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# THE IMPACT OF REGIME TYPE ON HEALTH

## Does Redistribution Explain Everything?

By SIMON WIGLEY and ARZU AKKOYUNLU-WIGLEY\*

### INTRODUCTION

THE is a small but growing number of cross-national studies that purport to show that democracies produce healthier populations than autocracies.<sup>1</sup> This denotes an interesting departure from the usual focus in the political economy literature on the effects of political institutions on economic outcomes. More direct measures of human well-being, such as the ability to avoid preventable illness and premature death, promise to provide a more meaningful basis for assessing institutional arrangements. However, the prevailing explanation for the association between regime type and health focuses on the effect of policy-making on the distribution of material resources. It is argued that democratic societies are healthier than their autocratic counterparts because elected representatives must satisfy a wider range of supporters and, therefore, ensure that health-enhancing resources such as health and education services reach a broader segment of the population. In this article we consider whether democratic governance also has a pro-health effect regardless of its impact on public redistributive policies. In other words, does a country that transitions from autocratic to democratic rule undergo an improvement in population health even if its public redistributive policies remain unchanged?

The article is composed of two parts. In the first section we briefly review the political economy literature on the link between regime type

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<sup>1</sup> See Besley and Kudamatsu 2006; Álvarez-Dardet and Franco-Giraldo 2006; Franco, Álvarez-Dardet, and Ruiz 2004; Gerring, Thacker, and Alfaro 2007; Zweifel and Navia 2000.

and health. We then outline the various ways in which regime type may nondistributively influence population health. In the second section we use a panel of 153 countries for each year from 1972–2000 to test the hypothesis that democratic governance alone, irrespective of its impact on the distribution of health-promoting resources, has a positive influence on health. More specifically, we examine whether regime type continues to have an effect on life expectancy when controls are introduced for the distribution of health-promoting resources such as health care, education, welfare transfers, and food. We then use a panel of fifty autocratic countries for the years 1994–2007 to examine whether media freedom by itself, regardless of government responsiveness, has a positive impact on life expectancy. We find that the health dividend of democratic rule and media freedom is not erased when controls are introduced for, respectively, government spending and government responsiveness.

### THE DISTRIBUTIVE EFFECTS OF REGIME TYPE

In theory at least, democratic countries tend to produce healthier societies by virtue of the fact that elected representatives are accountable to voters, subject to pressure by autonomous interest groups, and vulnerable to public criticism. People who live in a democratic polity are able to penalize governments whose policies fail to adequately prevent or treat ill health. As a corollary to bottom-up pressure by voters and interest groups, there is also a competitive struggle between political elites for votes. As result of that competition candidates have an incentive to capture previously ignored votes in order to be elected to office. Thus, the number of citizens who benefit from public provisioning increases as candidates seek to broaden their support base. In autocracies, however, the cost of political participation in order to change the leadership is high due to the threat of reprisals. Thus, because there is little or no competition for votes, there are typically fewer incentives for autocrats to redistribute income or provide social services.<sup>2</sup>

Allan Meltzer and Scott Richard present perhaps the most influential political economy model of the distributional effects of democratic versus autocratic governments.<sup>3</sup> The basic claim underpinning their model is that redistribution and investment in public services increases

<sup>2</sup> Dahl 1971. See also McGuire and Olson 1996; Bueno de Mesquita, Smith, Siverson, and Morrow 2002; Ghobarah, Huth, and Russett 2003, 191; Lake and Baum 2001, 593–96.

<sup>3</sup> Meltzer and Richard 1981. See also Acemoglu and Robinson 2005, and Boix 2003.

in democracies when the income of the median voter—whose preferences determine public policy—is below the mean. In contrast, autocratic governments need only serve the interests of the wealthy elite; therefore redistribution is less likely to take place.

In keeping with that theoretical prediction, there is some empirical evidence in support of the claim that the desire to win votes coupled with exposure to interest-group pressure and public criticism helps to ensure the adequate provisioning of social services and thus improves the health of the population. Amartya Sen, for example, notes that famine has not occurred in an independent country where there are regular and competitive elections and a relatively free press.<sup>4</sup> There are also a number of cross-national studies that show that democracies devote more resources to health and education than autocracies.<sup>5</sup>

Nevertheless, Michael Ross presents evidence that leads to questions regarding the linkage between democracy and the delivery of resources to the neediest.<sup>6</sup> The poorest segment of the population is typically afflicted by higher rates of infant and child mortality.<sup>7</sup> Moreover, the causes of mortality among the very youngest are typically easier to prevent than the causes of mortality in the adult population. Furthermore, mortality among the very young can be prevented by inexpensive interventions such as oral rehydration therapy, antibiotics, or immunization. Yet Ross finds that in an area where public provisioning can have the most significant impact on mortality, democracies appear to perform no better than autocracies. Thus, while democratic governance may increase overall social spending (and, therefore, the life expectancy of the overall population), it may not ensure that social services reach the poor (and, therefore, does not increase the life expectancy of the least advantaged). As has been often noted, much depends on how well each government targets public spending rather than on how much is spent.<sup>8</sup> Ross's study suggests that democracies are no better than autocracies at targeting public services to the least advantaged.<sup>9</sup>

<sup>4</sup> Sen 1999, 152–53.

<sup>5</sup> See, for example, Brown and Hunter 1999; Deacon 2009; Ghobarah, Huth, and Russett 2004; Kaufman and Segura-Ubiergo 2001; Lake and Baum 2001; Lindert 2004, chaps.15–17; Przeworski, Alvarez, Chiebub, and Limongi 2000; Stasavage 2005.

<sup>6</sup> Ross 2006. See also Mulligan, Gil, and Sala-i-Martin 2004, and Nelson 2007.

<sup>7</sup> Gwatkin 2004, 5–6.

<sup>8</sup> See, for example, Bidani and Ravallion 1997; Filmer and Pritchett 1999; McGuire 2005.

<sup>9</sup> Striking evidence to the contrary is presented by Kudamatsu 2010. Using demographic health surveys from twenty-eight sub-Saharan African countries, Kudamatsu finds that the mortality rate of infants born from the same mother was reduced by 1.2 percentage points following the democratization that took place in those countries during the 1990s.

One explanation for this apparent failure is that the poor comprise a comparatively small constituency. The seminal Meltzer-Richard model introduced above predicts that the middle-income classes represent the decisive voters and so the low-income classes may not necessarily be targeted by those competing for political power. Thus, a growing number of scholars argue that the extent to which the poor in democracies actually benefit from social spending depends on the electoral rules that have been adopted.<sup>10</sup>

A further explanation for this failure is that young democracies are not as good as more established democracies at targeting social services.<sup>11</sup> In new democracies, political leaders are not sufficiently accountable until the formal procedures of democratic rule become entrenched, voters become accustomed to exercising their newfound political and civil rights, and a network of voluntary associations (such as political parties, pressure groups, and trade unions) has had time to emerge. This suggests that the pro-health effect of democracy is dependent on the stock of democracy accumulated over an extended period of time, rather than on the flow of democracy at any given time. In support of that claim, Timothy Besley and Masayuki Kudamatsu present evidence that the pro-health effect of democracy is primarily dependent on whether democratic institutions have persisted over time.<sup>12</sup> Similarly, John Gerring and colleagues find that long-term democratic experience—but not short-term democratic experience—is a significant determinant of infant mortality.<sup>13</sup> We assume that the extent to which democratic rule is entrenched is equally important for the nondistributional effects that we now introduce. As such, the regime variable we include in our empirical models is constructed to reflect the accumulated stock of democracy.

### THE NONDISTRIBUTIVE EFFECTS OF REGIME TYPE

According to the distributional thesis, political institutions influence population health because they determine access to resources that are crucial for avoiding preventable morbidity and premature mortality

<sup>10</sup> Iversen and Soskice 2006; Persson and Tabellini 2003, 17–18. Elsewhere we find that greater electoral proportionality is negatively associated with infant mortality and positively associated with life expectancy, and that proportionality conditions the impact of aggregate health spending on infant mortality. See Wigley and Akkoyunlu-Wigley, forthcoming.

<sup>11</sup> Gerring, Thacker, and Alfaro 2007; Keefer 2007; Keefer and Khemani 2005; Persson and Tabellini 2006.

<sup>12</sup> Besley and Kudamatsu 2006.

<sup>13</sup> Gerring, Thacker, and Alfaro 2007.

(for example, health care, schooling, income, and food). Our primary contention is that the distributional thesis does not fully capture the impact of democratic governance on health. If that hypothesis turns out to be correct, then, everything else being equal, we expect a country that transitions from autocratic to democratic rule to eventually experience an improvement in population health even if its social and economic policies remain unchanged. It is incumbent upon us, therefore, to provide a theoretically plausible account of what the nondistributional effect might entail as well as empirical evidence for such an effect.

We contend that democratic governance will have salutary effect on health regardless of public policy because it permits active participation in the decision-making process, and because of the protection afforded to the individual by civil and political rights. We consider four pathways—autonomy, social capital, collective action, and information diffusion—through which active participation and rights protection can have a nondistributive effect on health. While both aspects of democratic rule are crucial to the first two pathways, autonomy and social capital, rights protection alone is the key feature of the second two, collective action and information diffusion.

#### AUTONOMY

Epidemiological research into the social determinants of health suggests that being subordinate to the authority of another can have a negative effect on mental and physical health. Perhaps the most striking evidence for the pro-health effect of autonomy is provided by the Whitehall studies of health differentials among British civil servants. Those longitudinal cohort studies find that individuals in the least senior job position (junior office support staff) have a mortality rate three times higher than individuals in the most senior job position (senior administrators).<sup>14</sup> Significantly, that result followed even when the researchers controlled for income, access to medical care, lifestyle choices (smoking, high cholesterol, diet, etc.), genetic predisposition, and upbringing.<sup>15</sup> These studies show that even among individuals who are not impoverished, relative status is a significant determinant of inequalities in health. The researchers conclude that the extent to which individuals perceive they have control over their lives plays a significant role in determining their health.<sup>16</sup>

<sup>14</sup> Marmot et al. 1997; van Rossum et al. 2000.

<sup>15</sup> Marmot 2004a, 38–58.

<sup>16</sup> Marmot 2004b, 52–54.

The standard biomedical explanation for the pro-health effect of autonomy is that it reduces exposure to chronic stress, for example, because the individual is less vulnerable to the arbitrary will of someone he or she is subordinate to or dependent upon. The mechanisms that are designed to protect and restore the body in response to stress—cortisol levels, for example—can have a damaging effect on the body if they are continually activated.<sup>17</sup> Thus, greater control over one's life reduces an individual's exposure to chronic stress and, therefore, the damaging effects that result from higher basal cortisol levels.

Democratic regimes may generate an autonomy effect because, (1) they permit most of the population to participate in the governing process, and (2) because they are typically more protective of individual rights. Regarding the first, democratic governance may have a direct effect in the broad sense that each citizen has at least some influence over the decision-making process. The representatives that citizens elect define the laws that the citizens are then subject to. The principle of self-rule is further enhanced when majority rule is complemented by constitutional constraints on the actions of the majority, including, protection of civil and political liberties, separation of powers, and judicial review, so that the minority is less likely to be subject to the will of the majority. Compare this with an autocratic regime where the vast majority of individuals are subject to the discretion of the ruling elite.

Robert E. Lane argues that the desire to control one's environment is a cross-cultural trait and that democracy frustrates that desire by virtue of the remote connection between participation and policy outcomes.<sup>18</sup> We claim that one's sense of political efficacy is even more radically attenuated in an autocratic country given that participation rights are, at best, inadequately protected.

Regarding the second, citizens in a democratic polity tend to support policy-making that minimizes the chances of being overly dependent on the will of others. For example, they are more likely to enjoy civil and political rights that protect them from the arbitrary discretion of public officials, employers, landowners, creditors, and so on. Moreover, electoral accountability means that citizens are able to ensure that those rights endure over time. Compare this with an autocratic regime where leaders are typically able to annul or ignore individual rights without fear of being removed from office.

<sup>17</sup> McEwen 1998.

<sup>18</sup> Lane 2000, chap. 13.

## SOCIAL CAPITAL

There is also a growing body of evidence in support of the claim that participation in society improves the ability of individuals to avoid illness and premature mortality.<sup>19</sup> In theory social connectedness has a pro-health effect because it provides people with a basis for cooperation that is mutually advantageous, a source of aid or assistance, a means of staying well informed about health issues, and a source of self-esteem, among other things.<sup>20</sup> As with autonomy, the greater sense of self-worth and security enabled by social affiliation reduces exposure to chronic stress and, thereby, to harmful levels of cortisol.

Democracy, therefore, might improve longevity by virtue of the social relations that it engenders (joining an interest group or political party, participating in public debate, or volunteering for a campaign or on election day, for example). Indeed, in a democratic polity there is an incentive to become a member of an interest group or political party in order to offset the negligible influence of a single vote on political outcomes. Compare this with an autocracy where membership in an association may be risky (particularly if freedom of association is limited or nonexistent) and will typically have little or no impact on political outcomes. In this respect, the autonomy and social-capital effects of democracy may in fact work in tandem. An individual can obtain more control over political outcomes if he or she is a member of an interest group or party than if he or she operates as an isolated voter. Social capital can also play an influential role in the provisioning of social services such as health care. The existing literature tends to interpret the pro-health effect of civic engagement that way. Civic engagement is taken to be an important precondition of good governance, which in turn affects the quality of resource distribution.<sup>21</sup> Our claim is that the causal link also works in the reverse direction. Democracies tend to foster social capital to a greater extent than autocracies, and social capital promotes health regardless of public redistributive policy (for example, it enables social support, information diffusion, and self-esteem).

## COLLECTIVE ACTION

Democratic regimes are also more permissive than autocratic ones toward collective action that takes place beyond of the realm of govern-

<sup>19</sup> Holt-Lunstad, Smith, and Layton 2010; Kawachi, Kennedy, Lochner, and Prothrow-Smith 1997; Kawachi, Kennedy, and Glass 1999; Putnam 2001, 329–31; Wilkinson 1996.

<sup>20</sup> Berkman, Glass, Brissette, and Seeman 2000; Szczerba and Woolcock 2004.

<sup>21</sup> Putnam 1993; La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1997.

ment policy. Democracies, for example, are more likely to protect the ability of workers to bargain for better wages and improved working conditions. In an often cited paper, Dani Rodrik presents evidence in support of the claim that the increased protection of freedom of association that occurs in a country as it becomes more democratic leads to significantly higher wages in its manufacturing sector.<sup>22</sup> Adam Przeworski and colleagues also find that workers under democracies earn a considerably higher share of the income generated in the manufacturing sector than those under autocracies.<sup>23</sup> This in turn suggests that democratization has a positive impact on the health of those in the low-middle income bracket. Similarly, it suggests that freedom of association enables citizens to protest against companies whose products or policies they perceive as dangerous or detrimental. These various forms of collective action also suggest that social capital may emerge in a democratic polity for reasons other than the desire to influence public policy.

#### DIFFUSION OF HEALTH-PROMOTING INFORMATION

The role of the media to inform suggests a further avenue through which regime type may influence health outcomes. Its function in the promotion of health, however, is usually understood in terms of the distributional thesis. A free media typically results in members of the public who are better informed and, therefore, better able to scrutinize government policy-making. In addition, it enables the transmission of health-related information from poor and isolated areas (the emergence of a famine or a cholera outbreak, for example) to government officials. Thus, an increase in media freedom should, in theory at least, increase the effectiveness of the government's distributional policies.<sup>24</sup>

We contend that media freedom can also have a nondistributional effect on population health. Uncensored independent media enable the horizontal transmission of health information between citizens and between nongovernmental organizations and citizens.<sup>25</sup> Such transmission helps to improve the diffusion of health knowledge (including information on how to avoid contracting or transmitting communicable diseases, birth control methods, and the effective use of health

<sup>22</sup> Rodrik 1999.

<sup>23</sup> Przeworski, Alvarez, Cheibub, and Limongi 2000, 168–70.

<sup>24</sup> Sen 1999, 180–81; Ruger 2005; Besley, Burgess, and Pratt 2002.

<sup>25</sup> A particularly clear illustration of this possibility is provided by the use of community radio in developing countries. It has been argued that such services help to overcome the obstacles—such as geographic isolation, language differences, and illiteracy—to the transmission of information. See James 2006, part 3, and World Bank 2002, chap. 10.

care systems) as well as the responsiveness of nongovernmental organizations. In addition, it may be used to disseminate information that enables micro-level income growth (exposure to new agricultural techniques, for example). This suggests that a free press can have a positive effect on health that is separate from its effect on government policy-making. By the same token, a free press can help to mitigate situations where government policy does not meet the health needs of its citizens. In sum, a free media may both expose policy failings and provide the nongovernmental means to respond to such failings.

Intriguing evidence for the nonpolicy effect of the media on health is provided by a study on the impact of soap operas on fertility patterns in Brazil. Eliana La Ferrara and colleagues find that fertility rates declined in areas that were exposed to popular soap operas that portrayed female characters with significantly fewer children than the national average.<sup>26</sup> Moreover, the pattern emerged during a period in which there was no government-sponsored family planning campaign. Similarly, Robert Jensen and Emily Oster find that the accessibility of cable television, which typically targets an urban audience, in rural villages in India was followed by a decrease in fertility rate, in women's reported preference for male offspring, and in their acceptance of wife-beating.<sup>27</sup> Thus, both studies illustrate the nonpolicy impact that can occur as segments of the population become exposed to uncensored media content. We provide further evidence for that pathway in the penultimate section below.

With these four pathways we establish at least the theoretical plausibility of the nondistributive effect of regime type on health. We do not assume, however, that the four exhaust the possible ways in which regime type can nondistributively influence health. It should also be pointed out that the nondistributional thesis does not entail a strictly nonmaterialist account of the determinants of health. Thus, while autonomy represents an exclusively nonmaterialist pathway, the remaining three pathways may be characterized in both nonmaterialist and materialist terms. Social capital, for example, may influence the self-esteem of individuals as well as their resource holdings. Similarly, collective action can be used to protest against hazardous mining practices as well to bargain for better wages. Equally, a free media will influence the diffusion of health knowledge as well the way in which individuals and local communities use the resources at their disposal. Neverthe-

<sup>26</sup> La Ferrara, Chong, and Duryea 2008.

<sup>27</sup> Jensen and Oster 2009.

less, the prevailing explanation in the political economy literature for the link between political institutions and health is strictly materialist in character (i.e., the effect of those institutions on the distribution of health-promoting resources). Our contention is that the distributive effect of regime type is complemented by the nondistributive effect.

Some scholars have examined the nonpolicy impact of political institutions on happiness. Bruno Frey and Alois Stutzer, for example, present evidence in support of the claim that participation in the political process generates mental satisfaction irrespective of the outcome of that process.<sup>28</sup> Our approach differs from this in two important ways. First, the nondistributive effect on well-being extends beyond the impact of active participation (such as autonomy and social capital) to include the impact of rights protection (such as collective action and media freedom). Second, and more significantly, we take population health (as indicated by mortality) as our measure of human well-being. A notable advantage of adopting this measure is that it is less susceptible to the phenomenon of adaptive preferences. One shortcoming of taking self-rated happiness as the measure of well-being is that individuals may adjust what they value according to what they realistically expect to achieve or avoid.<sup>29</sup> Thus, individuals born into deprived or oppressive circumstances may report a surprisingly high level of happiness.<sup>30</sup> Nevertheless, these two lines of research are complementary in the sense that they both aim to uncover the nonpolicy impact of political institutions on human well-being.

### EMPIRICAL EVIDENCE

The broad aim of our research is to contribute to the small but growing number of cross-country studies that examine the relationship between health and democracy. Our particular objective, however, is to test the theoretical claim that democracy has a positive effect on health regardless of public redistributive policies. In order to achieve this we adopt two complementary empirical strategies. First, we consider whether democratic governance continues to have a pro-health effect when we control for various forms of government spending. Second, we consider

<sup>28</sup> Frey and Stutzer 2005; Stutzer and Frey 2006.

<sup>29</sup> On the phenomenon of adaptive preferences, or sour grapes, see Elster 1983, chap. 3, and Sen 1987, 11–12.

<sup>30</sup> For empirical evidence that this amounts to more than just a theoretical possibility, see Graham 2010, chap. 3.

whether press freedom continues to have a pro-health effect when we control for government responsiveness. The goal of the first strategy is to provide general evidence that there is a nondistributive effect, while the aim of the second is to provide explicit evidence for information diffusion, the last nondistributive pathway introduced above.

To provide evidence of a nondistributive effect, we use a panel of 153 countries for each year from 1972 to 2000 to examine the relationship between extent of democratic experience and life expectancy. Educational attainment and calorie consumption, as well as public expenditure on health and social security are included as independent variables to test for the nondistributional effect of regime type.

To ensure the robustness of our findings, we employ two estimation models. The first is a regression of panel data with country fixed effects. The fixed-effects specification of the panel data allows us to account for the possibility of unmeasured country-specific factors. This method, however, tends to underestimate the significance of variables that do not change or that are slow changing. For that reason, the second model is a regression of panel data without country fixed effects but that includes region and legal origin dummies. Serial autocorrelation is not detected in the case of the model with fixed effects, but it is found in the model without fixed effects. In order to overcome the latter problem we add to the second model a lagged dependent variable to the ordinary least squares estimation and report panel-corrected standard errors for the coefficient estimates.<sup>31</sup> The substantive results for the nonfixed-effects model are not significantly altered when we use a first-order autoregressive process to correct for autocorrelation and a time-trend variable to control for time effects.

The period between 1950 and 2000 is characterized both by a significant decline in mortality, in large part because of the spread of inexpensive health technology, and by a significant increase in the number of democratic regimes.<sup>32</sup> It is necessary, therefore, to control for the possibility of a spurious correlation between life expectancy and democratic stock. Thus, both specifications include year dummies in order to control for exogenous health trends. In addition, we examine whether the results of our analysis are significantly altered when we use a trend variable instead of year dummies in order to model change over time.

<sup>31</sup> Beck and Katz 1995.

<sup>32</sup> For global health trends during the latter half of the twentieth century, see Cutler, Deaton, and Lleras-Muney 2006.

## VARIABLES

We take *life expectancy at birth* as our dependent variable for three reasons.<sup>33</sup> First, longevity at least partially captures the incidence of morbidity in the population—even nonfatal illnesses will tend to have a deleterious effect on an individual's lifespan.<sup>34</sup> Second, it provides an indication of the incidence of morbidity and mortality for the entire population rather than for a particular cohort such as infants or children.<sup>35</sup> Third, it represents a measure of life quality that does not preclude from the outset any of the hypothesized nondistributive pathways. On one hand, we expect that any pro-health effects that autonomy and social capital might have will become increasingly pronounced as individuals grow older. The effect of autonomy and social capital on parents may very well have a knock-on effect on their children's health, but it seems reasonable to assume that any health effects that work through that indirect channel will become more prominent as individuals progress beyond childhood. On the other hand, it also seems reasonable to assume that collective action and a free media will have a nontrivial impact on infant and child mortality.

The main independent variable of interest is *democratic stock*, which we constructed using the Polity2 index compiled by the Polity IV project.<sup>36</sup> The Polity2 index is based on the openness and competitiveness of executive recruitment, the extent to which the executive is subject to decisional constraints, and the extent to which political participation is competitive. Those three elements are converted to a twenty-one-point scale for each year, with the most autocratic countries receiving a score of -10 (for example, North Korea) and the most democratic countries receiving a score of +10 (for example, Japan). In theory, therefore, the Polity2 scale offers a highly sensitive measure of the degree to which a country is democratic or autocratic.<sup>37</sup> We constructed the democratic-

<sup>33</sup> The data for life expectancy at birth is taken from the World Development Indicators. World Bank 2009.

<sup>34</sup> Sen 1998.

<sup>35</sup> The problem with focusing exclusively on infant and child mortality is highlighted by mortality trends in Russia during the last thirty years of the twentieth century. Between 1970 and 2000, under-5 mortality in Russia decreased by approximately 40 percent. In spite of that fact, life expectancy at birth decreased by approximately 4 percent during the same period. This was largely due to a significant increase in the adult male mortality rate throughout those three decades. Similar trends occurred in Europe's other former communist countries. See Marmot 2004a, 200–202, 207–208. See also Mathers, Salomon, and Murray 2003.

<sup>36</sup> Marshall and Jagers 2008.

<sup>37</sup> We use the Polity2 index because it has become the standard measure of democracy in the literature and is probably less susceptible to measurement error than its main rivals. Moreover, it is highly correlated with alternative measures such as Freedom House's political rights index and Tatu Vanhanen's competition variable. For a critical review of the various indices, see Munck and Verkuilen 2002.

stock variable by first converting the Polity2 scale into a positive scale ranging from 1–21. Next, we calculated the sum of each country's Polity2 score since 1960 for each year between 1972 and 2000. Thus, our regime variable reflects the stock of democracy over time rather than the flow of democracy at any particular point in time.<sup>38</sup>

In order to isolate the effect that democracy might have above and beyond the effect it might have by way of public provisioning, we included four distributional variables among the independent variables. Two of those distributional variables are explicitly tied to government policy: *public expenditure on health* as a percentage of gross domestic product (GDP) and *public expenditure on social security and welfare* as a percentage of GDP.<sup>39</sup> In addition, we included two other distributional variables that are to a significant extent determined by public policy, *educational attainment* and *calorie consumption*.

*Educational attainment* is the average years of schooling achieved by those aged 15 years and above.<sup>40</sup> Education is an important determinant of health both because it increases personal income and because it means that individuals are better informed about their health and nutrition requirements and about how to use health care systems. In democracies education may also contribute to the distributional effect by improving the ability of voters to assess government policies and judge the merits of candidates for (re)election.<sup>41</sup>

Average daily *calorie consumption* is taken from the Food and Agriculture Organization's annual food balance sheets. The data in standard-

<sup>38</sup> In compiling the Polity2 data, the following alterations were made: (1) countries that previously belonged to a contiguous imperial power (e.g., former Soviet republics) were hand coded the same Polity2 value as the imperial power for the relevant years; (2) the countries that belonged to a noncontiguous imperial power (e.g., Kenya) between 1960 and 1970 were hand coded with a Polity2 value of 0 for the relevant years. The countries that gained independence from a noncontiguous imperial power after 1970 (e.g., Mozambique) were excluded from the sample; (3) former Yugoslav republics were assigned the same score as Yugoslavia before independence around 1990; (4) Vietnam was assigned the score of North Vietnam before unification in 1976; (5) Eritrea was assigned the score of Ethiopia for 1972–92; (6) Bangladesh was assigned the values of Pakistan prior to independence in 1972; (7) Czech and Slovak republics were assigned the values of Czechoslovakia for the years before 1993; (8) Yemen was assigned the score of North Yemen for the years prior to unification in 1990; and (9) Germany was excluded from the sample because it was both democratic and autocratic prior to unification. The Polity IV data set excludes those countries with populations less than 500,000. Thus, for the purposes of this study we used the expanded version of that data set constructed by Gleditsch 2008. Even so, the expanded data set does not cover those countries with populations less than 250,000. As a result, we exclude four microstates (Monaco, Liechtenstein, Samoa, and San Marino) even though they achieved independence before 1970.

<sup>39</sup> The public expenditure data is drawn from Easterly 2001.

<sup>40</sup> The educational attainment data is taken from Barro and Lee 2010.

<sup>41</sup> In addition, including educational attainment controls for the possibility that the preexisting stock of education is a significant determinant of both population health and the extent of democratization. See Glaeser, Ponzetto, and Shleifer 2007.

ized form is available for virtually every country-year. A further and significant advantage of using mean calorie intake is that it provides a way of approximating resource inequality. Lisa Blaydes and Mark Kayser, for example, plausibly infer that increases in average calorie consumption are more likely to benefit the poor because of the biological limit on how much a person can consume and the difficulty of hoarding food.<sup>42</sup> Indeed, we found that for 127 of the countries in our data set in the year 2000, there was a reasonably strong correlation of  $-0.7$  between average calorie intake and income poverty (measured as percentage of population below \$1 purchase power parity (PPP) per day).<sup>43</sup> Thus, the inclusion of average calorie consumption helps to capture policy-making that is pro-poor in terms of resources and, as a result, in terms of health outcomes.

It is worth noting that because educational attainment and calorie consumption are determined by factors other than government policy, they tend to overstate the distributive effect of regime type.<sup>44</sup> Our intention here, however, is to control for, rather than pinpoint, the distributive effect.

The fixed-effect model we use helps to mitigate any omitted variable bias. Nevertheless, it is necessary to control for the time-varying factors that might be simultaneously determining the extent of democracy, government spending, and life expectancy. For that reason we included *income* as well as *urbanization* as control variables.<sup>45</sup> The key variables of interest may also be influenced by whether a country is beset by internal conflict. Thus, we included a dummy variable that takes the value of 1 if a country is undergoing an *internal war*.<sup>46</sup>

The inclusion of average calorie intake and income per capita also allows us to control for policy-making that has an impact on economic growth (such as trade policy and investment in infrastructure) and,

<sup>42</sup> Blaydes and Kayser, forthcoming.

<sup>43</sup> The poverty data was taken from United Nations 2009. For each country where data was available, we took the average poverty rate for the 1990s. High-income countries were hand coded with a poverty rate of 1 percent.

<sup>44</sup> Unsurprisingly, democratic stock remained significant when we replaced educational attainment with public expenditure on education as a percentage of GDP (drawn from Easterly 2001) in both the fixed-effect and nonfixed-effect models.

<sup>45</sup> GDP per capita PPP converted and in constant 2005 international dollars is taken from the chain-series index of the Penn World Table 6.3 (variable rgdpc). Heston, Summers, and Aten 2009. Share of population living in urban areas is taken from World Bank 2009. We also take the quadratic transformation of both these variables to control for the possibility that they have a declining marginal effect.

<sup>46</sup> A country is classified as experiencing internal war if an armed conflict causes at least a thousand battle-related deaths within its territory. The data on battle deaths is taken from Uppsala Conflict Data Program/International Peace Research Institute, Oslo 2009.

thereby, population health. Note, however, that scholars have struggled to establish a clear link between regime type and prosperity.<sup>47</sup>

For the model without country fixed effects we use all of the above dynamic variables as well as a number of additional control variables that are time invariant. We included one such variable, *ethnic fractionalization*, for example, because diversity may negatively affect provisioning to minority groups or the government's ability to effectively provide due to intransigent disagreement. We used an index of fractionalization that expresses the probability that two individuals randomly selected from a population belong to different ethnic groups.<sup>48</sup> The other time-invariant control variables included are proportion of population in 1995 living in a *temperate* climate zone (based on Koeppen Geiger climate zones), because the environment in those areas is healthier and agriculture is more productive;<sup>49</sup> proportion of population *Muslim* in 1980; and *legal origin dummies* (British, French, Socialist, and Scandinavian).<sup>50</sup> The latter two variables were included to control for the possibility that preexisting cultural and historical factors simultaneously determine political institutions and population health. For similar reasons we included *world region dummies* based on the World Bank's classification (East Asia and Pacific, East Europe and Central Asia, Middle East and North Africa, South Asia, Sub-Saharan Africa, and Western).

#### DATA SET AND MULTIPLE IMPUTATION

The data on public spending is missing for a significant number of country-years. Thus, excluding the countries with insufficient observations would dramatically reduce the number of countries that could be included in the study. As a result, the analysis would be deprived of potentially relevant information. In addition, listwise deletion may bias the results of our analysis because the International Monetary Fund (IMF) financial data that is used to construct the public expenditure data is more likely to be missing for autocratic countries, and a number of those countries—Cuba, Poland, Saudi Arabia, Oman, and Libya, for example—perform well in terms of health outcomes.<sup>51</sup>

To circumvent the missing data problem, we used the multiple imputation program *Amelia* to fill in the missing observations.<sup>52</sup> The

<sup>47</sup> Przeworski and Limongi 1993; Kurzman, Werum, and Burkhardt 2002.

<sup>48</sup> Alesina et al. 2003.

<sup>49</sup> Gallup, Mellinger, and Sachs 1999.

<sup>50</sup> La Porta et al. 1999.

<sup>51</sup> Ross 2006, 863–65.

<sup>52</sup> Honaker, King, and Blackwell 2010.

multiple imputation procedure employs observed values to generate multiple estimates for each missing value. The variation between each imputed value is intended to reflect the estimated level of uncertainty in predicting each missing value.<sup>53</sup>

A further concern is that data is typically only available for every second or third year for life expectancy and every fifth year for average years of schooling. By using Amelia we were able to impute the intervening years for these two variables. Note that because both of these variables typically vary smoothly over time, it is reasonable to expect that the accuracy of the imputation for the intervening years will be high.

Overall, using the multiple imputation process meant we were able to generate a balanced panel for all countries that were extant in the world between 1972–2000 (with the exception of Germany, which was both democratic and autocratic prior to unification); countries with populations less than 250,000; and countries that were noncontiguously part of an imperial power after 1970.

Our imputation model included the log transformation of the dynamic control variables and generated five complete data sets. We then ran our fixed- and nonfixed-effects models for each of those data sets. Finally, we combined the estimation results by using a procedure outlined by Gary King and colleagues. A single coefficient was produced for each independent variable by taking the average of the estimates produced by each imputed data set, and a single standard error for each coefficient was produced by using a formula that takes into account variance both within and across each imputed data set.<sup>54</sup>

## RESULTS

Does democratic experience have a nondistributive effect on population health? We report the results of our analysis in Table 1. The dynamic variables have been standardized to enable comparisons. The first five columns report the results for the fixed-effects specification; the last five report results without fixed effects. Column 1 reflects the joint distributional and nondistributional effect of democracy on health while controlling for income, urbanization, and internal war. We find that there is a strong and significant correlation between extent of democratic experience and life expectancy. Other things being equal, a

<sup>53</sup> Honaker and King 2010; Schafer 1997.

<sup>54</sup> King, Honaker, Joseph, and Scheve 2001, 53.

one standard deviation increase in democratic stock (which is roughly equivalent to the difference between Costa Rica and Malaysia or South Korea and Indonesia in the year 2000) is associated with a rise in life expectancy of approximately 1.78 years (with a 95 percent confidence interval of 1.32 to 2.24).

In column 2 we attempt to isolate the nondistributional effect by adding the four distribution variables (public expenditure on health, public expenditure on social security and welfare, education attainment, and calorie consumption). The magnitude of the coefficient for the democracy variable remains substantive and significant at 1 percent. This shows that even after the introduction of the distribution variables democracy continues to have a significant positive impact on longevity. Thus, if a country such as Indonesia increased its democratic stock from its level in 2000 to the same level that South Korea had that year, we would typically expect, everything else being equal, life expectancy to increase by 0.87 years (with a 95 percent confidence interval of 0.32 to 1.41). Column 3 shows that the results are robust even when we use a trend variable rather than year dummies to account for the upward trend in longevity and democracy during the sample period.

A potential problem with country fixed-effect models, however, is that they tend to underestimate the significance of unchanging or slow-changing variables. Thus, in order to ensure the robustness of results we ran the second model (columns 6 through 10). This model does not include country fixed effects but does include year dummies as well as a number of time-invariant control variables. Columns 6 and 7 show that the current effect of democratic experience on life expectancy remains significant when we control for public distribution. Column 8 confirms the presence of the nondistributive effect when we use an alternative method to control for time effects (trend variable) and to correct for serial autocorrelation (AR(1) term).<sup>55</sup>

We also examine the impact of *electoral participation* (proportion of the total population voting in elections) on longevity<sup>56</sup> because the Polity2 index does not explicitly take into account the extent to which citizens are permitted to participate in elections. This also allows us to test whether our results hold when an alternative measure of democracy is adopted. Columns 4 and 5 indicate that participation has a significant pro-health effect even when it is included alongside the stock measure

<sup>55</sup> It may be argued that we do not control for the possibility that the distribution variables have a declining marginal effect on population health after a certain threshold level. Reassuringly, our results held when we used the quadratic transformation of the four distribution variables.

<sup>56</sup> The participation data is taken from Vanhanen 2008.

TABLE 1  
DEMOCRACY, DISTRIBUTION, AND HEALTH  
(1972–2000)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Fixed Effects</i>										
<i>Without Fixed Effects</i>										
Democratic stock	0.1758*** (0.0229)	0.0861*** (0.0272)	0.1039*** (0.0288)	0.0794*** (0.0255)	0.1001*** (0.0098)	0.0804*** (0.0135)	0.0932*** (0.0149)	0.0704*** (0.0133)	0.0704*** (0.0133)	0.0704*** (0.0133)
Electoral participation				0.0677*** (0.0087)	0.0649*** (0.0083)			0.0478*** (0.0096)	0.0377*** (0.0091)	
Public expenditure on health	0.0200** (0.0093)	0.0184*** (0.0087)	0.0207*** (0.0087)	0.0197*** (0.0087)		0.0203*** (0.0092)	0.0254*** (0.0107)	0.0237*** (0.0087)	0.0213*** (0.0089)	
Public expenditure on social security and welfare	0.321 (0.0183)	0.0032 (0.0171)	0.0056 (0.0176)	0.0032 (0.0171)	0.0018 (0.0854)	0.0010 (0.0208)	-0.0010 (0.0176)	0.0072 (0.0176)	0.0008 (0.0176)	
Educational attainment	0.0763*** (0.0259)	0.0584*** (0.0254)	0.0719*** (0.0243)	0.0699*** (0.0240)	0.1001*** (0.0167)	0.0924*** (0.0303)	0.0969*** (0.0324)	0.0924*** (0.0298)	0.0924*** (0.0296)	
Calorie consumption	0.1785*** (0.0153)	0.1720*** (0.0165)	0.1838*** (0.0178)	0.1712*** (0.0167)		0.1493*** (0.0156)	0.1876*** (0.0177)	0.1466*** (0.0164)	0.1439*** (0.0162)	
Muslim					-0.0016*** (0.0003)	-0.0013*** (0.0003)	-0.0020*** (0.0003)	-0.0013*** (0.0003)	-0.0013*** (0.0003)	-0.0012*** (0.0003)
Ethnic fractionalization					-0.0511* (0.0275)	-0.0054 (0.0359)	0.0620 (0.0447)	0.0620 (0.0358)	0.0620 (0.0358)	0.0620 (0.0358)
Temperate					0.1322*** (0.0235)	0.1254*** (0.0360)	0.1906*** (0.0417)	0.1459*** (0.0346)	0.1447*** (0.0342)	0.1447*** (0.0342)
Trend					0.0048** (0.0023)	0.0052*** (0.0013)				

Lag life expectancy				0.1840***	
Income	0.0671 **	0.0771 ***	0.0897 ***	0.0652 **	0.2949 ***
(0.0299)	(0.0268)	(0.0313)	(0.0304)	(0.0181)	(0.0262)
Income squared	-0.0142 ***	-0.0162 ***	-0.0130 ***	-0.0135 ***	-0.0411 ***
(0.0041)	(0.0048)	(0.0045)	(0.0048)	(0.0048)	(0.0037)
Urbanization	0.3958 ***	0.2523 ***	0.2565 ***	0.1641 ***	0.2382 ***
(0.0349)	(0.0394)	(0.0365)	(0.0429)	(0.0380)	(0.0181)
Urbanization squared	-0.1571 ***	-0.1088 ***	-0.0732 ***	-0.1070 ***	-0.0662 ***
(0.0161)	(0.0178)	(0.0184)	(0.0151)	(0.0164)	(0.0072)
Internal war	-0.0947 ***	-0.1167 ***	-0.1220 ***	-0.1033 ***	-0.1089 ***
(0.0317)	(0.0283)	(0.0243)	(0.0274)	(0.0286)	(0.0361)
Year dummies	yes	no	yes	yes	yes
World region dummies	no	no	no	yes	yes
Legal origin dummies	no	no	no	yes	yes
AR(1)	no	no	no	no	no
Adjusted R-squared	0.95	0.95	0.96	0.95	0.93
Countries	153	153	153	153	153
Observations	4437	4437	4437	4437	4284

Dependent variable is life expectancy at birth. Robust standard clustered at country-level errors are reported in parenthesis below regression coefficients. Each country-year represents a single observation. Autocorrelation was not detected in the fixed-effect specifications. Democratic stock is the sum of the Polity2 score for each year since 1960. All the dynamic variables have been standardized. <sup>\*\*\*</sup> significant at 1%, <sup>\*\*</sup> 5%, <sup>\*</sup> 10%.

of democracy. We arrive at a similar conclusion in the model without fixed effects (columns 9 and 10). It is worth noting that the combined effect of the two democracy measures is significantly greater than the effect of the stock measure by itself. This suggests that the two measures are capturing distinct information about the nature of political regimes and, therefore, that the stock variable by itself might be producing an underestimation of the pro-health effect of democratic governance. That underestimation could be due to the fact that the stock measure reflects the accumulation of democratic experience rather than the level of democracy at specific points in time. Alternatively, the stock measure may underestimate the pro-health effect because it is based on the procedures for selecting and constraining the chief executive rather than on the degree to which those procedures engender electoral participation. Note, however, that the participation data also includes voter turnout in uncompetitive elections (i.e., elections in one-party states). Thus, by itself, participation represents an insufficiently nuanced basis for assessing each country's democratic credentials. For that reason we prefer to use democratic stock, a measure that reflects the quality (and age) of democracy, to study the linkage between regime type and health.<sup>57</sup>

All in all, the results of our analysis suggest that nonpolicy pathways explain as much as half of the pro-health effect of democratic governance. Nevertheless, that finding might be challenged on the grounds that the distributional effect of regime type can work both through the aggregate provisioning of resources as well as how effectively those resources are targeted. Thus, the residual effect of democracy on life expectancy may be explained by the fact that democracies are better at ensuring that resources reach those who need them most, rather than by the salutary effect of factors such as autonomy, collective action, social capital, and the dissemination of information. Whether this is the case is not clear, however, because as we have seen, there is some evidence to suggest that democracies are no better at effectively targeting pro-health resources than autocracies.<sup>58</sup> Note also that the biological

<sup>57</sup> As a further robustness check, we examined whether our results held for a less aggregative measure of population health, namely, the (age-standardized) Disability Adjusted Life Years for cardiovascular diseases. World Health Organization 2002. We selected heart disease as the alternative dependent variable because a statistical linkage has already been found between that source of ill health and social determinants of health such as control and social capital (Marmot 2004a and 2004b). Using a cross-section of 134 countries (and virtually the same control variables as were used in the baseline models, we find that democratic stock for the year 2000 has a reductive and statistically significant (at 1 percent) effect on healthy years of life lost as a result of cardiovascular diseases in 2002. That effect remains when we introduced three of the distributional variables that were used in the baseline models—health expenditure, calorie intake, and educational attainment.

<sup>58</sup> Ross 2006.

limit on how much food an individual can consume means that average calorie intake at least partially captures the distribution of health-promoting resources to the poor. Still, given the possibility that the distributive variables do not adequately capture the distributive channel, the results are best interpreted as evidence for, rather than confirmation of, the nondistributive channel. In order to further strengthen that evidence, we test for the nondistributive effect that does not require any distribution variables to control for the policy pathway—information diffusion.

### THE NONDISTRIBUTIVE EFFECT OF MEDIA FREEDOM

Thus far we have adopted an eliminativist strategy to provide evidence in support of the nondistributional thesis. That is to say, we have shown that democracy has a residual effect on life expectancy even when we control for government influence over the distribution of health-promoting resources. In this section we provide direct evidence for the nondistributive effect by examining a specific feature of democratic governance—freedom of the press. In the theoretical section above, we argue that independent and uncensored media can have a positive impact on population health in ways that are not contingent on its effect on government policy-making. This denotes a departure from the existing political economy literature with its almost exclusive focus on the media's role in enhancing government responsiveness.<sup>59</sup>

In order to control for the effect of press freedom on government decision making, we restrict our analysis to autocratic regimes—namely, the fifty countries that scored below 1 on the Polity2 index for each year between 1994 and 2007.<sup>60</sup> For autocratic countries we assume that

<sup>59</sup> The nascent literature on this topic has focused on the effect of media penetration, press freedom, and media ownership on public policy. Besley and Burgess 2002, for example, find that greater media penetration is associated with more effective responses to shocks such as droughts and floods. Stromberg 2004 finds that those who have access to a new mass media medium are favored by government policies. Brunetti and Weder 2003 find that greater press freedom is associated with less corruption. Finally, Djanovic, McLeish, Nenova, and Shleifer 2003, find that less public ownership of the media is associated with better public policy outcomes (including higher life expectancies and lower infant mortality rates).

<sup>60</sup> However, we do not exclude a country from the sample if the chief executive was not replaced during the years that its Polity2 score rose above 0. Thus, the following countries are retained in the sample even though their Polity2 score exceeded 0 during the years noted in brackets: Algeria (2004–7), Belarus (1994–5), Ivory Coast (2000–1), and Mauritania (2007). For further clarification of the replacement rule see Cheibub, Gandhi, and Vreeland 2010. It might be argued that countries scoring between 1 and 5 on the Polity2 scale should be included because they are typically characterized by insufficiently competitive elections and weak institutional constraints on the exercise of executive power. Nevertheless, we deliberately exclude those so-called semidemocracies from the sample to ensure that we adequately control for government responsiveness.

the government will only be responsive to media pressure to the extent that it represents the interests of the government's narrow support base. We further assume that if the nondistributive effect of press freedom on health is apparent in autocratic countries, then it will be even more pronounced in democratic countries, which are typically characterized by greater freedom of the press. Indeed, the correlation between the average of Freedom House's Freedom of the Press index and the Polity2 index for 169 countries between 1994 and 2007 was 0.86.<sup>61</sup> Note, however, the correlation between the two indices for our sample of autocratic countries is only 0.39 for the same time period. Moreover, the correlation between the Polity2 index and the stock variable we constructed for press freedom is even lower at 0.23 (compared with a correlation of 0.82 for the 169 countries).<sup>62</sup> This suggests that the stock variable is not simply tracking variation in the degree of autocratic governance.<sup>63</sup> A significant advantage of examining the role of press freedom in autocracies is that the variable for press freedom does not act as a proxy for democracy. That is to say, it enables us to isolate the nonpolicy effect of press freedom from the nonpolicy effect of democracy in general.

Once again, we take *life expectancy* at birth as our indicator of population health. For *media freedom* we constructed a stock variable based on the tripartite classification compiled by Freedom House since 1980—not free, partly free, and free.<sup>64</sup> The classification is designed to capture the extent of content regulation, editorial independence, and the government's economic influence over the media.<sup>65</sup> We assigned a score of 1, 2, and 3, respectively, for those country-years that are categorized as not free, partly free, and free. For each country we then calculated the average press-freedom score since 1980 for each year from 1994 to 2007. The result is a variable that captures the extent of each country's

<sup>61</sup> For the press freedom index, see Freedom House 2010.

<sup>62</sup> That finding is perhaps not surprising given that the Polity2 index does not explicitly take into account the degree to which civil rights are protected. See Jaggers and Gurr 1995, 471.

<sup>63</sup> The observed variation in press freedom among autocratic countries may be due to the informational role of the media. Some autocratic rulers, for example, may wish to use press freedom as a means to identify potential sources of opposition or to monitor the performance of low-level bureaucrats. On the latter explanation, see Egorov, Guriev, and Sonin 2009. Nevertheless, this denotes a tricky balancing act for the regime because it also wants to prevent the opposition from using the media to overcome the coordination problem in revolts. See Bueno de Mesquita and Downs 2005.

<sup>64</sup> Freedom House 2010.

<sup>65</sup> It should be noted that Freedom House's classification reflects both the institutionalized constraints on the media (e.g., structure of media ownership or freedom of information laws) and actions by the state against the media (e.g., intimidation of journalists or closure of media outlets). Thus, it differs from the Polity2 index that we used to construct the democratic-stock variable both in terms of content (restrictions on the flow of information versus mechanisms for selecting and constraining leaders) and because it partially reflects the actual behavior of the government.

experience with press freedom rather than the level of press freedom at particular points in time.

It may be argued that some autocratic regimes are more responsive to the media because they permit some form of electoral process.<sup>66</sup> Note, however, that elections did not lead to the replacement of the chief executives in the countries in our sample. To control for the possibility that elections in autocracies influence the degree of government responsiveness to the media, we included proportion of the total population voting in elections (*electoral participation*) among the independent variables.<sup>67</sup> In addition, we included *educational attainment* (average years of schooling achieved by those aged 15 years and above) and *media penetration*.<sup>68</sup> Both of these latter factors may influence the degree of press freedom as well as population health. As with the models in Table 1, we also included *income*, *urbanization*, and *internal war* as control variables.

Press freedom in the sample varies significantly between, but not within, countries over time. For that reason we opted for a model (Table 2) without fixed effects. Like the model without fixed effects in Table 1, we included year, region, and legal origin dummies as well as *temperate*, *Muslim*, and *ethnic fractionalization*. Because dependence on mineral resources may affect the level of press freedom<sup>69</sup> as well as life expectancy, we included the proportion of merchandise exports that are *fuel exports*.<sup>70</sup> In addition, we included a dummy variable that indicates whether a country is *landlocked*. In order to mitigate the detected presence of serial autocorrelation we used Nathaniel Beck and Jonathan Katz's ordinary least squares with panel-corrected standard errors and lagged dependent variables.<sup>71</sup> As before, the multiple imputation process is used to estimate missing values. This allowed us to generate a balanced panel comprised of fifty autocratic countries for the years 1994–2007.

Does media freedom have a positive effect on population health in autocracies? We report the results of our analysis in Table 2. The dynamic variables have been standardized to facilitate comparisons. Column 1 shows that the current effect of press freedom on life expectancy

<sup>66</sup> For a discussion of the reasons why autocratic leaders permit elections, see Gandhi and Lust-Okar 2009.

<sup>67</sup> The participation data is taken from Vanhanen 2008.

<sup>68</sup> Data for the former variable is taken from Barro and Lee 2010. The latter variable is the average of daily newspapers per 1,000 people, televisions per 1,000 people, radios per 1,000 people, and Internet users per 1,000 people. Data for the first indicator was taken from World Bank 2009, while data for the last three indicators was taken from International Telecommunication Union 2009.

<sup>69</sup> See Egorov, Guriev, and Sonin 2009.

<sup>70</sup> World Bank 2009.

<sup>71</sup> Beck and Katz 1995.

TABLE 2  
MEDIA FREEDOM AND HEALTH IN AUTOCRACIES  
(1994–2007)

	(1)	(2)
Media freedom	0.0787*** (0.0304)	0.0926*** (0.0334)
Electoral participation	0.1292*** (0.0233)	0.1541*** (0.0325)
Educational attainment	0.1705*** (0.0613)	0.1575*** (0.0631)
Media penetration	0.1090*** (0.0346)	0.1261*** (0.0358)
Muslim	0.0050*** (0.0008)	0.0056*** (0.0009)
Ethnic fractionalization	-0.0839 (0.1473)	-0.1462 (0.1283)
Temperate	-0.0271 (0.1090)	-0.0377 (0.1277)
Fuel exports	-0.0455 (0.0330)	-0.0537* (0.0330)
Landlocked	-0.2179*** (0.0804)	-0.2511** (0.1058)
Lag life expectancy	0.1808*** (0.0567)	
Trend		0.0032 (0.0042)
Income	0.2444*** (0.0621)	0.3023*** (0.0819)
Income squared	-0.0444*** (0.0146)	-0.0532*** (0.0177)
Urbanization	0.0969* (0.0581)	0.1418** (0.0610)
Urbanization squared	-0.0051 (0.0245)	-0.0084 (0.0275)
Internal war	-0.0359 (0.1064)	-0.0299 (0.0935)
Year dummies	yes	no
World region dummies	yes	no
Legal origin dummies	yes	no
AR(1)	no	yes
Adjusted R-squared	0.92	0.92
Countries	50	50
Observations	650	650

Dependent variable is life expectancy at birth. Robust standard clustered at country-level errors are reported in parenthesis below regression coefficients. Each country-year represents a single observation. For all country-years Polity2 < 1. Media freedom is the average freedom of the press score since 1980 for each year between 1994–2007. All the dynamic variables have been standardized. \*\*\* significant at 1%; \*\* 5%; \* 10%.

is positive and statistically significant at 1 percent. That result holds when an alternative method is used to model time and correct for serial correlation (column 2). The results indicate that, other things being equal, a one standard deviation increase in the stock of press freedom (roughly equivalent to the difference between Singapore and China or Egypt and Syria in 2007) is associated with a rise in life expectancy of almost one year (with a 95 percent confidence interval of 0.36 and 1.72).

It may be argued that the coefficient for media freedom captures the responsiveness of autocratic governments to media pressure. There are at least two reasons for thinking that this is not the case. First, each autocratic regime's support base is comprised of a small segment of the population and typically that base has sufficient private resources to avoid preventable illness and premature mortality. Moreover, the regime's backers are unlikely to be critical of public policy for fear of losing the private benefits aimed at them by the government.<sup>72</sup> Hence, the government's survival typically does not hinge on its ability to provide health-promoting resources to individuals who are not members of its narrow support base. Second, the model explicitly controls for voter participation in autocracies that have elections. That is to say, we control for those autocracies where the government's survival depends on appeasing a larger segment of the population. Thus, given that democracies are characterized by higher levels of press freedom, these results provide further evidence that the effect of democratization on human well-being extends beyond social and economic policy-making.

## CONCLUSION

The prevailing theoretical explanation for the linkage between regime type and population health is distributional. It is argued that democratic regimes spread health-promoting resources more widely than their more autocratic counterparts because they must satisfy a broader support base. This article does not attempt to challenge the distributional thesis. Rather, we argue that the distributional thesis does not fully explain the health effects of regime type. In support of that claim we develop a theoretical account of the ways in which regime type can have a policy-independent affect on population health. We then use a panel of 153 countries for the years 1972–2000 to examine the relationship between extent of democratic experience and life expectancy.

<sup>72</sup> Bueno de Mesquita, Morrow, Siverson, and Smith 2002; Bueno de Mesquita, Smith, Siverson, and Morrow 2003; North, Wallis, and Weingast 2009, 142–44, 266.

In keeping with nascent empirical literature on the subject, we find that the extent of democratic experience has a salutary effect on life expectancy. Supporting our central contention, we find that the pro-health effect is not erased when we control for the distribution of health-promoting resources such as health care, education, welfare transfers, and food. Moreover, the results hold when we adopt electoral participation as an alternative measure of democracy. In order to provide direct evidence for the nondistributive thesis, we also test to see whether degree of media freedom has a positive effect on health when we control for government responsiveness. We find that level of press freedom has a positive effect on life expectancy even in autocratic countries. What the evidence we present suggests, therefore, is that even in the hypothetical case where a democratic regime distributes pro-health resources no better than an autocratic regime, it will still have a comparative advantage in terms of morbidity and mortality outcomes. If correct, then the effect of political institutions on the magnitude and targeting of government spending only provides a partial explanation of the impact of those institutions on population health.

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