

POLITICAL REGIMES AND HEALTH: COMPETING EXPLANATIONS

by

Andrew Cormac Patterson

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in

The Faculty of Graduate and Postdoctoral Studies

(Sociology)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

October 2014

Abstract

Many studies find that democratic governance improves population health. However, few offer a rigorous conceptualization of democracy. Many studies may overestimate the contribution of democracy to population health by removing cases with missing data from their analyses. Some highlight the importance of a legacy of democracy for health, but utilize measures of ‘level’ or degree of democracy that may confound the impact of democracy with other qualities of political regimes. Finally, few studies test specific explanations for the putative health effects of democracy. To address these issues, I use annual time-series data spanning from 1960 through 2010 to investigate variations in population health by political regime type. A combination of data supplementation and multiple imputation facilitates production of a working dataset with virtually complete data for 168 nations. My analysis proceeds utilizing a common measure of the ‘level’ of democracy (the Polity IV scale), followed by the application of a more specific operationalization of democracy that assesses whether countries choose their leaders via free and fair elections. I determine whether democracy is associated with population health outcomes after which I test various competing explanations for how and why democracy ostensibly promotes health while ruling out likely confounders. I find that level of democracy correlates positively with life expectancy and negatively with infant mortality rates and crude mortality rates. However, the accumulation of Polity scores over time (‘democratic capital’) is relevant for infant mortality only, while the strength and legacy of regimes is associated with population health irrespective of regime type. Models using the binary measure of electoral democracy indicate that, on average, people living in democratic nations can expect 10.8 more years of life and have 57% less infant

mortality and 21% less overall mortality. I identify several mechanisms that may link political democracy to population health, namely, systems of accountability that constrain the decision-making powers of elected leaders, the promotion of strong institutional frameworks through the distribution of freedoms to compete for political influence and the advancement of economic prosperity. Options for further investigating the influence of democracy on population health are discussed.

Preface

A. C. Patterson identified and designed all major components of the research program, analyzed all research data, and compiled the manuscript. Research Supervisor G. Veenstra contributed to the research design, conceptual organization of the text, and manuscript edits. Dissertation Committee members F. Duina and S. Lauer contributed to the manuscript edits. Relevant data were used from the Polity IV dataset, the World Bank Indicators, the 1997 historical supplement to the United Nations Demographic Yearbook, the United Nations National Accounts Main Aggregates Database, and the Standardized World Inequality Database.

Table of Contents

Abstract	ii
Preface	iv
Table of Contents	v
List of Tables	vii
Acknowledgments	viii
Dedication	x
Chapter 1: Introduction	1
Overview of the Research Strategy	2
Existing Evidence Linking Political Regimes to Health	7
Proposed Mediators.....	9
Key Challenges	13
Analytical Strategy	19
Research Hypotheses	24
Chapter 2: Defining Democracy	27
Democracy As Social Structure	32
Measurement of Political Regimes	36
Chapter 3: Data and Methods	39
National Vital Statistics and the Political Economy	41
Political Variables	43
Descriptive Statistics.....	48
Missing Data and Data Imputation	52
Multiple imputation.	56
Statistical Analysis	62
Chapter 4: Does Democracy Impact Health? Response to Extant Literature	65
Results.....	69
Summary	73
Chapter 5: Tests Using a Streamlined Conceptualization of Democracy	76
Democracy and Health: A Basic Test	78
Comparing the Impact of Political Regimes at Different Stages of Maturity	81
Tests of Intervening Mechanisms	84
The Accountability, Institutional Strength, and Economic Development Hypotheses.....	84
The Inequality Reduction Hypothesis.....	90
Predicting growth in income, executive constraints, competitive political participation	92
Summary	98

Conclusion	102
Implications.....	105
Limitations	116
Future Directions.....	121
Final Comments	123
References	136

List of Tables

Table 1: Descriptive Statistics.	125
Table 2: Results from Models Testing the Impact of the Level of Democracy on Population Health.....	126
Table 3: Results from Regression Models Testing the Impact of Electoral Democracy on Population Health.....	128
Table 4: Results from Models Testing the Impact of Electoral Democracy and GDP on Population Health According to the Length of Time a Regime Has Been in Power.....	130
Table 5: Results from Regression Models Testing the Intervening Effects of Executive Constraints and Competitive Political Participation.	131
Table 6: Results from Models Testing the Inequality Reduction Hypothesis.	133
Table 7: Results from Models Predicting Decade-Long Percentage Growth in Per-Capita GDP.....	134
Table 8: Results from Models Predicting Decade-Long Levels of Growth in Executive Constraints and Competitive Political Participation.	135

Acknowledgments

This dissertation would not have been possible without the kindness of many people. First and foremost, I thank my supervisor Gerry Veenstra. His generosity, thoughtful insights, and patient review of my writing have been central to my development over the past several years. He has been a most dedicated mentor, responding to my many requests for follow-up with what often seemed like lightning speed. I express my utmost gratitude to Prof. Veenstra for giving me the opportunity to pursue this work and for guiding me every step of the way. I also give my gratitude to committee members Sean Lauer and Francesco Duina for their insightful feedback. I thank them for their ongoing encouragement and mentorship both inside and outside of the dissertation.

Other people helped in additional ways. By inviting me to contribute to his own project as coauthor, Bob Ratner provided mentorship on the logistics and diplomacy of scholarly writing. My collaboration with him, which started in 2009 and culminated in a recent publication, gave me experience with comparative analysis and informed my choice of statistical techniques. Adam Easterbrook, a close friend and senior colleague in the department, provided ongoing support and encouragement. Ying MacNab assisted with the research proposal. Both she and Rima Wilkes provided feedback on the data and methods. I am also grateful for the funding I received from the University of British Columbia, the Province of British Columbia, and the C.D. Howe Institute.

Last but most certainly not least, I thank all of my friends and family for their laughter and their love. My parents, Richard and Cornelia Patterson, gave me constant reassurance, advice, and material support. My sister Rebecca and brothers Benjamin

and Matthew were at my side from the very beginning, each offering a second home, a hot meal and a listening ear during moments of rest.

I could not have completed the dissertation, could not have even imagined it, without these people in my life. I came this far because there were many hands to catch me when I stumbled. Thank you all.

Dedication

For Mom, Pops, Matt, Becky, and Ben: My family, my home, always.

Chapter 1: Introduction

Over the last half-century, the world has seen a shift toward democratic rule. The years following the fall of the Berlin Wall brought a number of new democracies into being. This transition from autocratic to democratic styles of governance appears to be continuing. In a referendum of Sudanese people, the year 2011 introduced the new country of South Sudan through majority vote. Other examples of countries currently undergoing regime change include the North African countries of Tunisia, Libya, and Egypt, the Southeast Asian country of Myanmar (formerly Burma), and the Arabian country of Yemen. On September 21st, 2014, Afghanistan named the cultural anthropologist Dr. Ashraf Ghani as its President. In so doing it transferred power to a democratically elected leader for the first time in its history. However, the meaning and long-term trajectory of the election may be determined by the actions of the Taliban and other elements of a long history of autocracy.

During this time of change, many proponents of democracy claim that people live longer and lead healthier, more productive, and more satisfactory lives in this kind of regime. Personal choice is much more limited in an autocracy, they argue, which constrains the leverage people have for protecting their own health. Yet the argument that democracy promotes stronger health is easy to make but difficult to substantiate empirically. The small literature that explores the implications of political regimes for population health is fraught with problems.

There are several challenges to the view that democracy protects health. Most studies test for a correspondence between democracy and population health but do not examine the viability of different explanations for it. Ross (2006) argues that the

complete removal of country-cases for which data are missing has led researchers to erroneously infer that political democracy promotes health. Few studies rigorously conceptualize and operationalize political regimes, despite diverging opinions about what is democracy. Most studies make little effort to conceptualize political regimes and instead rely upon popular measures of the ‘level’ of democracy, the validity of which is questionable. These decisions have arguably confounded democracy with other qualities of political regimes that have little to do with how a country’s leaders come to power. Some studies argue that democracy influences health over a much longer time frame and that political regimes must be viewed longitudinally to reveal any impact. There is more than one way to test a long-term influence of democracy on health, however, and the strategies that previous studies have chosen may be vulnerable to confounding explanations.

This dissertation offers key clarifications as well as possible solutions to the abovementioned challenges. Focusing on a streamlined selection of variables, it includes a test of the health impact of democracy which improves upon this literature in several crucial ways. It also explores more precisely what it is about democracy that promotes strong health. The following overview of the research strategy outlines some of the most important contributions, starting with a concerted conceptualization of democracy.

Overview of the Research Strategy

An important weakness of the literature on political regimes as a health determinant is the absence of any thoroughgoing conceptualization of political regimes. Most studies rely upon existing measures of the ‘level’ of democracy that tend to correlate highly with each other. As Munck and Verkuilen (2002) point out, though,

strong correlations do not necessarily satisfy the kind of measurement validity or accuracy that this research demands. In fact, agreement among measures is only *convergent validity*, which leaves other important kinds of validity (e.g., discriminant validity, construct validity) unaccounted for. To address this gap and support coherent causal arguments about how democracy impacts health, Chapter 2 is dedicated to the conceptualization of political regimes. In this chapter democracy is argued to be a regime that chooses its leadership through free and fair elections, which is a more minimalistic interpretation than other possible definitions.

Chapter 3 identifies the data and methods used for this dissertation. The Polity IV dataset (Marshall, Jaggers, & Gurr, 2011) is chosen to assess the status of each country's political regime. A widely popular dataset, the Polity series offers some key advantages, such as expansive time-series data stretching back to the year 1800. As further discussed below, the Polity series also allows alternative measures based on either the 'level' of democracy or on categories of political regime types. Chapter 3 discusses in detail how these data are combined with other reputable sources so as to facilitate a study of the political economy of population health outcomes. This chapter also discusses in detail how the problem of missing data is addressed so as to create the working dataset for this dissertation.

The first phase of the analysis in Chapter 4, much like the existing literature, uses Polity scores to measure the 'level' of democracy and to test its influence on health. The immediate impact of the level of democracy is compared to the long-term legacy of democracy ('democratic capital'), measured as the accumulation of Polity scores over time. Although the Polity scores are valuable as a composite measure of democracy,

Chapter 4 demonstrates how assessing the ‘level’ of democracy can be quite complicated, inviting a number of potential confounders. The strength of regimes, namely the degree to which they are *either* autocratic or democratic, is considered an important confounder here, and it similarly accumulates across the years when creating the measure of ‘democratic capital.’ Absolute values of both the contemporaneous and the cumulative Polity scores are therefore included in models so as to control for overall regime strength and the legacy of that regime strength for all regimes. Still another potential confounder is the length of time countries have been either autocratic or democratic, which is included in calculations that involve year-over-year aggregation like the cumulative Polity scores. Referred to below as ‘regime tenure,’ the number of years a regime has held power speaks broadly to a regime’s survivability, irrespective of a country’s regime type or the degree to which it claims one or another form of governance. Since the overall stability of regimes also corresponds with strong health (Klomp & de Haan, 2009), regime tenure is included an additional control variable. Finally, GDP is added so as to facilitate discussions of the Economic Development Hypothesis.

After responding to current literatures that use the Polity scores, Chapter 5 operationalizes democracy based on the definition developed in Chapter 2. The Polity scores and other measures of the ‘level’ of democracy have been quite popular in this literature. To define democracy and assess a particular nation as democratic is quite difficult, however. As Munck and Verkuilen (2002) point out, the conceptualization of democracy is an evolving theoretical challenge, so much so that there is little point debating which definition is best. Different authors focus on different characteristics when determining which countries are democratic. Arguably, though, the best

conceptualization might be one that reasonably fits the needs and interests of the researcher. Because this dissertation emphasizes competing explanations for how democracy affects health, Przeworski's (1991, p. 10) definition is chosen for the second major phase of the analysis: democracy is a political "system in which parties lose elections. ... There is competition, organized by rules. And there are periodic winners and losers." In other words, borrowing also from Sen (1994), democracy is a model of governance in which citizens choose their leaders by voting their preferences among a selection of candidates in elections that are regular, free, fair, and competitive. Compared to more encompassing definitions, this minimalist interpretation optimizes a researcher's ability to test the factors that may mediate democracy's impact on health.

To streamline discussion of the influence that democracy has on health and to provide a fuller test of key mediators, political regimes are defined in Chapter 5 simply as an indicator confirming whether a country holds democratic elections. Another key advantage of the Polity IV dataset is that it offers a way to distinguish those countries that hold free and fair elections to choose their leaders from those that do not. Defining political regimes as such, the analyses in Chapter 5 use this characteristic of the Polity IV data to compare democracies to non-democracies rather than assessing 'levels' of democracy. The use of a simple indicator indicating the presence or absence of elections disentangles the measurement of political regimes from the abovementioned confounders.

Democracy arguably requires some civic knowledge and a history of reciprocal trust that societies must accumulate over time (Persson & Tabellini, 2006; Keefer, 2007). Supporting this view, a number of authors conclude that long-standing democracies have stronger health than their younger counterparts (Besley & Kudamatsu, 2006; Gerring et

al., 2012; Wigley & Akkoyunlu-Wigley, 2011). Yet the overall stability of regimes irrespective of regime type also seemingly promotes stronger health (Klomp & de Haan, 2009). So as to facilitate discussion about the influence of the long-standing legacy of political regimes, measures of both the length of time a given regime has been in power and the length of time democratic regimes in particular have existed are included in these models.

Chapter 5 next examines four explanations for how democracy impacts health that can be tested separately in models. The *Accountability Hypothesis* argues that democracies more effectively constrain the decision-making powers of leaders, which impels them to make wiser policy decisions that in turn promote stronger population health. The *Institutional Strength Hypothesis* claims that democracies provide bureaucratic environments that more reliably serve the needs of everyday citizens and legal frameworks that more fairly arbitrate competing interests. The use of three of the five subcomponents of the Polity scale to define democracy based on elections frees up the remaining two, executive constraints and competitive political participation, which are (respectively) used to assess these hypotheses. The *Inequality Reduction Hypothesis*, claims that by giving under-benefitted citizens a means to defend their own interests (i.e., their votes in elections), democracy facilitates the reduction of social inequality and therefore better health and this supposition is tested using the Gini coefficient as the likely mediator. Finally, the *Economic Development Hypothesis* argues that democracies more effectively attract economic prosperity and therefore lift average health by improving everyone's access to material resources, a view that is tested using logged per-capita gross domestic product (GDP) as the likely mediator.

In all of the above, a replicable and transparent approach is taken to handling missing data. Specific justification is offered for the exclusion of any cases from the analysis. Regarding life expectancy, infant mortality rates, and crude mortality, United Nations data are then used to supplement World Bank data to create a mostly complete dataset, but since most of the missing data that remain are for poor or autocratic nations, multiple imputation is also used. Regression models, which are described in Chapter 3, are used to impute the data randomly. These efforts notwithstanding, the solutions to missing data and to the other challenges noted above may require further development than what is offered in this dissertation. Chapter 6 discusses the limitations of my findings along with recommendations for further study.

Existing Evidence Linking Political Regimes to Health

There is good reason to believe that living in a democracy promotes health. A variety of cross-sectional studies link the presence of democracy in nations to an absence of health catastrophes like famines (Sen, 1994), lower rates of infant mortality (Zweifel & Navia, 2000; Navia & Zweifel, 2003; Gerring, Thacker, & Alfaro, 2012; McGuire, 2013), higher life expectancy (Wigley & Akkoyunlu-Wigley, 2011; Besley & Kudamatsu, 2006), higher scores on a measure of needs provision that combines life expectancy with infant mortality and literacy rates (Moon & Dixon, 1985; London & Williams, 1990; Frey & Al-Roumi, 1999), higher scores on a holistic measure of health combining life expectancy with years of life lost due to disease and injury (Klomp & de Haan, 2009), lower rates of maternal death (Franco, Álvarez-Dardet, & Ruiz, 2004), higher health-adjusted life expectancy (Safaei, 2006), and lower rates of adult mortality (*id.*).

There are also some contrasting findings, however. Shandra, Nobles, London, and Williamson (2004) do not find an association between democracy and infant mortality. Ross (2006) does not find a relationship between democracy and infant mortality after imputing missing data for the world's more successful autocratic nations. Other authors either fail to find an association with life expectancy (Correa & Namkoong, 1992) or produce mixed results (Baum & Lake, 2003). Nevertheless, in a recent review of this literature, Muntaner et al. (2011) note that 80% of studies in the last twenty-five years identify a positive association between democracy and population health.

More recent studies assert that democracy must be viewed longitudinally so as to show a historical impact on health. Gerring et al. (2012) hypothesize that the positive effect of democracy is cumulative, with long-established democracies showing an especially strong contribution to human development (measured as the reciprocal of infant mortality rates). Wigley and Akkoyunlu-Wigley (2011) extend this finding to life expectancy. Lin, Chen, Chien, and Chan (2012) find a weaker contemporaneous correspondence between democracy and health but also find that the protective value of democracy appreciates over time, with a much stronger association manifesting itself when the dependent variable is lagged by a decade. Finally, Besley and Kudamatsu (2006) measure political regimes as the fraction of years within the prior five years that were spent as democratic. In their study, this measure robustly predicts both life expectancy and infant mortality, but explanatory power is much stronger when instead measuring the fraction of years each country has spent as democratic since 1956. The long-term trajectory of a country's political regime then seems to be most impactful.

Proposed Mediators

This dissertation takes care to distinguish causal explanations in models. A small set of intervening mechanisms are proposed on the basis of their availability in reputable datasets but also based on their feasibility as conceptual, macro-social explanations. Each of the hypotheses discussed in this section is founded on the notion that a citizen's set of duties, rights, and privileges is fundamentally different in a democracy. Because of their ability to vote in elections, everyday citizens can help set political agendas in ways they cannot under autocratic rule. Voting allows an ongoing dialectic to occur between themselves and their leaders, a dialectic through which the preferred balance of duties and privileges can be negotiated over time. Understanding democracy as an ongoing exchange over history during which many aspiring candidates win and lose elections, all of the mechanisms discussed next are taken to originate from the provision of voting privileges.

The *Accountability Hypothesis* (Sen, 1994) has been one of the most influential positions in this literature. According to this argument, democracies improve health by keeping government leaders accountable to their decisions. Autocracies usually pass leadership roles from one individual to another through genetic lineage, violent conflict, or appointment within groups that are otherwise elite and exclusive. In contrast, democratic leaders are hired and fired based on the whims of the voting public. Legitimate democracies allow limited terms of office in which leaders can, at best, continue in their positions only by winning reelection. Democratic leaders must therefore constantly appeal to the wishes of the voting public in order to be successful. Because most democracies also have an uncensored press, freedom of speech, freedom of

assembly and the like, citizens are able to publicly critique the performance of their governments as they see fit. Furthermore, people living in a democracy have a say not only on health-related issues but on all of the social circumstances that have any plausible bearing on health. Before government leaders agree to place a toxic waste site near a community, for example, they must appreciate the risk of a public-relations disaster that could end their political careers. Anything and everything that could create a negative public reaction must be avoided as much as possible, including decisions that relate even indirectly to health. Arguably, democracy should thus improve health in a holistic way, not just with respect to obvious disasters like famines as Sen originally posited.

The *Inequality Reduction Hypothesis* (referred to as the ‘simple democratic hypothesis’ in Moon & Dixon, 1985) is like the accountability hypothesis but focuses on socioeconomic correlates. According to this argument, there is more ‘return’ to population health from investing in the welfare of poor people, while poor people are also likely to improve their own circumstances through their voting preferences. Because democracy is a system in which all citizens can influence policy through their ability to vote, it gives political clout to people who are poor, marginalized, or otherwise under-benefitted. We can furthermore expect poor and marginalized groups to defend their own interests and to vote in kind, so their participation in elections works naturally towards the reduction of inequality. Yet because material deprivation also has a very strong, negative impact on health (Link & Phelan, 1995; 2010), the health of underprivileged people will be more sensitive to positive changes in inequality than will the health of privileged people. Social inequality is a negative health determinant in and of itself (Wilkinson & Pickett, 2006; 2010), furthermore, so the reduction of inequality should

lift median life expectancy while also being characteristic of democracies.

According to the *Institutional Strength Hypothesis* (Gerring et al., 2012; Gerring, Bond, Barndt, and Moreno, 2005), the institutions that provide all of a society's amenities are stronger in democracies. There are a number of reasons for this. First, democracies are more stable and their policy books are more permanent. An autocratic leader who has won a coup can overhaul all of the policies or create new ones by fiat, destroying much of the institutional memory and infrastructure that was created under the previous leadership. This is not easily done in a democracy, however, because other powerful actors also have a say. Second, democracies require a more rigorous effort to arbitrate disputes fairly. In a democracy, there is no one to decide the outcome of a conflict arbitrarily except by first referring to existing laws. The outcomes of even ambiguous cases either turn into case law or motivate the proposal of new statutes to guide similar dilemmas in the future. What results is an evolution of laws and policies that have been carefully crafted over time by a great many stakeholders. Third, in a democracy people have the freedom to affiliate, organize, and collaborate as they see fit. This is to say that they can compete with their governments in terms of serving the interests of citizens. Democracies cause institutions themselves to grow in number and variety not only to monitor the government decisions but also to convey health-related information, organize voluntarily to provide different kinds of assistance, or otherwise address any of the innumerable needs of citizens. Because most of these institutions function more or less democratically, they too are less vulnerable to destruction by autocratic overhaul and can comfortably develop their own organizational policies over time.

Finally, it is possible that economic prosperity intervenes between democracy

and health. In asserting a mediating effect, the *Economic Growth Hypothesis* claims both that democracy causes economic development and that economic development causes stronger health. Even though national income is one of the strongest and most consistent macro-social correlates of health, there has been little mention of economic prosperity as an intervening cause of health differences in discussions of the *political* determinants of health. Nevertheless, although controversial and flourishing in separate literatures, the views that economic prosperity is an outcome of political democracy and that it is a cause of strong health are long standing. Often referred to eponymously as the ‘McKeown thesis,’ scholars have argued since the middle of the 20th century that population health improves in tandem with rising standards of living (McKeown, 1976; McKeown, 1988; McKeown & Brown, 1955). Some authors suggest perhaps more tentatively that national income at least indirectly promotes good health (e.g., Riley, 2001), although Link and Phelan (1995; 2010) make a clear argument that income growth causes stronger health at the individual level. This would imply that national income growth also causes stronger health on average if it means lifting median income levels, a point supported by findings from Klomp and de Haan (2009).

Scholars have also suspected for some time now that political democracy may be good for business. Friedman and Friedman (1980) illustrate how economic freedom, a putatively democratic value, promotes economic development. This kind of argument has been controversial ever since Lipset (1959) made a causal argument in the reverse, but Knutsen (2012) observes how studies are beginning to converge in affirming a correspondence between democracy and income growth. In one of the most insightful causal arguments, Gerring et al. (2005) apply the Institutional Strength Hypothesis to

income growth. They explain that in a democracy decision-making power is diffused across multiple actors rather than being ultimately held by one person. Whereas in an autocracy a “fair” decision is simply made by fiat, issues of fairness are much more ambiguous in a democracy. An environment where free citizens must share both leadership and decision-making powers naturally requires a process of consensus on all kinds of policies. Over time, dependence on the court system and on a flourishing body of law develops. By providing extensive property protections, rule of law, and a culture of fairness that creates a universe of commonly accepted protocols, this very reliable environment is ideal for business initiative. Although not explicitly positioning income growth as an intervening cause, Evans (2009) echoes the view that a certain bureaucratic or institutional sophistication characteristic of democracy is required to facilitate the best health. As Gerring et al. (2005) demonstrate with their own findings, though, democratic nations – especially those with a long history of undisputed democracy – enjoy stronger income growth over time. Putting these arguments together, it is possible to argue that democracy facilitates the creation of stronger institutions, which improves health both directly and by facilitating income growth.

Key Challenges

At least five problems are evident in this literature. First is the issue of *missing data*. While discussing this problem Ross (2006) poses a key counterargument. In a majority of studies, he claims, the elimination of important cases from datasets has inflated the supposed impact of democracy on health. Comparative data are more often missing, he argues, among autocracies than among any other kind of regime. Because they are self-sufficient, these autocracies are less likely to appeal to the World Bank

and other funding bodies for help, which gives them little incentive to report their data to those entities. Until recently, the strong tendency has been to use only cases with complete data. In the process studies usually remove important counterexamples, i.e., self-sufficient autocratic regimes, which seriously undermines the conclusion that democracy improves population health. Supporting this view, Cereseto and Waitzkin (1986) show that the communist regimes of the era were actually doing quite well in terms of health after ruling out the positive impact of GDP. Many other authors have responded to Ross (2006), but most of them acknowledge the use of at least some list-wise deletion to eliminate points of missing data in their analyses. Very few results have been produced that are based on complete data. Even rarer is any thoroughgoing discussion of the different kinds of missing data in this literature, the mechanisms that describe why they are missing, and the rationales for specific choices of imputation strategies.

To complicate this issue, many scholars – including some responding to Ross’s (2006) argument – have used multiple control variables from multiple sources in effort to rule out spuriousness in the democracy-health link. Doing so naturally involves more missing data, however. As McKnight, McKnight, Sidani, and Figueredo (2007) note, imputing missing data becomes much more complicated when there are more variables to consider. Each variable will have its own mechanism of missingness and there can even be multiple mechanisms at play for the same variable. Moreover, because most data situations have missing data for the very variables that are used to impute the missing outcomes of interest, an iterative algorithm is often needed for imputing data based on other imputed values, which makes the results all the more difficult to interpret.

A second challenge has been the *absence of historical explanations*. Most studies have been cross-sectional and therefore examine only the contemporaneous effect of democracy on health. Many of these find only weak effects (e.g., Moon & Dixon, 1985), however. In terms of experience and stability over time, autocracies and democracies are not homogenous groups and other authors more recently highlight the importance of the overall experience of regimes. Some studies observe a much more reliable, positive correspondence with health when taking into account either how long a country has been democratic (Besley & Kudamatsu, 2006) or the accumulation of democracy scores over time (Gerring et al., 2012; Wigley & Akkoyunlu-Wigley, 2011). Lin et al. (2012) show how the positive effect of democracy on health appears much stronger when lagging the dependent variable by as much as a decade. This is to say that, in terms of health, democracy is a long-term investment and the shorter-term gains may be smaller.

There are many possible reasons why democracy should matter more when understood longitudinally. According to a number of authors (Persson & Tabellini, 2006; Keefer, 2007; Gerring et al., 2005; 2012), it may take time for a country to learn how to use democracy well. Voters must find ways to judge the performance of their leaders and the policies that they create, but those sorts of civic skills may not come automatically. Politicians, meanwhile, must learn to respond well to the wishes of their constituencies as they craft their policies and must then pass on this understanding to their successors. Well-defined roles of voter and elected leader strongly suggest an experience of reciprocal trust between those partaking in these roles. Indeed, new democracies should have a very different character compared to their more established counterparts. Due to an underdeveloped media network and less trustworthy elections infrastructures, new

democracies are inclined towards clientelism or favouritism towards people in positions of influence who can help change elections outcomes, making them more susceptible to corruption (Keefer, 2007).

Altogether, the knowledge and experience of long-standing democracies that contribute to efficient policies, good governance, informed voting decisions, a culture of civic participation, etc., must be created from scratch in a new democracy. According to the Accountability Hypothesis, the policies that are developed in democracies will have a stronger tendency to benefit health than they do in autocracies. Yet if democratic laws on average have a more positive impact on health or if they establish a greater number of health-promoting laws, then the improvement to health should be cumulative as the corpus of a democratic nation's policy grows. Also complementary to the Inequality Reduction Hypothesis, poor and marginalized groups may not know right away how to muster political clout, so time may be required for them to be successful in seeking amends. Either view suggests the positive effect of democracy on health is not immediate, but is instead cumulative over time. However, most studies in this literature have not carefully theorized how population health occurs in tandem with the evolution of a regime's decision-making experience and infrastructures.

A third challenge has been the *limited choice of data for measuring political regimes*. According to Munck and Verkuilen (2002), every dataset that assesses regime types has some problem or another of validity, reliability, and replicability. Moreover, the scales that arguably have the highest quality were recorded over only a limited time frame and are no longer current. Measures for democracy tend to correlate strongly with one another, which may have contributed to some complacency among many authors

in the choice of datasets. As Munck and Verkuilen point out, though, high correlations among datasets do not necessarily indicate construct validity of the measures in question. In technical terms, studies may mistakenly presume that convergent validity among measures should settle questions of their construct validity. Quite the contrary, though, the presence of high correlations among measures that are founded upon wildly different concepts (the Polity IV series and the Freedom House series being prominent examples), suggests an absence of discriminant validity, among other problems.

An apparent hesitation in this literature to formally conceptualize democracy before testing its potential impact on health has resulted in a fourth challenge: a tendency to use *measures of democracy that confound potential causes of health*. Ostensibly ‘democratic’ characteristics, such as rules and systems of accountability for a country’s chosen leaders, are not necessarily exclusive to democracies and may not be perfectly idealized by them. Moreover, while issues of construct validity are important, measures based on a more encompassing conceptualization of democracy reduce the leverage that an analyst has for testing intervening mechanisms. Patterns of accountability, institutionalization, or distribution of goods, freedoms, or services cannot be tested separately as factors that link political regimes to health if they are already included in the definition of democracy. An important task is therefore to formally consider what is democracy, or at least what is its most central feature, so that possible explanations for its impact on health can be tested.

Other conceptualizations (e.g., Arat, 1991) include personal freedom as a necessary component of democracy. A dilemma that extends as far back as Aristotle (1996 trans., Book VI), such conceptualizations presume that only in democracies can

citizens choose their leaders through elections, but in order to be a true democracy a nation's citizens must also be 'free.' Considering how even democracies demand laws that maintain a common decorum, though, laws that even apply to personal habits like alcohol and drug consumption, questions of which freedoms are the most 'democratic' involve an incalculable diversity of opinion. Any scheme that conceptualizes a democracy as a 'free' society will require substantial arbitrariness. Moore's (1966) analysis, furthermore, demonstrates how citizens living under monarchic rule can still enjoy generous privileges or even, paradoxically, subordinate a ruler. English and French monarchs of the Middle Ages, for instance, regulated little of their countrymen's social and economic life, which even put the French monarchy into a precarious position that culminated in revolution. Furthermore, Mill's (1978 / 1859) conception of the 'tyranny of the majority' illustrates how even democracies can oppress members of a voting minority. Rather, citizens ostensibly negotiate their distribution of freedoms by voting and the fact that they can do so at all (even if ineffectively) may be the most crucial component of democratic rule.

Relatedly, the tendency of many authors to prefer encompassing conceptions of political regimes over minimalist ones has contributed to a fifth challenge for this literature: the *paucity of studies testing potential mediators*. Few studies have compared the relative potency of the different explanations that link political regimes to health. Most studies include a measure of democracy in models and then control for any variety of alternative explanations. They often do so without having clarified the causal counterarguments so as to identify the specific threats that each of these alternative explanations poses. Upon reviewing their results, they then offer conclusions on

whether democracy promotes health. Few authors have tested competing explanations for just *how* democracy promotes health.

A final challenge, alongside problems stemming from the conceptualization of democracy, is the *introduction of confounders in the measurement of democracy*. Studies that presume a ‘level’ of democracy often fail to take into account the bimodal distribution of this kind of measure for political regime. Some authors (Gurr, 1974; Jagers & Gurr, 1995) discuss ‘regime coherence’ as variously referring to the institutional strength of a regime or the efficiency of its decision-making hierarchy and they measure it as a high Polity score in either a positive or a negative direction. Gurr (1974) finds that strong autocracies and strong democracies alike tend to survive longer than their weaker counterparts. If this measure has any bearing on health, a positive association between health and the ‘level’ of democracy may simply reflect a larger tendency for countries to be strongly democratic rather than strongly autocratic in the modern era and that the strength of a Polity score in either direction is what matters, not status as democratic. The concept of ‘democratic capital’ (Persson & Tabellini, 2006), which refers to the accumulated legacy of a country’s level of democracy and is measured as the aggregation of Polity scores across the years, naturally inherits this problem. Studies that defend the importance of ‘democratic capital’ for health also fail to distinguish its impact from the length of time a political regime has been in power, which is yet another potential confounder.

Analytical Strategy

Highlighted above are several problems of the literature as it stands now that pertains to the health implications of political regimes. Many of these stem from the

evident hesitation to conceptualize democracy and other political regime types, which has led to the likely intrusion of several confounders as well as the loss of opportunities to test the efficacy of specific explanations for why democracy might promote health. A millennia-old challenge, the task of conceptualizing democracy versus other kinds of regimes is quite necessary for this literature. This being the case, the purpose of Chapter 2 is to develop a suitable definition of democracy. The focus is not to arrive upon a universally acceptable definition, but instead to offer one that is both defensible and useful for this literature. The emphasis of this dissertation is not only to test whether democracy promotes health but also to examine why this may be so, i.e., the efficacy of specific mechanisms linking democracy to health. For our purposes, it would be a mistake to choose an exhaustive conceptualization if a more minimal model of democracy is also possible. After excluding putatively ‘democratic’ phenomena from the most minimalistic definition of democracy, those phenomena can then be included as separate variables in models alongside democracy and their potential to mediate the impact of democracy can be examined. In technical terms, the divergent validity of the concepts and measures for political regimes is prioritized in this study over content validity. The advantage to this approach is that in an analysis focused on mediating effects, any exclusion from the definition of democracy naturally becomes its own point of investigation.

Missing data and issues stemming from the strategies that prior research has chosen for handling this threat have been another key problem. To date, a majority of studies use at least some list-wise deletion to take out data rows with unexplained missing values. Few studies use an imputation strategy to address this issue and even fewer

give a thoroughgoing defense of whatever imputation strategies they do choose. This dissertation therefore emphasizes the choice of data that are as complete and encompassing as possible. The need for a statistically valid and representative test of the correspondence between political regimes and health is given logical priority over the need to rule out competing explanations. As explained above, the use of multiple control variables introduces that many more points of missing data and the complications that ensue increase exponentially with each new addition. Meanwhile there has been a lack of consensus as to which control variables pose the most threat as well as a lack of clarification about the causal processes that translate into true spuriousness for democracy. Given these difficulties, only a streamlined set of variables is used in this analysis. Doing so should provide a more credible first test that can serve as a benchmark for future studies that more assiduously examine competing explanations.

For most of the models presented in this dissertation (excepting only tests of the Inequality Reduction Hypothesis), in instances where data deletion is used a clear case is made that these data are missing at random and may be disregarded as such. Also discussed further below, a combination of World Bank and United Nations data is used to provide a nearly complete dataset. The remaining points of missing data are randomly imputed through a strategy of multiple imputation. Chapter 3 discusses in further detail the models used to impute these data. Multiple imputation allows the accuracy of point estimates for model coefficients as well as accurate standard errors (and thus, fair calculations for the statistical significance) of those estimates.

After providing the details in Chapter 3 of the data and methods chosen, this dissertation proceeds to the modeling of population health indicators. The first phase of

the analysis discussed in Chapter 4 is consistent with the current literature which most popularly uses scores from the Polity IV dataset (Marshall, Gurr, & Jaggers, 2011) to rank the ‘level’ of democracy in each nation and then test its potential impact on health. The purpose of Chapter 4 is to contribute a test of the health effects of democracy using complete data, but also to address abovementioned issues of confounding. It is argued that the strength of a polity as either autocratic or democratic may be just as important to health as the status of a nation as a democratic per se. It is also argued that many analyses of the supposed legacy of a nation as democratic (‘democratic capital:’ Persson & Tabellini, 2006; Gerring et al., 2012; Wigley & Akkoyunlu-Wigley, 2011) inherit this sort of problem and that the long-standing legacies of autocratic nations must also be considered. Finally, the length of time a regime has been in power may be still another confounder that must be controlled for in models. Accordingly, a measure of regime tenure is included as an additional control variable.

The next phase of the analysis, discussed in Chapter 5, uses an operational definition of democracy based on the minimalist interpretation (see Chapter 2) in lieu of the Polity scores. Rather than assessing the ‘level’ of democracy, subcomponents of the Polity metric are used to measure democracy as an indicator confirming whether legitimate elections determine a country’s leadership. The first set of tests compares the contemporaneous and the long-term historical impact of democratic status according to this streamlined conceptualization. To do so, the tenure of all regimes as well as democratic regimes in particular are included in models alongside an indicator that affirms democratic status as the presence of free and fair elections. Being annual accumulations, democratic tenure controlling for the tenure of all regimes is used to

test the argument that the value of democracy to health appreciates over time, particularly when the confounding effects of the experience and durability of all regimes (irrespective of democratic status) are removed. As an alternative test of historically minded arguments, this phase of the analysis also compares the unique impact of democracy among political regimes that are in different stages of maturity. Models show the relative impact of democracy among those regimes that are in their first year of transition from one kind of democracy to another compared to those that have existed for 1 to 10 years, 11 to 24 years, and 25 years or more.

Following next are several sets of models that test explanations for what in particular links democracy to population health. Executive constraints, competitive political participation, and national income are tested in separate models as potential mediators, the former two of which are possible to measure using the minimalistic interpretation of democracy. Due to the characteristic data situation for income inequality, which involves a much larger proportion of missing data, another set of models tests separately whether income inequality intervenes between democracy and health. In light of the Inequality Reduction Hypothesis, these models test the presumption that democracy curbs the damage that social inequality causes by giving under-benefitted individuals and groups at least some political clout.

To examine the reliability of any conclusions that are drawn, each phase of the analysis tests democracy against multiple measures of population health, namely, life expectancy, infant mortality, and crude mortality. With the exception of the models testing the impact of democracy on those factors that are found to intervene, all models lag the dependent variable by one year to help protect against endogeneity. Among

national income, executive constraints, competitive political participation, and income inequality any factor that appears to intervene in the correspondence between democracy and health is tested further in additional models, but as dependent variables. These additional models lag those factors by a decade and then test whether democratic status predicts growth in their values over this time frame.

As illustrated above, the strategy chosen for this dissertation improves upon the literature in several ways, although this point merits at least one important caveat. Results pertaining to life expectancy in particular perhaps deserve the most interest and attention, while rates of infant mortality and crude mortality are examined in large part to corroborate any patterns that appear with respect to life expectancy. However, as these are all one form or another of a death rate, chosen largely based on their availability in datasets, they are not necessarily superior measures of “health.” Other outcomes, such as morbidity rates, health-adjusted life expectancy, subjective well-being and even happiness may vary from country to country as well and they each fit under some conception or other of population health. To further corroborate the conclusions of this study, future research is encouraged that examines alternative measures of population health.

Research Hypotheses

Based on the research agenda outlined above, the following are taken to be the substantive research hypotheses of this dissertation:

- 1.a. Democracy, as measured by Polity scores, has a positive correspondence with health.
- 1.b. The Polity scores correspond positively with health controlling for the

absolute value of the Polity scores ('regime coherence'). Thus, the latter do not rule out the 'level' of democracy as spurious.

1.c. Cumulative Polity scores ('democratic capital') have a positive correspondence with health and fully explain the contemporaneous health impact of democracy.

1.d. Cumulative Polity scores retain a positive correspondence with health controlling for the length of time any given regime has been in power ('regime tenure') and for the legacy of all regimes irrespective of their status as autocratic or democratic (the absolute value of the cumulative Polity scores).

2a. Democratic status, a binary variable measured instead according to the Polity IV dataset's identification of countries that hold competitive elections, has a positive correspondence with health.

2b. The length of time a regime has been democratic ('democratic tenure,' a calculation similar to 'democratic capital' but using this revised measure for democracy) has a positive correspondence with health and fully explains the contemporaneous health impact of democracy.

2c. Democratic tenure has a positive correspondence with health controlling for the tenure of all regimes, democratic and autocratic.

2d. When comparing political regimes that are in different stages of their careers, a gradual appreciation in the positive health effects of democratic status exists.

3a. The presence of executive constraints mediates the impact of

democratic status on health.

- 3b. Competitive political participation also mediates the impact of democratic status on health.
- 3c. Any remaining, unique impact of executive constraints, competitive political participation, and/or democracy on health persists after controlling for democratic tenure and regime tenure.
- 3d. Per-capita GDP mediates the impact of democratic status and/or its political mediators (executive constraints and competitive political participation).
- 3e. Income inequality mediates the impact of democracy and/or democratic tenure on health.
- 3f. Democratic status positively and prospectively associates with these apparent mediators.

Chapter 2: Defining Democracy

In the literature that characterizes political regimes as a health determinant, surprisingly few authors make any thoroughgoing attempt to define democracy, a hesitancy that may have hampered research into its effects on human health and well-being. Democracy is a multidimensional phenomenon according to many authors, a political regime type that recurs over time across multiple contexts while manifesting some characteristic set of traits, depending on the definition. Yet if all of these traits are taken to be definitive of democracy, then those same factors cannot be tested separately as explanations for why democracy promotes health. If a nation somehow *must* keep leaders accountable to their actions or else fail to qualify as democratic, for example, then accountability can no longer be examined for its potential to explain the impact of political regimes on health because it is already included in the definition. Likewise, if some particular configuration for a society's institutions – a tendency for laws and policies to be shaped in a certain way, or a specific set of policies also characterize democracy by definition – then these cannot be discussed as intervening causes of health. There must naturally be some factors that connect democracy to health, but a conceptualization that is too encompassing will only allow tests of *whether* democracy impacts health (assuming the validity of the definition) and not *why* it does so. This is not to undermine its validity, but to say simply that a more minimalistic definition of political regimes is also a *useful* definition. Regardless, there is no consensus in the literature as to which is the superior conceptualization of democracy, so tests using the minimalistic definition will presumably be welcome.

Numerous datasets show a diversity of opinion about what comprises

democracy and autocracy. This may be because these are difficult to measure in the first place. Standard dictionary definitions refer to ideal-typical forms that presume foreknowledge about each country. The Webster's New Collegiate Dictionary (1977), for instance, defines democracy as "a government in which the supreme power is vested in the people and exercised by them directly or indirectly through a system of representation usu[ally] involving periodically held free elections." Yet to vote in an election cannot plausibly be to exercise *supreme* power over a government's decisions. The abovementioned dictionary defines autocracy, in contrast, as "a government in which one person possesses unlimited power." Yet neither can such a person possess 'unlimited' power so long as there is any threat of his or her removal from office via coup d'état, insurrection, etc.

Nevertheless, any coherent argument about whether and how political democracy impacts health should ideally begin with a conceptualization of democracy. Such a conceptualization should have a few desirable characteristics. First, as a cause of strong or poor health, political regimes should be conceptually distinct from likely mediators and confounders. For instance, suppose one were to argue that any 'true' democracy must include the creation of a stronger health care system. This kind of definition would be too encompassing: democracy is a type of political regime, while a health care system comprises a universe of public policies that all political regimes have the burden of deciding. Using the presence of a universal and/or efficient health care system in any measure of democracy would conflate these two. Arguably, though, this kind of problem affects many existing conceptualizations of democracy.

Second, a good conceptualization of political democracy would ensure that

democracies and autocracies are mutually exclusive. That is to say, there is something *putatively democratic* about some nations – a custom, institutional protocol, contractual obligation, and the like that one cannot identify as anything other than democratic. While there may be merit to measures of the ‘level’ of democracy, a set of mutually exclusive categories might at least provide a more intuitive measure of political regime. Nevertheless, to articulate the limiting conditions of democracy can be challenging. Moore’s (1966) analysis depicts France and England as two cases in point. Whereas in England the move toward democracy involved the slow siphoning off of regal powers across centuries, which even involved the formal execution of King Charles II by his own Parliament, in France the change to democracy was quite abrupt, resulting from the French revolution. Yet even for France, Barrington-Moore explains, the culprit was an embarrassing distribution of privilege heavily favouring the upper class, a problem King Louis XVI had great trouble avoiding, which fomented revolution rather than the use of overt oppression to maintain power. Arguably, what made these countries ‘autocratic’ were the means through which these Kings came to power. If the use of elections to decide a country’s leadership is at least a necessary condition for democracy to exist (presuming all democracies serving large populations must be representative in order to run efficiently), then it would make sense to assess the status of the world’s regimes according to whether there are free and fair elections.

A measurement strategy that defines regimes based on elections is much more challenging than one might expect. As Alvarez, Cheibub, Limongi, and Przeworski (1996) discuss, closet autocracies often hold rigged elections, misreport or miscount votes, intimidate voters into supporting a particular party or candidate and the like in

order to hold power while avoiding the gaze of the international community. Diverse idiographic literatures would be required to assess the fairness with which a country's political regime has come to power, much more so for all of the world's countries together. Yet even those scholars who undertake this effort rely on imperfect information. One study (Simpser & Donno, 2012) indicates that the use of international observers to guarantee free and fair elections can harm the quality of the winning party's governance, for example, when they respond by carrying manipulative tactics into other arenas like the judicial system. Gonzalez-Ocantos, Kiewiet de Jonge, Meléndez, Osorio, and Nickerson (2011) also assert that the prevalence of the use of bribes to influence elections outcomes is much higher than the literature has presumed. Yet even bribed voters are still making a conscious and free choice when they vote in favour of a particular candidate, which suggests substantial philosophical dilemmas in defining what is 'fair.'

Given the necessity of intricate and competing logistics, the political science literature has developed a whole literature area around the very definition of political regimes and has contrived competing measures of democracy in kind. Since the focus of this dissertation is primarily on the health effects of democracy, a key goal is that the chosen conceptualization of democracy should accord with existing measures. Datasets vary widely, however, and none are regarded as the universal authority on deciding the nature of the world's regimes (Munck & Verkuilen, 2002), which is to say that even the choice of a regime change dataset requires a thoughtful decision.

The objective of this chapter is to offer a reasonable conceptualization of democracy and then configure a measurement strategy for a country's political regime as a determinant of population health that accords with this conceptualization. Attempts

are made to reach a set of criteria that provide the necessary and sufficient condition(s) for a democracy to exist. This attempt to build a foundation for a conceptually valid measure of democracy addresses some of the concerns of Munck and Verkuilen (2002). In their insightful discussion of current opportunities in the social science literature for measuring democracy, they find that these measures in their aggregate form tend to show high correlations. They note, however, that this is an indication of reliability among the measures, *not* necessarily their validity: the scholarship may very well share a conspiracy of biases that remove its measures from an accurate depiction of democracy. Moreover, while the aggregate measures may correlate highly, their subcomponents do not necessarily. As an illustration, Munck and Verkuilen compare a selection of popular measures for democracy and find that when disaggregated they load onto different dimensions during principal components analysis. This is to say that the subcomponents used to construct measures for democracy may tap into different phenomena. On the other hand, if only some of those subcomponents are needed to support a minimalistic operational definition of democracy, this would free up the other subcomponents for analysis, making them testable (for instance) as potential mediators.

Practical usefulness is another important virtue. A conceptualization that cannot be operationalized to fit real data will not be as helpful, which places still more tension on the desire to provide an all-encompassing framework. Understandably, many thoroughgoing studies of democracy (e.g., Hadenius, 1992) include convenience to research as a key criterion. On points of disagreement that are otherwise unresolvable within the scope of this project, preference is accorded to conceptions of democracy that support empirical tests of its impact on population health. Still, there is no harm in

attempting to answer the question of what is a democracy. The above discussion suggests that this question is not asked often enough, and addressing it requires consideration of what are the necessary and sufficient conditions for ‘democracy’ to exist.

Democracy As Social Structure

Is democracy a particular kind of social structure or a particular kind of social process? Perhaps it is both. Focused on social practices, Anthony Giddens (1986) is a strong proponent of an action-oriented conception of social structure. In his framework, the people whom a social structure comprises are powerful actors who are able to use their statuses and relationships with others as ‘resources’ for making their own decisions. People respond to the rules and customs of their society by either adhering to them or deciding otherwise, decisions that continually recreate the very structure to which they belong. There is also a ‘duality of structure’ in that social circumstances themselves are born from the decisions of individuals: those *social* circumstances are one and the same with the individual agency that brings them into being.

On the other hand, methodological individualism may be a key pitfall of many important conceptualizations of social structure (Hodgson, 1986). The above view from Giddens (1986), which emphasizes the ‘duality of structure,’ may conflate individual agency with macro-social forces and pressures that supersede personal motives. Other views suggest that contextual variables hold logical priority over individual-level variables. Bhaskar (1998) sympathizes with the argument that individual-level behaviour to some extent defines the social structure, but both he and Archer (1998a; 1998b) contend that the decisions of individuals and the social histories, circumstances, and pressures that bring them about have a time-ordered relationship. Social circumstance

and reactions to social circumstance are thus analytically separable, despite both being characteristic of the social world and both being outcomes of the (collective) decisions of individuals. Because histories, circumstances, and pressures occur prior to the individual-level decisions in question, it is then possible to argue that they *cause* people to behave in some way.

According to Porpora (1998), what is missing in Giddens's theory is the set of power balances residing within the intricate set of relationships that a society comprises. The authority of a jury, the legal knowledge of a prosecutor, and the baton of a police officer are all resources that they can use, but these same 'resources' express themselves quite differently to those who have broken the law. Giddens thus seems to confuse people as being perfectly autonomous agents; they and their actions are isolated from each other and dependent solely on rational choice, rather than being lodged within an intricate set of power relations. Martin (2009) in turn brings interpersonal relationships into focus in his own conception of social structure. Much like how two hydrogen atoms can combine with an oxygen atom and thereby strike the senses in a very different way as a collective whole, so do relationships among actors coalesce and 'crystalize' over time. Social statuses and roles undergird those relationships by putting in place an elaborate set of expectations that people have of each other.

Despite the differences among these perspectives, they all point to a single location where democracy is expressed, practiced, justified, and arguably carried out: the ballot box. Extending back to ancient Greece, any social organization worth considering as democratic has fitted some significant proportion of its citizenry with the right to vote. What that vote should mean, and to whom, are subjects of debate as far as determining

the limiting conditions for a democracy. Nevertheless, it is possible that discussions of what makes a democracy flow from this one fundamental right.

To hinge notions of democracy on the presence of regular elections is concordant with each of the abovementioned conceptions of ‘social structure.’ Voter and public official have regularized and reciprocal roles that are subject to pre-existing rules, norms, and histories. Each party has decision-making power in those relationships. They can creatively use any of the diverse rules that define their relationship to each other so as to exercise those powers. Each party has the ability to constrain the choices of the other, one by voting for alternative candidates and the other by motivating or enforcing legislation. Voters and public officials alike can cease to participate in their pre-defined roles at any time. Yet for the most part no one individual from either group is able to change the relationship as a whole very much. In this sense, arguably, the complex relationship between voters and public officials coalesces to form what one may call a stable, characteristically *democratic* social structure.

Focusing solely on voting and elections may lead to a limited conception of democracy. As Singer (1973) points out, representatives may act on their own accord once in office. Even the more innocent representatives must answer to a plurality of competing and sometimes contradictory wishes among their constituencies. Nor are individual voters necessarily well informed about the plethora of issues that undergird their vote. Some may vote for surprisingly superficial reasons and some may otherwise know little about their candidates. All of this is to say that voting does not necessarily give individual citizens control over their circumstances. Moreover, elections in even recognized and reputable democracies are not always fair, for instance, where some

groups are deprived from the right to vote or where corporations are able to influence policy development by donating to the campaign funds of candidates. Nevertheless, in democracies the *relationship* between citizens and their rulers have a particular kind of pattern, one created by the presence of regular elections and the necessity to anticipate and respond to the outcomes of those elections. There is thus at least *prima facie* validity to basing any measure of democracy on its custom of recruiting leaders through elections.

On the other hand, not all legitimate democracies are equal. The United States, for instance, has only two dominant political parties that compete vigorously for a minority set of ‘swing voters.’ This problem is further complicated by the system of the Electoral College, which discounts dissenting, minority votes in each state while deciding among candidates for President. There is an ostensible problem of ‘gerrymandering’ in which the perimeters of electoral districts are decided arbitrarily so as to favour a particular party. Plausibly, democracy occurs on a continuum or can at least be measured as such. Nevertheless, the case can still be made that a nation is ‘democratic’ when it has a system of elections that is free, fair, and competitive, whereas those lacking such a system cannot be considered democratic. In any regard, this simple and intuitive conceptualization should lend itself easily to causal arguments about democracy and health and to quantitative tests of those arguments.

Despite the difficulties in using elections to assess a country’s status as democratic, this strategy is quite possible. To contrive their scale, Alvarez et al. (1996) are able to rule out sham democracies by borrowing criteria from Przeworski (1991). He proposes three rules: *ex ante uncertainty*, *ex post irreversibility*, and *repeatability*. These mean, respectively, that in democracies the outcomes of elections should be

demonstrably uncertain before they occur, that those who win are then duly allowed to take office, and that those taking office cannot extend their terms except by competing again in legitimate elections. Importantly, the rule of *ex ante uncertainty* entails that elections be competitive, with more than one party vying for seats, more than one candidate for key positions, and all in the absence of significant intimidation to voters preferring an opposing party. Obviously, a democracy should also rule out the possibility of a coup d'état when an opposing party wins as well as the discontinuation of free and fair elections. The scale by Alvarez et al. only extends through the year 1990, however other scales also assess the fairness of elections, such as the one used in this dissertation.

Measurement of Political Regimes

The Polity IV dataset includes a means of deciding which countries choose their leaders through free and fair elections. Specifically, the highest levels encoded for the component variables representing the 'regulation of executive recruitment' (*XRREG*), the 'competitiveness of executive recruitment' (*XRCOMP*), and the 'openness of executive recruitment' (*XROPEN*) together identify those regimes that hold competitive elections in the Polity IV dataset. As their names suggest, these variables determine whether a regime uses some sort of regularized process to determine its leadership, whether some relevant group of people (e.g., presidential candidates or representatives of political parties) have equal opportunity to access a leadership position, and whether all members of a polity can at least in principal achieve this position through some regularized process.

Most scholars use this dataset to measure the 'level' of democracy possessed by each country. However, some of the items used to create this measure reflect putatively democratic values but have less to do directly with elections. Aside from offering a

simple category for political regime, defining democracy strictly based on elections thus allows an additional key advantage: it frees up the other subcomponents of the Polity scores to be tested as potential mediators. In particular, the Polity variable ‘executive constraints’ (*XCONST*) assesses the degree to which the decision-making privileges of a country’s leaders are limited, while ‘competitive political participation’ (*PARCOMP*) is the degree to which individuals and groups can compete for political influence and express alternative preferences for policies and leadership. Both should plausibly be part of a more encompassing conceptualization of democracy, but if decision-making latitude of leaders and the freedom of competing actors to participate in the public arena both vary from country to country and if they are more (though not entirely or exclusively) characteristic of elections-based systems of governance, then they could explain why those systems might promote gains in life expectancy.

As the Accountability Hypothesis argues, installing policies that compromise population health in any way could lead to public embarrassment, which in turn would cause leaders to lose their bid for re-election. Nevertheless, like the Accountability Hypothesis the variable for executive constraints implies the strong motivation among leaders to follow decorum and protocol. Decision-making constraints are not unique to democracies but are more likely to occur and to be stronger for them. Although executive constraints also imply some substantial institutional infrastructure, they do not refer to the overall institutional and social environment of a society. Competitive political participation, on the other hand, refers more clearly to the public arena in which disagreements may be arbitrated, critiques may be shared about policy preferences, organizations formed to compete for the purchase of public opinions, and in a freer

marketplace, the accompanying necessity for rule of law, protection of property, etc. Referring to this variable as a measure of ‘public deliberation’ while making arguments similar to Gerring et al. (2005), Chandra and Rudra (in press) argue that competitive political participation reflects the very institutional environment that accelerates income growth for some nations. All of this being the case, in the analysis below executive constraints are presumed to be the variable that tests the Accountability Hypothesis, while competitive political participation is presumed to test the Institutional Strength Hypothesis. The latter view can be used to presume that the strength of a regime’s institutional infrastructure could impact health directly, but could also influence health by encouraging the growth of national income levels.

Policies, laws, and perhaps even constitutions define the set of constraints placed on the decision latitude of leaders in many countries. Decision-making constraints also conceivably apply to those who provide leadership on everyday decorum in the public sphere, such as corporate chiefs, law enforcement officers, and medical doctors. However, those active in public institutions are a much larger group than elected officials, their actions impact fewer people, and they are no more powerful. This is to say that the ability of a society’s leaders, or the absence of that ability, to restrict the public expression and activity of a country’s citizens is the logical precursor to whether those citizens take advantage of any such freedom. The analysis presented in Chapter 5 therefore presumes executive constraints to be logically prior to competitive political participation and statistical tests are arranged accordingly.

Chapter 3: Data and Methods

The Polity IV dataset is regarded in this analysis as the primary authority to decide which countries existed at what time as well as the type of political regime that has governed each. Annual time-series data were taken for the years 1960 through 2010 so as to determine the status of each regime as either democratic or non-democratic during each year or (alternatively) its 'level' of democracy. Many countries did not change their regime status during the whole time of their existence. The dataset is arranged so that any given observation represents a country during a particular year, which makes 'country-years' the unit of analysis and political regimes are able to vary among them. Duplicate rows were removed for Ethiopia and Yugoslavia for the years 1993 and 1991, respectively. A row was removed for North Vietnam for the year 1976 because there was an identical row for the country of Vietnam during that year. The country of Serbia and Montenegro (2003 – 2006) is treated as continuous with Yugoslavia (1921 - 2002). Whereas this country's change in name occurred in 2003, its borders did not change at that particular time and a presumed transition to democracy occurred earlier, in the year 2000. Data for Taiwan were removed because it is not clearly a nation independent from Mainland China. Analyses exclude the new country of South Sudan, which only came into being in 2011.

National vital statistics and gross domestic product (GDP) are available from World Bank Indicators for the whole of 1960 through 2010 and were appended in time-series to the Polity IV data. To represent health outcomes in Yugoslavia for the years of 1995 through 2006, World Bank data for the two countries of Montenegro and Serbia were combined into a single record for each year in this time frame by applying

weights for population sizes. World Bank data representing the Czech Republic and the Slovak Republic were combined in the same fashion to represent Czechoslovakia in 1992. Due to a discrepancy between datasets as to when the United Soviet Socialist Republic (USSR) became defunct, World Bank data for the Russian Federation were presumed to represent this country in 1991.

These data were missing among several countries for some years and for a few countries entirely. As further described below, United Nations data were therefore used to supplement the World Bank data, which allowed the creation of a nearly complete dataset. Where discrepancies exist between these two sources, World Bank data are assumed to be correct. For those cases and occasions where World Bank data are missing but United Nations data are available, the latter are taken to be fact. This is because missing data from the World Bank disproportionately applied to regimes that were autocratic and/or ostensibly successful; any process involving error correction to resolve discrepancies between these datasets may have weakened the strength of autocratic regimes as counterexamples to the view that democracy positively impacts health. Exploratory analysis indicated that these decisions did not bias the results of this study. These decisions thus far resulted in a total of 7,363 country-year rows representing 169 nations.

An additional criterion for inclusion in the dataset was the necessity of a valid Polity score (or equivalently, valid scores from the subcomponents measures from which the Polity scores were created) to determine the type of political regime. The Polity IV dataset accords a small proportion of country-years with non-regime status and their exclusion from analysis is justified in the next section regarding missing data. This

change resulted in a further reduction of the dataset by 314 country-years, which leaves a total of 7,049 for 168 nations. Summary statistics for these data are displayed in Table 1.

National Vital Statistics and the Political Economy

The World Bank Indicators were regarded as the primary authoritative data on the three measures of population health used in this study: *life expectancy*, *infant mortality rates*, and *crude death rates*. Life expectancy was negatively skewed, but the calculation for skewness ($\lambda = -0.27$) suggested the problem was relatively tractable within a linear modeling context and as such no adjustment was made to this variable. A modeling framework is chosen to accommodate right-skewness in the other two measures of population health. The World Bank Indicators were also regarded as the primary authoritative data on *per-capita gross domestic product (GDP)* at current U.S. exchange rates. To remove potential confounding with yearly trend and inflation, per-capita GDP was expressed in 2010 dollars by dividing values by the mean for that year. Values for per-capita GDP were analytically intractable due to very heavy positive skewness and were therefore transformed using the natural log. Some models test separately the potential impact of political variables on growth in national income. For these analyses, *income growth* is calculated as each country's percentage increase in (anti-logged) per-capita GDP after the elapse of ten years while adjusting for inflation. Percentage growth was then logged. Although not used in the models presented, crude birth rates were also collected so as to facilitate the data imputation process, which is discussed further below.

World Bank data were missing for a number of regimes both past and present. Among the most notable were North Korea and Myanmar (Burma), for which GDP is unavailable for the entire range of years. World Bank data were missing entirely for

nine defunct countries, namely, Czechoslovakia, East and West Germany, the USSR, North and South Vietnam, North and South Yemen, and Yugoslavia. To address Ross's (2006) concerns that the use of list-wise deletion to resolve missingness in data has caused scholars to reach biased conclusions in this literature, it was necessary to compile as complete a dataset as possible. Data from the United Nations were therefore used to supplement the World Bank data and provide known values for at least some years for each regime. Infant mortality rates and crude mortality rates were collected from the 1997 historical supplement to the United Nations Demographic Yearbook. GDP was collected for the years 1970 through 2010 from the National Accounts Main Aggregates Database. Amongst these sources, data for Vietnam and Yemen were only available in aggregate form, without distinguishing their northern and southern constituents. However, with the exception of the period of occupation in South Vietnam during the Vietnam War (1965 - 1972), only autocratic regimes have governed these countries, making the comparison between them largely moot for the purposes of this dissertation. Data rows were therefore removed for South Vietnam and South Yemen and the results of this study are understood as encompassing all of Vietnam and Yemen. GDP was only available in aggregate form for all of Germany. As Sleifer (2006) notes, "During the separation of the two parts of Germany from 1950 to 1989 GDP per capita in East Germany was constant at approximately 56 percent of the West German level" (p. 52). West and East German per-capita income values were therefore weighted by the respective population sizes (drawn from the Demographic Yearbook) so as to reflect Sleifer's claim.

To test the Inequality Reduction Hypothesis, values for *Gini coefficient* based on net incomes are taken from the Standardized World Inequality Database (Solt, 2009).

Income inequality is a key variable for much comparative research, but the World Bank Indicators report these data only very sparsely. Many datasets share the problem of sparseness in these data as well as a great many competing variables for socioeconomic inequality. Solt, however, carefully compiled his dataset using multiple data sources and a meticulous imputation strategy, which makes it among the most trustworthy and comprehensive datasets available on income inequality. Nonetheless, almost half of these data are missing, a problem that disproportionately affects autocracies. Any analysis using these data are therefore suspect, no matter which solution is used, so the Income Inequality Hypothesis is tested separately using net Gini as a potential mediator. Caution is encouraged with regards to these results especially.

Political Variables

As discussed above, the analysis for this dissertation occurs in two phases. In the first phase (Chapter 4), *Polity scores* are used to distinguish autocracies from democracies on a continuous scale. Based on the notion that democracy occurs in levels rather than being just a simple dichotomy from autocracy, these scores range between -10 to represent complete autocracy and +10 to represent complete democracy. The Polity scores are based on a handful of subcomponent variables, each of which speaks to some characteristic that the authors of this dataset use to distinguish democracy from autocracy. Competitiveness of Executive Recruitment (*XRCOMP*) is a subcomponent measure that compares regimes in which leaders gain power through elections (irrespective of whether votes are available generally or to an elite group) as opposed to hereditary succession or other, putatively less democratic mechanisms. Openness of Executive Recruitment (*XROPEN*) is the degree to which any citizen can ‘in principle’

vie for an executive leadership position through some sort of regularized process. Executive Constraints (*XCONST*) refer to the extent to which leaders must follow accepted protocols for making decisions as opposed to being able to enforce their decisions through fiat. Regulation of Participation (*PARREG*) and Competitiveness of Participation (*PARCOMP*) both indicate the degree to which non-elites can influence the decisions of elites within the realm of policy and beyond, either by providing institutional frameworks that support civil debate or by affirming that political groups exist that compete for influence over policy. Only the latter applies to the entire spectrum from complete autocracy to complete democracy. Admittedly, the Polity series uses a complex and rather unintuitive procedure to code the Polity scores based on these variables. It is therefore perhaps difficult to say what *exactly* the Polity scores assess as Gleditsch and Ward's (1997) study shows, except that it measures the level of democracy. Nevertheless, the Polity scores have wide use in this literature and therefore merit attention in this analysis.

Following Gerring et al. (2012; 2005) and based on a construct from Persson and Tabellini (2006), 'democratic capital' was calculated as each country's total accumulation of Polity scores since the year 1900. Because the word 'capital' may apply to autocracies in this way as well but could on its own be confused with economic phenomena, the models discussed below refer simply to *cumulative Polity scores* rather than 'democratic capital'. To calculate yearly values for this variable, a depreciation rate of 1% was applied to the prior accumulation of scores for each row of data and the resulting value was added to the current country-year's Polity score. In the case of the United States, an example of a well-established, fully democratic nation according to

these data, values for this variable start at 10 for the year 1900, then $10 + 0.99 \cdot 10 = 19.9$ for the year 1901, then $10 + 0.99 \cdot 19.9 = 29.701$ for the year 1902, etc. A country that has been strongly autocratic for a long time has a large, negative value for the cumulative Polity score at any given juncture, while long-standing, well-established democracies have a large positive value. Newer countries, countries that have spent a long while switching between autocracy and democracy, and countries having weak scores in either direction have cumulative Polity scores that are closer to zero.

Also mentioned above, this analysis in Chapter 4 identifies and controls for three possible confounders that could show the above variables to be spurious. First among these is the construct of ‘regime coherence.’ Gurr (1974) describes regime coherence as the degree to which a nation is *either* highly autocratic *or* highly democratic according to their Polity scores. This contrasts with ‘mixed’ or ‘anocratic’ regime types that have characteristics of both autocratic and democratic regimes or that have little resemblance to either. Discussed further in Chapter 4, regime coherence is operationalized and discussed as the *absolute value of the Polity scores* so as to identify countries that are either highly democratic or highly autocratic and this variable is controlled for in models. If regime coherence has its own bearing on health independently of democratic status, the construct of ‘democratic capital’ may also be spurious because it is derived from raw Polity scores. Additional models therefore include the *absolute value of the cumulative Polity score* so as to emphasize a country’s overall legacy as either strongly autocratic or strongly democratic (conceptually: ‘capital’ irrespective of whether it is ‘autocratic capital’ or ‘democratic capital’). As yet another possible confounder of the health effects of cumulative Polity scores, also included is the total length of time a regime has been

in power. To measure *regime tenure* as the length of time a regime has existed and also operationalize it so as to be comparable to the cumulative versions of the Polity score, the variable *DURABLE* was taken from the Polity IV dataset and a 1% annual depreciation rate was applied.¹ In the case of Afghanistan, missing values for this variable were imputed by presuming the regime ruling this country took power in 1800 and continued to rule through the year 1963, after which recorded values for *DURABLE* indicate a regime change occurred.

In the next phase of analysis, presented in Chapter 5, an alternative specification for democracy is used that avoids the above threats of confounding. The original Polity IV score is broken down into component elements to distinguish *electoral* democracy from possible intervening mechanisms. *Democracy* is coded as any country that the Polity IV dataset identifies as holding free, fair, and competitive elections, namely, by coding scores of 3, 3, and 4 (respectively) for the Polity IV variables *XRREG*, *XRCOMP*, and *XROPEN*. Doing so frees up two Polity IV component measures that can be tested separately as potential mediators of the health impact of democracy. *Competitive political participation* is taken from the Polity IV variable *PARCOMP* to characterize the degree to which political parties and non-governmental groups together can compete for political influence. The authors of this dataset explain that this variable “refers to the extent to which alternative preferences for policy and leadership can be pursued in the political

¹ Apparently a depreciation rate of 4% contributes the most explanation to these models, but using this rate would depart from the literature’s current approaches (e.g., Gerring et al., 2012).

arena” (Marshall et al., 2011, p. 26). Minimal values for this variable represent an absence of organized civil interaction in the political sphere, whereas increasing values indicate a higher “degree to which ... political participation is free from government control” (p. 71). *PARCOMP* therefore reflects the freedom of citizens to exert influence over public opinion, but it also suggests the growth of institutions independently of government regulation, including but not limited to political parties.

The Polity IV variable *XCONST* is used to characterize the presence and degree of *executive constraints*, namely, limitations to the decision-making powers of a country’s ruling officials. As the authors of this dataset (Marshall et al., 2011, p. 24) explain,

Operationally, this variable refers to the extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities. Such limitations may be imposed by any “accountability groups.” In Western democracies these are usually legislatures. Other kinds of accountability groups are the ruling party in a one-party state; councils of nobles or powerful advisors in monarchies; the military in coup-prone polities; and in many states a strong, independent judiciary. The concern is therefore with the checks and balances between the various parts of the decision-making process.

Thus, although in democracies *XCONST* refers to the presence of coded checks and balances that constrain the decision latitude of presidents and prime ministers (for instance), but there can still be comparable constraints in autocracies via powerful bodies of advisors and ruling political parties who carry substantial influence over a country’s political agenda.

Because the operational definition of political regime changes in this phase of the analysis from the ‘level’ of democracy to confirmation as either democratic or not, then the length of time regimes have stayed in power must also change. Contrasting with the above, these analyses instead measure *regime tenure* as the length of time regimes been either autocratic or democratic without transitioning between the two. For those that change over from one to another, regime tenure reflects the first year of rule and grows over the years from that point onward. As a measure comparable to ‘democratic capital’ that still relates to the legacy of democratic regimes based on this new operational definition, *democratic tenure* is similarly assessed as the accumulation of years reflecting democratic status but is kept at zero for autocratic regimes. Both measures of regime tenure are adjusted with a 1% annual depreciation rate.

Descriptive Statistics

Table 1 displays summary statistics for the variables used in this dissertation. Means and standard deviations for these are reflected separately for the year 1960, the year 2010, and all of the years throughout this range taken together. A mean of -0.78 on the Polity scale in 1960 rises to 3.92 in 2010 and averages 0.39 for all years together, which indicates a general shift toward higher levels of democracy during this time frame. There is still large variation in the scores, though, with an expected difference of around 7.59 between any given two observations. A modest decrease in the absolute value of average Polity scores from 1960 through 2010 suggests a slight weakening of ‘regime coherence’ or strength over time. For a variable ranging between -10 and +10 in integers that accords with the uniform distribution, the mean for the absolute value of this score would be 5.23. A higher mean of 7.18 throughout the study period for the absolute

value of the Polity score suggests there are fewer 'mixed' or anocratic regime types and that relatively more regimes were either strongly democratic or strongly autocratic. Exploratory analysis using scattergrams (not shown) confirmed that the raw Polity scores have a bimodal distribution.

Cumulative Polity scores switched from negative (-1.45) in 1960 to positive (37.43) in 2010, suggesting a transition among the world's nations from having a predominantly autocratic history to having one that is predominantly democratic. An increase in the absolute values for the cumulative Polity scores from 144 in 1960 to 216 in 2010 suggests that more polities stayed either autocratic or democratic than those that switched between the two. Very large standard deviations for these two variables, roughly equal to the means, suggest large variation in the historical legacy of the different regime types. Generally, the era from 1960 through the early 21st century witnessed many shifts in the political arrangements of the world's societies and these shifts continue today.

Contrasting with the Polity scores as the measure for 'level' of democracy, Table 1 also shows the averages for the variable that represents 'democratic status.' As described above, this variable operationalizes democracy according to whether a country holds elections that are free, fair, and competitive to choose its leaders. As averages for a binary variable, mean averages represent the proportion of countries that are democratic according to this streamlined conceptualization. In 1960, 41% of the world's nations were democratic. Just over 50% of the nations were democratic in 2010. What may seem to contradict these figures on first appearance, throughout the entire time frame from 1960 through 2010 an average of 38% of the countries were democratic. Many new

autocracies came into being from the 1960s through the 1980s, however. A shift toward democracy occurred around the time of the fall of European communism in 1990 and then resumed during the 2000s, leaving a majority of countries democratic in 2010.

Executive constraints increase from 3.77 in 1960 to 5.04 in 2010 with an overall average of 4.03, while competitive political participation increases from 2.49 to 3.42 with an overall average of 2.73. The variable for executive constraints is an ordinal variable ranging between 1 and 7 and this partly explains why its mean and standard deviation are slightly larger than those of competitive political participation, values for which range between 0 and 5. Since these variables are separated both analytically and conceptually from democracy, however, the shifts toward greater executive constraints and greater competitive political participation may apply to autocracies as well as democracies.

Average regime tenure increased from a value of 13.30 in 1960 to 22.04 in 2010. Unlike the United States and other long-established and successful countries, most political regimes appear to be quite young. Estimates that instead use the Polity IV variable *DURABLE*, which is this dataset's calculation for the length of time political regimes have been in power, indicate that the length of rule of the world's most typical regimes shifted from 17.2 in 1960 to 28.7 in 2010. This difference is much smaller than the full range of 50 years. While some regimes retained some stability, many countries continue to endure substantial changes in their style of leadership.

The Gini coefficient, which changed from 40.50 in 1960 to 37.20 in 2010 with an intervening average of 39.03, suggests relative stability in the level of income inequality if not a slight decrease overall throughout the 50 years. A constant average of 8.35 in per-capita GDP simply reflects the fact that values for this variable were adjusted for

inflation and all values are in 2010 dollar amounts. This approach maximizes the comparability of democracies to autocracies by completely removing the confounding influence of inflation along with all other trends in worldwide income levels. In 2010 dollars and using the antilog for this value, average worldwide income was estimated to be \$4,235.

Trends in national vital statistics clearly show a worldwide improvement in health over the last half-century. According to Table 1, life expectancy improved from 52.9 years in 1960 to 68.7 years in 2010, an increase by more than a decade and a half. A standard deviation of about a decade indicates there is substantial worldwide variation in this outcome. Similarly, infant mortality rates fell gradually from 98.9 per 1,000 live births in 1960 to 30.1 in 2010, while crude death rates fell gradually from 16.5 per 1,000 people to 8.7. One important question, which this dissertation addresses, is whether and how the global transition to democracy contributed to these changes.

Descriptive statistics for income growth indicate that the typical country experienced a large rate of growth during the 1960s, but growth was flat in the early 21st century. While worldwide growth in income may have been steadily positive, it appears to have stalled during the recent recession, which arguably originated with the housing crisis in the United States during the mid-1990s. Overall average growth for the last half-century was modest at about 3.9%. This figure is different from zero. As the measure for growth is still based on the measurement of income in 2010 dollars to rule out annual inflation, this may suggest some volatility in year-over-year growth.

Worldwide averages for the putatively democratic characteristics of executive constraints and competitive political participation declined during the 1960s but

increased from that time through the start of the 21st century. Again it is worth noting that, interpreted here instead as possible mediators, these traits may apply to autocratic regimes as well. Table 1 thus does not identify whether and to what degree democratic regimes in particular were successful in adhering to these ideals. This issue is explored further below in the section pertaining to analyses and models that more thoroughly examine how the world's regimes evolved throughout the study period.

Missing Data and Data Imputation

Emphasizing a complete-data approach, this section next discusses the missing data in detail, first by explaining the justification for any exclusions and then the decisions taken to handle missing values that remain after supplementation with alternative data sources. Not all political regimes for all countries could be included, but the exclusion of some countries is interpreted as non-threatening to the findings of this study. Of those nations present in the World Bank data but not in Polity IV, the majority were confirmed to be territories and protectorates of another country (e.g., Guam and Hong Kong) or are smaller nations that were excluded from the Polity IV dataset because they did not reach a population size of 500,000 people. The singular exception to this latter rule was Luxembourg,² which passed the population threshold only in 2010 according to the World Bank Indicators. Meanwhile only the Polity IV data contained entries for Taiwan, which is not clearly a nation independent from Mainland China and was therefore removed.

² The Polity series has more recently acknowledged Luxembourg and now has complete records for this country.

There are other regimes to which the Polity IV dataset does not give a Polity score and does not confer values for any of the component measures from which the Polity score is derived, even though the host countries meet the population threshold. For these observations, neither ‘level’ of democracy nor status as electoral democracy can be affirmed. The Polity scores and all subcomponent measures that are used to create them are instead coded with values of -66, -77, and -88. Respectively, these values refer to nations occupied by a foreign power (e.g., Iraq and Afghanistan in recent years); nations lacking an undisputed centralized government, undergoing a civil war, or otherwise enduring an era in which power relations are unfolding to determine what is to be forthcoming regime (e.g., Somalia from 1991 through the present day); and nations undergoing a time of transition to a new regime type, a time during which constitutions are drafted, referenda are organized, and steps are otherwise taken to achieve the global recognition of a new government’s authority (e.g., Tunisia recently). Since regime type could not be affirmed for these cases they were removed from all analyses, which reduces the dataset from 7,363 country-years to 7,049. Bosnia was removed entirely as it is a country that lacks an undisputed centralized authority (Polity score = -66) for all years according to these data.

With few exceptions that are each explained above,³ the dataset used for this dissertation comprises all countries since 1960 that have a substantial population size and

³ For reasons that are given throughout this chapter, these countries are South Sudan, Luxembourg, and the merging of the northern and southern counterparts of Yemen and Vietnam.

operate through an undisputed, centralized, and sovereign government. Falling outside the sample frame are smaller countries and countries that arguably do not host an autonomous political regime. Nevertheless, ideally the conclusions of these analyses should apply to all countries and regimes. With that being said, decisions to exclude some cases from these data sources were arbitrary and not based on health, national wealth, or any other aspect of a nation's prosperity. These data may thus be regarded as 'missing at random' according to texts on missing data (e.g., McKnight et al., 2007) and their removal may be regarded as 'ignorable.' That being the case, this analysis presumes minimal risk of bias based on these exclusions. Although this data situation still allows challenges to the external validity of findings to smaller countries, their exclusion is not a problem of missing data as it is customarily understood. However, other data remain missing in time-series, which still poses the threat of biased results as explained further below.

Harmonizing data sources and adjusting the dataset as described above produces a dataset covering the years 1960 through 2010 and 7,049 total rows in time-series to represent country-years. Of these, 943 (or 13.4%) were missing at least one of the World Bank Indicators. Life expectancy was missing for 163 country-years, or 2.3% of the total. Crude mortality rates were missing for 155 observations (2.2% of the total). Infant mortality rates were missing for 438 observations (6.2% of the total). Per-capita GDP was missing for 805 observations (11.4% of the total). For these variables the regimes that were missing data were disproportionately non-democratic.

Supplementing World Bank vital statistics and GDP with United Nations data and harmonizing these sources with the Polity IV data (the dataset described thus far)

reduces the proportion of cases with missing data from 13.4% to 7.5%. Life expectancy is not available in the supplementary data, which leaves the rate of missingness for this variable at 2.3% of the country-years. These included the years of 1960 through 1963 for Israel, but also, importantly, all years of the five currently defunct European regimes. For Czechoslovakia, the USSR, East Germany and West Germany, life expectancy was missing from 1960 through 1990 and for Yugoslavia from 1960 through 1999. Crude mortality is available for all observations, however, while 190 observations are still missing infant mortality (2.7% of the total) and 285 are missing GDP (4.0% of the total). Countries missing infant mortality were predominantly poorer and overwhelmingly non-democratic (90%), which highlights the importance of an imputation strategy in order to model this particular outcome. Missing values for infant mortality were also more likely to occur in the 1960s (61% of the total missing) or 1970s (30% of the total missing). Other than the USSR in 1991, data for GDP were non-missing for all countries from 1970 forward and the only other missing data occurred evenly throughout the 1960s. Countries missing GDP were predominantly non-democratic (88.4%) and ostensibly poorer as well. Crude birth rates were missing only for the USSR in 1990.

A very large proportion of values for the Gini coefficient were missing, which required separate treatment analytically. Values for this variable were absent for 3,236 or 45.9% of the total possible observations. A majority of countries ($n = 139$) lacked income inequality data for at least some years. Like the pattern that appears for other variables, countries missing net Gini report less per-capita GDP (3,050 dollars compared to 663), and are predominantly non-democratic (79.7%). Several countries ($n = 20$) lacked income inequality data for all years; these again were predominantly non-democratic ($n = 16$),

but many were wealthy autocratic nations, most prominently the oil-rich nations of the Middle East. Because the proportion of observations missing data for this variable is so large, any imputation strategy would have been suspect. No attempt to impute these data is made and list-wise deletion is instead used in models that test the mediating effects of income inequality. Scepticism is encouraged with regards to these results in particular.

The threat of missing data was much more tractable for all other variables considered in this study. Aside from the exclusions discussed above, data were entirely non-missing for all political variables including political regime status and for crude mortality rates. In the most severe instances, World Bank data representing infant mortality were missing for large eras of a country's history, yet United Nations data were available in regular intervals even for these, with known values occurring at least once every 5 years after appending to the World Bank data. Meanwhile for many countries GDP was missing for part or all of the 1960s, but otherwise followed a relatively regular trend in subsequent years. For both of these variables, listwise deletion was an implausible choice in lieu of data imputation because these nations were predominantly autocratic and tended to be poorer as well.

Multiple imputation.

After supplementing World Bank data with United Nations data, the proportion of observations with missing data is already small at 7.5%. Most of this is attributable to the absence of GDP, whereas complete records are available for crude mortality and both life expectancy and infant mortality each remain missing for fewer than 3% of the observations. Since these data are already virtually complete, a basic test of the health impact of political regime controlling for GDP is likely to be robust to whatever

imputation strategy is chosen. Nevertheless, Ross's (2006) concern still merits attention, in that the deletion of observations with any missing values while modeling population health may be inappropriate for this literature. As noted above, cases with missing data are disproportionately poor or autocratic. Highly desirable is a strategy for creating complete records by imputing the missing values so that all cases can be taken into account.

When using any form of imputation, a 'best guess' is given for each missing value in a dataset. Strategies that impute all of the values together and then simply analyze the resulting dataset (called *single imputation*) can often provide fair estimates of the most likely values for the missing data, but they underappreciate the extent to which those data may vary. This causes underestimation of the standard errors of model parameters and thus greater likelihood to falsely attribute statistical significance to the results (a 'Type I' error). A better strategy involves appreciating how the "true," but currently unknown, values in a dataset are likely to be distributed, rather than presuming a single point estimate for each. In the case of normally distributed data, for instance, each value would be randomly imputed assuming that it has a particular mean and a tendency to deviate to some extent from that mean, or: $Y \sim N(\mu, \sigma)$. So as to take into account both the most likely values for the missing data as well as their variation, multiple imputation involves the creation of multiple datasets while using the whole distributions of the variables so as to generate random synthetic values to replace the missing data. Each imputed dataset is then analyzed using standard regression techniques and the aggregates of both the resulting parameter estimates and their standard errors are reported as the results of the modeling exercise. Multiple imputation in this way allows reasonable estimates of both

model coefficients and their level of statistical significance.

Fortunately, a simple but still justifiable solution for multiple imputation was possible. At least some known case-level data or (in absence of life expectancy) other vital statistics were available for virtually all observations in regular intervals. A complex routine requiring additional software that iteratively imputes data based on other imputed values, along with the ensuing complexity of interpretation, was thus unnecessary. For longitudinal data, Engels and Deihl (2003) recommend taking advantage of the case-level trends in the outcomes in question where possible. Their study shows that doing so provides more trustworthy estimates than using other variables to predict what the missing values for the outcome in question must be. Knowing a country's infant mortality rates for some years, for instance, and using that information to impute the rates for the other years is better than having to guess what that country's unknown values for infant mortality must be based on other variables. This strategy was not possible for life expectancy, however, so the other known vital statistics were used to impute the missing values for this outcome.

A set of regression models was used to carry out the multiple imputation. For each variable that had missing data, an initial regression model was created based on the known data. To specify the degree of random deviation from predicted values, the residuals from this initial model were taken to estimate the dispersion of the conditional distribution. Using the function *rnorm* (or *rlnorm* for infant mortality) in the software package "R," a (log-)normally distributed value based on the model was then generated randomly to replace each missing value. Performing this exercise iteratively, thirty synthetic datasets were created and the study results were compiled for each. This is to

say that each model reported in the results below is based on thirty models calculated from the thirty datasets. The coefficient that the results comprise for each variable is the mean average of the coefficients from the thirty models. To calculate the standard errors and thus statistical significance, equations are borrowed from McKnight et al. (2007; see also Gelman & Hill, 2007) that use both the average standard error and the variation among the models in the standard error. Statistical significance is based on the normal distribution rather than the t -distribution since degrees of freedom were large.

For both GDP and infant mortality, data entries occurred in regular intervals of at least once every five years in all countries, which is to say that these data were never suddenly and mysteriously absent and yet they also provided enough information so as to infer a longitudinal trend in each country. To impute per-capita GDP (prior to adjusting for inflation) and infant mortality, a linear regression model was estimated for each country using the known values and assuming the (log)normal distribution (where linear or Gaussian regression against the logged outcome is equivalent to log-linked Gaussian or lognormal regression against the raw outcome, so this distinction is regarded here as moot). This model predicted the outcome based on the annual trend for that country. In particular, the model randomly imputed each missing value using the country-level intercept from the model, the estimated country-level slope for the trend in study year with those years starting in either 1960 or the year a new country came into being, and the standard deviation of the known residuals as the standard deviation for the random conditional values. Expressed in the form of an equation, the imputed values Y_i for either logged infant mortality or logged GDP was estimated as

$$Y_i = \alpha_i + \beta_i X + \varepsilon,$$

where i refers to a particular country, Y_i is the country's vector of imputed values for the outcome, α_i is the model intercept specific to that country, X is either the number of years since 1960 or number of years since the country first came into being if it was since then, β_i is the yearly trend specific to that country, and ε is the adjustment for random deviation from the most likely value, distributed as $\varepsilon \sim N(0, \sigma)$. The error term ε is the standard deviation of the residuals after calculating the model from the known values. This modeling framework predicted known values for GDP quite accurately. Although some error was evident for infant mortality rates predicting the known values from their trend, exploratory analysis suggested that the predicted values were unbiased.

To impute missing values for life expectancy, a single linear regression model assuming the normal distribution was created for all countries together. Based on the known values for life expectancy, this model used the other vital statistics (crude and infant mortality and birth rates) as well as the overall average life expectancy (intercept) and the overall global trend in life expectancy as predictors. Expressed as an equation, this model is

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon,$$

where Y is the vector of imputed values, α is the model intercept, X_1 is the global annual trend in life expectancy across all cases, and X_2 through X_4 are (respectively) the crude mortality rate (this being the most important predictor), the infant mortality rate, and the crude birth rate. The error term ε again follows $\varepsilon \sim N(0, \sigma)$ and again is the randomized adjustment for variation around the expected value using the standard deviation of the known residuals as the estimate for σ . The *R-square* for the model based on known values was about 95%, suggesting strong accuracy. Life expectancy was still missing

for the USSR in 1960 and 1990 due to missingness in the predictors prior to the application of multiple imputation, so the first equation above that takes advantage of the annual trend is used to impute these two observations upon imputing the rest of the values for life expectancy in this country.

In the models predicting life expectancy, crude mortality, and infant mortality and controlling for causes of possible spuriousness, dependent variables were lagged by 1 year to protect against endogeneity, resulting in 6,854 country-years. After multiple imputation, per capita GDP was adjusted for inflation and then logged, but infant and crude mortality rates were kept in their raw form. As mentioned above, these rows of data belong to 168 total countries after restricting the time frames for analysis excluded the country of South Sudan and the failure to confirm any regime type for Bosnia resulted in its removal as well. Infant mortality rates were missing for all three years of Kosovo's existence from 2008 through 2010, which leaves 167 countries for the study of infant mortality rates. Given again the exceptions explained above, multiple imputation otherwise provides a complete working dataset. To create models predicting income growth and change in either executive constraints or competitive political participation, these variables were lagged by 10 years, which produced 5,300 country-years for 164 nations. Lacking any more trustworthy data for the Gini coefficient and lacking any better strategy for addressing such a large proportion of missingness for this variable, list-wise deletion is used for models that test the Inequality Reduction Hypothesis. Only those rows that reflect a numeric value for the Gini coefficient are included and no attempt is made to impute these data. Models using the Gini coefficient to test income inequality as a potential mediator are based on 3,715 country-years, which belong to 148 nations.

Caution is encouraged in the interpretation of these results especially.

Altogether, this dataset is defensible on the grounds that it provides comprehensive coverage over 50 years of population trends, the exclusion of some cases is non-threatening to the findings of the study, and (with the exception of Kosovo for infant mortality and the decision not to impute net Gini) a combination of data supplementation and multiple imputation otherwise produces a complete dataset. The cases and country-years excluded from the Polity IV dataset due to small population sizes may be regarded as ‘missing at random’ and their removal therefore does not bias results (see McKnight et al., 2007), while other cases are ignorable on the grounds that they do not operate through a recognizable, autonomous political regime. Due to the already small proportion of missing data, results are likely robust to whatever imputation strategy is used, but the missing data are nonetheless multiply imputed using complementary data. Regardless of these arguments, the strategies chosen above are certainly superior to the use of listwise deletion because countries impacted by missing data are disproportionately poor and autocratic and it is important to include these as possible counterexamples to the health impact of democracy.

Statistical Analysis

The following steps were taken to test the correspondence between political regimes and health. Using the two different measures for political democracy (‘level’ of democracy in Chapter 4 and status as democratic versus non-democratic in Chapter 5), regression models were used to examine the impact of political regime on health, the historical relationship between political regimes and health, and the predictive correspondence between democracy and the factors that appear to mediate its impact

on health. Year of data collection, starting at zero to represent 1960 and increasing by 1 or each subsequent year, was included in all models to capture trend in time as a default control variable. To distinguish the impact of democracy from control variables as well as the influence of likely mediators, independent variables were added successively in separate models. Linear regression using ordinary least squares was used to predict life expectancy while log-linked gamma regression was used to predict crude mortality and infant mortality. To corroborate the possibility that national income growth mediates the positive impact of democracy on health, along with models that simply add GDP, additional models were used to predict growth in per-capita GDP. To create the variable for income growth, (anti-logged) per-capita GDP was lagged by 10 years and divided by per-capita GDP from the 10 years prior with both data points expressed in 2010 dollars. The resulting variable for growth was then adjusted for skewness by taking the natural log. The models predicting income growth were based on time-series removing the intervening decade and using ordinary least squares. Additional models used ordinary least squares to predict any changes in levels of executive constraints and competitive political participation based on political regime status.

Tests of significance for all model coefficients are based on Newey-West standard errors so as to accommodate autocorrelation and possible heteroskedasticity in these data. As opposed to random and mixed effects, this choice allows the examination of cross-sectional comparisons, whereas alterations in the type of political regime or in the 'level' of democracy occur much more gradually and the random intercepts would overwhelm the explanatory value of regime type by treating countries as a nuisance variable. Exploratory analysis showed that results using this approach agreed with models that

tested the health effects of democracy cross-sectionally one study year at a time.

Chapter 4: Does Democracy Impact Health? Response to Extant Literature

This chapter responds to existing literatures that use a typical measure of political regimes. Among the most popular is the eponymous score from the Polity series for the ‘level’ of democracy. Exploratory analysis quickly reveals a bimodal distribution for this variable, however, a point few studies have considered. While not a concern on its own right necessarily, there is a problem with the use of the Polity score in its raw form in models if highly negative scores (close to -10 to represent complete autocracy) also predict stronger health than the weaker scores (closer to zero) that represent ‘mixed’ regime types. In other words, the Polity scores may have a nonlinear (quadratic) relationship with health and a linear association may appear artificially simply because there are more countries on one or the other end of the spectrum.

In his study, Gurr (1974) examines the ‘regime coherence’ of countries and operationalizes it as a Polity score whose *absolute value* is greater than or equal to 7. Defined in this way as the ranking of polities as either highly democratic or highly autocratic, he finds that ‘coherent’ polities have the strongest tendency to survive, whereas weaker autocracies and weaker democracies are more vulnerable to political instability and crisis. Given Klomp and de Haan’s (2009) finding that the stability of regimes contributes its own independent, positive impact on health, something like regime coherence should be included as a control variable in models.

Gurr’s conception of regime coherence is based on Eckstein’s (1969) theory of political performance. According to this theory, regimes should not only be more stable but should also have stronger performance overall if they are decidedly democratic or autocratic rather than having a middling Polity score. When speaking of ‘regime

coherence,' Gurr's study (1974), as well as others that build from it (Jagers & Gurr, 1995; Mansfield & Snyder, 2002), make explicit reference to the institutional quality or 'strength' of the different regimes.

At first glance, when describing the strength of regimes Gurr (1974) appears to implicate the institutional structure that more directly relates to a regime's consolidation of power, such as the electoral system of a democracy or the military apparatus of an autocracy. Eckstein (1997) clarifies, however, that 'regime coherence' indicates the consistency of authority characteristics across all social units within a society, whether they be lobby organizations, police forces, schools, or community volunteer groups. By this interpretation, in strong democracies (i.e., those having a highly positive Polity score) the democratic *process* has become a social script that actors understand and replicate in diverse contexts at all levels of society. Gurr's (1974) use of the word 'institution' to discuss regime coherence therefore seems consistent with the usage from Gerring and his colleagues (2012, 2005) who develop the Institutional Strength Hypothesis. By being more 'coherent,' in established democracies the authority structure itself would seem to be a well-understood algorithm for creating democratically minded institutions. Eckstein (1997) points out that something similar may be said for autocratic authority structures in highly autocratic nations. The institutional environment may be more robust in consolidated autocracies because these countries have a clearly understood decision-making hierarchy that non-governing individuals and institutions can most efficiently negotiate, perhaps even replicate amongst themselves. Autocratic nations, then, may also offer strong institutional environments and this may be especially true of undisputed autocracies compared to their weaker counterparts.

Given a possibly nonlinear association between Polity scores and health, then, it may very well be the case that the Polity scores correspond with health in models only because there happen to be more strong democracies than there are strong autocracies. Regardless, whether regime coherence represents the clearness and efficiency of the decision-making hierarchy in a nation, the institutional strength of a nation, or both, the strength of the polity scores in either direction would seem to capture phenomena that may have important bearing on health. Arguably, regime coherence has direct bearing on issues of accountability in both autocracies and democracies because it indicates a clearer delineation of authority, rules for making decisions, and conformity to expectation at all levels. Even in a well-established autocracy a citizenry should expect certain behaviours from their rulers and the failure to conform to those behaviours could have unsavoury consequences for their careers in leadership. Highly autocratic nations, compared to their weaker autocratic counterparts, should thus have more reliable (if not more just) systems of institutions and accountability both, which is to say that the hypotheses discussed in the above introduction apply to these nations as well.

Because it is also based on Polity scores, the same counterargument extends to the construct of ‘democratic capital’ (Persson & Tabellini, 2006), which refers to a country’s total democratic capacity in light of the experience it has accumulated over time as consistently democratic. This construct can be used to test the viability of long-established democracies against those that are less established and against autocracies. While applying a 1% annual depreciation rate, Gerring et al. (2012; 2005) measure ‘democratic capital’ as the accumulation of Polity scores across the years in time-series, a strategy other authors have recently borrowed (Wigley & Akkoyunlu-Wigley, 2011).

Yet if the Polity scores themselves have a nonlinear relationship with health, then the accumulation of those scores over time naturally inherits this pattern. That being the case, it would be important to compare the impact of ‘democratic capital’ with a transformation thereof that includes the legacy and experience of autocracies (‘autocratic capital’) as well. One could take the absolute value of this measure to test the legacy or experience of political regimes overall (as this study does). This kind of variable may similarly rule out ‘democratic capital’ as spurious if the cumulative Polity scores have shown an effect in previous studies only because there are more well-established democracies than there are well-established autocracies.

The argument from Gerring et al. (2012) that the flourishing of institutions over time mediates the impact of democracy on health suggests yet another potential confounder when using cumulative Polity scores: the length of time a regime has been in power. If accumulated Polity scores have a robust association with health, but if they are also taken as an annual accumulation, then years of rule may explain at least part of their association with health. This view finds support in Klomp and de Haan’s (2009) affirmation of the positive health effects of political stability on individual health. Besley and Kudamatsu (2006) also observe how the proportion of each country’s history spent as democratic since 1946 has a greater impact on health than status as democratic per se. This is to say that established democracies protect health more effectively than new democracies, but a similar argument may be made with respect to autocracies. It is possible that controlling for the tenure of political regimes will show both democratic and autocratic ‘capital’ to have a spurious relation with population health.

Results

Table 2 shows results from the first set of models. Model 1 tests the impact of the level of democracy on life expectancy using the Polity score while controlling for the average annual increase in health that has occurred across the globe since 1960, which is captured by the variable for yearly trend (not shown). Supporting prior studies, this model ties each unit increase in the Polity score to an increase by 0.68 years in life expectancy. According to this model, the transition from being the strongest possible autocracy to the strongest possible democracy corresponds with an increase by $0.68 \times 20 = 13.6$ years of life expectancy. As a key control variable, 'regime coherence' or regime strength is operationalized in Model 2 as the absolute value of the Polity scores and included in the models. In this model the coefficient for the raw Polity score reduces somewhat to 0.57 (a difference of $0.57 \times 20 = 11.4$ years of life expectancy comparing the most and the least democratic nations), or about 15.6% less than the figure from previous model. Because this is only a small reduction, the inclusion of the absolute value of the Polity score does not rule out the raw Polity scores as spurious and 'regime coherence' explains little of the overall impact of democracy on health. On the other hand, this added variable does bear its own strong impact on life expectancy. Each unit increase in the absolute value of the Polity score corresponds with an increase by 1.29 years of life, which is more than twice the concurrent effect of the 'level' of democracy. Controlling for 'level' of democracy this figure translates into a difference of $1.29 \times 10 = 12.8$ years in the change from a weak, anocratic regime type to the strongest possible level of either autocracy or democracy.

Model 3 tests the impact of democratic legacy or 'democratic capital' on life

expectancy, measured as the accumulation of Polity scores over time with an annual depreciation rate of 1%. Inclusion of this variable further reduces the effect of democracy on life expectancy by about 26%. According to this model and using the estimates for variable standard deviations in Table 1, each increase in cumulative Polity scores by one standard deviation corresponds with an increase of $248 \times 0.00661 = 1.64$ years of life expectancy. Nevertheless, what seems to matter most is the overall legacy as either strongly democratic *or* strongly autocratic. While including the *absolute value* of the cumulative Polity scores in Model 4, the coefficient for the cumulative Polity scores loses statistical significance and reduces in size, while their absolute value carries a stronger effect on life expectancy. Each increase by one standard deviation in the latter variable is tied to an increase in life expectancy by $0.017 \times 159 = 2.7$ years. This is to say that the construct of ‘democratic capital’ appears to be spurious predicting life expectancy, although the overall accumulation of Polity scores in either direction does promote stronger health. This effect reduces somewhat but remains statistically significant at $p < 0.05$ in Model 5, which controls for regime tenure overall. Countries having a long history as being strongly autocratic or democratic thus appear to have better health than either their more fledgling or their institutionally weaker counterparts.

The final model controls for logged per-capita GDP. In this model, GDP has a strong and reliable impact on health, with each unit increase in GDP contributing 4.73 additional years of life expectancy ($p < 0.001$). The inclusion of this variable reduces to nil the impact of regime coherence and all experience-related variables, which does not necessarily rule out these variables as being important to health. If economic prosperity and increased standards of living were to improve life expectancy, these results would

be consistent with the presumption that institutionally strong and experienced regimes have more efficient decision hierarchies and countries that have long legacies as such were more effective at growing their national income.

The inclusion of GDP term in this last model of life expectancy also reduces the contemporaneous impact of the ‘level’ of democracy but does not entirely eliminate it. Controlling for all else, a change from complete autocracy to complete democracy corresponds with $0.284 \times 20 = 5.68$ additional years of life expectancy and this effect remains statistically significant ($p < 0.001$). However, if democracies are more successful in growing their income and if national income also promotes stronger health, then GDP may be taken to partially mediate the positive impact of democracy on life expectancy in these models. Nevertheless, democracy retains a contemporaneous influence controlling for GDP, which suggests an emphasis on the more immediate implications of a regime’s decisions. In other words, the pattern that appears in Table 2 seems to support the Accountability Hypothesis more than it does the Institutional Strength Hypothesis in terms of a direct impact of democracy on health. The flourishing of a stronger institutional environment over time, similarly, is not necessarily specific to democracies.

The next set of models measure the impact of the same variables on infant mortality rates. Similar to the above, Model 7 indicates a strong, protective impact of democracy against this outcome. As each unit increase translates into a 5.7% decrease in infant mortality and a change from complete autocracy to complete democracy thus corresponds with a $1 - (0.943)^{20} = 69\%$ reduction in infant mortality. The contemporaneous impact of the level of democracy is evident in the subsequent models and even remains in the final model that controls for GDP. Each unit increase in level

of democracy still predicts a 1.6% decrease in infant mortality rates in Model 12, which reflects a 28% decrease in infant mortality after a change from complete autocracy to complete democracy. GDP mediates most of the protective effect of the absolute value for the raw Polity scores ('regime coherence'). However, the coefficient for the cumulative Polity scores ('democratic capital') also retains statistical significance in the full model. Each increase in in this variable by one standard deviation corresponds with a 14% decrease in infant mortality, which is double the equivalent estimate for the absolute value of the cumulative Polity scores, while overall regime tenure does not appear to bear any impact. The construct of 'democratic capital' as a measure of the long-term legacy of democracy is therefore relevant to the survival of the world's youngest age group, but appears spurious predicting life expectancy overall.

According to Model 13, each unit increase in the Polity score corresponds with a 1.41% decrease in crude death rates and a change from complete autocracy to complete democracy corresponds with a 24.7% decrease. Interestingly, this effect changes little through Model 17, which estimates equivalent decreases of 1.46% and 25.4%, respectively, controlling for regime tenure, cumulative Polity scores ('democratic capital'), the absolute values of the cumulative Polity scores, and the absolute value of the raw Polity scores ('regime coherence'). Only the contemporaneous impact of the level of democracy is significant in this model, while regime tenure approaches statistical significance ($p < 0.077$). The coefficient for the raw Polity scores in the final model ties each unit increase for this variable to a 0.5% decrease in mortality, but this effect is non-significant. Per-capita GDP thus fully explains the contemporaneous impact of the level of democracy that persists through Model 17.

Summary

According to these results political democracy appears to bear an important influence upon multiple measures of population health, including life expectancy. Level of democracy contemporaneously predicts higher life expectancy and lower infant mortality even in full models. Depending on whether GDP is acceptable as a mediator rather than a source of spuriousness, level of democracy also robustly predicts lower rates of crude mortality. Variables pertaining to the strength and long-term experience of regimes appear to be important for all countries, in that strong or long-standing autocratic regimes likely have better life expectancy and lower mortality rates than their weaker and fledgling counterparts. Nevertheless, people living in a democracy appear to enjoy distinct advantages for longevity and survival.

On the other hand, the construct of ‘democratic capital,’ which measures the overall legacy of political regimes as the accumulation of raw Polity scores over time, is more tenuous since it predicts only infant mortality. With this being said, these results partially replicate those of Gerring et al. (2012) who find a persistent protective impact of ‘democratic capital’ against infant mortality, except that in their study this variable fully explains the contemporaneous effect of the ‘level’ of democracy. Using complete, mostly un-imputed data for the same time frame, according to Table 2 the more immediate effect of level of democracy on *infant* health remains intact even in the full model. These differences in findings may be due to the former study’s more thorough consideration of alternative explanations, inclusion of small countries, and inclusion of countries identified in the Polity IV dataset with non-regime status. Nevertheless, Table 2 indicates that ‘democratic capital’ is spurious upon considering the protective influence of both

autocratic and democratic ‘capital’ together on life expectancy. The long-term legacies of regimes therefore emerge as an important consideration in models of population health, but for all regime types and not just democracies. Still, it is also worth pointing out that in the models predicting crude death rates, any sense of democratic or autocratic ‘capital’ appears as spurious over the length of time regimes have held power, which reinforces the need to thoroughly consider variables pertaining to the strength and experience of different regimes.

Given the above comments, these results offer important extensions to the findings of other authors (e.g., Gerring et al., 2012; Wigley & Akkoyunlu-Wigley, 2011) who test the construct of ‘democratic capital’ but without controlling for the strength and experience of autocracies and democracies overall. If GDP, furthermore, is to be interpreted as a mediator, then it can also be interpreted as partially mediating the effect of democracy and other political variables on life expectancy and infant mortality and fully mediating their impact on crude death rates. Finally, the absolute value of the Polity scores, or ‘regime coherence,’ a measure of the regime strength overall irrespective of status as democratic, seems to bear its own influence in models, which merits further examination.

In terms of the hypotheses identified at the end Chapter 1, then, life expectancy corresponds positively and robustly with the ‘level’ of democracy as measured by the Polity scores (Hypothesis 1a). A positive, contemporaneous impact of the level of democracy remains even when controlling for ‘regime coherence,’ which is measured as its absolute value (Hypothesis 1b), and all other variables. However, the cumulative Polity scores (‘democratic capital’) do not fully mediate the contemporaneous

influence of democracy, which negates Hypothesis 1c. The cumulative Polity scores have no effect on life expectancy controlling for their absolute value, which negates Hypothesis 1d as it pertains to this outcome, although they do retain an influence on health when predicting infant mortality. Meanwhile the Polity scores uniquely predict crude death rates, but this is only prior to controlling for GDP and the influence of experience-related variables appears negligible for this outcome.

Altogether, this study replicates consensus in this literature using more complete data, in that democracy somehow protects health and the accumulation of specifically democratic experience protects against infant mortality in particular. However, issues of confounding pose substantial threats to studies that use Polity scores. Future studies should take into account the difficulties of using a bi-modally distributed measure of the 'level' of democracy and any further measures derived from it. More serious attention should also be given to the theoretical relevance of a regime's economic prosperity. To circumvent problems of confounding, the results shown next examine the correspondence between health and democracy, but based on a more streamlined conception of democracy that allows more specific tests of the abovementioned hypotheses.

Chapter 5: Tests Using a Streamlined Conceptualization of Democracy

The above analysis presents several challenges to the use of measures that assess the ‘level’ of democracy rather than types of regimes in categories. In particular, the Polity score is itself bi-modally distributed among nations and appears to have a nonlinear relationship with health. The lengths of time political regimes have been in power, furthermore, are embedded in measures that accumulate Polity scores and must be controlled for in models to better distinguish the impact of the latter. Although there is justification to use more comprehensive conceptualizations of political regimes, serious issues of confounding threaten conclusions from many studies that use these scores.

This chapter presents results from models that instead test the impact of status as democratic versus non-democratic. Of key importance is the conceptualization of democracy, discussed in detail above, as a political regime that appoints its leaders through regular elections. This more minimalistic interpretation offers some key advantages. It protects against many of the issues of confounding that stem from the distributional qualities of an interval measure. It frees up variables for testing as possible mediators that are otherwise used to construct the Polity scores but do not pertain directly to elections. It accords more intuitively with popular theories of social ‘structure,’ order and organization. Finally, the simple comparison of democracies to non-democracies may facilitate more intuitive estimates of just ‘how much’ democratic governance promotes health.

Due to the change in the operationalization of political regime in this chapter, measurement of the length of time a regime has stayed in power must also change. Regime change is regarded in this chapter as any switch to democracy from autocracy

or vice-versa. *Regime tenure* is thus calculated as the length of time a polity has stayed either autocratic or democratic, but without switching between the two. For those nations that experience a switch, regime tenure begins counting annually again from that time. An additional variable calculates regime tenure for only democratic regimes and for this variable autocracies assume values of zero. Because *democratic tenure* accumulates scores as democratic (under the new definition), it is comparable to the above construct of ‘democratic capital’ in that it reflects the long-term legacy of democracy in a country. Both variables for regime tenure are adjusted with an annual depreciation of 1%.

Gerring et al. (2012; 2005) highlight the importance of taking into account the legacy and history of political regimes, arguing that democracies are able to develop more effective institutional infrastructures but that they require time in order to do so. So as to more thoroughly examine how the value of democracy appreciates over time in terms of its protections to health, in addition to using the above measures for (democratic) regime tenure this analysis also features separate tests of the impact of democracy in regimes that are in different stages of their careers. These tests include GDP separately in models and leave interpretation of their results to the reader.

Featured in this chapter are also tests of four potential mediators: two that the more streamlined conceptualization allow as distinct variables that may mediate the impact of democracy on health, executive constraints and competitive political participation, followed by logged per-capita GDP and the Gini coefficient as measures of economic prosperity and income inequality. These variables may be construed respectively as tests of the Accountability, Institutional Strength, Economic Development, and Inequality Reduction Hypotheses. For any variables that emerge as

likely mediators in these models, to further examine their status as such this chapter also tests whether democracy predicts their changes over the course of a decade.

Democracy and Health: A Basic Test

The first set of models in Table 3 tests whether democratic nations have longer average life expectancy. Based on the streamlined concept and thus operationalized as a binary variable identifying the presence of a valid elections apparatus in a regime, Model 1 ties democracy to an increase in life expectancy by 10.8 years. While this is quite a large difference, much of it is explained by the length of time these nations have survived, according to Model 2. In this model, the impact of democracy drops by about half to a difference of 5.41, while each additional year of a democratic regime's survival – with an annual depreciation factored into this accumulation at a rate of 1% – adds 0.23 years in life expectancy. Model 3 controls for a comparable measure of regime tenure overall, which is now measured as the time since the last transition from non-democracy to democracy *or* vice-versa and again factoring in a 1% annual depreciation. Although democratic tenure reduces substantially in size in this model ($\beta = 0.14$), it still uniquely predicts life expectancy at $p < 0.05$, whereas the variable for regime tenure overall is smaller ($\beta = 0.09$) and only approaches statistical significance ($p < 0.095$). This suggests that the experience regimes have accumulated over the years is especially beneficial to democracies. Finally, according to Model 4 each increase in logged GDP corresponds with a large increase in life expectancy of 4.75 years. Yet there remains a unique, contemporaneous correspondence between democracy and life expectancy, contributing almost 5 years of life expectancy unexplained by GDP or regime experience. Using a streamlined operational definition of democracy based strictly on whether a country

holds elections, these results support prior literatures that suggest a robust influence of political regime types on population health, favouring democracy in particular.

Model 4 of Table 3 would traditionally be interpreted in this literature as indicating that GDP rules out much of the supposed impact of democracy on life expectancy that appears in Model 1, but that democracy still retains at least some impact. However, as noted above there is some reason to believe that GDP mediates the influence of democracy on health rather than ruling it out as spurious. Democratic status and especially the experience-related variables reduce substantially in size in this model, which suggests the long-term legacies of the different regimes improve life expectancy only to the extent that they contribute to growth in national revenue. An explanation following this viewpoint might be that, on the one hand, democracy promotes health directly by keeping government leaders accountable to their decisions or otherwise providing a more reliable health infrastructure, but these same points may be used to argue that democracy promotes income growth. According to two different studies by Gerring and his colleagues (2005; 2012) the same institutional environment characteristic of democracies involves a more developed corpus of laws, a bureaucratic legacy, and a stronger institutional environment overall, and these contribute to both better infant health and stronger income growth. Yet if national income also extends life expectancy, then democracy may promote health indirectly as well by promoting greater economic prosperity.

The models predicting infant mortality are similar but not identical to the pattern seen with respect to life expectancy. Model 5 connects democracy to a decrease in infant mortality rates by 57%. The degree to which democratic status curbs infant mortality

rates diminishes to 26% in Model 6, which controls for democratic tenure, but increases again to 30% in Model 7, which additionally controls for the tenure of all political regimes together. In Model 7, democratic tenure also retains its protective influence on infant mortality despite controlling regime tenure overall. Using the calculations for the standard deviations of this variable shown in Table 1, an increase in democratic tenure by one standard deviation predicts a $=1 - (0.974)^{16.6} = 35.7\%$ decrease in infant mortality, which is quite large. Finally, in Model 8, which controls for GDP, the same effect still translates into a 15.0% decrease in infant mortality, while democratic status continues to reduce infant mortality by 20.9% irrespective of income. Economic development may to some extent mediate the protective effects of democracy and long-term democratic legacy on infant health, but because the contemporaneous impact of democracy remains intact, these results also support the view that democracy protects infant health in a more immediate way.

Results are again similar but not identical in models predicting mortality overall. Model 9 connects democracy to a large decrease in crude death rates of 21.2%. This level of protection reduces in the subsequent models, fluctuating from 13.9% in Model 10, back to 21.2% in Model 11, and finally 11.6% in the full model. While the experience-related variables do not consistently explain the influence of political regimes on this measure of health, a contemporaneous impact on mortality rates remains even when controlling for GDP. As with the other results presented thus far, logged GDP similarly protects health in this last model, with each unit increase reducing crude death rates by 14.4%. Democratic tenure, in contrast, predicts larger rather than smaller mortality rates in the final model. This suggests that democracies that fail to grow GDP in particular

lose their advantage over non-democracies in terms of mortality rates.

The picture that emerges in Table 3 is that democracy is consistently and uniquely protective for multiple health outcomes. These results also highlight the importance of national wealth as a likely mediator. While the accumulation of democratic legacy and experience contributes extra protection against infant mortality controlling for all else, it may also improve life expectancy by facilitating growth in economic prosperity. Non-democracies improve only life expectancy through their maturation over time and only marginally so, but they too may be using their experience to improve their standards of living. Regardless of the intervening mechanisms, though, given the careful handling of missing data described in Chapter 3, these models provide justification to confidently rule out Ross's (2006) counterargument that the health-promoting impact of democracy will be negligible in complete datasets. The next set of analysis offers clarification as to the longitudinal correspondence between democratic governance and population health.

Comparing the Impact of Political Regimes at Different Stages of Maturity

As an alternative way to examine the correspondence between a country's health and the long-term historical legacy of its ruling regime, Table 3 compares how the positive impact of democracy may change the longer a regime has been in power. This table displays results from models showing how well GDP and democratic status predict health while restricting the dataset to regimes at different stages in their experience. Again using the alternative conception of democracy based on free and fair elections, models use the length of time a regime stays autocratic or democratic without transitioning between the two (and without adjusting with the 1% annual depreciation) in order to compare regimes in different stages of maturity. Models predict life

expectancy, infant mortality rates, and crude death rates, but testing democratic status and GDP separately among regimes that are within their first year of rule, followed by those in the subsequent 1 – 10th year of rule, 11th to 25th year of rule, and years of rule beyond 25.

Model 1 of Table 4 indicates a contribution of 2.04 years of life expectancy among countries that are in their first year of rule. This figure is much smaller than the increase indicated in Model 1 of Table 3, which is a similar model applied to all of the cases together. Model 2 of Table 4 indicates this effect is explained by GDP. These two models apply strictly to regimes in their first year of rule, which is to say democracy would likely not have impacted health by spurring the growth of national wealth during such a short time frame. Nevertheless, while the correspondence with democracy as well as the pattern of mediation appears quite small here, it grows substantially throughout the subsequent models. Model 3, which restricts the sample instead to those countries having been in power for at least a year but less than a decade, shows a larger impact of democracy ($\beta = 5.17, p < 0.001$), which is again fully explained by GDP in Model 5. According to the next model, democracy adds 11.6 years of life expectancy and this is mostly but not totally mediated by GDP in Model 6, which still estimates a unique contribution of more than five years in life expectancy. Finally, in Model 7 the contribution of democracy grows even further to 14 years of additional life expectancy for regimes older than a quarter century and this effect is completely explained by GDP in Model 8.

An even stronger pattern appears with respect to infant mortality. In models testing the impact of democracy without controlling for GDP, democracy among the

youngest regimes corresponds with 24.4% fewer infant deaths in Model 9, which is much smaller than the impact shown in Table 3. The number of saved infant lives increases monotonically across the remaining models in Table 4, however, with 37.9% fewer infant deaths among regimes with less than a decade of experience prior to controlling for GDP (Model 11), 60.9% fewer infant deaths among regimes with more than a decade but less than a quarter century of being in power (Model 13), and 71.3% among those regimes that have been in power for more than a quarter century (Model 15). Democratic status retains a contemporaneous impact on infant health controlling for GDP in all models. The proportion of saved infant lives unexplained by GDP also rises monotonically from 11.5% in Model 10 to 13.3%, 35.5%, and 47.0% in Models 12, 14, and 16, respectively.

Results regarding crude death rates appear similar, but in this case a positive impact of democratic status on health does not appear for regimes in their first year of rule and GDP wholly explains the correspondence with health in subsequent models. According to Models 19, 21, and 23, democratic status reduces crude mortality by 14.8% to 28.4% and 23.0%, respectively. The introduction of GDP in the subsequent models eliminates these effects however, which suggests democratic status reduces crude mortality entirely by encouraging growth in economic prosperity.

Findings thus far call into question Lipset's (1959) argument that growth in national wealth is what causes countries to turn democratic rather than democracy causing income growth. In light of these results, this argument at least does not negate the conclusion that democracy promotes health by facilitating income growth. Nevertheless, because the contribution of democracy to both life expectancy and infant health grows monotonically as regimes mature and because GDP consistently mediates the impact

of democracy on all three health outcomes, these results strongly support the Economic Development Hypothesis. As an alternative test of the long-term influence of democratic legacy, these results also shed light on the results regarding democratic regime tenure (Table 3), which bears a unique, protective influence on life expectancy and infant mortality in Table 3 but is also mediated to some extent by GDP. However, other factors may still play a role in linking democratic governance to health.

Tests of Intervening Mechanisms

Thus far, this study has carefully conceptualized democracy, created a complete dataset for analysis, responded to the existing literature regarding the impact of political regimes on health using a popular measure of democracy, compared these results to tests using a streamlined conceptualization of democracy, and offered clarifications about the historical relationship between democracy and health. The inclusion of GDP in all phases of the above has produced results that lend substantial support to the Economic Development Hypothesis. Missing still, however, are tests of the other possible explanations for how democracy promotes stronger health: by keeping government leaders accountable to their decisions, by allowing a stronger institutional environment to flourish, and by reducing social inequality. Needed are tests of these other hypotheses, which are addressed in the next set of analyses.

The Accountability, Institutional Strength, and Economic Development Hypotheses

Model 1 of Table 5 is a continuation of the first model shown in Table 3. Prior to controlling for the tenure of regimes or GDP, this model tests the level of constraint on the decision-making powers of elected leaders as an intervening factor. According to this view, democracy places limitations on the decision-making powers of ruling officials,

which speaks directly to the Accountability Hypothesis because this measure indicates the degree to which ruling officials can violate accepted standards of performance. A key implication is that leaders who do so may suffer important consequences, namely, an end to their political careers. Democracy controlling for executive constraints predicts 6.08 years of life expectancy in Model 1 of Table 5, a reduction by 44% from the figure of 10.82 shown in Model 1 of Table 3. A variable that ranges between 1 and 7, this model also estimates that each unit increase in executive constraints adds 1.22 years of life expectancy and thus that an increase from the least to the greatest level of executive constraints ties to an increase of $1.22 \times 6 = 7.3$ years of additional life expectancy. These results suggest systems of accountability for ruling officials (autocratic or democratic) are their own important health determinant, but also one which at least partially mediates the positive impact of democracy on health. These models, in other words, lend support to the Accountability Hypothesis in particular.

Model 2 adds competitive political participation as another possible mediator. A variable that ranges between 0 and 5, each unit increase in competitive political participation contributes 1.72 years of life expectancy and a change from the minimum to the maximum value for this measure thus translates into $1.72 \times 5 = 8.6$ additional years of life expectancy. The inclusion of competitive political participation in Model 2 further reduces the positive impact of democracy by 26% and fully explains the impact of executive constraints on health. It is possible that constraints on the decision-making powers of elected leaders, especially in democracies, may give unelected people and groups greater freedom to compete for political influence or to otherwise express their preferences for policy in the public arena. As characterized by Gerring et al. (2005;

2012), the Institutional Strength Hypothesis contends that the broad distribution of freedoms and equal status naturally encourages the growth of rules, protocols, and systems that keep everyday citizens accountable to each other. Taking this argument at face value, the freedom to compete for influence in the political realm may be used to infer that a country's institutions are stronger and more reliable compared to countries that use more restrictive policies of public participation. By allowing people to freely defend their own interests in the public sphere, if democracy encourages institutional systems to flourish that accommodate and arbitrate competing interests, then these results are interpretable as supporting the Institutional Strength Hypothesis.

Model 3 adds the two variables for regime tenure. Overall regime tenure predicts a larger increase in life expectancy than democratic tenure and only the former approaches statistical significance ($p < 0.07$). Meanwhile each unit increase in competitive political participation contributes 1.19 additional years in life expectancy. This effect is 31% smaller compared to the previous model and falls just short of statistical significance ($p < 0.053$), but the fact that both supposed mediators and experience-related variables fall short of statistical significance suggests a likely problem of multiple correlation. Additional tests (not shown) suggest democratic tenure in particular mediates the influence of competitive political participation on health. After removing democratic tenure from the models, competitive political participation is still statistically significant ($\beta = 1.373$; $p < 0.05$), but only approaches statistical significance ($\beta = 1.114$; $p < 0.09$) when keeping overall regime tenure and instead excluding democratic tenure. Because competitive political participation is a simple measure with only six levels that still approaches statistical significance in this model and is not fully

explained by (democratic) tenure, it seems reasonable to suppose that it is still mediates the health impact of democracy.

On the other hand, taking competitive political participation as a measure of institutional strength according the Institutional Strength Hypothesis may alternatively lead to the conclusion that it supports the ongoing stability of democratic regimes. That is to say, if competitive political participation in any way promotes with the growth of reliable institutions, as Gerring et al. (2005; 2012) theorize, then this stability may promote the very survivability of democratic regimes and thus contribute to longer tenures. Less clear is which variables measure institutional strength and which do not. Divergent studies use the Polity variable for competitive political participation ('public deliberation' from Chandra & Rudra, in press), cumulative Polity scores (democratic legacy or 'capital' from Gerring et al., 2005; 2012) and high values in either direction on the Polity scale ('regime coherence' from Gurr, 1974) to infer the institutional robustness of a polity. Democratic tenure too very plausibly measures phenomena that pertain to institutional stability, in that longer standing regimes ostensibly house institutional environments that are more reliable than do younger regimes. The fact that democratic tenure and competitive political participation are both included in Model 3 of Table 5 may be why neither variable reaches the threshold for statistical significance in this model: they may be assessing institutional strength simultaneously.

In the final model that controls for GDP, competitive political participation is no longer statistically significant, while democracy remains significant at $p < 0.05$ and executive constraints approach significance at $p < 0.08$. The latter two variables thus retain a modest impact on health irrespective of economic prosperity. Moreover,

comparing Model 4 of Table 5 with Model 4 of Table 3 indicates that executive constraints may partially mediate the contemporaneous influence of democracy on health, which lends credibility to the Accountability Hypothesis in particular. In light of the Economic Development Hypothesis, though, these results also continue to suggest that GDP is a significant mediator here, fully explaining the correspondence between competitive political participation and health. It is possible that the variable for political participation measures more than a kind of interpersonal interaction in the political arena, but may even point to a society's business infrastructure, which a new study by Chandra and Rudra (in press) suggests.

The next set of models examines whether the above patterns apply to other health outcomes. While Model 5 of Table 3 estimates that democratic status reduces infant mortality by as much as 57%, this effect reduces to 35% when including executive constraints in Model 5 of Table 5. Restrictions to the decision-making powers of executives thus explain about 40% of the positive impact of democracy on infant health. Based on an equivalent comparison between Model 5 and Model 6, competitive political participation further explains about a quarter of the impact of democracy on infant health controlling for executive constraints and about half of the positive impact of executive constraints on infant health controlling for democracy.

Thus far, results are similar with respect to infant mortality as for life expectancy. Including democratic and overall tenure in Model 7 only partially explains the influence of competitive political participation on health, however, reducing its protective influence by about a quarter. Democratic tenure appears to mediate the remaining protective impact of democratic status as well as (to a lesser extent) executive constraints. This would

suggest that the portion of the protective effect of democracy on infant health that has little to do with competitive political participation is wholly dependent on the accumulation of regime experience and that democracy is less protective of infant health for younger regimes. Democratic tenure is statistically significant in this model ($p < 0.001$), despite that the similar variable of overall regime tenure is also present. Again using the estimates shown in Table 1, an increase in democratic tenure by one standard deviation results in a reduction in infant mortality by $1 - (0.977)^{16.6} = 32.1\%$. Finally, Model 8 adds per-capita GDP. Very similar to the models predicting life expectancy, this variable eliminates most of the impact of democratic regime tenure as well as competitive political participation, while the coefficient corresponding with executive constraint is statistically significant. Plausibly, GDP is an outcome of the business infrastructure and freedom of professional association among citizens that is to some extent distinctive to democracies and the corresponding improvement to standards of living is one mechanism through which democracy protects infant health. Regardless, long-term democratic legacy and constraints to the decision latitude of elected leaders also curb infant mortality irrespective of GDP. Altogether, hypotheses that position systems of accountability, institutional strength, and economic prosperity as intervening mechanisms appear supported in models of infant mortality as well.

Further results suggest that executive constraints and competitive political participation play less of a role in curbing overall mortality. Whereas in Model 9 of Table 3 democratic status reduces crude mortality by 21% and adding executive constraints to Model 9 of Table 5 reduces this figure by about a third to 14%, for most of these models neither of the experience-related variables nor the variables relating to the democratic

political system in particular appear to mediate the influence of democracy on health. Even controlling for GDP in the full model democracy changes little of the apparent contemporaneous influence of democracy, which continues to reduce crude death rates by 13.5%. As in Table 3, democratic tenure even predicts larger mortality rates controlling for all else, which suggests that experienced regimes suffer increased death rates if they fail to grow their national income levels.

The Inequality Reduction Hypothesis

Another hypothesis that has thus far received scant attention is that democracy should promote health by reducing social inequality. According to this argument, democracy gives underprivileged citizens greater political clout on the political stage and that only in a democracy are these people able to use the elections apparatus to improve their lot. Under-benefitted people arguably defend their interests by choosing leaders who are committed to mitigating social inequality. Because social inequality is its own negative health determinant according to recent scholarship (Wilkinson & Pickett, 2006; 2010), this results in better health for vulnerable groups.

The models shown in Table 6 test the Inequality Reduction Hypothesis. Because the data for income inequality are much sparser than they are for the abovementioned variables and an imputation strategy was not possible, as an intervening mechanism inequality is tested separately from the abovementioned hypotheses. Due to the problem of missing data and the choice to use listwise deletion to resolve this problem, these models are based on a very different sample. Even the most inclusive data on income inequality only sparsely cover the range from 1960 to 2010 and these data are not evenly distributed across countries, years, or political regime types. Skepticism of these results

is encouraged. With those caveats in mind, prior to including the measure for income inequality the apparent impact of democracy in Models 1, 3, and 5 of Table 6 appears similar to the results shown in Table 3, which are based on complete data. The fact that the complete sample and the abbreviated sample support similar estimates of the impact of democracy on life expectancy to some extent validates the use of the latter sample to test the examination of income inequality as an intervening mechanism.

In Models 2, 4, and 6 of Table 6, income inequality as measured by the Gini coefficient appears to be a noteworthy determinant of health. With values ranging between 15.58 and 80.97, a change from the minimal to the maximal level of inequality equates to a difference of 65.39 for this variable. Multiplying this value by the coefficient for net Gini shown in Model 1 indicates that the most extreme change possible from the least to the greatest possible income inequality reduces life expectancy by 20.3 years. Exponentiating the figure of 1.037 shown in Model 3 by this amount indicates that this same change increases the infant mortality rate 10.8 times.

Income inequality does not appear to mediate the protective impact of democracy against either infant mortality or crude mortality. Models 3 through 6 show little change in the coefficients corresponding with either democratic status or democratic tenure. However, a comparison of Models 1 and 2 suggests income inequality may partially mediate the health impact of democracy on life expectancy. The contemporaneous impact of democratic status on health reduces by about 0.76 years of life expectancy, or 12.4%. Regime tenure has little impact, but the coefficient for the long-term legacy of democracy on life expectancy reduces by 24%. Again using the calculations for the standard deviations from Table 1, an increase in democratic tenure by one standard deviation

produces 2.62 extra years of life expectancy controlling for overall regime tenure in Model 1, but this same figure reduces to 1.99 years when also controlling for net Gini. These results then suggest at least modest support for the inequality reduction hypothesis, but only with regards to life expectancy. However, further tests showed that neither democratic status nor democratic legacy predicted any changes in the Gini coefficient over the course of a decade controlling for regime tenure.⁴

Predicting growth in income, executive constraints, competitive political participation

The above analysis suggests that executive constraints, competitive political participation, and income growth each predict stronger health among the world's nations. To complete the analysis of their potential to mediate the impact of democratic status on health, the next set of analyses examine whether democratic status also predicts changes these factors over time. The next set of analyses accomplishes this goal in two steps. First, exploratory analysis is used to determine whether these factors are greater in democracies than in non-democracies. Next, predictive models are created that lag these factors by 10 years to test whether democratic status predicts their growth over the course of any given forthcoming decade. These were linear models based on ordinary least squares with Newey-West standard errors. The variable for logged national income growth was normally distributed. The variables depicting positive change in either executive constraints or competitive political participation were centered at zero, the

⁴ Competitive political participation predicted reduced inequality over the course of a decade, but only controlling for GDP and it was not an apparent mediator of either democratic status or democratic legacy, which were non-significant in additional models.

former ranging in integers between -6 and 6 and the latter between -4 and 4. They had high kurtosis and relatively few possible values for change in competitive political participation especially. Skepticism is therefore encouraged with regards to results based on these.

Again using the streamlined definition to characterize democratic status, logged income growth was higher among democracies than non-democracies. Throughout the half-century under analysis, on average and expressed in 2010 dollars, democracies grew their income by 10.3% over the course of any given decade (not shown). By contrast, non-democracies lost income by an average of 0.9%. As a percentage in growth expressed only in 2010 dollars, it is perhaps more difficult for wealthy nations to grow their revenue compared to poorer nations, however. Further exploratory analysis showed that countries in the richest income quartile lost 6.8% in revenue adjusting for inflation, whereas countries in the poorest quartile gained 17.2%.

Table 7 presents results from regression models that predict growth in revenue over the course of any given decade. These are ordinary least squares models predicting logged national income growth and coefficients are anti-logged so as to show the percentage change associated with each unit increase in each variable. Adjusting for starting values in logged per-capita GDP, Model 1 indicates that democracies had 28.8% more growth in GDP compared to non-democracies on average. Model 2 ties each unit increase in executive constraints to a 3.4% increase in revenue, while the figure associated with democracy is cut in half in this model and also drops below the threshold of $\alpha = 0.05$. This suggests that constraints to the decision-making powers of a country's rulers mediate part or all of the impact of democracy on future economic prosperity.

Model 3 adds competitive political participation and associates each unit change in this variable with an 11.1% increase in GDP, an estimate which does not change controlling for both democratic tenure and overall regime tenure in Model 4. The inclusion of this variable also eliminates the impact of executive constraints as well as any remaining impact of democratic status. Competitive political participation and executive constraints thus appear to play important mediating roles predicting income growth.

Further analysis showed that this pattern mainly applies to the years from 1960 through the mid-1990s. The impact of democratic status was negative from about 1995 forward, which was about the time a global recession commenced, originating with the housing crisis in the United States. Supplementary analysis based on annual growth rates rather than decade-long growth confirmed that the year 1995 and the subsequent decade affected democracies more negatively in terms of growth but that a recovery may have started in around 2008. During this time democracies had their largest rate of yearly growth since 1994 (about 3%) and growth was still positive combining this year with 2009. Spot-checking a sample of cases suggested a ripple effect, in that the United States and other 'developed' nations throughout North America and Europe began to report positive yearly growth around 2003, but for democratic nations on average negative growth still occurred as late as 2009. Altogether, annual revenue growth was negative for the years 1995 through 2007 among democratic nations relative to non-democracies with an average yearly loss of 1.52%, which translates into an overall loss of 18.1% for this entire time frame. Meanwhile executive constraints and competitive political participation failed to explain any differences in growth. With this caveat in mind, these results overall still support for the Economic Development Hypothesis, which states

that economic prosperity mediates the positive health impact of democracy. Although caution is certainly warranted in the interpretation of these results, the recession starting in 1995 is taken to be a historical anomaly and no further analysis of its aftermath is pursued here.

Similar to other results regarding life expectancy and infant mortality, these results to some extent support the conclusion that democratic status promotes the growth of economic prosperity through the implementation of substantial constraints on the decision-making powers of elected leaders. By subjecting a leader's decision-making privileges to rules and protocols, furthermore, democracy may help citizens participate freely in the political arena. In a democracy, citizens can be politically active in any number of creative ways and are freer to associate and communicate with their peers for any reason, communicate with their fellow citizens in public, etc., without fear of retribution from a governing entity. Yet if the freedom to organize and voice opinion publicly also facilitate a stronger institutional environment as some authors contend (Gerring et al., 2005; Chandra & Rudra, in press), the democratic environment would seem to support the growth of a nation's economic prosperity as well. Such presumptions also support the Economic Development Hypothesis, which models of the different health outcomes further reinforce controlling for GDP .

What remains to be seen is to what extent executive constraints and political participation are tied to democratic status and whether democracy encourages the growth in these characteristics over time. An alternative possibility is that these characteristics are instead decided at the time a constitution is ratified. They may even decline as democracies mature and as politicians learn how to navigate and (arguably) manipulate

the political arena, which would have important implications for existing and future democracies.

As expected, exploratory analysis reveals that democratic nations on average have a mean value of 6.48 for the measure of executive constraints and a median of 7 throughout the study time frame. This compares to values of 2.52 and 2, respectively, among non-democracies. However, this difference also diminished somewhat during the study time frame. On average, democracies lost 0.31 units for this measure over the course of an ensuing decade, which surprisingly compares to an improvement by 0.61 units among non-democracies. Out of a total of 1882 country-years belonging to democracies, the majority (76.8%) did not change their values for this measure over the course of any given decade. However, a significant minority (14.7%) show a loss in executive constraints, while a smaller proportion (8.5%) increased their value for this measure. There was much less stability in the measure for executive constraints among non-democracies as 43.9% changed their scores for better or for worse. However, most non-democracies that did change their scores on this measure (72.4%) increased it over the ensuing decade. One possibility is that in the modern era autocracies are facing greater pressure to democratize and must therefore afford greater sympathy, by appearances at least, for putatively democratic values. However, the average loss in this measure among democracies is rather surprising and counterintuitive.

A similar pattern appears with respect to competitive political participation. Democracies on average had higher values for this measure, with a mean of 4.24 and a median of 5 across the study time frame. These figures compare to a mean of 1.78 and a median of 1 for non-democracies. Democracies on average lost 0.05 units for this

measure over the course of a decade, however, which compares to a gain by 0.40 units among non-democracies. Again, the majority of democracies (72.2%) did not change their values for this measure throughout any given decade, but less than half of those that did (47.2%) changed in a positive direction. Among country-years belonging to non-democracies, 38.4% altered their scores for competitive political participation. Among these, 78.9% altered their scores in a positive direction. Altogether, it would appear that democracies and autocracies are to some extent converging in these measures over time. Moreover, it would seem to be the case that there is much less opportunity to adjust these features of a democracy as it matures than there is when it first comes into being and the constitution is decided.

Among democratic regimes, further exploratory analysis revealed that the comparative change in the measure of executive constraints over the course of any given decade was largely determined by the younger democracies, while the decade-long change was relatively similar across the set of autocracies, irrespective of the length of time they had held power. For competitive political participation, the largest change was in the positive direction among mature autocracies and was slightly but uniformly negative for democracies.

Again using ordinary least squares and Newey-West standard errors to predict decade-long changes in the two intervening political variables based on democratic status, Table 8 presents results from linear models. In models predicting change in the level of executive constraints, the value for this variable during any given year was subtracted from reported level of executive constraints a decade later. A value of 0 represents no change, naturally, while a value of -6 represents the loss of executive

constraints by 6 units over time and a value of +6 represents a gain by 6 units. A similar dependent variable characterizes change in competitive political participation over the course of any given decade. Included is an indicator that identifies those regimes that had been in power for 10 years or longer and this variable is interacted with democratic status to distinguish mature regimes of both types from their more fledgling counterparts. Young democracies and mature autocracies increased their scores for executive constraints by 0.16 (n.s.) and 0.31 ($p < 0.01$) on average, respectively, while mature democracies surprisingly diminished their relative value for this measure on average by 0.59 points ($p < 0.001$). With respect to competitive political participation, young democracies and mature autocracies changed their scores by 0.17 (n.s.) and 0.23 ($p < 0.01$), respectively, while democracies that are 10 years old or longer experienced a loss of 0.40 units in political participation throughout a given decade. Because competitive political participation occurs on a smaller scale, these figures are comparable to those observed above with respect to executive constraints. Moreover, a country's economic prosperity does not seem to explain these patterns. All of the above being so, it is important to note that the difference between democracies and non-democracies is still large in terms of the degree to which they each honour putatively democratic values. Their modest convergence suggests the need to continue to monitor the health of democracies, however, while autocracies may be starting to achieve comparable success by promoting policies that adopt those same values.

Summary

The results presented in this chapter both corroborate and extend those shown

in the previous chapter, which is based on a very different operational definition of political regimes. As a further contribution to existing literatures, the current chapter uses a categorical interpretation of democratic governance that points to a surprisingly large difference between democracies and non-democracies across all three measures of population health. Included among these estimates is a difference of up to 11 years of life expectancy and a 57% drop in infant mortality. This chapter also separately tests potential mediators that to some extent illuminate just *why* democracy might promote stronger population health. The level of executive constraints, competitive political participation (and perhaps also democratic regime tenure), and GDP all appear as mediators in this analysis and respectively suggest that democracy promotes health by improving executive accountability, institutional strength, and economic prosperity. Arguments are possible that these occur in a logical order in models predicting health, although GDP could also be interpreted to overwhelm the explanatory value of the other two variables. Democracy for the most part does not, on the other hand, extend life expectancy and survivability by reducing income inequality. Regardless of the intervening mechanisms, though, the use of a virtually complete dataset removes the threat of missing data and rules the counterargument on the basis of that threat that democracy is spurious.

In terms of the hypotheses identified at the end Chapter 1, democracy bears a robust impact on health life expectancy when interpreted as a binary categorical variable based on elections (Hypothesis 2a), which is true for the other health outcomes as well. According to Table 3, the length of time an electoral democracy has been in power also positively impacts life expectancy (Hypothesis 2b) even when controlling for the tenure of regimes overall (Hypothesis 2c), but does not fully mediate the contemporaneous

effect of democracy and is fully explained by GDP. The impact of democracy appears to appreciate the longer a regime has been in power (Hypothesis 2d), although GDP for the most part explains its impact on health. Executive constraints and competitive political participation both appear to mediate the impact of democracy on life expectancy (Hypotheses 3a and 3b), although competitive political participation fully mediates the former and it is somewhat difficult to say whether even competitive political participation retains a unique impact on life expectancy independently of tenure-related variables (Hypothesis 3c). Throughout these analyses GDP appears as a strong mediator (Hypothesis 3d), but net Gini does not (Hypothesis 3e), thus failing to support the view that democracy promotes health by reducing social inequality. Finally, democracy predicts growth only in GDP but not in either executive constraints or competitive political participation (Hypothesis 3f). Regarding the other two health outcomes, results suggest democracy somehow curbs mortality, but democratic tenure, competitive political participation, and executive constraints would seem to attenuate infant mortality and not crude mortality.

Speaking more broadly of the potential mechanisms linking democracy to life expectancy and survivability, GDP emerges as an important variable both cross-sectionally and across the life course of each regime. Results presented in this chapter suggest that democracies are more effective than non-democracies in improving their economic prosperity and thus health. Meanwhile the importance of executive constraint and competitive political participation is difficult to distinguish from the role that economic prosperity has for life expectancy and survivability. The experience that democracies have accumulated over time, as measured by democratic tenure, emerges

as another important determinant of life expectancy and infant health, although its specific role as a mediator or as an alternative explanation to the contemporaneous influence of democracy merits further investigation.

With the above being said, factors relating to executive accountability and to the freedom of civilian actors to participate in the public sphere may improve health by contributing to increases in standards of living. On the one hand, though, more work may be needed to substantiate this argument. On the other hand, the most critical time for these factors to be set in place may be the moments surrounding the creation of a regime and a constitution is ratified. Relatively few democracies alter their levels of executive constraint and competitive political participation over time. Some autocracies, in contrast, appear to develop systems of accountability and/or institutional infrastructures so as to compete with democracies. In particular, some autocracies seem to be adopting at least some putatively democratic ideals by allowing greater public expression from citizens and greater executive constraints than other autocracies as they modernize. While demonstrating that not all non-democratic regimes meet the stereotype of a military dictatorship and many instead embrace some putatively democratic characteristics, these results also suggest at least some risk especially for mature democracies of losing ground on the very factors that contribute to their success.

Conclusion

This dissertation offers important contributions to the literature that explores the sociopolitical determinants of population health. With a focus on complete, encompassing data, results show that democratic governance promotes stronger population health. Using alternative measures of political democracy, multiple measures of health, and a replicable, virtually complete dataset, this study supports existing literatures that demonstrate a persistent and positive impact of democracy on survivability and life expectancy. Clarifications are offered in the meantime about potential confounders, on the historical correspondence between political regimes and health, and on what mechanisms in particular may link political democracy to health. Given the careful emphasis on complete data, these results corroborate the findings of many other authors that affirm an overall positive impact of democratic governance, despite the frequent use of listwise deletion to resolve missing data in this literature.

The first part of the analysis is a response to the current literature, which relies primarily upon popular measures of the ‘level’ of democracy. A strong and positive value on the Polity scale (+10), for instance, represents a strongly democratic nation, whereas a strong and negative value (-10) represents a strongly autocratic nation and a score close to zero represents a relatively weak regime. Some studies also test the health impact of a long-standing legacy of democracy, supposing that countries that have been strongly democratic for a very long time should have the best health. These studies measure each country’s legacy of democracy (‘democratic capital’) simply by accumulating annual Polity scores up to the year in question so that a very large number represents a long-standing, strongly democratic regime at the time of measurement. These studies then

include both measures in models – the raw Polity scores and the cumulative version thereof – so as to compare the immediate impact of democracy to the impact of a long-standing legacy of democracy for health.

Results presented in Chapter 4 show that the Polity scores as a measure of the ‘level’ of democracy relate strongly and persistently to life expectancy and mortality even when controlling for the full set of variables. Results therefore support the most common conclusion of the literature thus far, which is that democracy somehow protects or facilitates good health. However, the measure of the long-standing legacy of democracy (cumulative Polity scores or ‘democratic capital’) only predicts infant mortality; for life expectancy it appears spurious controlling for the strength and legacy of autocratic and democratic regimes overall. Given the changes that occur when GDP is included in the models of life expectancy and infant mortality, results could be interpreted to suggest that strong, long-standing autocracies and democracies alike improve life expectancy and survivability by growing national revenue.

Rather than considering the ‘level’ of democracy, Chapter 5 bases the conception of democracy strictly upon whether or not a country holds free and fair elections to choose its leaders. A set of models similar to the above then tests whether democracy according to this new definition impacts population health in any way. Model estimates indicate that democratic status adds more than a decade of life expectancy, cuts infant mortality rates by more than half, and reduces overall mortality by more than a fifth. Even after ruling out GDP and experience-related variables as alternative explanations, democratic status still contributes better health as measured by all three health variables, contributing almost five years of life expectancy, more than a fifth less infant

mortality, and about 11% less overall mortality. As with the above tests, a long legacy of democracy also predicts stronger health, although GDP partly or fully mediates both the contemporaneous and long-term impact of democracy depending on the health outcome. These models again suggest support for the Economic Growth Hypothesis, but they leave open the possibility that other mechanisms may also be at play that tie democracy to health.

In tests that include variables for executive constraints and competitive political participation, democracy appears to promote life expectancy and infant health at least in part by limiting the decision-making privileges of elected leaders. Democracies also augment the freedom of unelected actors and groups to compete for political influence. Finally, perhaps as a consequence of this freedom, citizens in democratic nations are evidently more adept at creating national wealth. With this being said, GDP emerges as a prominent mediator in models predicting life expectancy and survivability. The influence of these factors is perhaps more difficult to interpret after adding the length of time regimes overall and democracies in particular have been in power since they may also somehow promote the very survivability of regimes. Nevertheless, competitive political participation retains at least some unique, positive influence. Controlling for GDP, executive constraint promotes infant health and possibly stronger life expectancy as well. Altogether, these results support some combination of the Economic Growth Hypothesis, the Accountability Hypothesis, and the Institutional Strength Hypothesis, although more research and theory may be needed to illuminate just how these factors interact to determine longevity and survivability.

Other tests of the longitudinal relationship between democracy and health

show that the influence of democracy grows stronger the longer a democratic regime has been in power. Democracy adds barely two years of life expectancy in the first year of rule but more than 14 years for those regimes that have survived a quarter century or longer. For regimes at most stages of maturity, GDP entirely explains the influence of democracy on health. The unique impact of democracy for health irrespective of national wealth is more important for countries that have middling levels of maturity, while the most mature democratic regimes appear to improve health by the largest margin, but perhaps in principal by growing revenue. Additional models showing that democracy promotes income growth further support the view that economic prosperity is a key intervening mechanism.

Implications

Rather than highlighting specific mediators, most authors discuss multiple reasons why democracy may influence population health and then test only *whether* democracy remains a correlate of health controlling for all else. In the case of the Economic Development Hypothesis, other authors construe economic development variously as a cause or consequence of health, institutional robustness, economic freedom, and the like, but they similarly do not compare the potency of these different explanations or presume a causal order among them. Evans (2009) illustrates how institutional development is a key (political) health determinant, but does not emphasize political democracy as an originating cause. Chandra and Rudra (in press) interpret competitive political participation as a cause of economic growth, but they discuss it in a way that competes with political regime type in terms of explanatory value, rather than representing it as a likely mediator. Milton and Rose Friedman (1980) produced their work during a later

stage of the Cold War and articulate how restrictions to economic freedoms could stunt economic prosperity. Drawing several examples from the history of the Communist regimes while discussing only Sweden among the Scandinavian countries and only in passing alongside the United States and Britain, they at some points seems to conflate political regimes with economic regimes and at other points follow a sort of methodological individualism via a rational choice perspective. Similarly, Stroup (2007) identifies economic freedoms as a predictor of population health, but concludes that they rule out political freedoms (including the key freedom of voting in elections) as less important, rather than interpreting one as a likely cause of the other and rather than offering an *ecological* explanation about the intervening influence of economic prosperity.

After putting these pieces together, a more encompassing, macro-social, yet also *probabilistic* argument is possible about how political democracy influences health. A clearer depiction emerges than previous studies have offered about *why* political regime type corresponds with health. Results suggest that eliminating unilateral decision-making among elected leaders may have important implications for how a country's citizens organize themselves. The executive constraints that are typical of democracies may very well liberate the public arena to the free participation of citizens in the public sphere. Unlike in a command economy, where most decisions about 'fairness' are already made or are made by fiat, the democratic economy requires the development of carefully agreed-upon codes of decorum. What results is the kind of trustworthy environment and infrastructure ideally friendly to commerce. While in many respects the ensuing economic prosperity may be the strongest link to good health, substantial constraints

to the decision-making powers of the leadership also promote life expectancy and infant health in ways that reach beyond the simple accumulation of wealth. Altogether, systems of accountability appear in this study to promote health and prosperity both directly and perhaps also by opening up the public arena to free enterprise and competition, while competitive political participation in turn supports the development of institutional infrastructures that contribute to economic prosperity and longevity. Further study would be needed, though, as many other interpretations remain preeminently possible in light of these results.

Among the contributions of this study is the use of multiple modes of analysis to take into account the historical legacy of democracy. Table 4 in particular places tension on Lipset's (1959) claim that economic prosperity 'causes' the inclination of a country to adopt political democracy. In this table, a disparity between democracies and non-democracies in terms of health starts out small in the first year a regime has been in power but grows (in the case of infant mortality and life expectancy) monotonically the longer a regime exists. Economic development explains most of this growing disparity. If the conditions promoting both health and prosperity actually occur prior to the transition to democracy, these results place more onus to specify what those conditions are. Democratic governance may at least facilitate continued improvements in both life expectancy and prosperity, which is still an argument in favour of democracy as an ongoing cause of both.

A strength of this literature is the presence of a relatively persistent correlation between political regimes and health, despite broad diversity in measures of the latter. Some authors (e.g., Franco et al., 2004; Correa & Namkoong, 1992) test multiple

health outcomes in one study while others test holistic measures of health (e.g., Klomp & de Haan, 2009). Nevertheless, most studies discuss ‘health’ broadly writ, which implies a central interest in life expectancy and overall mortality. As Marmot (2002) explains in his historical review of the population health literature, infant mortality rates are often used to test impacts of macro-social variables on health because it is one of the most sensitive measures of population health. Yet Siddiqi and Hertzman (2007) show how the overreliance on this measure of population health is unnecessary and how differences in health should be easily visible when studies are cast in a historical frame. Findings demonstrate the value of their claim by demonstrating what may be a very strong impact of political democracy not only on infant mortality but on life expectancy as well.

While using more than one method to corroborate a longitudinal association between these factors, a further contribution of this dissertation is the use of a complete dataset for life expectancy among medium-to-large countries while offering comparable results for both infant mortality and crude mortality. As noted in Chapter 1, Ross (2006) contends that the frequent use of listwise deletion against datasets affected by missing data has led to overestimates of the positive influence of democracy on health in this literature. He suspects the countries that fail to report their data to the owners of data repositories, such as the World Bank and other funding agencies, are disproportionately successful and autocratic. By removing these cases, he argues, scholars falsely affirm a tendency of democratic governance to promote stronger population health. Using a thorough, replicable approach to the problem of missing data, this dissertation is a concerted response to Ross’s counterargument. For those cases that are excluded from analysis, which were principally the smaller countries and countries that do not have a

recognizable and autonomous political regime, specific reasons are offered for why their exclusion does not harm the validity of the findings. A combination of strategies produced a dataset with 50 years of annual data that contained complete records for almost all countries larger than 500,000 people. The only exceptions were South Sudan, which became a new country in 2011 and therefore fell outside of the sample frame, Kosovo, which became a new country in 2008 and is still missing data for infant mortality, and Luxemburg, which only in 2010 passed the population threshold for inclusion in the Polity series. Results otherwise cover all autocracies including the now defunct Communist regimes of Eastern Europe, which enforced strict policies of income equality. Multiple imputation was used to address data points that remained missing in time-series, which accepting the above would seem to eliminate the last remaining concerns about missing data. The models used to impute these data are also identified clearly in Chapter 3 so as to facilitate their replicability in future studies by other authors.

Few studies thoroughly consider the conceptualization and measurement of democracy or political regimes. Findings show how this absence invites important confounders. As a measure of the 'level' of democracy, the Polity scale is bi-modally distributed and confounds democracy with the strength of regimes, irrespective of regime type. Measures of the long-term legacy of regimes that accumulate Polity scores over time inherit this problem while also conflating political regimes with the length of time regimes have held power. Issues of confounding would seem to apply to other measures of the 'level' of democracy as well. Study results illustrate the need to control for factors that apply to all regimes, irrespective of status as democratic or autocratic, in terms of the quality of their histories and the strength of their decision-making hierarchies.

Gleditsch and Ward (1997) give further reason to compare results using a categorical conception of democracy. The Polity IV series includes separate scales for democracy (*DEMOC*) and autocracy (*AUTO*C). The variable representing overall level of democracy (*POLITY*) is calculated by subtracting the autocracy scale from the democracy scale so as to define a range from total autocracy (-10) to total democracy (+10). Upon analyzing the items that are used to construct these scales, Gleditsch and Ward conclude that the manner with which a country's leaders are recruited contributes surprisingly little to the calculation of the scales. The variable for executive constraints, rather, is what principally drives the democracy subscale. Meanwhile competitive political participation contributes little to the scales.

The alternative, conception of democracy based on the Polity IV data, which distinguishes democracies according to a simple dichotomy of whether elections decide each country's leadership, may provide distinct advantages as a minimalist measure of political regime. Implementing this other conceptualization frees up two potential mediators for testing (executive constraints and competitive political participation) while allowing a more intuitive test the differences between political regimes in terms of population health. Given that there are so many diverging opinions on how to define political regimes, though, further development in their conceptualization is encouraged.

While these findings suggest important implications for each of the hypotheses discussed in this study, they also offer starting points for richer discussions of them. Some key questions are whether everyday citizens have any real control over the outcomes of elections, whether that control materializes into beneficial policy changes, and whether they even own any coherent calculus for choosing leaders. In his

philosophical treatise on the merits of democracy, Singer (1973) points out how elected officials may act on their own accord once in office. Even those with nobler intentions must still answer to a plurality of competing and sometimes contradictory wishes among their constituencies. In a more recent book, furthermore, Lenz (2012) illustrates how voters are more likely to follow the ideological fluctuations of the political parties to which they belong. While pursuing the ever elusive ‘swing voter,’ political parties may quite paradoxically influence the policy choices of voters rather than the vice-versa.

As he articulates the Accountability Hypothesis, Sen (1994) argues that the free press is a key mechanism linking voter choice to executive performance. Other authors suggest caveats to this view, however. As Graber (2003) explains, media outlets are certainly an imperfect means for the dissemination of political information. In all countries they fall victim to at least some government control, if not due to overt manipulation of the law (even in democracies) then because reporters must depend on information that politicians share only voluntarily. Politicians, in turn, may give information to the press only to the extent that it serves their own interests. In those countries where media outlets are privately owned, moreover, companies are inevitably bound to profit-seeking motives, which incline them to focus on the sensational kind of news that will “sell.” This is further complicated by strong incentives to stay ‘impartial’ and thus avoid conveying information of practical relevance to voters. For these reasons and given fluctuating tastes in news stories, the fully informed, voting citizen “does not exist and cannot exist in most advanced industrialized societies” (Graber, p. 149).

In light of these counterarguments, the Accountability Hypothesis has an admittedly psychosocial flavor. Without clarifying just how democratic leaders fulfill

their roles and how those roles fit within the broader context of society, other, more properly macro-social explanations may logically supersede it. Reliance on macro-social or multilevel conceptions of social structure like those from Bhaskar (1998), Archer (1998a; 1998b), and Martin (2009) may help shape the Accountability Hypothesis into a more recognizably ecological argument.

The Institutional Strength Hypothesis, in contrast, is a macro-social, theoretically rich and complementary, but admittedly vague proposition. While offering distinct advantages, this hypothesis pertains to the development of social infrastructure, rule of law, organizational capacity, historical legacy, and other features of ostensibly ‘developed’ societies, which would seem to overlap conceptually with issues of economic prosperity. This hypothesis seems also to hinge upon an argument that is essentially cultural in nature. It does not locate any singular ‘cause’ of either health or development, except those that co-occur with some broad social movement that suspiciously resembles post-industrial modernization. The Institutional Strength Hypothesis as Gerring and colleagues (2005; 2012) explain it argues that these various factors arise from the fundamental features of democracy: the political equality and freedom of citizens. Yet this perspective too relies upon a number of important contingencies, not the least of which is the implication that these meso-level dynamics are somehow exclusive to or at least more likely to occur in democracies. Nevertheless, these points may illustrate more the tactical difficulties of testing the Institutional Strength Hypothesis than they do its lack of validity. If one purpose of a social theory is to inspire further research, then this viewpoint makes an important stride beyond the sole reliance on the Accountability Hypothesis.

A hallmark of democracy is the ability of citizens in democratic nations to exercise some control over the social policies that govern them, if not by their direct influence over the decisions of lawmakers then by their efforts to choose those who will represent their interests well. Yet if just policies are also egalitarian policies and if the right to vote allows citizens to improve their lot in kind, then results from tests of the Inequality Reduction Hypothesis are underwhelming. Income inequality does not appear to be as strong a mediator as do other variables examined in this study. Results only marginally support the conclusion that the Gini coefficient mediates the impact of democracy on health. This is only true for life expectancy and democracy does not independently predict changes in the Gini coefficient over time.

The failure of income inequality to emerge as an important mediator warrants further discussion. In the United States, voter turnout appears to be less among people of lesser privilege. To start, economic adversity is tied to lower voter participation (Rosenstone, 1982). According to Jackson (1995) levels of education also have a particularly strong, positive correspondence with voter turnout. Given arguments from Mirowsky and Ross (2003), education evidently arms people with the tools and sense of self-efficacy needed to attend elections and cast votes. Jackson (1995) also finds that African-Americans are underrepresented amongst voters. According to Miles (2004), most of the American states permanently disenfranchise convicted felons, a group overrepresented by African-Americans, from the right to vote. He concludes, however, that this does not impact overall rates of voter turnout because people from this group rarely vote anyway. Another complication, according to Hajnal (2009), is that African-Americans who do vote more often end up having voted for the losing candidates.

Altogether, underrepresented and disenfranchised groups may be less inclined to use effectively the tools that democracy provides in order to change their own outcomes.

Such patterns appear to generalize to the global stage. Among post-communist states, Fauvelle-Aymar and Stegmaier (2008) find that voter turnout is lower in regions with higher rates of unemployment and less job opportunity. Blais and Dobrzynska (1998) find that both illiteracy rates and population size correspond negatively with voter turnout while economic development corresponds positively. In a meta-analysis of aggregate-level correlates with voter turnout figures, Geys (2006) finds that turnout is negatively associated with population growth, percentage of home renters versus owners, population mobility, and percentage minority ethnicity. Although results are mixed, he reports that some studies furthermore find a negative association between income inequality and voter turnout. All of the above would suggest the people and social groups that are least inclined to use the tools of democracy are those who need them most.

Finally, this dissertation points to a need to more assiduously consider the Economic Development Hypothesis in this literature. Questions of whether democracy promotes economic growth and whether economic growth promotes stronger population health have been controversial, however, which may explain the absence of this hypothesis in literature that explicitly links democracy to health. Controversies continue more than a half-century since some of the best-known arguments were offered about the interplay amongst democracy, prosperity, and health (Lipset, 1959; McKeown & Brown, 1955). Casabonne and Kenny (2012) argue for instance that the development and diffusion of cheap technologies, not economic development per se, are the principal cause of rising global life expectancies. This dissertation cannot hope to resolve decades-

long debates over the causes and consequences of changes in standards of living.

Nevertheless, the above findings offer important points of entry into conversations about the Economic Development Hypothesis. As to the connection to democracy, on the one hand unfettered economic freedom may not offer the most plausible solution for economic growth. Campbell (2010) contends that lax policies were principally responsible for creating the recent housing crisis in the United States. The worst recession in American history since the Great Depression ensued, sending shockwaves throughout the global economy. He blames the liberalization of the American economy from the 1970s throughout the period of the Regan Administration and beyond as the principal cause of laissez-faire economic policies. The rampant distribution of mortgage loans amidst an ongoing trend in stagnant wages resulted in frequent default, crushing the economic sustainability of many families. Moreover, laissez-faire attitudes toward economic policy may have caused a precarious level of liquidity in the market that continues today. These claims notwithstanding, Gerring and Thacker (2008) show how some economic policies that follow this much maligned movement of ‘neoliberalism’ may actually protect population health. Agreeing with Stroup (2007), results suggest economic freedoms have been quite important to the success of democracies over the past half-century. Discussion of them must reach beyond the freedoms of individuals, however, and should take into account the bureaucratic and political underpinnings of economic prosperity. Needed here is a holistic explanation that steps beyond rational choice and that conceptualizes the causes and consequences of group-level behavior to explain how a legacy of democracy influences *both* health and prosperity.

Limitations

Although this dissertation offers valuable contributions to the literature, many important caveats remain. First, it is unclear how well each of the proposed mediators tests the hypotheses introduced at the beginning of this study. As Munck and Verkuilen (2002) point out, with little explanation of the specific coding schemes from the authors (Marshall et al., 2011) the Polity IV dataset itself is not altogether replicable. Moreover, the dataset uses a convoluted algorithm for contriving the Polity scale. There was therefore little choice for analysis except to interpret at face value the various Polity IV measures and what the authors of the dataset claim about them. Nevertheless, the advantages of using this dataset are taken to outweigh the disadvantages by far. Employing this dataset for the core analysis allows a highly replicable study that invites conversation with the great many other authors who also use it for their own purposes.

Other problems emerge when considering more specific hypotheses about whether and why democracies produce good health. The Accountability Hypothesis most strongly argues that democratic leaders who support unwise policies should suffer political fallout that can end their careers. This is not what the Polity IV variable *XCONST* assesses, however. Executive constraints are instead the institutionalized mechanisms guiding the behaviors of elected leaders irrespective of the specific policies they promote. This variable simply tests the degree of decision-making freedom executive officers enjoy and by implication the degree to which they will suffer consequences for trespassing the boundaries of those privileges. While an adequate test of the Accountability Hypothesis at face value, other measures of executive accountability and consequence are worthy of consideration.

Similarly, it is unclear just what aspect of the Institutional Strength Hypothesis the Polity IV variable *PARCOMP* measures. This dissertation makes a somewhat tenuous assumption that this *PARCOMP* is a valid measure of the freedom of unelected individuals and organizations to compete for influence over public opinion. This same variable presumably tests the ability of these groups to express preferences for specific policies in the public arena. Yet the measure does not distinguish the activities of political parties that are directly invested in elections outcomes from the activities of other civilian organizations, which may confound it with electoral democracy rather than being a true mediator. While Chandra and Rudra (in press) contend that *PARCOMP* adequately captures a regime's capacity for public deliberation of policy choices, just why this should translate into the institutional reliability of a regime is less clear. Other authors (Gurr, 1974; Gerring et al., 2005; 2012) use the Polity IV dataset in quite different ways to infer the institutional robustness of a regime. Even executive constraints, although obviously pointing to the accountability of ruling officials, still require a careful, clearly defined set of rules that are encoded into policy and that thus imply some degree of institutionalization. Even regime tenure captures some sense of the stability of regimes, which would seem to overlap conceptually with institutional strength. Further analysis may be needed that offers a more thoroughgoing explication of institutional strength as an intervening cause of longevity and survivability.

Variables pertaining to the political economy are also subject to critique. Per-capita GDP (adjusted for inflation and logged) was chosen because it was a more generally available measure of national wealth that has a strong presence in this literature. However, other measures such as gross national income or measures based on

purchasing power parity may more assiduously assess national income, economic growth, and the kinds of prosperity that influence health. Moreover, GDP is an exchange-based measure that may capture social phenomena extending beyond economic prosperity. A variable researchers use to assess many different aspects of society, this is to say that the use of GDP in these models may overestimate the contribution of economic prosperity as an intervening cause of strong health.

Other measures are also available to assess income inequality, a subject of paramount importance in studies of the political economy. Net values for the Gini coefficient were used to examine the admittedly complex relationship between social inequality, political regimes, and health, however even the most reputable and extensive datasets for this variable include a preponderance of missing values. The dataset that this dissertation uses to assess income inequality, which is one of the most encompassing sources available, lacks almost half of the possible data points and this problem disproportionately impacts poor countries and autocracies. Further tests are therefore needed.

This dissertation is a concerted response to problems of missing data and accompanying shortages of statistical power. To address these issues, a dataset was created so as to offer a large number of observations while representing as many countries as possible and. Excepting tests of the Inequality Reduction Hypothesis, data imputation was needed to impute only a small minority of missing values. A key component of the strategy, though, was to use a streamlined set of the most widely available variables for analysis. Only a small selection of control variables was used, some of which were derived from existing measures. While offering a trustworthy but

basic test, more work may be necessary to rule out alternative explanations. Other phenomena may impose potent influence on health and prosperity while also pertaining to political regimes. Ethnic fractionalization, population size, and government spending patterns, for instance, are common control variables that were not considered in this study.

This analysis also excludes many important cases, namely, countries with under 500,000 people and those countries that the Polity dataset accords with non-regime status. Still excluded for instance is the country of Bosnia and Herzegovina, which the Polity IV dataset does not recognize as having a single, centralized national government. Yet this and other excluded countries still carry many of the most important properties of political regimes, including democratic (or autocratic) methods of governance. The correspondence between population size and democratic effectiveness is a complex and long-standing issue (Dahl & Tufte, 1973), but the quality of political democracy may also be quite different in smaller nations and these findings do not necessarily apply to those nations. In technical terms, if concerns about missing data can be ruled out on the basis that these data are ‘missing and random’, this still does not resolve problems of external validity to smaller nations. Population size may also exert a moderating influence on the efficacy of democracy to protect health, either strengthening it or lessening it. Future study may benefit from tests of a moderating impact of population size on the correspondence between democracy and health as well as a more encompassing sample that includes smaller nations.

Yet another problem involving sample selection is the methodology used to carry out the analysis. Whereas exploratory findings (not shown) revealed that mixed-

effects models over-controlled for within-country influences on health, Newey-West standard errors are instead used to resolve issues of autocorrelation and heteroskedasticity. However, this still leaves open the problem that an exhaustive sample set is used: *all* of the world's nations having over 500,000 people. There is an extent to which the use of inferential statistics does not make sense because this 'sample' represents an entire set of cases and was not drawn randomly from a larger set. In place of the standard frequentist approach, a Bayesian approach was therefore considered. The Bayesian perspective would have been quite plausible for the purpose as a probabilistic interpretation that appreciates the uncertainty of 'true' model parameters. However, creation of the 'prior distribution,' which is a key component of this alternative technique, would have required educated guesswork if not foreknowledge of what the outcomes of this study would have been. Other solutions might have been possible, such as the iteration of the models for each year from 1960 so as to contrive valid prior distributions. Ultimately, though, such solutions would have greatly increased processing times and some models failed to converge altogether. The current solution was therefore used since it has a clear precedent in this literature.

Last but not least, this dissertation is necessarily limited in scope. Democracy is examined as a determinant of health while ignoring many of the causes and consequences of democratization. These findings imply some very large and important literatures, such as those pertaining to industrialization, its concomitant impact of environmental sustainability, and armed conflict. Also looming amidst these findings is still the question posed by Ross (2006): "Is democracy good for the poor?" Altogether, it is unclear that democracy is a fitting solution for every nation irrespective of its set of sociopolitical

circumstances. Other exploratory analyses (not shown) revealed that ‘mixed’ regime types tended most strongly to be the world’s poorest with the worst health. If democratic transition requires passage through a weaker type of regime status, then democratic aspirations could cost many lives rather than saving lives in the shorter run. Proponents of democracy suffer substantial obligation to ensure that countries making a democratic transition have the correct kinds of infrastructures to support that transition while avoiding crisis and catastrophe. Lipset’s (1959) argument continues to echo amidst these findings, in that prosperity and infrastructure may first be needed to support democratic change, which is an especially salient point for countries that have recently experienced abrupt change or that have reverted back to autocratic rule.

Future Directions

One of the most important absences from this analysis is the exclusion of variables pertaining to civil, political, and economic liberties. Reverberating throughout these discussions is the notion that political democracy involves the availability of putatively democratic privileges and freedoms to everyday citizens. This dissertation uses an alternative conceptualization of democracy focusing strictly on free and fair elections rather than personal liberty, but doing so could facilitate tests of the latter as an intervening mechanism. In fairness, the dissertation does test the influence of everyday personal freedoms through the use of Polity IV variables pertaining to executive constraints and competitive political participation, but only loosely so. One possible extension of these results would involve appending datasets that specifically measure the different kinds of freedoms people in democracies enjoy and then examining their performance as mediators.

Another critical question is how democracies should balance aspirations for economic prosperity against the need for egalitarian social policies. The histories of the Scandinavian countries illustrate that policies of redistribution do not necessarily interfere with income growth. Whether and how such policies are conceivable and for which countries continue to be crucial questions. One recent review (Bergvist, Yngwe, & Lundberg, 2013) shows how a country's welfare state characteristics have important implications for health and how this literature is beginning to converge towards a common set of conclusions, although further research is necessary in this area. A key question is whether egalitarian social policies impede or support income growth, while other questions pertain to the intersection of political regimes with economic regimes. The failure of European communist socialism at the turn of the 1990s may indicate that policies of redistribution are difficult for command economies to sustain while being more plausible in established democracies.

In addition to addressing the above, still other opportunities offer possible next steps for this research. Autocracies and democracies alike vary substantially in quality and the Polity IV dataset allows additional categories for the former. Excluded from these findings but still widely available are mortality rates of children under 5. Further consideration of data imputation strategies such as the Bayesian framework may allow yet more thoroughgoing tests of population health. The main analysis and possible the interpretations thereof imply possible benefits using structural equation modeling. Either of these more sophisticated approaches could be used to test more complex or holistic arguments about how political regimes impact health. A Bayesian framework could also be used to address the preponderance of missing data for income inequality. Perhaps

among the most important opportunities, though, is to append data that more rigorously test hypotheses linking political regimes to health. Also needed is a more thoroughgoing examination of whether and how democracies continue to honor their commitments to accountability, civil and political liberties, etc., or whether autocracies are also starting to avail themselves of these and in so doing compete with democracies in terms of health and prosperity.

Final Comments

While offering a basic, but fairly trustworthy analysis, this study provides a coherent story about how democracy influences health. A possible explanation of these findings is that political democracy requires elected leaders to keep to protocols that are generally agreeable to the fellow citizens that they serve. Reasonable constraints to their decision-making privileges prevent them from supporting unwise policy decisions that could harm health. While improving life expectancy and infant health directly, these constraints may also facilitate the ability of unelected people and groups to compete for political influence. Yet the free, open participation of everyday citizens in the public arena, particularly if it is an acceptable measure of the quality of a country's institutional environment, would also seem to support business opportunity, infrastructure development, and other amenities that ostensibly promote growth in economic prosperity. These same factors may also support the stability of democratic regimes. Regardless, growth in economic prosperity emerges as a key outcome of political democracy and also a key determinant of health. Meanwhile a persistent, contemporaneous impact of democracy in many of the models suggests that these regimes still keep government leaders accountable to their decisions in a fairly immediate way. Altogether, these

results support – more or less in tandem – hypotheses that democracy improves health by promoting the accountability of elected officers, institutional infrastructures, and economic development. However, such arguments require further exploration than this dissertation could provide. Nor does democracy appear to improve health substantially by giving under-benefitted groups a venue through which to reduce social inequality.

Findings are naturally subject to critique using different explanatory variables, different levels of analysis, and altogether different research strategies. Even the most fundamental notions of macro-social causality may require further development. In his seminal explication of the epidemiological transition, Omran (1971) includes health, urban migration, industrialization, and economic prosperity among a ‘syndrome’ of causes that characterize modernization. Discovering which cause comes before the other is perhaps much more difficult to accomplish than first appearances suggest. Doing so may not even be necessary when using a holistic interpretation of social structure such as those proposed by Bhaskar (1998) and Archer (1998a; 1998b). There are furthermore other conceptualizations of population health to consider since different countries may bear vastly different patterns of chronic disease, infectious disease, holistic health and subjective health alongside longevity and survivability. Nevertheless, this study improves upon a tendency in this literature either to pit one cause against another and expect the ‘winning’ one to remain salient in models, to discuss diverse theoretical causes together in one set while testing only whether and not how political regimes affect health, and to test singular measures of population health. Further research is encouraged that considers the likely order and concurrence with which conceivable causes of strong population health take shape. More research and theory are needed to extend these findings.

Table 1: Descriptive Statistics.

	1960		2010		1960 - 2010	
<i>Independent Variables</i>						
	Mean	SD	Mean	SD	Mean	SD
Polity score	-0.781	7.701	3.918	6.291	0.390	7.589
Abs (Polity score)	7.276	2.544	6.854	2.783	7.179	2.490
Cumulative Polity score	-1.447	201.487	37.432	278.495	-8.110	248.364
Abs (cum. Polity score)	144.203	140.016	215.786	179.191	190.888	159.082
Democratic status	0.410	0.494	0.506	0.502	0.382	0.486
Executive constraints	3.771	2.383	5.038	2.000	4.039	2.343
Competitive political participation	2.486	1.588	3.424	1.313	2.730	1.560
Regime tenure (by Polity)	13.298	17.178	22.042	18.229	17.783	17.405
Democratic regime tenure	6.981	13.023	13.118	19.153	9.194	16.637
Regime tenure (by Democratic status)	19.699	17.049	28.783	18.878	24.536	17.934
Gini coefficient (net)	40.497	15.359	37.195	8.777	39.034	11.273
GDP per capita (logged)	8.286	1.575	8.351	1.529	8.339	1.689
<i>Dependent Variables</i>						
	Mean	SD	Mean	SD	Mean	SD
Life Expectancy	52.883	12.672	68.746	9.983	61.816	11.888
Infant Mortality Rate	98.901	64.608	30.111	28.345	59.548	48.382
Crude Death Rate	16.522	7.249	8.739	3.530	11.567	5.663
	1960 – 1970		2000 - 2010		1960 - 2010	
	Mean	SD	Mean	SD	Mean	SD
National income growth (logged)	0.313	0.440	0.011	0.532	0.057	0.557
Growth in executive constraints	-0.485	1.708	0.224	1.084	0.281	1.653
Growth in comp. pol. participation	-0.136	0.793	0.095	0.634	0.238	0.966

Table 2: Results from Models Testing the Impact of the Level of Democracy on Population Health.

	Life Expectancy											
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Polity score ^a	0.676	***	0.570	***	0.423	***	0.454	***	0.488	***	0.284	***
Abs (Polity score) ^b			1.288	***	1.154	***	0.812	***	0.763	***	0.086	
Cumulative Polity scores ^c					0.007	*	0.003		0.002		-0.004	
Abs (cumulative Polity scores) ^d							0.017	***	0.012	*	0.001	
Regime tenure ^e									0.066		0.017	
GDP per capita											4.729	***

	Infant Mortality Rates											
	Model 7		Model 8		Model 9		Model 10		Model 11		Model 12	
Polity score ^a	0.943	***	0.950	***	0.976	***	0.974	***	0.973	***	0.984	***
Abs (Polity score) ^b			0.880	***	0.906	***	0.935	***	0.936	***	0.978	†
Cumulative Polity scores ^c					0.998	***	0.999	***	0.999	***	0.999	***
Abs (cumulative Polity scores) ^d							0.998	***	0.999	***	1.000	†
Regime tenure ^e									0.998		1.002	
GDP per capita											0.704	***

Crude Death Rates

	Model 13		Model 14		Model 15		Model 16		Model 17		Model 18	
Polity score ^a	0.986	***	0.988	**	0.988	**	0.987	**	0.985	**	0.995	
Abs (Polity score) ^b			0.978	*	0.978	*	0.987		0.990		1.014	†
Cumulative Polity scores ^c					1.000		1.000		1.000		1.000	*
Abs (cumulative Polity scores) ^d							1.000	†	1.000		1.000	
Regime tenure ^e									0.996	†	0.998	
GDP per capita											0.845	***

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

^a The raw Polity scores assess the ‘level’ of democracy, with values of +10 representing complete democracies and -10 representing complete autocracies.

^b Absolute values of the Polity scores reflect ‘regime coherence’ (Gurr, 1974), or variously ‘regime strength’, i.e., the degree to which a polity is *either* highly autocratic *or* highly democratic.

^c This variable accumulates prior scores on the Polity scale for any given country-year while applying a 1% rate of annual depreciation. Following the conception of ‘democratic capital,’ cumulative Polity scores essentially capture the long-term legacy of a polity as strongly democratic, with highly positive values representing established democracies and highly negative values representing established autocracies.

^d Similar to the absolute value of the raw Polity scores, the absolute value of cumulative Polity scores assesses the degree to which a polity is *either* a long-established, strong autocracy *or* a long-established, strong democracy, with values close to zero reflecting ‘mixed’ regime types that are either less established or institutionally weaker polities.

^e Regime tenure in these models is derived from the Polity IV variable *DURABLE*, which uses large, abrupt changes in Polity scores from one year to the next to determine change in political regimes. So as to be comparable to the other variables, a 1% annual depreciation rate is applied and the resulting variable is regarded as the long-term legacy of polities irrespective of regime type and irrespective of the strength of the regimes.

Table 3: Results from Regression Models Testing the Impact of Electoral Democracy on Population Health.

		Life Expectancy							
		Model 1		Model 2		Model 3		Model 4	
Democracy ^a		10.823	***	5.408	***	7.683	***	4.803	***
Democratic tenure ^b				0.225	***	0.136	*	-0.072	†
Regime tenure ^c						0.090	†	0.052	
GDP per capita								4.750	***

		Infant Mortality Rates							
		Model 5		Model 6		Model 7		Model 8	
Democracy ^a		0.426	***	0.740	***	0.702	***	0.791	**
Democratic tenure ^b				0.972	***	0.974	***	0.990	**
Regime tenure ^c						0.998		1.000	
GDP per capita								0.692	***

		Crude Death Rates							
		Model 9		Model 10		Model 11		Model 12	
Democracy ^a		0.788	***	0.861	**	0.788	***	0.884	*
Democratic tenure ^b				0.996	*	0.9997		1.008	**
Regime tenure ^c						0.996		0.997	
GDP per capita								0.856	***

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

^a Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

^b Democratic tenure is the number of years since a regime has last switched from being an autocracy to a democracy, based on the above definition and after applying a rate of annual depreciation at 1%. Democratic tenure is essentially the same as the interaction term multiplying democratic status by regime tenure, but is included separately in these models for the convenience of the reader as a comparison to the concept of ‘democratic capital.’

^c This variable is reset to 1 for any year in which a political regime has switched from autocracy to democracy or vice-versa. Regime tenure is the same as democratic tenure, but also includes the length of time since transition alternatively from democracy to autocracy after applying a rate of annual depreciation at 1%.

Table 4: Results from Models Testing the Impact of Electoral Democracy and GDP on Population Health According to the Length of Time a Regime Has Been in Power.

		Life Expectancy															
		First year of rule		1 < Years of rule <= 10		10 < Years of rule <= 25		Years of rule > 25									
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8								
Democracy		2.038	*	0.883		5.170	***	1.546		11.662	***	5.292	***	14.008	***	2.591	
GDP per capita				5.502	***			5.089	***			4.565	***			4.559	***

		Infant Mortality Rates															
		First year of rule		1 < Years of rule <= 10		10 < Years of rule <= 25		Years of rule > 25									
		Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16								
Democracy [±]		0.871	*	0.885	*	0.719	***	0.867		0.433	***	0.645	**	0.228	***	0.530	***
GDP per capita				0.695	***			0.702	***			0.709	***			0.674	***

		Crude Death Rates															
		First year of rule		1 < Years of rule <= 10		10 < Years of rule <= 25		Years of rule > 25									
		Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24								
Democracy [±]		0.972		1.013		0.852	**	0.966		0.716	***	0.915		0.770	***	1.200	
GDP per capita				0.839	***			0.842	***			0.865	***			0.863	***

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

[±] Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

Table 5: Results from Regression Models Testing the Intervening Effects of Executive Constraints and Competitive Political Participation.

	Life Expectancy							
	Model 1		Model 2		Model 3		Model 4	
Democracy ^a	6.082	***	4.476	**	3.672	*	2.933	*
Executive constraints ^b	1.224	***	0.574		0.588		0.515	†
Competitive political participation ^c			1.720	**	1.185	†	0.113	
Democratic tenure ^d					0.090		-0.085	†
Regime tenure ^e					0.099	†	0.057	†
GDP per capita							4.688	***

	Infant Mortality Rates							
	Model 5		Model 6		Model 7		Model 8	
Democracy ^a	0.650	***	0.736	*	0.980		0.999	
Executive constraints ^b	0.891	***	0.944	*	0.963		0.956	*
Competitive political participation ^c			0.837	***	0.878	*	0.953	
Democratic tenure ^d					0.977	***	0.992	*
Regime tenure ^e					0.998		1.000	
GDP per capita							0.695	***

	Crude Death Rates							
	Model 9		Model 10		Model 11		Model 12	
Democracy ^a	0.858	*	0.874	*	0.847	*	0.865	*
Executive constraints ^b	0.978		0.985		0.984		0.990	
Competitive political participation ^c			0.980		0.989		1.033	
Democratic tenure ^d					1.000		1.007	*
Regime tenure ^e					0.996		0.997	
GDP per capita							0.854	***

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

^a Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

^b Executive constraints are the degree of institutionalized restriction to the decision-making powers

of chief executives, whether they are elected leaders of a nation or autocratic rulers. It is used in this study to test the Accountability Hypothesis.

- ^c Competitive political participation is the degree to which participation in the political sphere and competition for influence over public opinion are free from government control. Because this variable implies the extent to which citizens are able to form their own autonomous organizations, including but not limited to political parties, it is used in this study to test the Institutional Strength Hypothesis.
- ^d Democratic tenure is the number of years since a regime has last switched from being an autocracy to a democracy, based on the above definition and after applying a rate of annual depreciation at 1%. Democratic tenure is essentially the same as the interaction term multiplying democratic status by regime tenure, but is included separately in these models for the convenience of the reader as a comparison to the concept of ‘democratic capital.’
- ^e This variable is reset to 1 for any year in which a political regime has switched from autocracy to democracy or vice-versa. Regime tenure is the same as democratic tenure, but also includes the length of time since transition alternatively from democracy to autocracy after applying a rate of annual depreciation at 1%.

Table 6: Results from Models Testing the Inequality Reduction Hypothesis.

	Life Expectancy		Infant Mortality Rates		Crude Mortality Rates	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Democracy ^a	6.124 ***	5.364 ***	0.699 **	0.716 **	0.822 **	0.816 **
Democratic tenure ^b	0.158 **	0.120 *	0.973 ***	0.976 ***	1.000	1.000
Regime tenure ^c	0.035	0.009	0.999	1.002	0.998	0.997
Gini (net)		-0.310 ***		1.037 ***		0.999

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

^a Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

^b Democratic tenure is the number of years since a regime has last switched from being an autocracy to a democracy, based on the above definition and after applying a rate of annual depreciation at 1%. Democratic tenure is essentially the same as the interaction term multiplying democratic status by regime tenure, but is included separately in these models for the convenience of the reader as a comparison to the concept of ‘democratic capital.’

^c This variable is reset to 1 for any year in which a political regime has switched from autocracy to democracy or vice-versa. Regime tenure is the same as democratic tenure, but also includes the length of time since transition alternatively from democracy to autocracy after applying a rate of annual depreciation at 1%.

Table 7: Results from Models Predicting Decade-Long Percentage Growth in Per-Capita GDP

	Model 1		Model 2		Model 3		Model 4	
Democracy ^a	1.287	***	1.130	†	1.023		1.007	
Executive constraints ^b			1.034	*	0.995		0.995	
Competitive political participation ^c					1.118	***	1.117	***
Democratic tenure ^d							1.001	
Regime tenure ^e							0.999	
GDP per capita (logged)	0.918	***	0.914	***	0.901	***	0.902	***

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

^a Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

^b Executive constraints are the degree of institutionalized restriction to the decision-making powers of chief executives, whether they are elected leaders of a nation or autocratic rulers. It is used in this study to test the Accountability Hypothesis.

^c Competitive political participation is the degree to which participation in the political sphere and competition for influence over public opinion are free from government control. Because this variable implies the extent to which citizens are able to form their own autonomous organizations, including but not limited to political parties, it is used in this study to test the Institutional Strength Hypothesis.

^d Democratic tenure is the number of years since a regime has last switched from being an autocracy to a democracy, based on the above definition and after applying a rate of annual depreciation at 1%. Democratic tenure is essentially the same as the interaction term multiplying democratic status by regime tenure, but is included separately in these models for the convenience of the reader as a comparison to the concept of ‘democratic capital.’

^e This variable is reset to 1 for any year in which a political regime has switched from autocracy to democracy or vice-versa. Regime tenure is the same as democratic tenure, but also includes the length of time since transition alternatively from democracy to autocracy after applying a rate of annual depreciation at 1%.

Table 8: Results from Models Predicting Decade-Long Levels of Growth in Executive Constraints and Competitive Political Participation.

	Executive Constraints				Competitive Political Participation			
	Model 1		Model 2		Model 3		Model 4	
Democracy [‡]	0.158		0.186		0.144		0.185	
Length of rule >= 10 years	0.260	*	0.270	*	0.201	*	0.215	*
Democracy X length of rule >= 10 years	-0.492	**	-0.463	**	-0.401	**	-0.358	*
GDP per capita (logged)			-0.025				-0.037	

*** p < 0.001 ** p < 0.01 * p < 0.05 † p < 0.10

[‡] Based on the Polity IV variables *XRREG*, *XROPEN*, and *XRCOMP*, democracy is operationalized in these models as an indicator affirming whether a regime chooses its leaders through regular, free, fair, and competitive elections.

References

- Alvarez, M., Cheibub, J. A., Limongi, F., & Przeworski, A. (1996). Classifying Political Regimes. *Studies in Comparative International Development*, 31, 2, 3-36.
- Arat, Z. F. (1991). *Democracy and human rights in developing countries*. Boulder, CO: Lynne Rienner.
- Archer, M. (1998a). Introduction. In M. Archer, R. Bhaskar, A. Collier, T. Lawson, & A. Norrie (Eds.). *Critical realism: Essential readings* (pp. 189 - 205). New York: Routledge.
- Archer, M. (1998b). Realism and morphogenesis. In M. Archer, R. Bhaskar, A. Collier, T. Lawson, & A. Norrie (Eds.). *Critical realism: Essential readings* (pp. 356 - 381). New York: Routledge.
- Aristotle. (1996). *The politics and constitution of Athens* (Rev. student ed.). (S. Everson, Ed.). New York: Cambridge University Press.
- Baum, M. A., & Lake, D. A. (2003). The political economy of growth: Democracy and human capital. *American Journal of Political Science*, 47, 2, 333-347.
- Bergvist, K., Yngwe, M. Å., & Lundberg, O. (2013). Understanding the role of welfare state characteristics for health inequalities – An analytical review. *BMC Public Health* 2013, 13, 1234.
- Besley, T., & Kudamatsu, M. (2006). Health and democracy. *The American Economic Review*, 96, 2, 313-318.
- Bhaskar, R. (1998). *The possibility of naturalism* (3rd ed.). New York: Routledge.
- Blais, A., & Dobrzynska, A. (1998). Turnout in electoral democracies. *European Journal of Political Research*, 33, 239-261.

- Campbell, J. L. (2010). Neoliberalism in criss: Regulatory roots of the U.S. financial meltdown. In M. Lounsbury & M. Hirsch, *Markets on Trial: The Economic Sociology of the U.S. Financial Crisis, Part B, Research in the Sociology of Organizations*, Vol. 30B, 65-101. Bingley, United Kingdom: Emerald Group.
- Casabonne, U., & Kenny, C. (2012). The best things in life are (nearly) free: Technology, knowledge, and global health. *World Development*, 40, 1, 21-35.
- Cereseto, S., & Waitzkin, H. (1986). Economic development, political-economic system, and the physical quality of life. *American Journal of Public Health*, 76, 6, 661-665.
- Chandra, S., & Rudra, N. (In press). Reassessing the links between regime type and economic performance: Why some authoritarian regimes show stable growth and others do not. *British Journal of Political Science*.
- Correa, H., & Namkoong, K. (1992). Determinants and effects of health policy. *Journal of Policy Modeling*, 14(1), 41-63.
- Dahl, R. A., & Tufte, E. R. (1973). *Size and democracy*. Stanford, CA: Stanford University Press.
- Eckstein, H. (1969). Authority relations and governmental performance: A theoretical framework. *Comparative Political Studies*, 2, 269 – 325.
- Eckstein, H. (1997, July 15). Congruence theory explained. Center for the Study of Democracy Working Paper, University of California-Irvine. Downloaded November 3, 2013 from <http://escholarship.org/uc/item/2wb616g6>.
- Engels, J. M., & Diehr, P. (2003). Imputation of missing longitudinal data: A comparison of methods. *Journal of Clinical Epidemiology*, 56, 968-976.

- Evans, P. (2009). Population health and development: An institutional-cultural approach to capability expansion. In P. A. Hall, & M. Lamont (Eds.). *Successful Societies: How Institutions and Culture Affect Health* (pp. 104-127). New York: Cambridge University Press.
- Fauvelle-Aymar, C., & Stegmaier, M. (2008). Economic and political effects on European Parliamentary electoral turnout in post-communist Europe. *Electoral Studies*, 27, 4, 661-672.
- Franco, Á., Álvarez-Dardet, C., & Ruiz, M. T. (2004). Effect of democracy on health: Ecological Study. *BMJ: British Medical Journal*, 329, 7480, 1421-1423.
- Frey, R. S., & Al-Roumi, A. (1999). Political democracy and the physical quality of life: The cross-national evidence. *Social indicators Research*, 47, 73-97.
- Friedman, M., & Friedman, R. (1980). *Free to choose: A personal statement*. Orlando, FL: Harcourt.
- Gelman, A., & Hill, J. (2007). *Data analysis using regression and multilevel / hierarchical models*. New York: Cambridge University Press.
- Gerring, J., Thacker, S. C., & Alfaro, R. (2012). Democracy and human development. *The Journal of Politics*, 74, 1, 1-17.
- Gerring, J., Bond, P. J., Barndt, W. T., & Moreno, C. (2005). Democracy and economic growth: A historical perspective. *World Politics*, 57, 3, 323-364.
- Gerring, J., & Thacker, S. C. (2008). Do neoliberal economic policies kill or save lives? *Business and Politics*, 10, 3, Article 3.
- Geys, B. (2006). Explaining voter turnout: A review of aggregate-level research. *Electoral*

- studies, 25, 4, 637-663.
- Giddens, A. (1986). *The constitution of society: Outline of the theory of structuration*. Berkeley, CA: University of California Press.
- Gleditsch, K. S., & Ward, M. D. (1997). Double take: A reexamination of democracy and autocracy in modern polities. *The Journal of Conflict Resolution*, 41, 3, 361-383.
- Gonzalez-Ocantos, E., de Jonge, C. K., Meléndez, C., Osorio, J., & Nickerson, D. W. (2012). Vote buying and social desirability bias: Experimental evidence from Nicaragua. *American Journal of Political Science*, 56, 1, 202–217
- Graber, D. (2003). The media and democracy: Beyond myths and stereotypes. *Annual Review of Political Science*, 6, 139 - 160.
- Gurr, T. R. (1974). Persistence and Change in Political Systems, 1800-1971. *American Political Science Review*, 68, 4, 1482-1504
- Hadenius, A. (1992). *Democracy and development*. Cambridge, UK: Cambridge University Press.
- Hajnal, Z. (2009). Who loses in American democracy? A count of votes demonstrates the limited representation of African Americans. *American Political Science Review*, 103, 1, 37-57.
- Hodgson, G. (1986). Behind methodological individualism. *Cambridge Journal of Economics* 1986, 10, 211-224.
- Jackson, R. A. (1995). Clarifying the relationship between education and turnout. *American Politics Research*, 23, 3, 279-299.
- Jagers, K., & Gurr, T. R. (1995). Tracking democracy's third wave with the Polity III data. *Journal of Peace Research*, 32, 4, 469-482.

- Keefer, P. (2007). Clientelism, credibility, and the policy choices of young democracies. *American Journal of Political Science*, 51, 4, 804-821.
- Klomp, J., & de Haan, J. (2009). Is the political system really related to health? *Social Science and Medicine*, 69, 36 – 46.
- Knutsen, C. H. (2012). Democracy and economic growth: A survey of arguments and results. *International Area Studies Review*, 15(4), 393–415
- Lenz, G. S. (2012). *Follow the leader? How votes respond to politicians' policies and performance*. University of Chicago Press.
- Lin, R.-T., Chen, Y.-M., Chien, L.-C., & Chan, C.-C. (2012). Political and social determinants of life expectancy in less developed countries: A longitudinal study. *BMC Public Health*, 12:85.
- Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behaviour*, 35, Special Issue, 80 – 94.
- Link, B. G., & Phelan, J. (2010). Social conditions as fundamental causes of health inequalities. In C. Bird, P. Conrad, A. Fremont, & S. Timmermans (Eds.), *Handbook of medical sociology* (6th ed.). Nashville, TN: Vanderbilt University Press.
- Lipset, S. M. (1959). Some social requisites of democracy: Economic development and political legitimacy. *American Political Science Review*, 53, 69-105.
- London, B., & Williams, B. A. (1990). National politics, international dependency, and basic needs provision: A cross-national analysis. *Social Forces*, 69, 2, 565-584.
- Mansfield, E. D., & Snyder, J. (2002). Democratic transitions, institutional strength, and war. *International Organization*, 56, 2, 297-337.

- Marmot, M. (2002). The influence of income on health: Views of an epidemiologist. *Health Affairs*, 21, 2, 31-46.
- Marshall, M. G., Jaggers, K., & Gurr, T. R. (2011). *Polity IV Project: Political regime characteristics and transitions, 1800-2010. Dataset user's manual*. Vienna, VA: Center for Systemic Peace.
- Martin, J. L. (2009). *Social structures*. Princeton, NJ: Princeton University Press.
- McGuire, J. W. (2013). Political regime and social performance. *Contemporary Politics*, 19, 1, 55-75
- McKeown T. (1976). *The Modern Rise of Population*. London: Edward Arnold.
- McKeown T. (1988). *The Origins of Human Disease*. Oxford: Basil Blackwell.
- McKeown, T., & Brown, R. G. (1955). Medical evidence related to English population changes in the eighteenth century. *Population Studies*, 9, 2, 119-141.
- McKnight, P. E., McKnight, K. M., Sidani, S., & Figueredo, A. J. (2007). *Missing data: A gentle introduction*. New York: The Guilford Press.
- Miles, T. J. (2004). Felon disenfranchisement and voter turnout. *Journal of Legal Studies*, 33, 85-129.
- Mill, J. S. (1978). *On liberty*. (E. Rapaport, Ed.). Indianapolis, IN: Hackett. (Originally published in 1859)
- Mirowsky, J., & Ross, C. E. (2003). *Education, social status, and health*. Aldine de Gruyter.
- Moon, B. E., & Dixon, W. J. (1985). Politics, the state, and basic human needs: A cross-national study. *American Journal of Political Science*, 29, 4, 661-694.
- Moore, B., Jr. (1966). *Social origins of dictatorship and democracy: Lord and peasant in the*

- making of the modern world. Boston, MA: Beacon Press.
- Munck, G. L., & Verkuilen, J. (2002). Conceptualizing and measuring democracy: Evaluating alternative indices. *Comparative Political Studies*, 35, 1, 5-34.
- Muntaner, C., Borrell, C., Ng, E., Chung, H., Espelt, A., Rodriguez-Sanz, M., Benach, J., & O'Campo, P. (2011). Review article: Politics, welfare regimes, and population health: Controversies and evidence. *Sociology of Health and Illness*, 33, 6, 946-964.
- Navia, P., & Zweifel, T. D. (2003). Democracy, dictatorship, and infant mortality revisited. *Journal of Democracy*, 14, 3, 90 - 103.
- Omran, A. R. (1971). The epidemiologic transition: A theory of the epidemiology of population change. *The Milbank Memorial Fund Quarterly*, 49, 4, Part 1, 509-538.
- Persson, T., & Tabellini, G. (2006). Democratic capital: The nexus of political and economic change. National Bureau of Economic Research Working Paper # 12175. Downloaded on July 28, 2013 from <http://www.nber.org/papers/w12175>.
- Porpora, D. V. (1998). Four concepts of social structure. In M. Archer, R. Bhaskar, A. Collier, T. Lawson, & A. Norrie (Eds.). *Critical realism: Essential readings* (pp. 339 - 382). New York: Routledge.
- Przeworski, A. (1991). *Democracy and the Market: Political and Economic Reforms in Eastern Europe and Latin America*. New York: Cambridge University Press.
- Riley, J. C. (2001). *Rising life expectancy: A global history*. New York: Cambridge University Press.
- Rosenstone, S. J. (1982). Economic adversity and voter turnout. *American Journal of Political Science*, 26, 1, 25-46.

- Ross, M. (2006). Is democracy good for the poor? *American Journal of Political Science*, 50, 4, 860-874.
- Safaei, J. (2006). Is democracy good for health? *International Journal of Health Services*, 36, 4, 767-786.
- Sen, A. (1994, January 10 & 17). Freedom and needs: An argument for the primacy of political rights. *The New Republic*, 210 (2/3), 31 – 38.
- Shandra, M., Nobles, J., London, B., & Williamson, J. B. (2004). Dependency, democracy, and infant mortality: A quantitative, cross-national analysis of less developed countries. *Social Science & Medicine*, 59, 321-333.
- Siddiqi, A., & Hertzman, C. (2007). Towards an epidemiological understanding of the effects of long-term institutional changes on population health: A case study of Canada versus the USA. *Social Science & Medicine*, 64, 589-603.
- Simpser, A., & Donno, D. (2012). Can international election monitoring harm governance? *The Journal of Politics*, 74, 2, 501-513.
- Singer, P. (1973). *Democracy and disobedience*. Oxford: Clarendon Press.
- Sleifer, J. (2006). *Planning ahead and falling behind: The East German economy in comparison with West Germany, 1936 - 2002*. Berlin, Germany: Akademie Verlag GmbH.
- Solt, F. (2009). Standardizing the World Income Inequality Database. *Social Science Quarterly*, 90, 2, 231-242. SWIID Version 4.0, September 2013.
- Stroup, M. D. (2007). Economic freedom, democracy, and the quality of life. *World Development*, 35, 1, 52-66.
- Webster's New Collegiate Dictionary. (1977). Springfield, MA: G. & C. Merriam Co.

- Wigley, S., & Akkoyunlu-Wigley, A. (2011). The impact of regime type on health: Does redistribution explain everything? *World Politics*, 63, 4, 647-677.
- Wilkinson, R. G., & Pickett, K. E. (2006). Income inequality and population health: A review and explanation of the evidence. *Social Science and Medicine* 62(7), 1768-1784.
- Wilkinson, R. G., & Pickett, K. E. (2010). *The spirit level: Why greater equality makes societies stronger*. New York: Bloomsbury Press.
- Zweifel, T. D., & Navia, P. (2000). Democracy, dictatorship, and infant mortality. *Journal of Democracy*, 11, 2, 99-114.