thomas E. O'Toole." *International Journal of African Historical Studies*, 21:4, pp. 722-724.

[90] Gauri, Varun, and Peyvand Khaleghian. 2002. "Immunization in Developing Countries: Its Political and Organizational Determinants" *World Development*, 30:12, pp. 2109-32.

[91] Geddes, Barbara. 1999. "Authoritarian Breakdown: Empirical Test of a Game Theoretic Argument." Unpublished Paper.

[92] Gilley, Bruce. 1998. *Tiger on the Brink: Jiang Zemin and China's New Elite.* Berkeley: University of California Press.

[93] Glaeser, Edward L., Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer. 2004. "Do Institutions Cause Growth?" *Journal of Economic Growth*, 9:3, pp. 271-303.

[94] Glaeser, Edward L., Giacomo Ponzetto, and Andrei Shleifer. 2006. "Why Does Democracy Need Education?" NBER Working Paper, no. 12128.

[95] Gleditsch, Nils Petter, Peter Wallensteen, Mikael Eriksson, Margareta Sollenberg, and Havard Strand. 2002. "Armed Conflict 1946-2001: A New Dataset." *Journal of Peach Research*, 39:5, pp. 615-37.

[96] Glik, Deborah C., William B. Ward, Andrew Gordon, and Fassu Haba. 1989. "Malaria Treatment Practices Among Mothers in Guinea." *Journal of Health and Social Behavior*, 30:4, pp. 421-435.

[97] Golder, Matt. 2005. "Democratic Electoral Systems Around the World, 1946-2000." *Electoral Studies*, 24, pp. 103-121.

[98] Govindaraj, Ramesh, and Ravindra Rannan-Eliya. 1994. "Democracy, Communism and Health Status: A Cross-national Study." Harvard School of Public Health Data for Decision Making Project Working Paper, no. 7.2.

[99] Grossman, Herschel I., and Suk Jae Noh. "Proprietary Public Finance and Economic Welfare." *Journal of Public Economics*, 1994, 53, pp. 187-204.

[100] Grugel, Jean, and Tim Rees. 1997. *Franco's Spain.* London: Arnold.

[101] Gwatkin, Davidson. 1980. "Indications of Change in Developing Country Mortality Trends: The End of Era?" *Population and Development Review*, 6:4, pp. 615-44.

[102] Haber, Stephen. 2006. "Authoritarian Government." in Barry Weingast and Donald Wittman. (eds.) *The Oxford Handbook of Political Economy.* Oxford: Oxford University Press.

[103] Haggard, Stephan. 1990. *Pathways from the Periphery: The Politics of Growth in the Newly Industrializing Countries.* Ithaca: Cornell University Press.

[104] Hobcraft, J. N., J. W. McDonald, and S. O. Rutstein. 1985. "Demographic Determinants of Infant and Early Child Mortality: A Comparative Analysis." *Population Studies*, 39, pp. 363-85.

[105] Hodonou, Valentin. 2004. "Guinea-Conakry Adrift." *African Geopolitics*, 14. http://www.african-geopolitics.org (accessed 19 July 2007).

[106] Huntington, Samuel P., and Clement H. Moore. (eds.) 1970. *Authoritarian Politics in Modern Society: The Dynamics of Established One-Party Systems.* New York: Basic Books.

[107] Institute for Resource Development and Macro International. 1990. "Demographic and Health Surveys Phase II: Model "B" Questionnaire with Commentary for Low Contraceptive Prevalence Countries." DHS-II Basic Documentation Number 2. Columbia, Maryland: IRD/Macro International.

[108] Jackson, Robert H., and Carl G. Rosberg. 1982. *Personal Rule in Black Africa.* Berkeley: University of California Press.

[109] Jacobson, Louis S., Robert J. LaLonde, and Daniel G. Sullivan. 1993. "Earning Losses of Displaced Workers." *American Economic Review*, 83:4, pp. 685-709.

[110] Johnson, R. W. 1970. "Sekou Toure and the Guinean Revolution." *African Affairs*, 69, pp. 350-365.

[111] Jones, Benjamin F., and Benjamin A. Olken. 2005. "Do Leaders Matter? National Leadership and Growth Since World War II." *Quarterly Journal of Economics*, 120:3, pp. 835-64.

[112] Jones, Benjamin F., and Benjamin A. Olken. 2007. "Hit or Miss? The Effect of Assassinations on Institutions and War." BREAD Working Paper, no. 150.

[113] Kaba, Lansine. 1977. "Guinean Politics: A Critical Historical Overview." *Journal of Modern African Studies*, 15:1, pp. 25-45.

[114] Kaba, Lansine. 1985. "A New Era Dawns in Guinea." *Current History*, 84:501, pp. 174-178 and 187.

[115] Kasara, Kimuli. 2007. "Tax Me If You Can: Ethnic Geography, Democracy, and the Taxation of Agriculture In Africa." *American Political Science Review*, 101:1, pp. 159-72.

[116] Kaufman, Robert R. 1979. "Industrial Change and Authoritarian Rule in Latin America: A Concrete Review of the Bureaucratic Authoritarian Model." in David Collier. (ed.) *The New Authoritarianism in Latin America.* Princeton, NJ: Princeton University Press.

[117] Keefer, Philip. 2005. "Clientelism, Credibility and the Policy Choices of Young Democracies." Unpublished Paper.

[118] Kiszewski, Anthony, Andrew Mellinger, Andrew Spielman, Pia Malaney, Sonia Ehrlich Sachs, and Jeffrey Sachs. 2004. "A Global Index of the Stability of Malaria Transmission." *American Journal of Tropical Medicine and Hygiene*, 70:5, pp. 486-98.

[119] Klasen, Stephan. 1996. "Nutrition, Health and Mortality in Sub-Saharan Africa: Is There a Gender Bias?" *Journal of Development Studies*, 32:6, pp. 913-932.

[120] Knippenberg, Rudolf, Eusebe Alihonou, Agnes Soucat, Kayode Oyegbite, Maria Calivis, Ian Hopwood, Reiko Niimi, Mamadou Pathe Diallo, Mamadou Conde, and Samuel Ofosu-Amaah. 1997. "Implementation of the Bamako Initiative: Strategies in Benin and Guinea." *International Journal of Health Planning and Management*, 12:S1, pp. S29-S47.

[121] Lake, David, and Matthew Baum. 2001. "The Invisible Hand of Democracy: Political Control and the Provision of Public Services." *Comparative Political Studies*, 34:6, pp. 587-621.

[122] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny. 1999. "The Quality of Government," *Journal of Law, Economics, & Organization*, 15:1, pp. 222-279.

[123] Lee, David S., Enrico Moretti, and Matthew J. Butler. 2004. "Do Voters Affect or Elect Policies? Evidence from the U.S. House." *Quarterly Journal of Economics*, 119, pp. 807-59.

[124] Lentz, Harris M. 1994. *Heads of States and Governments: A Worldwide Encyclopedia of Over 2,300 Leaders, 1945 through 1992.* Jefferson, NC: McFarland.

[125] Levitsky, Steven, and Lucan A. Way. 2002. "The Rise of Competitive Authoritarianism." *Journal of Democracy*, 13:2, pp. 51-65.

[126] Liberthal, Kenneth. 2004. *Governing China: from Revolution through Reform* (2nd edition). New York: W. W. Norton & Company.

[127] Lindberg, Staffan I. 2003. "The Democratic Qualities of Competitive Elections: Participation, Competition and Legitimacy in Africa." *Common Wealth & Comparative Politics*, 41:3, pp. 61-105.

[128] Linz, Juan J. 2000. *Totalitarianism and Authoritarian Regimes.* Boulder: Lynne Rienner Publishers.

[129] Lipset, Seymour Martin. 1959. "Some Social Prerequisites of Democracy: Economic Development and Political Legitimacy." *American Political Science Review*, 53:1, pp. 69-105.

[130] Lizzeri, Alessandro, and Nicola Persico. 2004. "Why Did the Elites Extend the Suffrage? Democracy and the Scope of Government, with an Application to Britain's 'Age of Reform'." *Quarterly Journal of Economics*, 119:2, pp. 707-65.

[131] Londregan, John, Henry Bienen, and Nicolas van de Walle. 1995. "Ethnicity and Leadership Succession in Africa." *International Studies Quarterly*, 39, pp. 1-25.

[132] Majumdar, Sumon, Anandi Mani, and Sharun W. Mukand. 2004. "Politics, Information, and the Urban Bias." *Journal of Development Economics*, 75, pp. 137-65.

[133] Mani, Anandi, and Sharun Mukand. 2007. "Democracy, Visibility and Public Good Provision." *Journal of Development Economics*, 83:2, pp. 506-529.

[134] Marshall, Monty G., and Keith Jaggers. 2002. "POLITY IV Project: Political Regime Characteristics and Transitions, 1800-2002." University of Maryland.

[135] Marshall, Monty G., and Keith Jaggers. 2005. "POLITY IV Project: Political Regime Characteristics and Transitions, 1800-2004." Center for Global Policy, George Mason University.

[136] Maxwell, Kenneth. 1986. "Regime Overthrow and the Prospects for Democratic Transition in Portugal." in Guillermo O'Donnell, Philippe C. Schmitter, and Laurence Whitehead. (eds.) *Transitions from Authoritarian Rule: Southern Europe.* Baltimore: Johns Hopkins University Press.

[137] McGuire, Martin C., and Mancur Olson, Jr. 1996. "The Economics of Autocracy and Majority Rule: The Invisible Hand and the Use of Force." *Journal of Economic Literature*, 34, pp. 72-96.

[138] Miguel, Edward, and Mary Kay Gugerty. 2005. "Ethnic Diversity, Social Sanctions, and Public Goods in Kenya." *Journal of Public Economics*, 89, pp. 2325-68.

[139] Miguel, Edward, and Michael Kremer. 2004. "Worms: Education and Health Externalities in Kenya." *Econometrica*, 72:1, pp. 159-217.

[140] Millimouno, Dominique, Alpha Amadou Diallo, James Fairhead, and Melissa Leach. 2006. "The Social Dynamics of Infant Immunisation in Africa: Perspectives from the Republic of Guinea." IDS Working Paper, no. 262.

[141] Momoh, Eddie. 1984. "A Dawn Descends, A Myth Broken." *West Africa*, 9 April, pp. 756-7.

[142] Montalvo, Jose G., and Marta Reynal-Querol. 2005. "Ethnic Polarization, Potential Conflict, and Civil Wars." *American Economic Review*, 95:3, pp. 796-816.

[143] Morrison, Donald George, Robert Cameron Mitchell, and John Naber Paden. 1989. *Black Africa: A Comparative Handbook*, 2nd edition. New York: Paragon House.

[144] Mulligan, Casey B., Richard Gil and Xavier Sala-i-Martin. 2004. "Do Democracies have Different Public Policies than Non-Democracies?" *Journal of Economic Perspectives*, 18:1, pp. 51-74.

[145] Munck, Gerardo L., and Jay Verkuilen. 2002. "Conceptualizing and Measuring Democracy: Evaluating Alternative Indices." *Comparative Political Studies*, 35:1, pp. 5-34.

[146] Murdock, George Peter. 1967. "Ethnographic Atlas: A Summary." *Ethnology*, 6:2, pp. 109-236.

[147] Murray, Christopher J. L., and Alan D. Lopez. (eds.) 1996. *The Global Burden of Disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020.* Cambridge, MA: Harvard University Press.

[148] Myerson, Roger. 2006. "Leadership, Trust, and Constitutions." Unpublished Paper.

[149] Nelson, Michael H. 2001. "Thailand." in Dieter Nohlen, Florian Grotz, and Christof Hartmann. (eds.) *Elections in Asia and the Pacific: A Data Handbook*, Volume II. Oxford: Oxford University Press.

[150] Nohlen, Dieter, Michael Krennerich, and Bernhard Thibaut. (eds.) 1999. *Elections in Africa: A Data Handbook.* Oxford: Oxford University Press.

[151] North, Douglass C., and Barry R. Weingast. 1989. "Constitutions and Commitment: The Evolution of Institutions Governing Public Choice in Seventeenth-century England." *Journal of Economic History*, 49:4, pp. 803-832.

[152] Nyamnjoh, Francis B. 1999. "Cameroon: A Country United by Ethnic Ambition and Difference." *African Affairs*, 98:390, pp. 101-118.

[153] O'Donnell, Guillermo A. 1979. *Modernization and Bureaucratic-Authoritarianism: Studies in South American Politics.* Berkeley: Institute of International Studies.

[154] O'Donnell, Guillermo A., and Philippe C. Schmitter. 1986. *Transitions from Authoritarian Rule: Tentative Conclusions about Uncertain Democracies.* Baltimore: Johns Hopkins University Press.

[155] Olson, Mancur. 1993. "Dictatorship, Democracy, and Development." *American Political Science Review*, 87:3, pp. 567-576.

[156] ORC Macro. 2006. "MEASURE DHS: Model Questionnaire with Commentary for Countries with the Expanded HIV Questions." MEASURE DHS Basic Documentation Number 2.

[157] O'Toole, Thomas and Janice E. Baker. 2005. *Historical Dictionary of Guinea: Fourth Edition.* Lanham, Maryland: The Scarecrow Press.

[158] Overland, Jody, Kenneth Simons, and Michael Spagat. 2005. "Political Instability and Growth in Dictatorships." *Public Choice*, 25:3-4, pp. 445-470.

[159] Padro-i-Miquel, Gerard. 2006. "The Control of Politicians in Divided Societies: The Politics of Fear." NBER Working Paper, no. 12573.

[160] Paltseva, Elena. 2006. "Autocracy, Devolution and Growth." Unpublished Paper.

[161] Pande, Rohini. 2003. "Can Mandated Political Representation Increase Policy Influence for Disadvantaged Minorities? Theory and Evidence from India." *American Economic Review*, 93:4, pp. 1132-51.

[162] Papaioannou, Elias, and Gregorios Siourounis. 2005. "Democratization and Growth." Unpublished Paper.

[163] Payne, Stanley G. 1987. *The Franco Regime: 1936-1975.* Madison: University of Wisconsin Press.

[164] Persson, Torsten. 2005. "Forms of Democracy, Policy and Economic Development." NBER Working Paper, no. 11171.

[165] Persson, Torsten, and Guido Tabellini. 2000. *Political Economics - Explaining Economic Policy.* Cambridge, MA: MIT Press.

[166] Persson, Torsten, and Guido Tabellini. 2003. *The Economic Effect of Constitutions.* Cambridge, MA: MIT Press.

[167] Persson, Torsten, and Guido Tabellini. 2004. "Constitutional Rules and Fiscal Policy Outcomes." *American Economic Review*, 94:1, pp. 25-45.

[168] Persson, Torsten, and Guido Tabellini. 2006a. "Democratic Capital: The Nexus of Political and Economic Change." NBER Working Paper, no. 12175.

[169] Persson, Torsten, and Guido Tabellini. 2006b. "Democracy and Development: The Devil in the Details." *American Economic Review*, 97:2, pp. 319-324.

[170] Persson, Torsten, and Guido Tabellini. 2007. "The Growth Effect of Democracy: Is It Heterogenous and How Can It Be Estimated?" NBER Working Paper, no. 13150.

[171] Pison, Gilles. 1992. "Twins in Sub-Saharan Africa: Frequency, Social Status, and Mortality." in Etienne van de Walle, Gilles Pison, and Mpembele Sala-Diakanda. (eds.) *Mortality and Society in Sub-Saharan Africa.* Oxford: Clarendon Press, pp. 253-278.

[172] Pitt, Mark M. 1997. "Estimating the Determinants of Child Health When Fertility and Mortality Are Selective." *Journal of Human Resources*, 32:1, pp. 129-58.

[173] Posner, Daniel N. 2005. *Institutions and Ethnic Politics in Africa.* Cambridge: Cambridge University Press.

[174] Posner, Daniel N. 2007. "Regime Change and Ethnic Cleavages in Africa." *Comparative Political Studies*, 40:11, forthcoming.

[175] Preston, Samuel H. 1975. "The Changing Relation between Mortality and the Level of Economic Development." *Population Studies*, 29:2, pp. 231-48.

[176] Preston, Samuel H. 1980. "Causes and Consequences of Mortality Declines in Less Developed Countries during the Twentieth Century." in R. A. Easterlin. (ed.) *Population and Economic Change in Developing Countries.* Chicago: The University of Chicago Press.

[177] Przeworski, Adam, Michael E. Alvarez, Jose Antonio Cheibub and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990.* New York: Cambridge University Press.

[178] Przeworski, Adam, and Fernando Limongi. 1993. "Political Regimes and Economic Growth." *Journal of Economic Perspectives*, 7:3, pp. 51-69.

[179] Rauch, James E. 2001. "Leadership Selection, Internal Promotion, and Bureaucratic Corruption in Less Developed Countries." *Canadian Journal of Economics*, 34:1, pp. 240-258.

[180] Razzaque, Abdur, Nurul Alam, Lokky Wai, and Andrew Foster. 1990. "Sustained Effects of the 1974-5 Famine on Infant and Child Mortality in a Rural Bangladesh." *Population Studies*, 44, pp. 145-54.

[181] Reinikka, Ritva, and Jakob Svensson. 2004. "Local Capture: Evidence from a Central Government Transfer Program in Uganda." *Quarterly Journal of Economics*, 119:2, pp. 679-705.

[182] Riviere, Claude. 1977. *Guinea: The Mobilization of a People.* Ithaca: Cornell University Press.

[183] Rodrik, Dani. 1997. "Democracy and Economic Performance." Unpublished Paper.

[184] Rodrik, Dani. 1999. "Democracies Pay Higher Wages." *Quarterly Journal of Economics*, 114:3, pp. 707-38.

[185] Rodrik, Dani. 2000. "Participatory Politics, Social Cooperation, and Economic Stability." *American Economic Review*, 90:2, pp. 140-44.

[186] Rodrik, Dani, and Romain Wacziarg. 2005. "Do Democratic Transitions Produce Bad Economic Outcomes?" *American Economic Review*, 95:2, pp. 50-55.

[187] Ross, Michael L. 2001. "Does Oil Hinder Democracy?" *World Politics*, 53, pp. 325-361.

[188] Ross, Michael. 2006. "Is Democracy Good for the Poor?" *American Journal of Political Science*, 50:4, pp. 860-74.

[189] Ruan, Ming. 1994. *Deng Xiaoping: Chronicle of an Empire.* Boulder: Westview Press.

[190] Schissel, Howard. 1986. "Conte in Control." *Africa Report*, 31:6, pp. 21-25.

[191] Sen, Amartya K. 1999. *Development as Freedom.* Oxford: Oxford University Press.

[192] Sillah, Alhassan. 2007. "Guinea's Strongman Feels the Heat." *BBC News*, 22 January, http://news.bbc.co.uk/1/hi/world/africa/6287961.stm (accessed 20 July 2007).

[193] Skidmore, Thomas E. 1988. *The Politics of Military Rule in Brazil, 1964-85.* Oxford: Oxford University Press.

[194] Sohn, Hak-Kyu. 1989. *Authoritarianism and Opposition in South Korea.* London: Routledge.

[195] Stasavage, David. 2005. "Democracy and Primary School Attendance: Aggregate and Individual Level Evidence from Africa." Unpublished Paper.

[196] Stepan, Alfred. 1971. *The Military in Politics: Changing Patterns in Brazil.* Princeton, NJ: Princeton University Press.

[197] Strand, Havard, Joachim Carlsen, Nils Petter Gleditsch, Havard Hegre, Christin Ormhaug, and Lars Wilhelmsen. 2005. "Armed Conflict Dataset Codebook Version 3-2005." International Peace Research Institute (PRIO).

[198] Strauss, John, and Duncan Thomas. 1996. "Human Resources: Empirical Modeling of Household and Family Decisions." in J. Behrman and T. N. Srinivasan. (eds.) *Handbook of Development Economics*, Volume 3A. Amsterdam: Elsevier. pp. 1883-2023.

[199] Svolik, Milan. 2006. "A Theory of Government Dynamics in Authoritarian Regimes." Unpublished Paper.

[200] Szreter, Simon. 1988. "The Importance of Social Intervention in Britain's Mortality Decline c.1850-1914: a Re-interpretation of the Role of Public Health," *Social History of Medicine*, 1:1, pp. 1-37.

[201] Tishken, Joel E. 1994. "Book Review: Ethnicity and Conflict in the Horn of Africa by Katsuyoshi Fukui; John Markakis." *African Economic History*, 22, pp. 149-153.

[202] Tismaneanu, Vladimir. 2003. *Stalinism for All Seasons: A Political History of Romanian Communism.* Berkeley: University of California Press.

[203] UNICEF. 2006. "Childinfo.org: Delivery Care." http://www.childinfo.org/areas/deliverycare (accessed 20 August 2006).

[204] Uwechue, Raph. (ed.) 1996. *Makers of Modern Africa: Profiles in History* (3rd edition). London: Africa Books Limited.

[205] van de Walle, Nicolas. 2002. "Africa's Range of Regimes." *Journal of Democracy*, 13:2, pp. 66-80.

[206] van de Walle, Nicolas. 2003. "Presidentialism and Clientelism in Africa's Emerging Party Systems." *Journal of Modern African Studies*, 41:2, pp. 297-321.

[207] Wade, Robert. 1990. *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization.* Princeton: Princeton University Press.

[208] Wiarda, Howard J. 1977. *Corporatism and Development.* Amherst: University of Massachusetts Press.

[209] Wintrobe, Ronald. 1990. "The Tinpot and the Totalitarian: An Economic Theory of Dictatorship." *American Political Science Review*, 84:3, pp. 849-872.

[210] Wintrobe, Ronald. 1998. *The Political Economy of Dictatorship.* New York: Cambridge University Press.

[211] WHO Collaborative Study Team. 2000. "Effect of Breastfeeding on Infant and Child Mortality due to Infectious Diseases in Less Developed Countries: A Pooled Analysis." *Lancet*, 355, pp. 451-55.

[212] Wolfers, Justin. 2006. "Did Unilateral Divorce Laws Raise Divorce Rates? A Reconciliation and New Results." *American Economic Review*, 96:5, pp. 1802-1820.

[213] World Bank. 2003. *World Development Report 2004: Making Services Work for Poor People.* Washington, D.C.; World Bank and Oxford University Press.

[214] World Bank. 2005. "Project Appraisal Document on a Proposed Credit in the Amount of SDR 16.6 Million (US$25 Million Equivalent) to the Republic of Guinea for a Health Sector Support Project." http://go.worldbank.org/XDNQC6V6F0 (accessed 19 July 2007).

[215] Yansane, Aguibou Y. 1990. "Guinea: The Significance of the Coup of April 1984 and Economic Issues." *World Development*, 18:9, pp. 1231-1246.

[216] Young, Alwyn. 2005. "In Sorrow to Bring Forth Children: Fertility amidst the Plague of HIV." Unpublished Paper.

[217] Zenger, Elizabeth. 1993. "Siblings' Neonatal Mortality Risks and Birth Spacing in Bangladesh." *Demography*, 30:3, pp. 477-88.