

Political Survival and Endogenous Institutional Change

Bruce Bueno de Mesquita

Alastair Smith

New York University

Incumbent political leaders risk deposition by challengers within the existing political rules and by revolutionary threats. Building on Bueno de Mesquita, Smith, Siverson, and Morrow's selectorate theory, the model here examines the policy responses of office-seeking leaders to revolutionary threats. Whether leaders suppress public goods such as freedom of assembly and freedom of information to hinder the organizational ability of potential revolutionaries or appease potential revolutionaries by increasing the provision of public goods depends, in part, on the sources of government revenues. Empirical tests show that governments with access to revenue sources that require few labor inputs by the citizens, such as natural resource rents or foreign aid, reduce the provision of public goods and increase the odds of increased authoritarianism in the face of revolutionary pressures. In contrast, without these sources of unearned revenues, governments respond to revolutionary pressures by increasing the provision of public goods and democratizing.

Keywords: *revolution; political institutions; democratization; endogenous institutional change; leader survival; selectorate politics*

Democracy is the worst form of government for political leaders and the best for almost everyone else. That this is true is easily seen by considering two telling measures of welfare: the political tenure of national leaders and the average life expectancy at birth of ordinary people. Because politicians aspire to cling to power for as long as possible, their leadership tenure is an important index of their welfare. Nondemocrats are most successful at staying in power. Democratic leaders keep

Authors' Note: An earlier version of this article won the Franklin L. Burdette/Pi Sigma Alpha Award and best paper in the Political Economy section at the 2007 annual meeting of the American Political Science Association.

their jobs, on average, only about half as long as their autocratic counterparts, and for a much shorter time if they are compared with dictators who survive the 1st year or so in office. It is clear that office holders benefit from nondemocratic arrangements. It is no coincidence that few dictators voluntarily transform their countries into democracies, whereas many democratically elected leaders convert their countries to dictatorships. People living in democratic polities easily throw the rascals out of power and can expect to live better and longer—about 14 years longer—lives than those in despotic societies (Buono de Mesquita, Smith, Siverson, & Morrow, 2003). In general, the longer a leader lasts in office, the poorer the welfare of the incumbent's average subject.

The tension between the government that is best for “the people” or best for the political elite is the source of at least four important puzzles: (a) Why does any nondemocratic regime become a democracy? (b) Why do some regimes evolve to become less democratic whereas others shift to be more democratic? (c) How do domestic economic circumstances influence changes in political arrangements? and (d) How do foreign efforts to promote change specifically through foreign aid influence the prospects of democratization? These are the questions that motivate this study. In the process of providing theoretically derived, empirically tested responses to these questions, we illuminate the linkages between political institutions, domestic upheaval, economic conditions, and leadership political survival.

Our study proceeds as follows. In section 2, we examine the literature concerned with the endogenous choice of political institutions and relate it, in turn, to research on economic conditions and threats of revolution. We highlight important insights in these literatures and also draw attention to what seems to us appropriate next steps in theorizing about these issues. In section 3, we introduce a formal model of governance that relies on insights concerning how different political institutions shape what policies are incentive compatible for political-survival-oriented leaders. We examine how these policy provisions induce preferences over institutional arrangements for each societal group. These induced preferences allow us to assess how each group would change institutions given its druthers.

In section 4, we explore the conditions under which desires for institutional preferences converge and conditions under which leaders are likely to be able to overcome the opposition of other societal groups in shifting institutions. Such conditions are ripe for democratization and autocratization, respectively. In section 5, we test theoretically derived hypotheses concerning policy provisions and institutional change. Section 6 concludes with a discussion of some policy implications of our results.

Literature Review

Since the early 1980s, the world has experienced an expansion in the number of democratic or nearly democratic governments. Yet, these same decades also provide numerous examples of polities that, having adopted democratic principles of governance, then retreated back to illiberal, nondemocratic rule (Przeworski, Alvarez, Cheibub, & Limongi, 2000).

There are competing answers as to what makes countries more or less susceptible to adopting particular forms of government. Barington Moore (1966) distinguished between societies that had become democratic from those that had not on the basis of policy choices that promoted or discouraged the commercialization of agriculture and the co-optation of the peasantry into a modern economy. At roughly the same time, A.F.K. Organski (1965) identified stages of political development that were contingent on whether workers and peasants, workers and owners of capital, or peasants and owners of capital coalesced. In his view, the coalitions that formed shaped the economic policies that were subsequently followed by the government in power. For Seymour Martin Lipset (1959), the path to democracy was through economic growth. Growth-oriented policies, according to Lipset, fostered the development of a large middle class that would demand greater control over their economic welfare through the political process. So, for Lipset, economic growth was hypothesized to lead to democracy, whereas for Organski, economic outcomes were shaped, at least in part, by the nature of the government. The evidence for these contending perspectives is mixed and many of their central claims remain, in modified form, central to current debate especially over whether economic conditions determine political outcomes or political choices determine economic outcomes (Glaeser, LaPorta, Lopez de Silanes, & Shleifer, 2004; Jones & Olken, 2005; Przeworski & Limongi, 1997).

Others have focused on the emergence of autocratic rule. Wintrobe (1990), Olson (1993), and McGuire and Olson (1996), for instance, examine the entrenchment and routinization of autocratic rule. Their studies tie institutional design to optimal means by which leaders can extract wealth through taxation of their subjects. In Olson's memorable image, roving bandits fail in competition with stationary bandits. The latter choose less confiscatory tax rates so as to maximize long-term gains rather than short-term extraction. These stationary autocrats provide security for their subjects in exchange for wealth extraction from those same subjects

(McGuire & Olson, 1996). Although this literature provides an insightful analysis of the emergence and maintenance of nondemocratic regimes, it generally is not concerned about explaining democratic governance.

In Acemoglu and Robinson's (2006) insightful account, societies are divided along economic class lines. If there is a credible threat of revolution (exogenously), then the rich may democratize as a means to commit to the redistributive policies required to placate the poor. Their model, like earlier research by North and Weingast (1989), identifies a critical moment when governance institutions may be changed due to an overwhelming exogenous shock that jeopardizes the welfare of just about everyone in a society.

Acemoglu and Robinson's account leaves no room for the possibility that the incumbent nondemocratic regime leadership co-opts some of the poor with side payments or other means to buy their loyalty. Thus, there is no room for the mix of coalitional demands or interests envisioned in the earlier research by Moore, Organski, and others. Furthermore, prospective revolutionaries are not themselves strategic actors within the Acemoglu and Robinson framework; they are an unmodeled source of the exogenous shock that is addressed in terms of an agreement for a resource and power transfer from the rich to the poor. The revolutionaries, like some potential faction within the out-of-power poor group, cannot be co-opted by the incumbent regime. In these regards, Acemoglu and Robinson's model, like that by McGuire and Olson and others (Grief & Laitin, 2004), has taken us forward in understanding endogenous institution change, but it has left unexplained significant elements that restrict the generality of their account.

We try to build on the important insights from these and other studies by providing an endogenous account of the credibility of revolutionary threats and an endogenous account of the factors that induce incumbent leaders to sometimes leave political institutions as they are, and other times make them more democratic or less so. Our theory allows for the possibility that revolutionaries or subsets of the masses can be bought off by the ruling elite and for the possibility that such efforts will fail. It allows the opportunity for governments to form while allowing the opportunity for individual economic and political mobility. And, it distinguishes between changes in leaders (or their retention) within existing institutional arrangements or in the context of changes in the institutions of governance. Thus, we believe our contribution is to offer a more general account than that suggested by others and to do so within a unified theoretical approach, an approach that also provides explanations of how

governments allocate resources and how resources and political institutions interact to influence policy choices. Furthermore, in the course of examining how anticipated revolutionary threats shape resource reallocations, we propose and test an explanation of the effect of the resource curse (Gelb, 1988; Humphreys, 2005; Jensen & Wantchekon, 2004; Ross, 1999; Sachs & Warner, 2001) on endogenous shifts toward or away from democracy. In addition, our results also help inform the contemporary debate on foreign aid (Easterly, 2006; Sachs, 2005).

A Model of Responses to Domestic Political Threats

Threats to political survival can arise from three distinct sources: rivals within the current political order; domestic mass movements that seek to revolutionize the extant political system by replacing it with new institutions of governance; and foreign enemies who seek to take control of national resources or policies. We focus here on threats from mass movements, or what we will refer to as revolutionary threats, and rivals within the existing political order. The effects on governance from foreign threats have been examined elsewhere (Bueno de Mesquita et al., 2003). Naturally, self-interested leaders take actions in anticipation of political threats from any source so as to diminish the risk that they will lose office and perhaps much more. Included among the actions that leaders can take to forestall these threats are the reallocation of resources and the realignment of political interests. We now develop a theory of such reallocations and the implications of these allocations for subsequent institutional change.

Following Bueno de Mesquita et al. (2003), we characterize polities as including four nested groups: N, the people residing in the society; S, the selectorate, made up of those residents with a real say in choosing leaders and a prospect of being members of an incumbent's winning coalition; W, the winning coalition, made up of those residents whose support is essential for sustaining the incumbent in office; and L, the incumbent leader (or leadership). Political leaders are motivated first to gain and retain political power and, conditional on meeting that goal, to maximize their discretionary control over government revenue. As in Bueno de Mesquita et al.'s formulation, in order to survive, leaders need to provide their supporters with rewards worth at least as much as they expect to obtain by defecting to a political rival.

In this view of politics, leaders generate revenue and spend a portion of it on public goods (g) and private goods (z) intended to meet the demands

of their winning coalition. Any resources not spent in response to those demands are the leader's discretionary resources. All members of society derive benefits from whatever public goods are provided, but only coalition members benefit from private goods allocations. The price of public goods is p . We assume that private goods have a unit cost for each person who receives them. Therefore, coalition size acts as an implicit price for private goods. The cost of providing g public and z private goods is $pg + Wz$.

In addition to acting as rewards, public goods play three important roles in the political economy of a nation. First, they enhance economic productivity. Healthy, informed, mobile citizens are more productive than sickly, ignorant, and isolated citizens. Second, by enhancing productivity, they increase the pool of income potentially available to the government in the form of tax revenue. Third, some public goods, especially freedom of assembly, free speech, free press, and transparent government, improve the ability of citizens to form views about what their government is doing and to organize and coordinate in the event that they are displeased with their government. We assume that, should the citizens decide to rebel, the probability that they will succeed is an increasing function of these core public goods: $\rho(g)$.

Everyone has additively separable preferences over public and private goods. Thus, the value of receiving g public and z private goods is $v(g) + u(z)$, where v and u are increasing concave functions and $u(0) = 0$. For ease of signing comparative statics, we examine the specific utility functions $v(g) = \sqrt{g}$ and $u(z) = \sqrt{z}$. As noted, public goods enhance government revenue through taxation. In particular, given that there are N tax-paying residents and a tax rate of r , the government receives tax revenues of $Nr\phi(g)$, where $\phi(g)$ is an increasing concave production function that captures how the provision of public goods improves productivity. Smith (2008) provides the micro-foundations for the willingness of citizens to participate in the economy as the provision of public goods changes.

Taxation is not the only source of government revenue. Governments also obtain revenue from sources that do not depend on the willingness of citizens to participate in the economy. Typical examples of these "unearned" resources are rents from mineral or oil extraction and from foreign aid. We denote such goods as free resources. They are free in the sense that they provide the government with resources without the government needing to provide conditions, such as high levels of public goods, that are conducive to economic activity by residents in order to generate

revenue. The government's total revenue, then, is $R + Nr\phi(g)$. This implies a budget constraint:

$$R + Nr\phi(g) \geq pg + Wz \quad (1)$$

A leader's discretionary resources, $R + Nr\phi(g) - pg - Wz$, provide a convenient metric of leader survival. The greater the discretionary resources, the greater are the incumbent's survival prospects. Small coalition leaders can have their cake and eat it too. They want to survive and they want discretionary authority over revenue. The smaller their coalition, W , and the larger their selectorate, S , the more discretionary resources they have. Finally, if all else is equal with respect to survival and discretionary resources, we assume that leaders form a coalition with those selectors with whom they share idiosyncratic likes. We label these preferences over whom to include in a coalition as affinities (Bueno de Mesquita et al., 2003). To reflect that more is known about incumbents than challengers, we assume that initially a leader's affinities are unknown, but upon attaining office, the top W selectors in the leader's affinity ordering are fully revealed. We assume that all possible affinity orderings are equally likely. The net effect of this assumption is that once a new leader is established in office, each selector has a W/S chance of being one of the leader's highest W affinity supporters and, hence, being included in the incumbent's long-term (posttransitional) coalition. Later, we will see conditions under which incumbents have an incentive to hide their true, complete affinity ordering.

We consider an infinitely repeated game with common discount factor δ . In each period, the incumbent leader faces political threats from a challenger (C), who seeks office within the existing political rules, and from a revolutionary (D), who seeks the citizens' support to overthrow the entire regime and recast institutions. Following the standard practice of revolutionaries, we assume that D declares (not necessarily truthfully) the intention to remake the polity in a more democratic light.

To attract supporters, C and D each propose public and private goods provisions subject to the budget constraint. To defeat these threats, the incumbent must provide sufficient private and public goods to maintain the loyalty of her supporters against C and, if necessary to forestall the onset of revolution, against D . To understand how economic and political circumstances shape which policies best enable a leader to survive in office, we characterize equilibria in which leaders survive in every period. We now state the stage game.

The Political Survival and Policy Game

1. **Coalition and policy proposals:** L proposes a coalition of size W made up of her highest affinity selectors. She also proposes public and private goods provisions (g_L and z_L) subject to the budget constraint. The challenger proposes a coalition of size W , which includes at least one member of L's coalition and proposes policies g_c and z_c (subject to the budget constraint). The revolutionary forms a democratic coalition of size $W_D = N/2$, which excludes members of the incumbent's coalition and proposes policies g_D and z_D (subject to the budget constraint).
2. **Selectorate competition:** The selectors choose between the incumbent and challenger. If any member of the incumbent's coalition supports the challenger, then the incumbent is deposed and the challenger attains office and becomes the new leader; otherwise, the incumbent survives in office.
3. **Revolutionary threat:** If the incumbent leader survives Step 2, then residents in the revolutionary's coalition decide whether to rebel. The public goods provided by the incumbent not only facilitate productivity and tax revenue, but they also help would-be revolutionaries and leaders of mass movements to organize and coordinate disgruntled residents. If there is a rebellion, it succeeds with probability $\rho(g)$, which is increasing in g . Those who rebel pay cost k for their action. If the revolution succeeds, then D becomes the new leader and institutions shift. The continuation value associated with future play under postrevolutionary institutions is Δ for all residents. This continuation value reflects expectations about the likelihood that the revolutionary, once ensconced in power, will in fact sustain democratic institutions as promised and will continue to deliver the promised policies or will revert to a nondemocratic government with a different mix of private and public goods once the revolutionary adopts the role of a survival-oriented incumbent leader.
4. **Policy implementation, work, and affinity revelation:** The policies of the selected leader are implemented and the highest W selectors in the leader's affinity ordering are identified.

Internal Political Competition

In the proposition to follow, we characterize a Markov Perfect Equilibrium in which leaders provide the optimal survival-oriented policies (g^*, z^*) given the institutions, W and S , in every period and survive. Some preliminaries will simplify the statement of the proposition. We start by examining the best possible offer by a nonrevolutionary challenger in the

immediate period. The challenger wants to offer as many rewards as possible to entice some of the incumbent's essential supporters to defect. Because the challenger needs a coalition of size W , his programming problem is $\max_{g,z} v_{g,z}(g) + u(z)$, subject to the budget constraint $R + Nr\phi(g) - pg - Wz \geq 0$. This globally concave program implies $z = \frac{R + Nr\phi(g) - pg}{W}$ and the first order condition

$$v_g(g) + \frac{Nr\phi_g(g) - p}{W} u_z \left(\frac{R + Nr\phi(g) - pg}{W} \right) = 0 \quad (2)$$

We represent these best policies as \hat{g} and \hat{z} and the value of the challenger's best possible offer in the immediate period as $v(\hat{g}) + u(\hat{z})$. Although selectors whose support is solicited by the challenger can expect to receive these benefits in the immediate period if they defect, the challenger cannot credibly commit to these policies in the future. Once established in office, the new leader identifies a coalition of his W highest affinity selectors and provides them with the public and private goods (g^*, z^*) , which ensures his survival in all future periods. Given that each member of the selectorate has a W/S chance of being one of these highest affinity selectors who are to be placed in the new leader's long-term coalition, the best the challenger can credibly offer is $v(\hat{g}) + u(\hat{z}) + \frac{\delta}{1-\delta} v(g^*) + \frac{\delta}{1-\delta} \frac{W}{S} u(z^*)$. The incumbent leader survives, provided that the value of the policies she offers her entrenched coalition in the current and future periods ($\frac{1}{1-\delta}(v(g^*) + u(z^*))$) is at least as large as the challenger's best offer. Equating these offers implies that if the incumbent is to survive political threats within the extant institutional system, then her policies (g, z) must satisfy the following constraint:

$$Select(g, z) = v(g) + u(z) - v(\hat{g}) - u(\hat{z}) + \frac{\delta}{1-\delta} \left(1 - \frac{W}{S} \right) u(z) \geq 0 \quad (3)$$

The following definition will greatly simplify the statement of the results. Let $\zeta(g)$ be the private goods provision that solves Equation 3 evaluated at g public goods: $Select(g, \zeta(g)) = 0$, which can alternatively be expressed as $\zeta(g) = u^{-1} \left(\frac{S(1-\delta)}{S-W\delta} (v(\hat{g}) + u(\hat{z}) - v(g)) \right)$, where u^{-1} is the inverse function of u . If Equation 3 is the only constraint, then the incumbent wants to pick those policies that maximize discretionary resources subject to this constraint. This efficient allocation between public and private goods implies the following first order condition¹:

$$FOC(g, z) = v_g(g) + \frac{Nr\phi_g(g) - p}{W} u_z(z) = 0 \quad (4)$$

Revolutionary Threats

Internal political threats, as characterized by the incumbency constraint, 3, are not the only threat that leaders face. Leaders also risk deposition by mass political movements, such as revolutions. We now examine how a credible revolutionary threat constrains a leader's policy choices. We assume that in the immediate period, a revolutionary leader proposes a public and private goods provision to a coalition of size $N/2$. Should the revolution succeed, the likelihood of which ($\rho(g)$) depends on the incumbent's public goods provision, then all citizens receive a continuation value worth Δ associated with the policies under the postrevolutionary institutions. Note that given our assumption that all affinity orderings are equally likely, each citizen has an equal chance of advancement under the new institutional arrangements. This justifies the use of a single continuation value. In constructing numerical examples, we assume what may well be the hardest case for the incumbent—that the revolutionary will, in fact, implement a democratic system with coalition size $N/2$ after the revolution. We recognize that does not always come to fruition in reality. There often is substantial denigration of democratic ideals following revolutionary success.

In the immediate period, the revolutionary leader can do no better than offer the mix of public and private goods that provides the highest possible level of rewards to a coalition of size $W_D = N/2$. That is, analogous to Equation 2, the revolutionary can do no better than offer policies (\hat{g}_D, \hat{z}_D) that maximize $v(g) + u(z)$ subject to the budget constraint $R + Nr\phi(g) - pg - W_D z \geq 0$. Therefore, $\hat{z}_D = \frac{R + Nr\phi(\hat{g}_D) - p\hat{g}_D}{W}$ and $v_g(\hat{g}_D) + \frac{Nr\phi_g(\hat{g}_D) - p}{W} u_z(\frac{R + Nr\phi(\hat{g}_D) - p\hat{g}_D}{W}) = 0$.

If the revolution succeeds, then the expected payoff for each member of the revolutionary's coalition is $v(\hat{g}_D) + u(\hat{z}_D) + \Delta - k$. The public goods provision of the incumbent affects the likelihood of revolutionary success $\rho(g)$. When deciding whether to rebel, citizens face a tradeoff between the gains they hope to realize from a successful revolution, the likelihood that the revolution will succeed, and the public goods rewards they currently receive from the incumbent, that is, $\rho(g)(v(\hat{g}_D) + u(\hat{z}_D) + \Delta - k) + (\rho(g))(\frac{1}{1-\delta} v(g) - k)$ versus $\frac{1}{1-\delta} v(g)$. Provided

that the incumbent's public goods provision (g) satisfies the following constraint, the residents choose not to rebel as they do not expect their welfare to be improved by rebellion.

$$Rebel(g) = \rho(g) \left(\frac{1}{1-\delta} v(g) - v(\hat{g}_D) - u(\hat{z}_D) - \Delta \right) + k \geq 0 \quad (5)$$

The equilibria break down into two distinct cases depending on whether (a) selectorate political competition (Equation 3) forms the only binding constraint on an incumbent's policy choice, or (b) leaders face both selectorate and revolutionary credible threats (Equations 3 and 5) so that both serve as binding constraints on incumbency.

Proposition 1. In Markov Perfect Equilibria in which leaders always survive, the leader proposes policies (g^*, z^*) as follows:

Let (g_1, z_1) be the policies that solve $Select(g, z) = 0$ and $FOC(g, z) = 0$.

Case 1: If $Rebel(g_1) \geq 0$, then the incumbent leader's policies are $(g^*, z^*) = (g_1, z_1)$ and the leader's (per period) payoff under this circumstance is $\Theta_1 = (R + Nr\phi(g_1) - pg_1 - W\zeta(g_1))$.

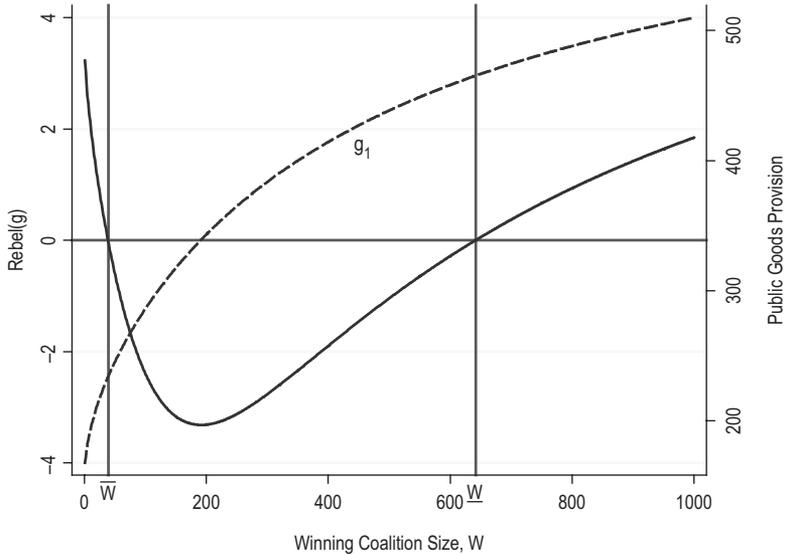
Case 2: If $Rebel(g_1) < 0$, then define \bar{g}_2 as the smallest $g > g_1$ such that $Rebel(g) = 0$ and \underline{g}_2 as the largest $g < g_1$ such that $rebel(g) = 0$; leader L proposes $(g^*, z^*) = (\bar{g}_2, \zeta(\bar{g}_2))$ if $\bar{\Theta} = (R + Nr\phi(\bar{g}_2) - p\bar{g}_2 - W\zeta(\bar{g}_2)) > (R + Nr\phi(\underline{g}_2) - p\underline{g}_2 - W\zeta(\underline{g}_2)) = \underline{\Theta}$ and $(g_L^*, z_L^*) = (\underline{g}_2, \zeta(\underline{g}_2))$ if $\bar{\Theta} \leq \underline{\Theta}$.

The first case corresponds to Bueno de Mesquita et al.'s (2003) existing selectorate theory and so needs no further comment here. Smith (2008) provides a formal proof of the second case in which incumbents must take seriously the threat of revolution or mass movement. The logic follows straightforwardly from the derivation of the constraints above. We illustrate the intuition in Figure 1.²

To guarantee her survival, the incumbent must satisfy the constraints $Select(g, z) \geq 0$ and $Rebel(g) \geq 0$. When there is no revolutionary threat, the incumbent chooses those policies, (g_1, z_1) , that ensure internal political support ($Select(g, z) = 0$) and maximize the discretionary resources in the immediate period ($FOC(g, z) = 0$). The dashed line of Figure 1 plots these optimal public goods provisions (g_1) (right axis) against coalition size. As the figure shows, as coalition size increases, leaders substitute public goods for the increasingly expensive private goods.

The second (solid) curve in Figure 1 plots $Rebel(g_1)$ (evaluated at the Case 1 optimum policies) against coalition size. The curve reflects how

Figure 1
The Rebel(g) Constraint and Public Goods Provisions Under Selectorate Competition



public goods influence the decision to rebel in two different ways. When the function $Rebel(g_1)$ takes positive values, as is the case when $W < \bar{W}$ or $W > \tilde{W}$, then citizens do not support revolutionary movements. However, their lack of support in each of these regions is motivated by different incentives. When the coalition is small ($W < \bar{W}$), incumbent leaders provide few public goods (in this figure, $g_1 < 233$). Under these conditions, many residents desire institutional change, but the lack of public goods makes it difficult for them to organize and coordinate in opposition to the government. Thus, a revolution is unlikely to succeed. In large coalition systems ($W > \tilde{W}$), incumbents provide high levels of public goods that, in principle, facilitate successful revolutionary actions. However, because the incumbent provides high levels of public goods (in this figure, $g_1 > 465$), the county's residents are relatively satisfied with the benefits they derive from their government and so they do not want to rebel.

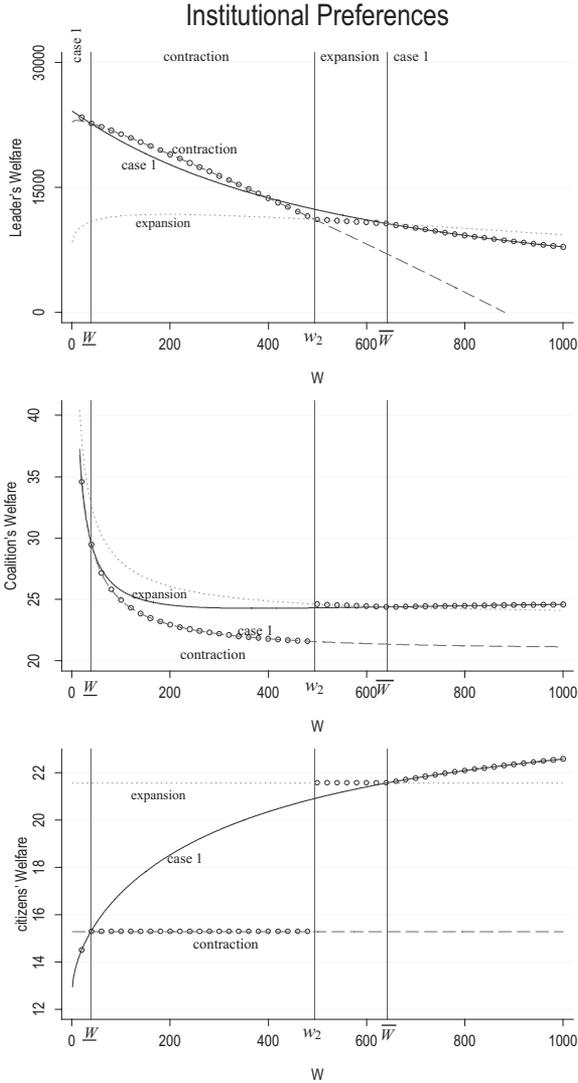
Leaders face credible revolutionary threats when coalition size is in an intermediate range, $\underline{W} < W < \overline{W}$ (between 39 and 662 in the figure). The leader provides sufficient public goods to facilitate the organization of revolutionary activities but not sufficient public goods to buy off the potential revolutionaries. If the incumbent continues to provide the Case 1 efficient level of public goods (g_1) when $\underline{W} < W < \overline{W}$, then there will be a revolt. The figure offers insight into how the incumbent can prevent a revolution by mimicking the public goods provisions of a coalition of size \underline{W} or \overline{W} . These are the public goods provisions \underline{g}_2 and \overline{g}_2 characterized in the proposition. For presentational purposes, we refer to these two responses as contraction and expansion, respectively.

By contracting the public goods supply relative to that which best solves challenges within the institutional framework, the leader deters a revolution by making it less likely to succeed. Expanding the public goods supply, relative to that which best solves political competition within the existing institutional framework, ameliorates the discontent with the extant system that might stimulate a revolution.

Incumbents can forestall the onset of revolution through either contraction or expansion. The first panel of Figure 2 helps illustrate which is the incumbent's most preferred option by plotting the incumbent's payoff from the Case 1 optimal policies Θ_1 (solid line), from contraction $\underline{\Theta}$ (dashed line), and from expansion $\overline{\Theta}$ (dotted line) against coalition size. The second and third panels of Figure 2 show the corresponding welfare for members of the incumbent's coalition and for those outside of the winning coalition. When $W < \underline{W}$ or $W > \overline{W}$, then the *Rebel* constraint does not bind. Therefore, in these ranges, the incumbent's equilibrium policies (which are highlighted throughout Figure 2 by tiny circles) are $(g_1, \zeta(g_1))$. Between \underline{W} and \overline{W} , the incumbent chooses contraction or expansion depending on the exact size of the winning coalition. As the circles highlighting the equilibrium policies in Figure 2 show, the incumbent prefers contraction to expansion when coalition size is sufficiently small, $W \leq W_2$ (which equals 494 in Figure 2), and expansion otherwise.

Contraction and expansion each have advantages and disadvantages as means to solve the incumbent's problem, that is, the revolutionary threat. Contraction reduces the supply of public goods, thereby reducing the ability of revolutionaries to organize. It also shrinks the economy and, hence, the government's access to resources. However, the shift away from public goods and toward a greater focus on private goods increases loyalty to the incumbent within the coalition. When private goods are a large component of the benefits that a leader provides, her supporters greatly fear

Figure 2
Institutional Preferences for the Incumbent (Panel 1),
Winning Coalition Members (Panel 2), and Citizens (Panel 3)
in Case 1 (solid), Contraction (dashed), and Expansion (dotted)



Note: The equilibrium outcomes are indicated by the circles.

being excluded from future coalitions. Because challengers cannot guarantee members of the current coalition a place in their long-term coalition if they come to power and incumbents can (because they already have learned affinities), supporters become increasingly reluctant to defect as private goods supplant public goods. This increase in loyalty enables leaders to spend less on their coalition, leaving more for their own discretionary use. In contrast, if the leader responds to the revolutionary threat by expansion, then members of the coalition become less loyal because the shift toward public goods lessens the cost of being excluded from future coalitions.

If the incumbent chooses to contract public goods provision as coalition size increases, then more supporters receive private goods. Because coalition size indicates the cost of private goods, the private goods policy associated with contracting public goods provision becomes increasingly unattractive to the incumbent as the coalition gets larger. The incumbent's payoff associated with contracting public goods is negatively sloped: $\frac{d\Theta}{dW} < 0$. We define w_2 as the coalition size such that $\underline{\Theta} = \overline{\Theta}$. For coalition sizes greater than w_2 , the incumbent prefers to expand public goods provision. It is interesting to note that whereas the incumbent's payoff for contraction ($\underline{\Theta}$) is strictly decreasing in W , in expansion, the incumbent's payoff ($\overline{\Theta}$) can be either increasing or decreasing in W .³

The second and third panels of Figure 2 show the payoffs for members of the winning coalition and for the residents who are not part of the winning coalition. When the revolutionary constraint binds, that is, between \underline{W} and \overline{W} , the winning coalition prefers the policies of expansion to those of Case 1, which are in turn preferred to those of contraction, as shown in the second panel of Figure 2: $v(\overline{g}_2) + u(\zeta(\overline{g}_2)) > v(g_1) + u(\zeta(g_1)) > v(\underline{g}_2) + u(\zeta(\underline{g}_2))$. These preferences are driven by the effect of the increasing private goods focus across these three options and the loyalty norms induced. Those outside the winning coalition receive rewards only from public goods. In common with members of the coalition, they prefer expansion to Case 1 to contraction, as shown in the bottom panel of Figure 2: $v(\overline{g}_2) > v(g_1) > v(\underline{g}_2)$.

The Pernicious Effect of Free Resources

Free resources increase the incentive to rebel, especially in small coalition settings. In large coalitions, much of the revenue generated through free resources is spent to provide public goods. In contrast, in small coalition systems, a large proportion of the free resources is siphoned off by the leader and those resources not captured by the incumbent are

predominantly used as private rewards for coalition members. Thus, whereas the average citizen receives little benefit from free resources in a small coalition system, citizens would benefit greatly from these resources in a large coalition setting. This increases the citizens' desire for democracy.

The increased incentive to rebel in the face of free resources implies that the revolutionary constraint is more likely to bind in small coalition systems as the value of free resources increases. As the level of free resources grows, the incumbent must further contract the supply of public goods to forestall a revolution: $\frac{dW}{dR} < 0$ and $\frac{dg_2}{dR} < 0$. Furthermore, although analytically, their sign depends on precise parameter values and functional forms, our simulations suggest that typically $\frac{dw_2}{dR} > 0$ and $\frac{d\bar{W}}{dR} > 0$, so that as free resources become more abundant, the range of institutional configurations in which leaders face revolutionary threats increases and the response to the threat is likely to be contraction. The leader's welfare is greatly enhanced by free resources in small coalition systems. In these systems, the strong loyalty norm induced by the private goods focus enables the incumbent to capture much of the value created by free resources. In larger coalition systems, the incumbent cannot expropriate as many of the resources. This means that incumbents have huge incentives to try to engineer a small coalition system when revenue from free resources is large, including the possibility of large amounts of foreign aid. We turn now to those incentives to engineer institution change.

Institutional Change

The formal model characterizes the policies that are incentive compatible with political survival under different political institutions and economic settings. These policies induce the preferences over different institutional arrangements for leaders, members of the winning coalition, and others within the society. These preferences characterize how each group would like to change political institutions given its druthers. We investigate conditions likely to result in institutional change by examining those conditions under which desires for institutional changes converge and those conditions under which leaders can best overcome the opposition of other groups. These circumstances are most conducive to institutional change.

Incumbent political leaders want to reduce the size of their coalition—they want to purge members—if they can. Coalition members and

ordinary people typically oppose such institutional developments. However, the extent of their objections is influenced by whether there is a revolutionary threat and, if so, by how the incumbent responds to it. As we shall see, if the incumbent's best response to a revolutionary threat is to contract the supply of public goods, then it is easier and attractive for incumbents to contract coalition size as well, becoming more autocratic or despotic.

To illustrate our reasoning, suppose the incumbent wants to diminish the winning coalition from W to W' . Under what circumstances will the coalition's members support such a purge? We start by considering the incentives in the absence of a revolutionary threat (that is, Case 1). The second panel of Figure 2 graphs the welfare of coalition members at different coalition sizes. In the absence of a revolutionary threat, the welfare of coalition members at first sharply declines as coalition size increases. However, beyond some sizes ($W = 377$ in Figure 2), as coalition size continues to increase, coalition members' welfare gradually begins to increase. Although an increase in coalition size leads to a dilution of private goods, the shift toward public goods weakens the loyalty norm, which forces the incumbent to spend more revenue on the coalition. Figure 2 only plots coalition sizes up to 1,000. The increase in welfare over this range is slight. However, the upward trend continues at larger coalition sizes. At relatively large coalition sizes, because welfare is then continuously increasing for coalition members, they oppose institutional changes intended to contract the winning coalition.

When coalition size initially is relatively small ($W < 377$), the coalition's welfare is decreasing as coalition size increases. In this small coalition range, there is the potential for coalition members and the incumbent to agree to a reduction in the coalition's size. Of course, if a coalition member were certain that he or she would not be purged as the coalition shrinks, the member would support the purge and enjoy the benefits of larger private rewards. Any supporter who expects to be excluded from the diminished coalition, however, would naturally oppose such an institutional change by defecting to a challenger (thereby deposing the incumbent) if the coalition member believed that institutional change via a purge is imminent. This difference in willingness to support institutional contraction suggests that a detailed knowledge of the leader's affinity ordering is critical.

Members of the leader's long-term (that is nontransitional) coalition know that they are in the top W selectors in the leader's affinity ordering; that is why they are coalition members. Suppose they know their precise

position in the ordering, as assumed in Bueno de Mesquita et al. (2003). If a supporter is at the bottom of the ordering (that is, is the W th member of the coalition), then he or she defects if it is perceived that the incumbent might attempt a reduction in coalition size because the supporter is then sure to be purged. This suggests that leaders cannot be open about their plans and their idiosyncratic preferences. Leaders have an incentive to convince each of their supporters that they are high in the affinity ordering. Of course, given the incumbent's incentives, such claims cannot be credible.

Suppose, instead, that the incumbent's precise affinity ordering is not fully revealed. Under this circumstance, members of the incumbent's winning coalition know that they are in the top W in the ordering, but they are not certain if they are in the top W' . If coalition members support a purge, then they increase their welfare provided they are retained, but they are much worse off if they are among those who are purged. In expectation, this loss is much worse than the potential gain, so that, on average, coalition members do not support purges. Therefore, if leaders are to remove members of the winning coalition, they must do so as a fait accompli. It is obvious that implementing such a spontaneous change requires great skill and ingenuity. But, talented leaders can sometimes do so.

Saddam Hussein's actions following his accession to the Iraqi presidency provide just such an example. On July 16, 1979, Saddam Hussein took over the Iraqi presidency following the retirement of his predecessor allegedly for health reasons. On July 22, 1979, he convened a meeting of all the leading figures in the government at ruling Baath party headquarters. He videotaped the following events and distributed the video widely within Iraq. Hussein announced the discovery of a plot against him (which is widely believed to have been completely fictional). He then proceeded to announce, one by one, the 68 members of the alleged plot. Each was asked to leave the meeting. As they realized what was happening, those denounced became more and more reluctant to leave and had to be escorted out by armed guards (22 were subsequently executed). Those who were allowed to remain, after initial apprehension, vigorously cheered for Hussein as they realized that the coalition had been purged but that they had survived and been retained.

Although the Saddam Hussein example shows that leaders can orchestrate contractions of the winning coalition, in general, coalition members are, in expectation, opposed to such institutional changes. Revolutionary threats lessen this opposition. This is illustrated in the second panel of Figure 2. Suppose the initial coalition size is between \underline{W} and w_2 . In this

region, the incumbent responds to the threat of revolution by contracting public goods. The resultant increase in the private goods focus increases loyalty and harms the welfare of the winning coalition. This is seen in Figure 2, where the welfare associated with contractionary policy is below that associated with the Case 1 optimum. If the leader contemplates a diminution of the coalition's size, then coalition members face the same risk of exclusion under contraction as under Case 1 but with a greater improvement in welfare if they are retained. This diminishes the coalition's incentives to stand in the way. It is also worth noting that people not in the coalition have no incentive to hinder contraction within the range \underline{W} to w_2 because they receive the same payoff whatever the coalition size is, based on the public goods provision g_2 . This effect is amplified when free resources are plentiful and coalition size is small because, as we saw earlier, free resources make contraction a more attractive response for leaders.

Hypotheses and Empirical Tests

Many empirical predictions follow from the theory. Here, we focus on novel hypotheses that relate how the provision of policy and institutional change depends on existing institutions, the presence of free resources, and the presence or absence of a revolutionary threat. In particular, we examine the changes in the provision of what we call core public goods, which help facilitate the organization of revolutionary actions (freedom of assembly, free press, free speech, transparent government) and institutional change. We specifically test the following hypotheses implied by the theory:

Hypothesis 1: When facing a credible threat of revolution, future core public goods provision contracts as the availability of free resources increases in small coalition systems but not in large coalition systems.

Hypothesis 2: When not facing a credible threat of revolution, core public goods provision remains unchanged as a function of the availability of free resources regardless of coalition size.

Hypothesis 3: When facing a credible threat of revolution, the degree of future democracy (or coalition size) decreases as the availability of free resources increases in small coalition systems but not in large coalition systems.

Hypothesis 4: When not facing a credible threat of revolution, the degree of future democracy remains unchanged as a function of the availability of free resources regardless of coalition size.

Empirical Tests

Our tests require data on political institutions, free resources, the expansion or contraction of core public goods provision, and the threat of revolution, as well as relevant control variables. To measure institutions, we use Bueno de Mesquita et al.'s (2003) 5-point measure of winning coalition size (*W*) and Polity IV's well-known 21-point Democracy-Autocracy index. Each of these is normalized to vary between 0 and 1, with 1 representing the most democratic countries and 0 the most autocratic. Bueno de Mesquita et al.'s (2003) construction of *W* relies on components from the Polity data. In particular, they add 1 point to the index for each of the following conditions: if the *REGTYPE* is nonmilitary, if *XRCOMP* is greater than or equal to 2 (meaning the chief executive is not chosen by heredity or in rigged, unopposed elections), if *XROPEN* is greater than 2, and if *PARCOMP* equals 5 (indicating the presence of a competitive party system). This variable is normalized between 0 and 1 by dividing by 4. See Bueno de Mesquita et al. (2003) for details and justification of this variable.

Free resources indicate the extent to which governments receive revenues from sources that do not require taxing the economic activities of citizens. Natural resource rents and foreign aid represent two common sources of such unearned income. Using the World Bank's (2005) World Development Indicators, we examine oil and aid as a percentage of gross domestic product (GDP).⁴

Although the theoretical model considers only a single government-provided public good, in reality, governments provide many public goods. Public goods such as public health are valuable to the citizens and promote economic activity. However, such goods do little to assist the organization of mass political movements.⁵ We create an index of core public goods. The choice of components for the index is governed by theoretical and practical considerations. First, the components should be factors that enable potential revolutionaries to organize—factors such as personal political freedoms, access to information through the media, freedom of assembly, and transparency of government. Second, measures of these factors need to be available for a wide range of nations over a long period

of years. Combining these demands, the chosen variables are as follows: (a) each country's Freedom House Civil Liberties score each year to indicate personal political freedom; (b) the logarithm of the number of radios (+ 1) per 1,000 population for each country each year, derived from Arthur Banks's (2001) Cross-National Time-Series data and intended to assess access to media information; (c) the logarithm of the number of general strikes (+ 1) involving more than one employer and at least 1,000 striking workers for each year for each country, used as an indicator of freedom of assembly (also taken from Banks, 2001); and (d) a dummy variable intended to assess government transparency, coded as 1 when government tax revenue is reported and coded as 0 when it is missing data for each country each year, as reported in the Penn World Tables (variable cg). To construct the Core Goods index, we standardized ($M = 0$, $SD = 1$) each of the components and then summed these components and divided by 4.

As a robustness check, we replicate our analyses and find similar results by substituting Freedom House's Civil Liberties index for Core Goods. The results based on Civil Liberties can be found at the Web site, <http://politics.as.nyu.edu/object/datapage.html>. This replication archive contains numerous robustness checks as well as all the data and code required to implement the analysis. These robustness checks include additional controls and the use of alternative estimation methods. This archive also reexamines all estimates considering using 2-year lags and leads rather than the 5 years presented here.

Measuring revolutionary threats presents an onerous task, not least because leaders act to prevent the realization of threats. Although admittedly rudimentary, to assess the threat of revolution, we examine the extent to which the occurrence of mass political events has risen or fallen over the previous 5 years. The implicit assumption is that if the number of these events has been rising over recent years, then leaders perceive this as a sign of increasing organization by potential revolutionaries and, hence, an increased revolutionary threat. These temporal differences provide an assessment of the need for leaders to forestall potential revolutionary activities. The temporal nature of these measures also helps control for systematic difference between nations. Regular protests might be the norm in one system and are, therefore, not necessarily an indicator of a growth in revolutionary threats. In contrast, protest in a system unaccustomed to such activity is a powerful signal of growing revolutionary activity.

We construct the variable *threat* using five variables from Arthur Banks's Cross-National Time-Series data, which reflect mass political

movements and the potential for revolutionary threats: the number of anti-government demonstrations, the number of riots, the number of general strikes, the number of attempted assassinations, and the number of revolutions. In each year, we calculate the change in each of the component variables relative to 5 years earlier. For instance, with respect to the riots variable, we subtract the number of riots 5 years ago from the number of riots in the current year. Because some components of the index, such as antigovernment demonstrations, are generally much larger in scale than other measures, such as revolutions, we standardize each of these difference components (i.e., convert them to mean 0 and variance 1). These standardized change variables are then summed and divided by 5 to create the threat variable.

When threat is positive, then leaders face more antigovernment demonstrations, riots, strikes, assassination attempts, and revolutions than they did 5 years previously. This is an indication of an increased revolutionary threat. In contrast, leaders face less risk of removal through mass political means when the number of these events is declining. As a simple way to incorporate these effects into the analysis, we split the sample into those cases in which the leader faces a growth in the number of events indicative of a potential revolution ($\text{threat} > 0$) and those cases in which the number of these events is falling ($\text{threat} < 0$). Our measure of revolutionary threat is primitive. However, it provides a basis measure of a leader's perceptions of revolutionary threat, which, as we shall see, strongly influences policy and institutional change. We remain committed to finding improved measures for this key concept.

When leaders face revolutionary threats, the theory predicts that their policy response and direction of institutional change depend on initial institutions and the level of free resources. In particular, when free resources are abundant and initial coalition size is fairly small, leaders contract public goods. When initial coalition size is fairly large, leaders are likely to expand public goods. In addition, in this latter case, the deleterious effect of free resource is ameliorated. To capture these possibilities in our specification, we include variables for institutions and institutions², where institutions are measured as either Bueno de Mesquita et al.'s *W* or Polity's Democracy-Autocracy, each scaled between 0 and 1. The specifications include interactions between the free resource measures (Oil and Aid) and institutions. This allows the deleterious effect of free resources, which is hypothesized to be strongest in small coalition systems, to differ across institutions.

All of our analyses include controls for the logarithm of per capita income, the logarithm of per capita income interacted with institutions, and the logarithm of total population (with both per capita income and population derived from the World Bank's World Development Indicators). We also control for the year to correct for any secular trend in institutional reform or in the provision of core public goods. The population control corrects for any scaling effects across countries, whereas the per capita income variable corrects for wealth effects.

We focus attention on two dependent variables, Future Core Public Goods ($t + 5$) and Future Institutions ($t + 5$). Our general specification is $\text{Dependent Variable}(t + 5) = a + b1 \text{ Dependent Variable}(t0) + b2 \text{ Institutions} + b3 \text{ Institutions}^2 + b4 \text{ Oil} + b5 \text{ Oil} \times \text{Institutions} + b6 \text{ Aid} + b7 \text{ Aid} \times \text{Institution} + b8 \ln(\text{GDP per capita}) + b9 \ln(\text{GDP}) \times \text{Institution} + b10 \ln(\text{Population}) + b11 \text{ Year} + e$, with the analysis being divided into those cases in which a leader faces an increasing revolutionary threat ($\text{threat} > 0$) and those in which the revolutionary threat is declining ($\text{threat} < 0$). Data availability allows us to carry out the institutional change analysis using most nations from 1962 to 1999. Worse data coverage for the components of the Core Public Goods measure means that for most nations, the policy choice analysis covers 1972 to 1994.

The Provision of Core Public Goods and Institutional Change

Table 1 provides ordinary least squares (OLS) estimates of how political institutions and free resources affect the provision of core public goods as a function of whether a government faces a credible revolutionary threat or not. We expect a significant reduction in core public goods below their baseline provision when a relatively nondemocratic nation with free resources faces a credible threat ($\text{threat} > 0$). We do not expect a comparable effect for more democratic countries; rather, we anticipate that free resources do less harm to the provision of core public goods in such societies even in the face of a credible revolutionary threat. In the absence of a credible threat ($\text{threat} < 0$), we expect policy shifts and institutional reforms to be muted.

Models 1 and 3 examine Future Core Public Goods when leaders face an increasing revolutionary threat. Model 1 uses Bueno de Mesquita et al.'s *W* measure of institutions, whereas Model 3 uses the Polity measure. We discuss Model 1; the estimates in Model 3 are similar. When

Table 1
The Effect of Institutions, Free Resources, and Revolutionary Threats on
the Provision of Core Public Goods in 5 Years

Dependent Variable	Institutions Measured as Bueno de Mesquita, Smith, Siverson, and Morrow's W		Institutions Measured as Polity's Democracy-Autocracy	
	Future Core Public Goods (t + 5)		Future Core Public Goods (t + 5)	
	Model 1	Model 2	Model 3	Model 4
Revolutionary threat	increasing threat (threat > 0)	decreasing threat (threat < 0)	increasing threat (threat > 0)	decreasing threat (threat < 0)
Core public goods (t)	0.419 (0.025)**	0.308 (0.053)**	0.374 (0.027)**	0.263 (0.057)**
Institutions	-0.206 (0.234)	0.215 (0.411)	0.525 (0.238)*	0.887 (0.415)*
Institutions ²	0.867 (0.150)**	1.168 (0.275)**	-0.123 (0.167)	-0.015 (0.310)
Oil exports (% of GDP)	-0.010 (0.002)**	-0.014 (0.003)**	-0.007 (0.001)**	-0.013 (0.003)**
Oil exports × institutions	0.011 (0.003)**	0.014 (0.007)*	0.007 (0.002)**	0.013 (0.005)*
Aid (% of GDP)	-0.012 (0.005)*	-0.002 (0.009)	-0.007 (0.003)	-0.004 (0.006)
Aid × institutions	0.010 (0.008)	-0.007 (0.016)	0.002 (0.006)	-0.003 (0.011)
Ln(GDP per capita)	0.082 (0.024)**	0.164 (0.043)**	0.050 (0.019)**	0.123 (0.034)**
Ln(GDP per capita) × institutions	-0.083 (0.036)*	-0.188 (0.065)**	-0.019 (0.025)	-0.095 (0.044)*
lnPOP	0.011 (0.008)	0.031 (0.013)*	0.008 (0.008)	0.020 (0.013)
Year	-0.002 (0.002)	0.002 (0.003)	-0.004 (0.002)*	-0.001 (0.003)
Constant	3.187 (3.175)	-5.341 (5.319)	8.020 (3.189)*	1.449 (5.593)
Test(free resources) = 0	$F(1, 1246) = 16.53$	$F(1, 497) = 2.63$	$F(1, 1218) = 12.74$	$F(1, 489) = 5.89$
	Pr = 0.000	Pr = 0.106	Pr = 0.000	Pr = 0.016

(continued)

Table 1 (continued)

Dependent Variable	Institutions Measured as Bueno de Mesquita, Smith, Siverson, and Morrow's W		Institutions Measured as Polity's Democracy-Autocracy	
	Model 1	Model 2	Model 3	Model 4
Test(free resources + institutional interactions) = 0	$F(1, 1246) = 0.00$	$F(1, 497) = .89$	$F(1, 1218) = 1.11$	$F(1, 489) = 0.56$
Observations	Pr = 0.948 1258	Pr = 0.346 509	Pr = 0.293 1230	Pr = 0.456 501
Nations and years coverage	108 nations between 1972 and 1994 0.48	106 nations between 1972 and 1994 0.32	106 nations between 1972 and 1994 0.50	
R^2				0.32

Note: Standard errors are in parentheses. GDP = gross domestic product.

* $p < .05$. ** $p < .01$.

leaders face an increasing revolutionary threat, institutions and free resources strongly influence shift in the provision of public goods. The coefficient estimates on the institutions and institutions² variable indicate that the smaller the initial coalition size, the more leaders are likely to contract public goods in response to a revolutionary threat. Moving from the smallest to largest coalition systems explains more than one standard deviation in the variance of Core Public Goods.

Free resources lead to a contraction in public goods provisions in small but not in large coalition systems. In the smallest coalition systems ($W = 0$), an increase in oil revenues or foreign aid equivalent to 10% of GDP contracts future public goods provisions by about a fifth of a standard deviation. However, as predicted, in large coalition systems, an increase in free resources has no significant effect on the provision of public goods. The coefficient estimate for the interaction term between Institutions and Oil is positive and of similar magnitude to the negative estimate on the Oil variable. As a result, when coalition size is large, oil exports have no effect on the provision of public goods. The same pattern is true for the Aid variable and its interaction with Institutions. In the presence of a revolutionary threat, free resources reduce future core public goods in small coalition systems but have no effect in large coalition systems. The F tests toward the bottom of Table 1 confirm this statistically. The sum of the Aid and Oil coefficient estimates is statistically significant and negative. However, the sum of these free resource variables and their interactions with institutions is not significantly different from zero.

In the absence of a revolutionary threat ($\text{threat} < 0$, Model 2), the effects of institutions and free resources are muted. Although the general pattern of effects is similar to that observed in the presence of a revolutionary threat, the coefficient estimates are less significant and the model has lower explanatory power. For instance, the F test examining the effect of free resources in Model 2 shows that oil and aid have no significant effect on the provision of public goods, although the individual effects of the Oil variable remain powerful and significant. A comparison of the R^2 statistics (0.48 and 0.32) suggests that Model 1 explains around 50% more variance in shifts in public policy than does Model 2. In the presence of an increasing revolutionary threat, free resources have deleterious effects in small, but not in large, coalition systems. Absent a growing revolutionary threat, these effects are more muted and explain less of the variation in the provision of public goods. These patterns persist in the presence of year fixed effects (instead of the time trend included in the current specification) or region-year fixed effects, if the most democratic nations (i.e.,

$W = 1$) are excluded, or Freedom House's Civil Liberties measure is substituted for the index of Core Public Goods (see our replication archive).

The models in Table 2 examine institutional change using an ordered probit model in the presence of an increasing (Models 5 and 7) or decreasing revolutionary threat (Models 6 and 8). We do not report the cut-point estimates. We focus on Models 5 and 6, which measure institutions using Bueno de Mesquita et al.'s W measure. Recall that we expect parallel results to those found when examining the provision or contraction of core public goods. As is evident from Table 2, these are precisely the patterns in the data.

When leaders face an increasing revolutionary threat ($\text{threat} > 0$), free resources encourage autocratization unless coalition size is already large. In Model 5, the estimate on the Oil variable is negative and statistically different from zero. In small coalition systems, oil exports harm the prospects for democratization. For relatively small coalition systems, an increase in oil exports equivalent to about 10% of GDP results in an expected contraction of coalition size by an average of about .02 on the 0-to-1 scale. However, this effect is ameliorated in large coalition systems. When leaders are not faced with an increasing revolutionary threat ($\text{threat} < 0$, Model 6), free resources have no statistical effect on institutional change.

The effect of aid on democratization depends on the institutional context and whether a leader faces a revolutionary threat. Foreign aid promotes democratization only when leaders face a revolutionary threat and when the initial coalition size is already substantial (greater than 0.30 and 0.46, according to Models 5 and 7). In smaller coalition systems, aid on average retards democratization. This autocratizing effect is not statistically significant in Model 5, although in Model 7 and across many of the robustness checks we run, it is. Absent a revolutionary threat, the pernicious effects of free resources are lessened. Although in some specifications, such as Model 8, the pattern of free resources on institutions is significant, the statistical strength of this relationship is weaker than when revolutionary threats are present.

Foreign aid, like oil in the ground, makes autocratic leaders more likely to concentrate power in their hands when they face a growing risk of revolution or mass opposition. That is just what happened in Tanzania during its election in 2000, in Chad in 2005 when the law was changed to allow the incumbent to have a third term, and in Turkmenistan, where the president had himself declared President for Life in 1999. Conversely, countries that faced a similar threat but were not reliant on large amounts of

Table 2

The Effect of Institutions, Free Resources, and Revolutionary Threats on Institutional Change

Dependent Variable	Institutions Measured as Bueno de Mesquita, Smith, Siverson, and Morrow's W		Institutions Measured as Polity's Democracy-Autocracy	
	Model 5	Model 6	Model 7	Model 8
Revolutionary threat	increasing threat (threat > 0)	decreasing threat (threat < 0)	increasing threat (threat > 0)	decreasing threat (threat < 0)
Institutions	-4.020 (0.700)**	-6.466 (1.079)**	-4.782 (0.656)**	-7.912 (1.017)**
Institutions ²	5.764 (0.440)**	7.164 (0.677)**	1.580 (0.456)**	4.117 (0.681)**
Oil exports (% of GDP)	-0.016 (0.005)**	-0.011 (0.008)	-0.035 (0.004)**	-0.030 (0.007)**
Oil exports × institutions	0.004 (0.010)	0.008 (0.018)	0.021 (0.007)**	0.025 (0.013)
Aid (% of GDP)	-0.019 (0.014)	-0.005 (0.019)	-0.031 (0.009)**	-0.052 (0.015)**
Aid institutions	0.063 (0.023)**	0.027 (0.032)	0.068 (0.015)**	0.072 (0.023)**
Ln(GDP per capita)	0.195 (0.063)**	0.207 (0.096)*	-0.160 (0.047)**	-0.222 (0.078)**
Ln(GDP per capita) × institutions	0.308 (0.107)**	0.393 (0.159)*	0.914 (0.071)**	0.935 (0.104)**
lnPOP	0.083 (0.023)**	0.090 (0.032)**	0.017 (0.021)	0.028 (0.028)
Year	0.021 (0.003)**	0.026 (0.004)**	0.021 (0.003)**	0.019 (0.004)**
Constant	-4.020 (0.700)**	-6.466 (1.079)**	-4.782 (0.656)**	-7.912 (1.017)**
Test(free resources) = 0	$\chi^2 = 5.73$	$\chi^2 = 0.55$	$\chi^2 = 39.36$	$\chi^2 = 22.41$
F test and prob(free resources + institutional interactions) = 0	Pr = 0.167	Pr = 0.460	Pr = 0.000	Pr = 0.000
	$\chi^2 = 4.56$	$\chi^2 = 0.64$	$\chi^2 = 4.71$	$\chi^2 = 0.74$
Observations	Pr = 0.033	Pr = 0.423	Pr = 0.030	Pr = 0.390
Nations and years coverage	1954	871	1890	846
Pseudo R ²	134 nations between 1962 and 1999	131 nations between 1962 and 1999	131 nations between 1962 and 1999	131 nations between 1962 and 1999
	0.46	0.45	0.33	0.29

Note: Standard errors are in parentheses. GDP = gross domestic product.

* $p < .05$. ** $p < .01$.

foreign assistance or oil, such as Peru and Bulgaria, became more democratic.

Conclusions

We provided and tested a theory about how political and economic conditions in terms of core public goods provision, economic reliance on free sources such as oil and foreign aid, and political institutions shape future policy choices. In the course of developing the theory, we proposed an explanation for changes in the ease with which ordinary people can organize and coordinate among themselves and we offered an endogenous account for political decisions to democratize or further autocratize societies. The statistical evidence supports the theory's predictions. Our results, therefore, may have significance not only from the perspective of social science inquiry but also from the perspective of selecting foreign policies to influence the prospects of spreading freedom and democracy elsewhere.

This project was motivated by a desire to understand the implications of Western nations' development policies for developing nations. The theory suggests that, contrary to their goals, plans such as the Millennium challenge grants (<http://www.unmillenniumproject.org/>; Sachs, 2005) to increase development assistance are unlikely to help and stand a substantial chance of retarding democratization among those countries most likely to receive such assistance. Increasing the winning coalition size in developing nations offers the best long-term prospects for improving their economic and social welfare because the nature of political competition in such systems encourages leaders who want to survive in office to produce policies with these goals in mind. Foreign aid often impedes that objective.

Foreign aid is a free resource. In small coalition systems, free resources shift the nature of political competition. First, leaders capture most of the benefits that free resources provide, such that even in the best of circumstances, providing free resources is an inefficient way to improve social welfare. Second, free resources reduce a leader's dependence on tax revenues and so remove the need for leaders to enact policies that encourage economic activity. Third, free resources increase the potential gains from revolutionary change, thereby encouraging revolutionary movements to which leaders, as a result of being less dependent on tax revenues, are likely to respond with the contraction of public goods, especially those that enhance freedom, rather than the promotion of public-goods-oriented

policies or democratization. At best, foreign aid is an inefficient means through which to improve welfare in developing countries. At worst, foreign aid induces a decline in economic activity and social welfare and retards democratization. Although foreign aid provides leaders with the resources to promote social welfare, it provides them with the political incentive to do just the opposite.

Notes

1. In particular, the incumbent's programming problem is $\max_{g,z}^R + nr\phi(g) - pg - Wz$ subject to $v(g) + u(z) - v(\hat{g}) - u(\hat{z}) + \frac{\delta}{1-\delta}(1 - \frac{W}{S})u(z^*) \geq 0$. In equilibrium, the policies in the immediate period equal those in future periods ($g = g^*$ and $z = z^*$).

2. The numerical examples are constructed using $v(g) = \sqrt{g}$, $u(z) = \sqrt{z}$, $\phi(g) = \sqrt{g}$, $\rho(g) = 1/(1 + e^{-\frac{g-270}{60}})$, $N = S = 10,000$, $p = 200$, $R = 1000$, $\delta = .5$, $r = .5$, and $k = 7$.

3. Contraction is always a best policy response for some range of W , provided that $\bar{W} > 0$. Contraction can be the best policy response for the whole range to \bar{W} , which is to say $w_2 \geq \bar{W}$.

4. As a robustness check, we also constructed a dummy variable, called GetAid, coded 1 for country-years in which foreign aid receipts represented at least 3% of the recipient country's gross domestic product as reported by the World Bank. This approach is intended to minimize concerns about the endogeneity of the amount of aid received (Alesina & Dollar, 2000; Bueno de Mesquita & Smith, 2007). The results are similar to those reported in the text.

5. Health measures do not exhibit the strong dependence on free resources that we observe in the results presented here.

References

- Acemoglu, D., & Robinson, J. A. (2006). *Economic origins of dictatorship and democracy*. Cambridge, UK: Cambridge University Press.
- Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth*, 5(1), 33-63.
- Banks, A. (2001). *Cross-National Time-Series Data Archive* [CD-ROM]. Binghamton, NY: Databanks International.
- Bueno de Mesquita, B., & Smith, A. (2007). Foreign aid and policy concessions. *Journal of Conflict Resolution*, 51(2), 251-284.
- Bueno de Mesquita, B., Smith, A., Siverson, R., & Morrow, J. (2003). *The logic of political survival*. Cambridge, MA: MIT Press.
- Easterly, W. (2006). *The Whiteman's burden*. London: Penguin.
- Gelb, A. H. (1988). *Windfall gains: Blessing or curse?* New York: Oxford University Press.
- Glaeser, E. L., LaPorta, R., Lopez de Silanes, F., & Shleifer, A. (2004). Do institutions cause growth? *Journal of Economic Growth*, 9(3), 271-303.

- Grief, A., & Laitin, D. D. (2004). A theory of endogenous institutional change. *American Political Science Review*, 98(4), 633-652.
- Humphreys, M. (2005). Natural resources, conflict, and conflict resolution: Uncovering the mechanisms. *Journal of Conflict Resolution*, 49(4), 508-537.
- Jensen, N., & Wantchekon, L. (2004). Resource wealth and political regimes in Africa. *Comparative Political Studies*, 37(7), 816-841.
- Jones, B., & Olken, B. (2005). Do leaders matter? National leadership and growth since World War II. *Quarterly Journal of Economics*, 120(3), 835-864.
- Lipset, S. M. (1959). Some social requisites of democracy. *American Political Science Review*, 53, 69-105.
- McGuire, M. C., & Olson, M. C. (1996). The economics of autocracy and majority rule. *Journal of Economic Literature*, 34, 72-96.
- Moore, B. (1966). *Social origins of dictatorship and democracy*. Boston: Beacon Press.
- North, D. C., & Weingast, B. R. (1989). Constitutions and commitment: The evolution of institutions governing public choice in seventeenth-century England. *Journal of Economic History*, 49(4), 803-832.
- Olson, M. C. (1993). Dictatorship, democracy and development. *American Political Science Review*, 87(3), 567-576.
- Organski, A.F.K. (1965). *Stages of political development*. New York: Knopf.
- Przeworski, A., Alvarez, M. E., Cheibub, J. A., & Limongi, F. (2000). *Democracy and development*. New York: Cambridge University Press.
- Przeworski, A., & Limongi, F. (1997). Modernization: Theories and facts. *World Politics*, 49(2), 155-183.
- Ross, M. L. (1999). The political economy of the resource curse. *World Politics*, 51(2), 297-322.
- Sachs, J. D. (2005). *The end of poverty: Economic possibilities for our time*. New York: Penguin Press.
- Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European Economic Review*, 45, 827-838.
- Smith, A. (2008). The perils of unearned income. *Journal of Politics*, 70(3), 780-793.
- Wintrobe, R. (1990). The tinpot and the totalitarian: An economic theory of dictatorship. *American Political Science Review*, 84, 849-872.
- World Bank. (2005). *World Development Indicators* [CD-ROM]. Washington, DC: Author.

Bruce Bueno de Mesquita is a Silver Professor of politics and the director of the Alexander Hamilton Center for Political Economy at New York University. He is also a senior fellow at the Hoover Institution at Stanford University. He has published more than 100 articles and 14 books.

Alastair Smith is a professor of politics at New York University. His research lies at the intersection of comparative politics and international relations. He is the author of three books, including *The Logic of Political Survival and Election Timing*, and he has published more than 30 articles on international relations and comparative politics.