

# DEMOCRACY, DICTATORSHIP, AND INFANT MORTALITY

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The effect of *economic development* in reducing hunger is widely known, but what is the effect of a country's *political regime* on the basic welfare of its inhabitants? Does it matter whether that country has an authoritarian or a democratic regime? The answer is yes. Any randomly selected country's regime, regardless of its level of development, matters for its social performance. Fewer children die in democracies than in dictatorships.

The infant mortality rate is the indicator of chronic hunger most commonly used by policy makers and international organizations. In 138 countries observed annually over the period 1950–90, democracies showed markedly lower infant mortality rates than dictatorships. More importantly, at the *same* levels of development, and everything else being equal, a country's political regime had an independent effect on infant mortality. Democracy outperformed dictatorship at every level of per-capita GNP.

It is well known that per-capita income is inversely correlated with hunger: the higher a country's per-capita GNP, the lower the number of hungry people in that country. But that is far from the whole story. Average per-capita income, for instance, can mask inequalities between rich and poor. Growth in per-capita income is a necessary but not a sufficient requirement for bringing about an end to chronic hunger. Additional factors are needed; one is a country's political regime.

A political regime is the institutional framework in which decisions

are made about the production and allocation of public resources, including the provision of public goods and services. The character of the regime may affect performance directly by fostering an environment of opportunity, or indirectly by influencing what rulers are willing and able to do.

Democracy has been defined in many ways. For convenience, we adopt the minimal definition first suggested by Adam Przeworski: "Democracy is a system in which parties lose elections,"<sup>1</sup> which he and his collaborators later refined by drawing upon Robert Dahl's concept of "contestation."<sup>2</sup> They argue that alternation in power "constitutes prima facie evidence of contestation," which exists where three key requirements are met: 1) "ex ante uncertainty," meaning that "there is some positive probability that at least one member of the incumbent coalition can lose in a particular round of elections"; 2) "ex post irreversibility," meaning "the assurance that whoever wins elections would be allowed to assume office"; and 3) "repeatability," meaning that "elections must be expected to be repeated. Whoever wins the current round of elections cannot use office to make it impossible for the competing political forces to win next time."<sup>3</sup>

### **Political Regimes and Social Performance**

The study of political regimes and their performance has seen a renaissance with the third wave of democratization. The relative performance of democracy and dictatorship in enhancing a country's development has been hotly debated for years. Competing models about the social performance of political regimes have presented three broad possibilities: 1) that democracy facilitates economic and social development; 2) that democracy hinders development; and 3) that democracy bears no independent relationship to development.<sup>4</sup>

The first school of thought argues that democratic government, with its emphasis on civil liberties and political rights, is far better suited than dictatorship to foster the economic pluralism required for sustained, balanced, and equitable economic development. According to this view, democracies address the needs of their populations better because they are more accountable to citizens than are dictatorships. In a democracy, citizens decide through a voting mechanism among policy mixes proposed by candidates competing for office. Since under democracy public decisions must take into account the preferences of the majority, policies are more likely to represent the needs of that majority than they would under dictatorship.

According to this school of thought, democracies provide superior welfare for two reasons. First, they perform better because of what they do directly. Democracies bring to power leaders who voice the concerns of the people, and their political institutions are designed to respond to

these concerns. Democracies invest more in education, social services, and human capital. Democratic leaders must care for their constituencies, since regular elections allow voters to evaluate their government's welfare performance and to punish incumbents whose performance is inadequate by voting them out of office.

Second, democracies perform better because of what they permit indirectly, including a civil society exercising political rights and civil liberties, a free market, and a political environment that fosters free associations. Rights and liberties allow people from all walks of life to shape their own destiny. A free market gives individuals the chance to express their preferences both as consumers and producers. Non-governmental organizations and a free press can act as watchdogs and early-warning systems. The economist and Nobel laureate Amartya Sen, for example, has shown a direct correlation between democratic institutions and the prevention of famines: “[T]here is hardly any case in which a famine has occurred in a country that is independent and democratic with an uncensored press.”<sup>5</sup>

The second school of thought, diametrically opposed to the first, contends that the unintended consequences of “premature” democracy slow development and that the decisive and pervasive state intervention required for development is unduly fettered by democratic institutions. Dictatorships, by contrast, are seen as free to impose any policy they choose. Dictatorships can force individuals and groups to behave counter to their perceived self-interest—for example, by resisting demands for short-term consumption at the expense of long-term investment and hence of development. Authoritarian elites are insulated from pressures for redistribution. They are able to extract resources, provide public goods, and impose short-term costs needed for economic adjustment.

Yet the autonomy of authoritarian rulers does not necessarily enhance popular welfare. Their capacity for unilateral action does not inevitably foster the development of administrative infrastructures needed to provide public goods. There is no guarantee that rulers unconstrained by the will of their subjects will act in the best interests of those subjects. Benevolent dictators are rare.

Proponents of the third school are skeptical about the existence of any systematic relationship between democracy and development. They argue that regime type alone matters very little compared with other factors, such as the cultural environment, the stratification of society, the pattern of industrialization, or the form of state intervention in the economy. Adam Przeworski and Fernando Limongi, for instance, suggest that while political institutions do matter for growth, “thinking in terms of regimes does not seem to capture the relevant differences.” Of the 21 studies that they examine dealing with the relation between regime type and economic growth, eight reached

conclusions favorable to democracy, eight favored authoritarian regimes, and the remaining five found no difference. Przeworski and Limongi conclude that “we do not know whether democracy fosters or hinders economic growth.”<sup>6</sup>

### **Investigating Infant Mortality**

Our own research on the relationship between regime type and socioeconomic performance focuses on the comparative success of democracy and dictatorship in reducing deaths due to hunger. While direct measurements of hunger-related deaths are not available, the Hunger Project estimates that 24,000 individuals worldwide die each day of hunger-related causes, three-quarters of whom are children under the age of five.<sup>7</sup> Two decades ago, evidence about the extent of chronic hunger around the world tended to be unreliable or wholly unavailable. Today, demographic data are more accessible, though reporting is still skimpy in some countries.

Hunger can be divided into two types: 1) famines, and 2) chronic hunger, or what Amartya Sen has called “endemic deprivation”:

Famines are transient but violent events—they come and go, decimating the population and causing extreme misery and widespread death. In contrast, endemic deprivation is a more persistent phenomenon, forcing people to live regularly and ceaselessly in a state of undernourishment, disease and weakness. While endemic deprivation is less fierce as a calamity, it is also more resilient and affects more people. If famines kill millions through starvation and epidemic diseases, endemic deprivation can afflict hundreds of millions through debilitation and illness, increasing mortality rates and shortening people’s lives.<sup>8</sup>

One of the most widely accepted indicators of society-wide hunger is the infant mortality rate (IMR), which is used as such by numerous international agencies, including UNICEF and the World Health Organization. The IMR measures the number of deaths among children under the age of one per thousand live births. In 1999, for example, Andorra reported an IMR of 1.4 per thousand, the lowest in the world; Switzerland had an IMR of 4.8; the United States, 7.0; Poland, 9.6; Brazil, 41; South Africa, 52; India, 72; and Malawi, 137, the highest in the world.<sup>9</sup> Chronic hunger is said to persist as a society-wide condition in any country where the IMR is above 50 per 1,000 live births.<sup>10</sup>

In developing countries, the number of children needed to ensure that one or two reach adulthood—and provide an “insurance policy” for their parents—is often high. A computer-simulation study in India in 1976 indicated that a couple must have 6.3 children to secure a 95 percent chance that one son will live until the father’s 65th birthday.<sup>11</sup> An Indian farmer explained his need for sons as follows: “I have no machinery. . . . Just look around; no one without sons or brothers to

help him farm his land. The more sons you have, the less labor you need to hire and the more savings you can have.”<sup>12</sup>

To produce a downward trajectory in the IMR, a country must improve the quality of life of a vast majority of its inhabitants. Hence, when we observe a sustained downward trend in the IMR, we can safely conclude that other social indicators have also improved. For example, available data indicate that social improvements resulting in a reduction of infant deaths simultaneously reduce child and adult deaths as well.<sup>13</sup> Infant mortality has proven to be a reliable indicator not only of the health of infants but also of such adjacent phenomena as nutrition quality, the health of children and mothers, medical conditions, sanitary conditions within households, and the social status and rights of women and girls. Anecdotal evidence based on interviews in India and Bangladesh<sup>14</sup> suggests that about five years after a country’s IMR drops to 50 or below, women tend to begin spacing out their births. Fertility drops because people realize that they no longer need to have so many children to ensure that they will be supported in their old age.<sup>15</sup>

**Data and Method.** To examine whether political regimes have a causal effect on countries’ infant mortality rates, we use the ACLP data set, which yields 1,081 separate observations of annual IMRs from 138 countries over the period 1950–90.<sup>16</sup> In this data set, countries are classified either as democracies or as dictatorships. The dichotomous classification of regimes has been questioned on the grounds that democracy is a continuous phenomenon—a matter of degree, not of kind. Nonetheless, for our purposes, it is useful to treat regime type as a dichotomous phenomenon. As in the proverbial case of pregnancy, countries either are democratic or they are not.

Since regime type is associated with level of development, however, our analysis runs into a problem. The world we observe consists mostly of wealthy democracies and poor dictatorships. Naturally, the IMR is low in most democracies, since most of them are industrialized, and high in most dictatorships, since they are less developed. The data show this correlation clearly: While 91 percent of our observed IMRs in the richest countries (433 of 474 observations of regimes with per-capita GDP above \$5,000) are from democracies, 87 percent of our observed IMRs in the world’s poorest countries (320 of 367 observations of regimes with per-capita GDP of less than \$1,999) are from dictatorships.

Our problem (in technical parlance, a “selection problem”) arises because economic development affects both the likelihood of democracy *and* the level of the IMR. The lower IMRs that we observe in democracies could be due to *either* 1) the distribution of regime types at different levels of development, *or* 2) the effect of regime type on the IMR. We do not know which is the case, since reality has provided

us with a biased sample. For example, to what extent was Greece's observed IMR of 39.8 in 1961 a result of Greece's democratic regime and not merely of Greece's level of industrialization? The IMR responds to both factors. How can we isolate the causal impact of regime type?

To "balance" the sample, we need more cases of rich dictatorships and poor democracies. Once the sample is equalized, we can isolate the distinct influence of regime type and make valid generalizations. To do this, we use a widely accepted statistical procedure called the Heckman Two-Step method, which "corrects" for the bias observed in the world (see the Appendix on pp. 110–12). Like the novelist Philip K. Dick, who imagined an alternate world in which Germany and Japan had *won* World War II,<sup>17</sup> we assume that every democracy we observe in a given year existed *simultaneously* as a dictatorship, and vice versa. For example, Chile was a dictatorship in 1975. Thus we create an alternate, democratic Chile for 1975 and add it to our sample. This "counterfactual" Chile allows us to isolate and compare the impact of regimes, separate from the impact of development. This method may seem complex, but it is necessary to obtain statistically reliable results that show the pure influence of regime types, all other things being equal.

**The Model.** Our model is called a selection model because we select and "estimate" cases that are not actually observed in the world—in this case poor democracies and rich dictatorships. When selection is strong (in this case, when most dictatorships are poor and most democracies wealthy), the correct specification of a model matters. Our model builds upon findings of Michael Alvarez et al. in their forthcoming study of democracy.<sup>18</sup>

Our model is designed to isolate the impact of regime type from other factors that might impact the IMR. Two sets of variables influence the IMR level in a given country and year. One set affects the country's IMR level directly. The factors we expect to *lower* the IMR (and lessen hunger) are average years of education of the population, percentage of women in the labor force, and GDP per capita. The factors we expect to *increase* the IMR (and hunger) are fertility levels and the country's population size. (For the relative weights of these variables, see Table A2 on p. 112.)

The other set of variables helps us predict whether countries were democracies or dictatorships during the 1950–90 period. Variables in this second set include whether the country in question has experienced transitions to authoritarianism, whether the country is an exporter of primary commodities, whether it is newly independent, whether it has a colonial legacy, the diversity of religions in the country's population, and the proportion of other democracies in the region and in the world as a whole. The regime-type variable is derived from this second set of factors. We use this derived variable—rather than the observed regime

**TABLE 1—INFANT MORTALITY RATE (IMR)  
BY LEVEL OF DEVELOPMENT AND BY REGIME TYPE**

PER-CAPITA INCOME LEVEL	DICTATORSHIP		DEMOCRACY	
	IMR	# OF OBSERVATIONS	IMR	# OF OBSERVATIONS
\$0–\$1,999	122.7	320	95.7	47
\$2,000–\$2,999	84.1	57	59.6	38
\$3,000–\$3,999	55.1	44	42.6	35
\$4,000–\$4,999	43.6	42	28.9	24
\$5,000–\$5,999	31.2	26	23.4	48
\$6,000+	35.0	15	15.1	385
<b>TOTAL NUMBER OF OBSERVATIONS (N=1081)</b>		<b>504</b>		<b>577</b>

for a given country in a given year—to produce counterfactuals and isolate the *separate* effect of regime type on the IMR.

The Heckman Two-Step method yields two predicted values for each country and year from the unbiased, equalized sample, one for hypothetical democracy and one for hypothetical dictatorship. The *hypothetical* value for the regime type *actually* observed in a given country and year shows us whether our model predicts reasonably well the actually observed value (and it does, as we will see in Table 2). The other hypothetical value is the one the model predicts would have been observed had the country in question been governed by the *opposite* regime type.

**Findings.** Table 1 shows all the real-world infant mortality rates reported in our database, both by level of development and by regime type. There are enough observations in every GDP per-capita bracket to allow plausible conclusions, though by far the largest number of observations come from the 320 poorest dictatorships at income levels of \$0–\$1,999 and from the 433 richest democracies at income levels of \$5,000 and above. As expected, IMRs fall as GDP per capita rises; more importantly, the IMR is consistently and significantly higher under dictatorship than under democracy *at every income level*. In fact, on average, democracies with income levels of only \$4,000–\$5,000 outperform dictatorships with income levels above \$6,000 per year.

We could have contented ourselves with performing a normal statistical regression on these figures, but that would not have corrected for the biased sample produced by the preponderance of rich democracies and poor dictatorships. Our model, by enabling us to include “counterfactual” cases, does correct for the bias in the real-world sample: Nonetheless, it still shows a marked advantage for democracies over dictatorships: On average across the sample, the

predicted IMR under dictatorships is 52.6, while under democracies it is 42.8—a difference of 9.8 (see Table A1 on p. 112). In other words, the model predicts that, all else being equal, if there were as many rich dictatorships in the world as there are rich democracies, and as many poor democracies as there are poor dictatorships, there would still be 10 more infant deaths per 1,000 live births in dictatorships than in democracies. This difference may seem small, but its consequences are huge when applied to a large country like Indonesia, where approximately 4,834,000 children were born in 1995. Our model estimates that more than 47,000 infants died that year in Indonesia solely because its regime was a dictatorship and not a democracy.

When we assert that dictatorships and democracies perform differently, we need to show that in at least some cases the *same* factors have different effects under democracy than they do under dictatorship (see Table A2 on p. 112).

As expected, fertility shows a strong influence in increasing infant mortality under dictatorship, but an even stronger influence under democracy. If more children are born, more hunger persists, and more children die.

Although education acts to lower the IMR under both regimes, the effect of education is weaker under democracy than under dictatorship. Why? We presume that under democracy education is only one facet of an environment of opportunities that improves well-being. Under dictatorship, education sticks out; it goes against the grain of the overall political environment and is therefore a stronger factor.

Education shows a stronger effect on infant mortality than does the level of development, a fact that points to the need to focus resources and priorities on the development of human capital, not merely on short-term economic growth. The level of development has a marginal impact in lowering the IMR under both regimes.

Somewhat surprisingly, the participation of women in the labor force has an even stronger upward effect on the IMR than fertility does, and the upward effect acts under both regimes. The more women there are in the labor force, the more infants die. How can this be, when the beneficial influence of women's participation in the labor force is well known in industrialized countries? One possible reason is that most women in the world labor force are employed in agriculture, the dominant economic activity for women both in poor countries and in dictatorships. Women in the labor force in developing countries tend to be poorer and to have less access to healthcare for their children than do working women in industrialized countries.

As has been indicated, our selection model is designed to predict "counterfactual" phenomena. To illustrate these nonobserved "counterfactuals" with specific examples, Table 2 shows unbiased data for a cross-section of 14 selected countries in selected years. For each country

**TABLE 2—REGIME TYPE AND INFANT MORTALITY RATE (IMR)  
BY YEAR IN SELECTED COUNTRIES AND YEARS**

COUNTRY	YEAR (A)	REGIME (B)	OBSERVED IMR (C)	PREDICTED IMR DICTATORSHIP (D)	PREDICTED IMR DEMOCRACY (E)	DIFFERENCE F=(D-E)
<b>Burkina Faso</b>	1967	Dic	185.0	168.5	93.5	75.0
	1982	Dic	149.0	162.5	93.8	68.8
	1987	Dic	138.0	161.0	98.2	62.8
<b>Brazil</b>	1970	Dic	94.6	104.2	62.5	41.7
	1977	Dic	79.0	88.7	54.5	34.3
	1982 <sup>20</sup>	Dem	71.0	77.2	50.6	26.6
	1987	Dem	63.0	63.8	43.5	20.3
<b>China</b>	1962	Dic	88.0	106.9	141.6	-34.7
	1970	Dic	69.0	72.9	130.9	-57.9
	1976	Dic	44.0	42.5	107.6	-65.0
	1980	Dic	42.0	27.2	105.1	-77.9
	1987	Dic	37.0	6.3	109.9	-103.6
<b>Egypt</b>	1970	Dic	158.0	103.1	62.4	40.7
	1982	Dic	112.0	76.9	51.1	25.8
	1987	Dic	86.0	64.7	42.6	22.2
<b>Ethiopia</b>	1967	Dic	162.0	161.8	84.9	76.8
	1972	Dic	155.0	160.0	84.8	75.2
	1982	Dic	159.0	156.1	96.4	59.7
<b>Greece</b>	1961	Dem	39.8	83.6	27.6	56.0
	1964	Dem	35.8	76.4	27.6	48.9
	1970	Dic	34.3	58.1	24.0	34.1
	1974	Dem	23.9	47.3	22.3	25.0
	1984	Dem	14.3	28.4	13.2	15.3
	1987	Dem	11.7	16.7	8.4	8.3
<b>India</b>	1967	Dem	145.0	97.3	108.8	-11.6
	1972	Dem	132.0	82.6	106.4	-23.8
	1982	Dem	108.0	53.3	104.0	-50.7
	1987	Dem	96.0	37.0	101.1	-64.0
<b>Indonesia</b>	1970	Dic	118.0	110.5	76.3	34.1
	1977	Dic	105.0	96.4	68.9	27.4
	1982	Dic	95.0	84.3	61.1	23.2
<b>Mexico</b>	1970	Dic	72.4	91.8	69.2	26.9
	1982	Dic	49.0	55.8	45.0	10.8
	1987	Dic	41.0	42.1	38.7	3.4
<b>Nicaragua</b>	1967	Dic	115.0	110.7	81.8	29.0
	1972	Dic	100.0	104.9	77.9	27.0
	1982	Dic	68.0	87.5	66.6	20.9
<b>Nigeria</b>	1970	Dic	139.4	145.8	94.5	51.2
	1972	Dic	135.0	144.1	93.3	50.8
	1982	Dem	95.7	130.1	91.9	38.2
	1987	Dic	87.0	115.4	83.3	32.2
<b>Pakistan</b>	1967	Dic	145.0	130.2	79.1	51.1
	1982	Dic	120.0	116.0	80.3	35.8
	1987	Dic	104.0	109.3	72.8	36.5
<b>South Africa</b>	1970	Dic	78.8	71.3	64.2	7.2
	1977	Dic	72.0	65.2	58.4	6.8
	1982	Dic	63.0	58.7	54.8	3.9
<b>Switzerland</b>	1961	Dem	21.0	10.2	14.1	-3.1
	1970	Dem	15.4	14.1	7.7	6.3
	1974	Dem	12.4	7.8	2.9	4.9

and year reported, the table displays the regime type, the IMR actually observed under that year's regime, and the IMR our model predicts both for a democracy and for a dictatorship at that country's level of development. For example, Nigeria was a dictatorship in all years shown except in 1982, when its actually observed IMR was 95.7; its predicted "counterfactual" IMR under democracy that year would have been 91.9 (close to the reality), while its predicted "counterfactual" IMR under dictatorship would have been much higher: 130.1.

In almost all cases (Brazil, Burkina Faso, Egypt, Ethiopia, Indonesia, Mexico, Nicaragua, Nigeria, Pakistan, South Africa, and Greece) our hypothesis holds: Without fail, both the predicted and the observed pattern show markedly lower IMRs under democracy than under dictatorship.<sup>19</sup>

Two exceptions are China and India. Throughout the period 1950–90, China was a dictatorship while India was a democracy. China is the only country in our selection whose predicted IMRs under dictatorship are *lower* than its predicted IMRs under democracy. By contrast, India's predicted IMRs under democracy are *higher* than its predicted IMRs under dictatorship. How can this be?

China's government policy has focused intensely and for decades on lowering fertility (for example, through rigorously enforcing its one-child policy) and has achieved a much lower infant mortality rate than most other authoritarian regimes. But this achievement imposed exorbitant costs on China's populace. A democratic government with a similar commitment would likely have done at least as well in reducing China's IMR—without violating human rights.

India presents the opposite case. Although formally a democracy, India is still fettered by the informal constraints of its age-old and pervasive caste system. The country has a central democratic structure, including elections, but we know from personal experience that its democratic processes at the state and local levels are less developed than those of other democracies. The result is that many policy directives from the central government in New Delhi fail to be implemented at the state and local levels.

In sum, one answer to the riddle is size. While China is formally an authoritarian regime, in reality the central government does not control decision making at the local level, where informal and flexible decision-making processes often overturn rigid central planning objectives created in faraway Beijing. While India is formally a democracy, in reality the national government commands little authority, while local officials control local politics. Despite their differences, the enormous size of both India's and China's populations makes it difficult for their national governments to enforce their regime at the subnational level. Also, we should not forget that our data set ends in 1990 and does not reflect significant changes underway in both countries in the last decade.

In China, citizens enjoy many *de facto* freedoms to shape their destiny. India, in a historic social experiment, has passed new laws requiring that one-third of all members of local democratic governments be women, enacting a transfer of power and responsibility to more than one million rural women.

The third outlier, Switzerland, tells us that at very high levels of development, regime type does not matter. This is consistent with the finding by Przeworski and Limongi that no democracy has ever fallen at high levels of development. In fact, the highest level of development at which a democratic breakdown ever occurred was \$6,055 per capita in Argentina in 1976.<sup>21</sup>

### Implications for Policy

The findings of this article are potentially significant for policy makers. The example of infant mortality points to a clear pattern: With virtually no exceptions, democracies make their inhabitants better off than do dictatorships. The reason is a matter of speculation, but it seems that democracies are likely to provide their citizens with a wider array of opportunities. Opportunity may take many forms, including access to education, freedom from absentee landlords, the absence of war, the provision of credits and income, the freedom to space births, or simply a cow of one's own. Opportunity gives people greater power to shape their own destiny, enabling them to be more self-sufficient.

In their study of democracy and development, Alvarez et al. supply convincing data for our assertion that democracies enact policies that provide superior opportunities to their citizens. The use of contraception is noticeably higher in democracies than in dictatorships, even when we control for the level of development. In democracies, 50.7 percent of women use contraception, compared with only 24.8 percent in dictatorships. In the poorest countries (those with a per-capita GDP of under \$1,000), 20 percent of women in democracies use contraceptives, compared with only 8 percent in dictatorships. Fertility rates are 2.7 percent in democracies and almost double—5.2 percent—in dictatorships. On average, 98.5 percent of girls in democracies are enrolled in primary school, compared with 73.6 percent in dictatorships. In secondary-school enrollment of girls, the difference is even more pronounced, with 66.1 percent enrolled in secondary school in democracies and only 26.2 percent in dictatorships.<sup>22</sup> And as our findings demonstrate, democracies have lower levels of infant mortality than dictatorships *at every level of per-capita GDP*.

Samuel Huntington has pointed out that while some authoritarian governments have been successful in achieving prosperity, order, and well-being, others have triggered economic catastrophe, violence, corruption, and inequality. Dictatorships suffer from at least two critical

weaknesses. First, they lack feedback mechanisms and early-warning systems. In democracies, politicians concerned about reelection will not let their people starve. Second, dictatorships seek to promote the goals of the dictator, which do not necessarily serve the needs of the citizens. The argument that authoritarian rule produces good government assumes that dictators are good people, an unrealistic assumption about human nature.

Even well-intentioned policies often fail to improve popular welfare because they are imposed from above. Examples range from government cribs on the streets of Tamil Nadu, India (that allowed parents conveniently to get rid of their baby girls) to World Bank water hand-pumps that were provided without instruction manuals. At least as important as solutions provided from above is the response from below—and democracy is a far better mechanism for voicing that response than is dictatorship. If countries are to guarantee basic well-being to their inhabitants, they must strengthen their democratic institutions. In their ongoing efforts to bring about the end of hunger, governments and international agencies alike must go beyond focusing their efforts on economic growth alone. They must also focus on building and consolidating democracy.

## Appendix

The data set we used for this paper was Michael Alvarez, José Antonio Cheibub, Fernando Limongi, and Adam Przeworski 1997, *ACLP World Political/Economic Database*. ACLP defines the variables used here below.

- BRITCOL: British colony. Dummy variable coded 1 for every year in countries that had been a British colony any time after 1919, 0 otherwise.
- CATH: Percentage of Catholics in the population.
- COMEX: Primary commodity exporting country, as defined by the IMF.
- EDT: Cumulative years of education of the average member of the labor force. (Bhalla-Lau-Louat series).
- FERTIL: Total fertility rate (births per woman).
- INFMORT: Infant mortality rate per 1,000 live births.
- LEVEL: Level of economic development. Real GDP per capita, 1985 international prices, Chain index.
- LFPW: Labor force, female (percent of total).
- MOSLEM: Percentage of Muslims in the population.
- NEWC: New country. Dummy variable coded 1 for every year in countries that became independent after 1945, 0 otherwise.
- ODRP: Democracies in the region (percentage). Percentage of democratic regimes in the current year (other than the regime under consideration) in the REGION to which the country belongs.
- ODWP: Democracies in the world (percentage). Percentage of democratic regimes (other than the regime under consideration) in the world for the current year.
- POP: Population, in thousands.
- PROT: Percentage of Protestants in the population.
- RELIGION: Percentage of population of the largest religious group,

measured in the year for which data were available (roughly 1976–85) as presented in *The Economist* (1988) and Vanhanen (1992). Time invariant variable.

- STRA: Sum of transitions to authoritarianism. The sum of past transitions to authoritarianism in a country. If a country experienced a transition to authoritarianism before 1950, STRA was coded 1 in 1950.
- YEAR: From 1950 or date of independence to 1990.

We follow Cheibub, who used the well-known Heckman Two-Step method with ordinary least squares for studying the effect of regime type on levels of taxation. During the first step of the Heckman procedure, we must correct for auto-correlation. Cheibub notes [we have replaced his references to taxation by infant mortality rates]:

There are several ways to take selection bias into consideration when selection is assumed to occur on unobservables. The analysis in this work is based on the procedure proposed by Heckman, which essentially consists of two steps. The first is to estimate through probit the parameters of the selection equation, that is, the equation which represents the process whereby a country is observed as a democracy or as a dictatorship. This yields the probability that a country that is observed as one regime will be observed as the other regime, given the postulated selection mechanism. This probability (the hazard rate [LAMBDA]) can be used as an estimate of the bias introduced into the sample by the process that makes us observe countries as authoritarian or democratic. The second step is to estimate separately the determinants of the [IMR] for each regime, including the hazard rate as an additional variable to control for the selection process and the bias it may introduce. For this reason, the coefficients of the other determinants of [the IMR] are unbiased. Because this procedure produces unbiased estimates of the determinants of [the IMR] in each regime, it also provides the necessary components for evaluating the effects of political regimes on [IMRs] under identical exogenous conditions. Under these circumstances, inferences about the effects of regimes on [IMRs] can then be made.<sup>23</sup>

Much like Cheibub, we proceed in two stages:

- 1) To produce counterfactuals—“observations” that we do not in fact observe—we employ a probit selection model to regress exogenous variables (XREG) on regime (REG).
- 2) We use a performance model to predict the performance of regime types (REG) for infant mortality by regressing IMR on the selection variable LAMBDA and on exogenous variables (XIMR), using the Heckman Two-Step method.

The problem of selection means that the counterfactuals (nonobserved alternative states of the world) are missing from the sample. The sample provided by the world is not fully random, and we cannot assume a normal distribution of observations. If selection is nonrandom, the error terms will be correlated, meaning that variables that select REG also select REG’s performance in infant mortality. Therefore: “To correct for non-random selection, we must use the observations we have to generate the counterfactuals we miss.”<sup>24</sup>

**TABLE A1—PREDICTED INDEPENDENT EFFECT OF REGIME TYPE ON INFANT MORTALITY RATE (IMR)**

<i>Unbiased Values / Descriptive Statistics</i>					
<i>All results based on nonmissing observations.</i>					
VARIABLE	MEAN	STD. DEV.	MINIMUM	MAXIMUM	CASES
IMR (Dictatorship)	52.62	58.51	-85.12	168.51	943
IMR (Democracy)	42.79	33.28	-4.52	141.57	943
<b>Difference</b>	<b>9.83</b>	<b>33.92</b>	<b>-103.64</b>	<b>79.14</b>	<b>943*</b>

\* Because in our model we drop the first observation for each of the 138 countries whose data we have, the total number of observations goes down from 1081 to 943.

**TABLE A2—IMPACT OF EXOGENOUS VARIABLES ON INFANT MORTALITY RATE (IMR) BY REGIME TYPE**

<i>Ordinary Least Squares Model [Democracy=0, Dictatorship=1]</i>		
<i>(Standard errors in parentheses.)</i>		
PARAMETER	DICTATORSHIPS	DEMOCRACIES
Constant	134.437** (10.087)	3.595 (0.520)
COMEX	1.278 (2.686)	4.662** (1.861)
EDT	-14.087** (0.690)	-1.847** (0.362)
FERTIL	2.397* (1.171)	10.169** (0.764)
POP	-0.000** (0.000)	0.000** (0.000)
LFPW	0.461** (0.112)	0.535** (0.108)
LEVEL	-0.003** (0.001)	-0.002** (0.000)
LAMBDA	-15.940** (3.960)	-8.547** (1.926)
N	423.0	520.0
Degrees of Freedom	415.0	512.0
F	256.88	315.60
Fit: R-squared	0.81	0.81
Fit: Adj. R-squared	0.81	0.81
Durbin-Watson final	1.892	1.859
Final Rho	0.054	0.070

Notes: \*  $p < 0.05$ , \*\*  $p < 0.01$ .

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## NOTES

1. Adam Przeworski, *Democracy and the Market* (Cambridge: Cambridge University Press, 1991), 10.

2. Robert A. Dahl, *Polyarchy: Participation and Opposition* (New Haven: Yale University Press, 1971), 20.

3. Michael Alvarez, José Antonio Cheibub, Fernando Limongi, and Adam Przeworski,

“Classifying Political Regimes,” *Studies in Comparative International Development* 31 (Summer 1996): 3–36.

4. Larry Sirowy and Alex Inkeles, “The Effects of Democracy on Economic Growth and Inequality: A Review,” *Studies in Comparative International Development* 25 (Spring, 1990): 126–57.

5. Amartya Sen, “Public Action to Remedy Hunger,” Fourth Annual Arturo Tanco Memorial Lecture (London: The Hunger Project, 1990), 30.

6. Przeworski and Limongi point out that the “dictatorship=growth” argument is built on a set of implicit and mostly unexamined assumptions: 1) Poor people want to consume immediately; 2) when workers can organize, they drive wages up, reducing investment and profits; 3) when people can vote, governments move resources away from investment and into consumption; 4) lower investment slows growth; 5) dictators are future-oriented; 6) the state has a role in fostering economic efficiency; 7) the state must be insulated from private interests to perform this role well; 8) the state wants to perform this role well. These assumptions are open to discussion, to say the least. Adam Przeworski and Fernando Limongi, “Political Regimes and Economic Growth,” *Journal of Economic Perspectives* 7 (Summer 1993): 51–69.

7. The Hunger Project bases its estimates on conclusions drawn from various studies of undernutrition, malnutrition, and mortality. The Hunger Project, “Decline in the number of hunger related deaths,” [www.thp.org](http://www.thp.org), 1999.

8. Amartya Sen, “Public Action to Remedy Hunger,” 7.

9. Population Reference Bureau, *World Population Data Sheet* (Washington, D.C.: Population Reference Bureau, 1999).

10. Population Reference Bureau, *World Population Data Sheet* (Washington, D.C.: Population Reference Bureau, 1983).

11. Mary Alice Caliendo, *Nutrition and the World Food Crisis* (New York: MacMillan, 1979), 198.

12. Mahmood Mamdani, *The Myth of Population Control: Family, Caste, and Class in an Indian Village* (New York: Monthly Review Press, 1972), 78.

13. The Hunger Project, *Ending Hunger: An Idea Whose Time Has Come* (New York: Praeger, 1985), 384.

14. The Hunger Project, *Ending Hunger Briefing* (New York: The Hunger Project, 1985).

15. In their study of political institutions and popular welfare, Michael Alvarez, José Antonio Cheibub, Fernando Limongi, and Adam Przeworski argue, however, that fertility rates do not decline immediately when death rates fall. Moreover, crude birth rates continue to increase well after fertility decline because of the increase in the proportion of women of childbearing age, a phenomenon called “demographic momentum.” The same study finds that “regimes matter more for the growth of population than for the growth of income. In the end, regimes have more to do with demography than with economics.” The study shows that people live longer under democracy. Michael Alvarez, José Antonio Cheibub, Fernando Limongi, and Adam Przeworski, *Democracy and Development: Political Institutions and Material Well-Being, 1950–1990* (New York: New York University Press, 1998), ch. 4. Our findings are consistent with this study.

16. Our data set was created by Michael Alvarez, Antonio Cheibub, Fernando Limongi, and Adam Przeworski (ACLP). They describe the data in Alvarez et al., “Classifying Political Regimes for the ACLP Data Set,” Working Paper No.3, (Chicago: University of Chicago Center of Democracy, 1994). The total data set includes 4,126 observations

from 141 countries; however, the rejection of missing values (3,045 rejected values) and of the first observation of each country due to one-year time lags (138 rejected values) reduced our sample to 1,081 observations from 138 countries.

17. Philip K. Dick, *The Man in the High Castle* (New York: Vintage Books, 1962).

18. Alvarez et al. used the same procedure that we use here in their study of the influence of democracy on development. Alvarez et al., *Democracy and Development*, ch. 4.

19. Note that the observed IMRs are sticky: Where a switch of regime occurs, as in Nigeria and Brazil in 1982 or Greece in 1970, the IMR does not jump up or down immediately. It may take several years for the IMR to change once a regime change occurs.

20. The ACLP data set codes Brazil in 1982 as a democracy because the military Figueredo government transferred power democratically to the Sarney administration.

21. Adam Przeworski and Fernando Limongi, "Modernization: Theories and Facts," *World Politics* 49 (Summer 1997): 155–83. The figures are reported in Purchasing Power Parity (PPP) U.S. dollars.

22. Alvarez et al., *Democracy and Development*, ch. 4.

23. José Antonio Cheibub, "Political Regimes and the Extractive Capacity of Governments: Taxation in Democracies and Dictatorships," *World Politics* 50 (April 1998): 349–76.

24. Adam Przeworski and Fernando Limongi, "Selection, Counterfactuals and Comparisons," Manuscript (New York: New York University, 1996), 2.