Announcement, Credibility and Turnout in Popular Rebellions

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Abstract

In this paper, we study the dynamics of popular rebellions against authoritarian governments. We focus on how the public's beliefs about the durability of an authoritarian government may have self-fulfilling qualities: when people believe the government will soon collapse, they are more likely to take to the streets and will hence help cause its collapse; if they believe the government will endure they become more likely to stay home, and thus help cause it to endure.

This self-fulfilling quality gives both government and opposition leaders an incentive make exaggerated "announcements" about the likelihood of a rebellion in the near future. Yet if their predictions are too far off, they will lose credibility and their future announcements will carry less weight.

To explore this issue, we first examine the case of Indonesia, where the government's loss of credibility, and the opposition's ability to exploit it, led to a popular uprising in 1998. We then develop a computational model with a government, an opposition, and a population of citizens with heterogeneous preferences to further explore how announcements by the opposition (to inspire turnout) and the government (to deter it) can influence the likelihood of rebellion. Our model suggests that when the government's credibility is high, the opposition can do little to inspire rebellions; but a small loss of credibility, if capitalized on by the opposition, markedly boosts the chances of a rebellion. We also find that when the public's underlying preferences are polarized, the likelihood of a rebellion drops sharply.

1.0 Introduction

Since the late 1980's there has been a surge of popular, anti-authoritarian rebellions in East Asia, Sub-Saharan Africa, and Central and Eastern Europe. Often these movements have surprised scholars; sometimes they even surprised opposition leaders in the countries where they occurred.

These events—which we call "popular rebellions"—are puzzling to political scientists for two reasons. First, they seem to depart from earlier types of popular movements. Previous studies of mass political rebellions suggested they were commonly motivated by scarcity or inequality [Russett 1964; Gurr 1970; Midlarsky 1982; Muller and Seligson 1987]; had rural or peasant roots [Tilly 1977; Scott 1976; Goldstone 1991]; or if they occurred in urban settings, would most likely transpire in advanced industrialized democracies, where protest is far less risky [McCarthy and Zald 1977; Chong 1991; Tarrow 1995]. By contrast, the popular rebellions of the last two decades have most often been led by the middle class; focused on political, not economic issues; based in urban areas; and occur despite the terrible risk of challenging an authoritarian government.

Second, popular rebellions seem to confound the widespread belief among scholars that democratic transitions begin "from above" (due to elite cleavages or negotiations) instead of "from below" (due to popular movements). According to a landmark study by O'Donnell and Schmitter [1986, 19], "there is no transition whose beginning is not the consequence—direct or indirect—of important divisions within the authoritarian regime itself." Many other democracy scholars have agreed with this analysis [di Palma 1990, Haggard and Kaufman 1995, Colomer 1990, Przeworski 1991]. Others, more recently, have argued that many transitions begin with popular pressures from below [Collier 1999; Wood 2000]. We observe that both elite cleavages and popular movements are typically important, and wish to explore how they interact.

Some scholars have used formal models to help explain how large protests can suddenly arise, even under repressive conditions [Kuran 1989; Lohmann 1994; Ginkel and Smith 1999]. In this paper we develop an agent-based model that builds on these earlier efforts. Our model emphasizes a conundrum faced by both the government and the opposition.. To overthrow the government, the opposition must persuade citizens to voice their dissent. But since speaking out

is hazardous, few citizens are likely to do so, unless they are already convinced the government will soon fall. The government, conversely, can prevent citizens from voicing their dissent by persuading them that the opposition is certain to fail, rendering their protests futile. For both the government and opposition, the likelihood of success depends in part on the public's perceptions of the likelihood of their success. In other words, the public's beliefs about the durability of an unpopular regime have self-fulfilling qualities: if they believe the government will fall, they will voice their dissent and help cause its fall; if they believe it will endure, they will stay home and help cause it to endure. How might this dynamic influence rebellions?

To explore this problem we develop a computational model with a government, an opposition, and a population of citizens with heterogeneous preferences. We use this model to address a series of interlinked questions: how do announcements by the government and opposition on the durability of the current regime influence the likelihood of rebellion? Are some announcement strategies more effective than others? How does the level of repression influence the likelihood of rebellion? And how do different preference distributions among the population influence outcomes? We believe that computational modeling can be a fruitful way to explore these questions, which are extraordinarily difficult to study empirically.

Our paper proceeds as follows. In the next Section, we describe previous work on popular rebellions, explain how we build on this work, and explore the case of Indonesia's 1998 popular uprising. In Section 3, we explain our model and in Section 4 we present our results. We conclude the paper in Section 5, and suggest possible extensions of the model we develop.

2.0 Background and Motivation

Social scientists have long tried to explain the outbreak of protests, rebellions, and revolutions in undemocratic states. Some have focused on economic factors—tying these movements to economic growth [Tocqueville (1856) 1998; Huntington 1968], economic decline [Haggard and Webb 1994, Przeworski et al. 1996], a combination of growth and decline [Davies 1962, Zagorin 1982], or inequality and "relative deprivation" [Russett 1964, Gurr 1970, Muller and Seligson 1987]. Others have drawn on survey research in democratic countries to scrutinize the factors that cause people to protest, noting they are often motivated by non-material rewards conferred

by their peers, including enhanced reputations and conformance with group norms; and by a belief that their own participation can contribute to the movement's success [Chong 1991, Muller, Dietz, and Finkel 1991; Obserschall 1994; Finkel and Muller 1998]. Another set of scholars has constructed an overarching framework for the study of "contentious politics," suggesting that mass movements are caused by changes in the "political opportunity structure," when closed systems of opportunities begin to open up [Tarrow 1995, McAdam, McCarthy, and Zald 1996, Tilly, Tarrow, and McAdam 2001].

Formal theorists have recently made important contributions to this literature, enabling us to better understand the microbehavioral foundations of protest movements. One key advance has been the application of threshold models—also called bandwagon, cascade, or tipping models—to the study of popular rebellions. When actors face two choices, and the net benefits of each choice are influenced by the number of others making the same choice, a bandwagon effect may emerge. Threshold models have been used to explain fads, riots, strikes, stock market crashes, and crime waves [Granovetter 1978, Gennotte and Leland 1990, Glaeser, Sacerdote, and Scheinkman 1996, Bikhchandani, Hirshleifer and Welch 1998]. They are attractive for explaining rebellions against authoritarian regimes, since they retain rational choice assumptions, but can account for the abrupt rise of collective protests sometimes observed non-democratic states.

Several threshold models have led to important advances in our understanding of popular rebellions. Models by Kuran [1989, 1991] suggest uprisings occur when the costs of living under repression become outweighed by the emotional need of individuals to voice their opposition. Once a sufficient number of aggrieved individuals openly criticize the government, the costs of dissent begin to drop, since dissidents begin to achieve safety in numbers.[1] When the costs of dissent drop sufficiently, the result is a bandwagon of dissent. In Kuran's model, citizens are motivated by the satisfaction of denouncing a repugnant government.

An alternative model by Lohmann [1994] suggests that anti-authoritarian protests occur when protests provide citizens with previously hidden information about the malignant quality of the government. Lohmann divides society into four subgroups (activist moderates, rationally

apathetic moderates, anti- and pro-status-quo extremists), depending on their level of discontent and proclivity to join demonstrations. When organized extremists protest, bystanders gain no salient information; but when moderates protest, bystanders realize that their government has performed more poorly than they thought, and decide to join in. The bandwagon is not created by safety in numbers—as in Kuran's model—but by the aggregation of information about the government's performance.

Ginkel and Smith [1999] construct a model in which the government becomes an active agent, which chooses to respond to dissidents with either concessions or repression. Although theirs is not a threshold model but a game with three actors (the government, a group of organized dissidents, and the mass public), it incorporates both Kuran's insight that actors tend to falsify their preferences and Lohmann's argument that the public acts in part based on information about the government's performance. Finally, Crescenzi [1999] develops a model of authoritarian states that face pressure to democratize. The model captures the interaction between an authoritarian government and an opposition, when the government is divided between "hard-liners" and "soft-liners" and the opposition is uncertain about the regime's true type.

2.1 Our Approach

Our model seeks to build on these efforts in four ways. First, we go further than previous models in capturing the heterogeneity of the public. Prior studies acknowledge that the distribution of preferences among the public at large is a critical variable; most have been forced to treat the public as a unitary actor, however, to render their models tractable. Lohmann shows that dividing the public into multiple groups-in her case, four-can produce surprising results. In our model the crowd is composed of 100 actors with varying preferences; we also test the model with four different preference distributions. This enables us to examine how variations in popular preferences may influence the success or failure of popular rebellions.

Second, we suggest that for most individuals, the decision to publicly criticize a repressive government-by joining a demonstration, signing a petition, or simply speaking out-is *not* principally influenced by a desire for emotional release, as Kuran suggests; nor is it mainly

caused by the disclosure of information that the government's performance has been poor, as Lohmann implies.[2] Rather, we believe that for most people, the decision to openly denounce the government is most strongly influenced by their expectations about the consequences for themselves and their families; and that these in turn heavily depend on their beliefs about whether the incumbent regime or the opposition is likely to prevail in the near future. If citizens believe that the government will prevail, they will be reluctant to oppose it, no matter how odious they find it; if they believe the opposition will soon prevail, they will be more likely to voice their support for it. In other words, citizens in repressive states are strongly motivated by the desire to be on the winning side.[3]

We think there is good reason to support this view. Survey research in democratic states has found that citizens decide whether to join a demonstration based in part on their beliefs about the likelihood of the movement's success [Muller, Dietz, and Finkel 1991; Finkel and Muller 1998]. We hypothesize that individuals have even stronger incentives in authoritarian states to pick the winning side. Liberal democratic governments tend to provide citizens with many public goods and few selective goods; moreover, the public's right to dissent is protected by law. Hence citizens in democratic states have few material incentives to back the winning side, and face few penalties for supporting the losing side.

Authoritarian states tend to provide fewer public goods and more selective goods, enabling them to differentially reward their backers. In states with neopatrimonial or clientelistic features, these benefits take the form of patronage; in communist and other one-party states, selective benefits go to members of the ruling party and its affiliate organizations. Opposition can lead to imprisonment, torture, and death. As a result, individuals have a much greater incentive to remain on the winning side, regardless of their ideological views. The more repressive the government, the more the public will be driven to support the winning side - and hence, the more they will be influenced by their beliefs about the regime's durability.

We are certainly not the first to point out the importance of being on the winning side in social movements.[4] But we believe we are the first to place this insight at the center of a model of popular rebellions, and to explore how this influences the outcome of democratic movements.[5]

Third, our use of a computational model lets us capture aspects of rebellions that have not been explicitly incorporated into game theoretic or threshold models.[6] In particular, we do not assume some history of information about the government or opposition's credibility. Rather, agents in the model learn whether their initial beliefs are correct by comparing government and opposition announcements with subsequent events. The model therefore generates its own history of play, and agents update their beliefs about the credibility of official information, as well as their own information, and act on updated beliefs based upon this information. The model we specify also allows us to capture the emergent properties of participation in rebellion—the model is constructed in a "bottom-up" manner in terms of entities and dynamics at the level of individual actors and their interactions with each other and with their environment—comprised of the government and opposition; its dynamics are driven endogenously (rather than by exogenous events or shocks to the system); and our results reflect both the unpredictable and path dependent nature of rebellions. In addition, the simulation can be run hundreds or thousands of times—with various tracking measures or outcome variables summarized across runs—to study the variations in and sensitivity of results.

Finally, other cascade models—like those of Kuran and Lohman—rely on a core group of selfless activists to begin the bandwagon of protests. While this may accurately model some types of rebellions, others seem to occur even in the absence of any organized core group.[7] Our model does not rely on any such selfless activists, although it does assume the presence of an opposition, which may be either domestic or in exile. It is hence designed to capture both the initiation and diffusion of a mass movement, which we believe to be an important advance in the formal study of rebellions.

2.2 Perceptions of Regime Durability

What then influences the public's beliefs about the regime's durability? We believe that at least six factors matter. First, if an authoritarian government is highly personalistic or patrimonial, so that power is held by an individual rather an institution, anything that influences the longevity of the ruler—such as advancing age or decrepit health—will also influence beliefs about the regime's durability.

Second, if authoritarian power rests with an institution—such as the military, a government party, or a well-institutionalized monarchy—then this institution's perceived unity, and its ability to replace its leadership, will influence perceptions about regime durability. A government run by the collective leadership of a party that is unified and can replace senescent or incompetent leaders, should increase the public's belief that the regime will endure; if the party grows highly-factionalized or has weakly-institutionalized procedures for succession, it should lower the public's estimates of the regime's longevity.

Third, public perceptions should be influenced by information about the government's prior vulnerability. In states where authoritarian governments have been overthrown in the past—such as Thailand and Nigeria—then *ceteris paribus* the public should be more likely to perceive the government as vulnerable.

Fourth, perceptions may be influenced by spillover effects from other states. When citizens observe similar authoritarian governments stepping down, they may revise upward their estimates of their own government's vulnerability.[8]

Fifth, beliefs about regime vulnerability should depend in part on beliefs about the likelihood that the military will continue to back the government, even if the opposition grows large. If the military is perceived as relatively independent from the government's leadership, or is highly-factionalized, it may be perceived as less likely to stand by the ruler in a time of crisis. If the military is more unified and closely tied to the government—or perhaps runs the government itself—people should be more inclined to believe that the government will endure.[9]

Finally, perceptions about regime durability may be influenced by "announcements" made by both the government and opposition—that is, efforts to influence popular opinion through public statements or symbolic actions. Each side has a large stake in influencing public perceptions. In a repressive state, information on factors that may influence the regime's underlying durability—such as splits in the ruling party, the position of the military, and events in neighboring states—is likely to be scarce and unreliable. Moreover, both the government and opposition may realize

that the regime's actual durability will be heavily influenced by its perceived durability. The government should hence try to make credible announcements that make it appear invulnerable; the opposition should attempt to deliver credible messages that the regime's demise is imminent.[10]

We note that regime change in authoritarian states is rare. Yet there are a handful of situations that may cause citizens to significantly downgrade their estimates of regime durability—when a personalistic ruler appears to be near death, when a ruling party or elites grow bitterly factionalized or lose the support of the military, or when authoritarian regimes are toppled in neighboring states. During these all-too-rare episodes, the efforts of government and opposition leaders to influence the public beliefs about the regime's future, using announcements, may become critical.

2.3 Types of Announcements

Since our model focuses on the influence of these announcements, it may be useful to specify what they look like. For opposition movements, they commonly include inspirational rhetoric and symbolic leadership. Leaders of rebellions and revolutions often use inspirational rhetoric to persuade their followers that their movement is on the verge of crossing a critical threshold. Marx's claim that revolution was assured by the "iron laws of historical necessity" may be seen as an effort to persuade his audience that capitalist regimes were indeed vulnerable to revolution. Writing in 1930, Mao urged his colleagues to believe that "our forces, although small at present, will grow very rapidly. In the conditions prevailing in China, their growth is not only possible but indeed inevitable...All China is littered with dry faggots which will soon be aflame (Mao [1930] 1963)."

Armed, organized insurrections—like those instigated by Mao and Lenin—are able to use coercion to signal that the government is vulnerable: they can attack symbolic targets; conduct high-profile strikes in areas believed to be secure for the government; and more generally use the arsenal of terror to persuade the population to raise its estimates of the government's vulnerability. But popular rebellions that forsake armed struggle, and may be loosely organized, must rely more heavily on rhetoric alone.

Another important tool is the selection of symbolic leaders who, by their personal or family association with previous governments, make the opposition's aspirations more credible and the government's incumbency appear less inevitable. Pakistan's Benazir Bhutto, Burma's Aung San Suu Kyi, and Indonesia's Megawati Sukarnoputri were all the daughters of previous national leaders; in the Philippines, Corazon Aquino was the wife of a martyred party leader. All had catalytic effects on their nations' democratic movements, in part due to their ability to persuade disaffected bystanders to raise their valuations of the incumbent government's vulnerability.[11]

Among authoritarian governments, we discern at least three types of announcements. The first are symbolic displays of the state's coercive power, such as military parades, pageants, and slogans. These exercises are less intended to suppress the opposition than to persuade the public that the government is determined to prevail, and the opposition is certain to fail. By lowering the public's estimate of opposition victory, these actions can raise their perception of regime durability.

A second type of symbolic action is noncompetitive elections. Many political scientists regard noncompetitive elections as puzzling exercises, since they confer little "legitimacy" on the governments that stage them [Taylor 1996]. But the government's goal may not be to show that they are loved by their citizens, but rather that the regime's opponents remain weak, fragmented, and demobilized, and the government retains an overwhelming ability to coerce its citizens.[12]

A third type of announcement may entail symbolic liberalization. Scholars tend to find liberalization puzzling, since it often leads to the decline of governments that initiate it [Przeworski 1991]. In some cases, superficial liberalization might be explained as a form of signaling. If a repressive government fears that opposition strength is growing, it may offer a pre-emptive liberalization program in an effort to raise public perceptions about its durability. In these cases, liberalization "from above" may be provoked by fear of popular rebellions from below.

Our model cannot possibly capture the variety of announcements made by government and

opposition. It can, however, capture a critical feature of their strategies: the decision by each side to issue "realistic" announcements, "moderately optimistic" announcements, or "highly optimistic" announcements about the likelihood of their imminent success. Each side has an incentive to overstate the likelihood of its own victory, in hopes of creating a self-fulfilling prophecy. Yet if their announcements are subsequently contradicted by events they lose credibility in the public's eyes, and their future announcements will be discounted. By varying the "optimism" of each side's announcements, we can explore how different government and opposition strategies can influence outcomes.[13]

2.4 An Illustration: Suharto's Overthrow

To illustrate how government and opposition may adopt announcement strategies that vary in their level of optimism, consider the 1996-98 movement that overthrew Indonesia's President Suharto. Suharto had been in power since 1966 and by the mid-1990s virtually all observers agreed he would remain in office as long as he wished. In 1996, one of Indonesia's two opposition parties—both of which were moribund entities whose activities were largely controlled by the government—appointed Megawati Sukarnoputri, the daughter of Indonesia's first President Sukarno, as its head. Megawati was not selected for her skills as a political organizer, tactician, or visionary: she was a shy housewife with little experience in public affairs, few discernible opinions, and an aversion to speaking in public.[14] Indeed, she was only approached after all her brothers and sisters refused. Her appointment, however, can be seen as a type of opposition announcement: as the daughter of Suharto's predecessor, she was instantly viewed as someone who could legitimately be President herself—making Suharto's incumbency appear less inevitable.[15] This announcement might be seen as "moderately optimistic": if the opposition made a realistic announcement, it would have to state that the Suharto government was virtually invulnerable – which was almost all observers believed at the time. A highly optimistic announcement (declaring, for example, that Suharto would soon be overthrown) would squander the opposition's credibility. Issuing a moderately optimistic announcement turned out to be the right strategy: Megawati's presence soon energized a wide range of anti-Suharto groups, who gathered around the once-ineffectual opposition party.

The government tried to protect Suharto's perceived invulnerability with several announcements

of its own. In June 1996, the government forced the opposition party to replace Megawati with its own hand-picked candidate; when pro-Megawati activists refused to comply, the party's headquarters were sacked. To restore the appearance of government invulnerability, the Suharto regime made an exceptional effort to increase its share of the vote in the May 1997 non-competitive elections. As Aspinall (1997, 1) noted, its campaign seemed less designed to attract supporters than to persuade the public of its political supremacy:

(Indonesian) elections functioned as visible demonstrations of the government's ability to assert its will over the population. The mobilization of overwhelming financial and administrative resources, the humiliation wreaked on the parties, even the openness of the pressure brought to bear on voters: all seemed designed to parade the New Order's invincibility. The orderly and ritualistic character of campaigning communicated the essential message that even when the population was handed an opportunity to challenge, the government could remain aloof, impervious, triumphant.

If the government wished to use the 1997 election to make a realistic announcement about its vulnerability, it might have allowed a relatively free vote—something far too risky for Suharto to chance, given the growing resentment against his government's corruption and nepotism. Instead, the government used an array of pressure tactics to produce a 74 percent vote—a moderately or highly optimistic announcement about its own popularity.[16] The tactic soon backfired: many people realized that the government had overstated its own popularity, which led to a decline in the government's credibility. This loss of credibility, while initially small, tipped off a series of protests that grew gradually, then exponentially, over the next 12 months, as the Suharto regime was overtaken by a cascade of popular opposition.

We might infer from the Indonesian case that the opposition used the correct strategy, and the government an incorrect strategy, to persuade the population that the government was vulnerable. But how can we test this? How might the results have differed if leaders used different strategies? If there had been more repression, or greater (or less) dissatisfaction with the Suharto government? To address these questions, we turn to an agent-based model that simulates what we believe are the key features of popular movements in repressive states.

3.0 Model Specification

The model we develop involves a government G, an opposition party O, and N individuals each denoted by i. The government and opposition each make announcements about the likely turnout at a planned anti-government demonstration. Each individual is characterized by a prediction about the turnout at the demonstration $A_i \sim U[0,1]$, a unique threshold for action T_i defined on the interval[0,1], and a credibility score S_i. We assume that the cost (benefit) incurred (gained) by an individual for supporting the opposition is captured by T_i. Hence T_i reflects both the individual's political preferences and the government's repressiveness.

Episodes—each composed of 100 "events"—are structured so as to reflect the sequence of interactions that occur during incidents of popular rebellion. Each event consists of simultaneous announcements by both the government and opposition, and the subsequent reaction of individuals to these announcements.

At the start of the first episode, nature draws the true turnout $A^* \sim U[0,1]$ which is not revealed. Both government and opposition attempt to influence the public expectations by announcing expected turnout in each round of play. These announcements are made in the absence of information on the distribution of individual thresholds. To inject an element of randomness in the choice of strategies—to better capture the uncertainty and poor information that tends to characterize popular movements—each side randomly draws an estimate of turnout from bounded intervals between the turnout from the previous round of play, and what they hope to see in the next round of play (for the government, a lower turnout; for the opposition, a higher turnout). To make a realistic announcement, a party selects an estimate that closely reflects previous turnout; to make a moderately optimistic announcement, the party randomly chooses an estimate that falls between the previous turnout and a modestly favorable turnout; and in the case of a highly optimistic announcement, the party randomly selects a value that falls between the previous turnout and a more ideal turnout.

More formally, the government's announcement is denoted by $A_g \sim U[\alpha, A^*]$ and the opposition's announcement is denoted by $A_o \sim U[A^*, \beta]$, such that α is the lower bound for A_g

and $\underline{\beta}$ is the upper bound for $\underline{A_o}$. We specify one-sided bounds, based on our belief that the government always seeks to minimize turnout, while the opposition always seeks to maximize turnout in a rebellion.

We recognize—as Scott [1985] and others have pointed out—that citizens will greet the announcements of political elites with skepticism. Hence once the government and opposition announcements have been made, individuals must decide whether to buy the government's estimate of turnout, the opposition's estimate of turnout, or rely upon their own estimate of the same. The individual decision rule is based on a simple comparison of credibility scores. We define $\underline{S_g}$ as the correlation coefficient of the true turnout and the government's estimate of turnout in the completed round of play. Likewise $\underline{S_o}$ is the correlation coefficient of the opposition's estimate of turnout and the true turnout. These two scores are compared to $\underline{S_i}$, the correlation coefficient of each individual's estimate of turnout and the true turnout in the completed round. An individual selects the estimate with the highest credibility score—what effectively reflects the individual's confidence in the government's announcement, the opposition's announcement, or in her own estimate. Note that for the first three events, individuals rely on their own estimates of turnout, as history of government and opposition announcements is generated endogenously.

After each individual has had an opportunity to participate (or refrain), we set $\underline{A^*}$ equal to the number of individuals who participated in the rebellion. The government and opposition announce new estimates of turnout and play continues in this manner. At the most basic level, a government that consistently makes inaccurate announcements is likely to suffer a decline in credibility, whereas consistently accurate announcements on the part of the opposition are likely to result in greater credibility as an episode progresses. We note that the model retains a stochastic component, in that the progression of an episode is determined in part by the initial level of turnout—drawn randomly at the start of play. Multiple runs of the model therefore permit us to analyze distributions of histories generated under a variety of initial conditions.

3.1 Parameter Sweeps

We are interested in exploring the interplay between the government and opposition by paying

particular attention to announcements. As a result, we permit the government and opposition to adapt to turnout information by randomly drawing values of A_g and A_o from the bounded intervals $[\alpha, A^*]$ and $[A^*, \beta]$ respectively. These intervals may: closely reflect previous turnout such that $\alpha = (0.9 \bullet A^*)$ and $\beta = (1.1 \bullet A^*)$—in which case we have realistic announcements (R); imprecisely reflect previous turnout such that $\alpha = (0.7 \bullet A^*)$ and $\beta = (1.3 \bullet A^*)$—in which case we have moderately optimistic announcements (M); or not reflect previous turnout such that $\alpha = (0.5 \bullet A^*)$ and $\beta = (1.5 \bullet A^*)$—giving rise to highly optimistic announcements (H). We examine the effects of both "symmetric" and "non-symmetric" combinations of announcements—to reflect different levels of political maneuverability on the part of government and opposition—and examine these effects with uniformly distributed participation thresholds, a moderate or high threshold population, an extreme or low threshold population, and a stratified or bi-polar population.

In the following sections, we present the results of our analysis. We treat a uniform threshold distribution as the base case in our analysis, and subsequently examine how our results change by skewing this distribution. We derive the probability of rebellion p(rebellion) by running a model (with 100 agents and 100 events) under each threshold distribution for 1000 episodes, and counting the number of times two-thirds or more of the population participates in rebellion. We do this for each of the nine possible combinations of government and opposition bounds.[17] Our decision to run the model for 100 events reflects our desire to both capture salient patterns of behavior for a particular set of parameters, and keep an episode relatively short-lived, given the fact that the government and opposition do not adapt to turnout in our specification of the model. Likewise, our decision to run a model with 100 agents reflects our desire to represent the dynamics of a popular rebellion—the interaction between government, opposition and the public at large, as opposed to an elite-level game—with a tractable number of agents. It is highly unlikely that adding additional agents would change the model's dynamics in any fundamental way. For purposes of the discussion, we consider $p(\text{rebellion}) < 0.33$ to indicate that the probability of rebellion is low; $0.33 \leq p(\text{rebellion}) < 0.66$ to indicate that the probability of rebellion is medium; and $p(\text{rebellion}) \geq 0.66$ to indicate that this probability is high. We define a scenario by specifying the accuracy of government announcements, the accuracy of opposition

announcements, and the probability of regime change. A scenario in which the government announcements is highly optimistic (H_g), the opposition announcement is realistic (R_o), and the probability of rebellion =0.5, would be given by $\{H_g, R_o, 0.5\}$. We follow this convention in the sections that follow.

4.0 Results

Our analysis locates four Nash Equilibria under the different population distributions we examine. These outcomes are driven, in large measure, by the opposition's tradeoff between maintaining credibility and inspiring turnout, and the government's tradeoff between maintaining credibility and deterring turnout. Small mistakes by the government given low or uniform threshold distributions can lead to major gains for the opposition. Likewise, slip-ups by the opposition given low and bi-polar threshold distributions can be costly. In these more volatile settings, selecting the right strategy will have a critical influence on the outcome. Our runs of the model also produce an unexpected result: having a bipolar, as opposed to a uniform threshold distribution, matters greatly. Rebellion is less likely and outcomes are much more difficult to predict when citizen preferences are polarized. We discuss these and other results in greater detail in the sections that follow.

4.1 Uniformly Distributed Thresholds: Mixed Population

In the first population of agents we examine, thresholds for participating in popular rebellion are uniformly distributed. As noted above we treat the uniform distribution as the base case in our analysis since it permits us to examine the dynamics of turnout with a heterogeneous population.

Under a uniform distribution, we find two scenarios in which p(rebellion) is high. These include $\{H_g, M_o, 0.880\}$ and $\{M_g, M_o, 0.677\}$. We find five scenarios in which p(rebellion) is medium. These include $\{R_g, R_o, 0.360\}$, $\{M_g, R_o, 0.581\}$, $\{H_g, R_o, 0.605\}$, $\{M_g, H_o, 0.480\}$, and $\{H_g, H_o, 0.640\}$. Two remaining scenarios in which p(rebellion) is low include $\{R_g, M_o, 0.270\}$ and $\{R_g, H_o, 0.248\}$. Variance in this probability, holding all other things constant, increases as government announcements change from R_g to H_g. Figure 4.1 depicts how the probability of rebellion with uniformly distributed thresholds varies as the accuracy of government and opposition announcements change.

Under these conditions, it pays opposition to make realistic announcements when government does so. If the government does make highly optimistic announcements, the opposition has an opening and can take advantage of this. This is particularly true if the opposition exercises some restraint in the face of highly optimistic government announcements, and adopts of strategy of moderately optimistic announcements. In contrast, the government's dominant strategy is to make realistic announcements, with the greatest payoff accruing when the opposition makes highly optimistic announcements. It follows that as long as government announcements remain realistic, the probability of rebellion remains low regardless of opposition strategy.

Figure 4.2 contains a best response mapping for government and opposition under a uniform threshold distribution. This figure formally captures the strategies that each party—as a rational actor—would adopt in response to the other's behavior, and depicts a Nash Equilibrium that consists of both government and opposition making realistic announcements.

From this set of runs, we see that as the government becomes less accurate (and hence more optimistic) in its forecasting, rebellion grows more likely, although the opposite does not hold true. Our results imply that a repressive government's optimal strategy is to maintain its credibility by not understating the size of the opposition. As long as the government retains its credibility, there is little that the opposition can do. But if the government's forecasts of opposition activity grow inaccurate, it creates an important opening for the opposition to boost dissent.

4.2 High Thresholds: Moderate Population

In the second population of agents we examine, thresholds for participating in popular rebellion are skewed to reflect a bias towards inaction. While the heterogeneity of types is still maintained, agents with a high threshold for participating in rebellion dominate the population. We therefore move away from our base case, to examine a population in which government repression is high.

Under a high threshold distribution—as may be expected—there are no scenarios in which

p(rebellion) is high. Rather, we find two scenarios in which this probability is medium: {H_g, H_o, 0.583} and {H_g, M_o, 0.422}. In all the remaining scenarios, the probability of rebellion is low. As in the case of uniformly distributed thresholds, variance in the probability of rebellion— holding all else constant— increases as the government strategy changes from R_g to H_g. Unlike a uniform distribution, however, changing the accuracy of government announcements when opposition announcements remain realistic has little impact of turnout, which remains low.

Under these conditions, the opposition's dominant strategy to make highly optimistic announcements, regardless of the government's strategy. In contrast, the government's dominant strategy is to make realistic announcements, especially when opposition announcements are moderately optimistic or highly optimistic. It follows that the government has no payoff from failing to disclose a situation that is to its advantage. The more accurate the information provided by the government, the less likely rebellion is. Rebellion only becomes possible with inaccurate signals from the government.

Insert Figures 4.1 - 4.4

Figures 4.3 depicts how the probability of rebellion varies as the accuracy of government and opposition announcements change, and Figure 4.4 provides a best response mapping for government and opposition under a high threshold distribution. This figure illustrates a Nash Equilibrium that consists of government making realistic announcements, and opposition making highly optimistic announcements.

4.3 Low Thresholds: Extreme Population

In the third population of agents we examine, thresholds for participating in popular rebellion are skewed to reflect a bias towards action. While the heterogeneity of types is still maintained, agents with a low threshold for participating in rebellion dominate the population. As a result, we move away from our base case to examine a population in which government repression is high.

Under a low threshold distribution several scenarios that support rebellion emerge, although

p(rebellion) is extremely sensitive to shifts in government and opposition strategy. In six scenarios, p(rebellion) is high. These include {R_g, R_o, 0.731}, {M_g, R_o, 0.934}, {M_g, M_o, 0.930}, {H_g, R_o, 0.927}, {H_g, M_o, 0.986}, and {H_g, H_o, 0.972}. In contrast, we find only one scenario in which p(rebellion) is medium: {M_g, H_o, 0.585}. The two remaining scenarios in which p(rebellion) is low include {R_g, M_o, 0.333} and { R_g, H_o, 0.280}. In contrast to both uniform and moderate threshold distributions, variance in participation levels— holding all other things constant—decreases as the government strategy changes from R_g to H_g.

Under these conditions, the opposition enjoys an advantage in making realistic announcements, although the opposition could arguably fare better by making highly optimistic announcements when the government does so. In contrast, the government's dominant strategy is to make accurate announcements, especially when the opposition does not. It follows that the opposition stands to gain from accurately describing a situation that is to its advantage, and that the loss in credibility that results from deviation mitigates the advantage of a favorable situation. As a result, it takes an opposition mistake to reduce p(rebellion) to below 0.50.

Figure 4.5 depicts how the probability of rebellion varies with changes in the accuracy of government and opposition announcements, given a high threshold distribution. Figure 4.6 provides a best response mapping for government and opposition under the same conditions, and depicts a Nash Equilibrium in which both government and opposition make realistic announcement, as in the case of a uniform population distribution.

Insert Figures 4.5 - 4.8

4.4 Bi-Polar Thresholds: Stratified Population

In the final population of agents we examine, thresholds for participating in popular rebellion are bi-modal, reflecting a split in the population. While the heterogeneity of types is still maintained, extremists with low thresholds and moderates with high thresholds for participating in rebellion dominate the population. Once again, we move away from our base case to examine a population in which the government may favor one group while repressing another.

Under a bi-polar distribution there is only one scenario under which rebellion is likely: when both government and opposition make highly optimistic announcements. It follows that p(rebellion) is high if and only if $\{H_g, H_o, 0.778\}$. Also distinct from the cases examined thus far, variance in participation levels—holding all other things constant—increases as the government strategy changes from R_g to M_g, but decreases as the government strategy changes from M_g to H_g.

Under these conditions, it pays the opposition to make highly optimistic announcements when government announcements are realistic or highly optimistic. When the government makes moderately optimistic announcements, however, it pays the opposition to follow this strategy. In contrast, the government's dominant strategy is to be realistic, especially when the opposition makes moderately optimistic or highly optimistic announcements.

Figure 4.7 depicts how the probability of rebellion varies as the accuracy of government and opposition announcements change, under a bi-polar threshold distribution. Figure 4.8 provides a best response mapping for government and opposition under the same threshold distribution, and depicts a Nash Equilibrium that consist of the government making realistic announcements, and the opposition making highly optimistic announcements. What strikes us with this set of runs is that rebellion under a bi-polar distribution is less likely than rebellion under a uniform distribution. A politically splintered population is bad news for a democratic opposition but good news for an authoritarian regime.

In Figure 4.8, we compare our results across various threshold distributions, examining symmetric combinations of government and oppositions announcements. We find that as government and opposition increase their optimism, participation increases moderates with extreme preferences, decreases with uniform preferences, but increases sharply with bi-polar or moderate preferences.

To reiterate, our use of an agent-based model permits us to analyze the dynamics of popular rebellions from a range of perspectives. Whereas we analyze aggregate levels of participation for 1000 episodes under various parameter settings to derive the probability of rebellion, we can

also unpack our results and examine how trajectories of participation differ across various parameter settings, something we reserve for later work on this topic. In particular, this facet of the model permits us to determine whether distinct patterns of participation exist across parameter settings. Figure 4.10 illustrates how aggregate participation varies across events in one episode. Participation initially peaks at 55, drops steadily to 25, then hovers between 30 and 15, and levels out at 12 by event 70.

The agent-based framework also permits us to examine individual participation histories across events. We are therefore able to record each individual's actions during each event that comprises the episode analyzed in Figure 4.10. Figure 4.11 indicates that we do not simply have extremists participating at time t, less extreme at t+1, and least extreme at t+2, in contrast to the monotonic behavioral cascades observed in threshold models. Rather, we see a number of agents who participate initially and then refrain from participating as the episode progresses, as well as a number of individuals who participate initially, refrain from participating, and subsequently resume their participation.

Insert Figures 4.9 - 4.11

5.0 Conclusions

Our objective in this paper has been to better understand the determinants of popular rebellions, by focusing on citizens' perceptions about regime durability, and the government and opposition's efforts to influence these perceptions. We develop an agent-based model to explore how announcements by the government and opposition on the durability of the current regime influence the likelihood of rebellion, and how different preference distributions among the population influence outcomes. Our model nonetheless constitutes a representation—and an artificial one at that—of a process that influences individual turnout in rebellions. With this in mind, we consider two of our results especially interesting.

Our analysis locates four Nash Equilibria under the different population distributions we examine. In all four of these cases, the government's dominant strategy is to make realistic announcements. Unlike the government, the opposition's strategy varies. Under both a uniform

and a low-threshold distribution, the opposition's best strategy is to make realistic announcements, whereas under high and bi-polar threshold distributions, their best strategy is to make highly optimistic announcements. That said, the only equilibrium that supports a rebellion occurs with a low-threshold population. What this implies is as long as repressive governments follow the right strategy, they should be able to deter rebellion; it also implies that some of the rebellions we observe may have been caused, in part, by mistakes in government strategies. It follows that once play moves off the equilibrium path, the strategy of the government and that of the opposition assume critical importance. Small mistakes by the government under uniform and low-threshold distributions can lead to major gains for the opposition. Likewise, slip-ups by the opposition under low and bi-polar threshold distributions can be costly. In these more volatile settings, selecting the right strategy will have a critical influence on the outcome.

One way to understand this dynamic is by noting that the opposition faces a tradeoff between maintaining credibility and inspiring turnout, while the government faces a tradeoff between maintaining credibility and deterring turnout. For the government, we find that the benefits of retaining credibility usually outweigh the potential gain of exaggerating its own popularity in order to deter turnout. For the opposition, we find that there are situations in which the demand for credibility is greater than the demand for inspiration, and vice versa. The opposition, as a result, must keenly tune its strategy to that of the government, and utilize changes in government strategy to its advantage. Most importantly, we find that a small loss in the credibility of the government can lead to dramatic changes in turnout, especially when the opposition properly adjusts its own strategy.

Our finding can help explain the unexpected success of the movement to overthrow Indonesia's President Suharto in 1997-98. Few if any observers believed in mid-1997 that the Suharto government—which had been firmly in charge for over thirty years—might be vulnerable to a popular rebellion. Yet the modest loss in government credibility produced by the 1997 election, coupled with a shrewd opposition strategy to encourage turnout, helped produce a dramatic rise in protests. When these protests reached a critical size in May 1998, even longtime supporters of Suharto defected to the opposition, forcing him to resign from office. We suspect that a similar dynamic could help explain other surprising popular rebellions against authoritarian rule,

including those in the Thailand in 1973, the Philippines in 1988 and Burma in 1988.

In comparing our results across different threshold distributions, we find that the probability of rebellion is lowest with a moderate population, and increases as we move toward an extreme population – that is, one in which citizens are more strenuously opposed to the government. While this result is intuitive, our runs of the model produce an unexpected result: having a bipolar, as opposed to a uniform threshold distribution, matters greatly. Rebellion is less likely and outcomes are much more difficult to predict when citizen preferences are polarized.

In closing, we note that our model may be extended in number of ways. For instance, one may examine how adaptive government and opposition strategies and learning by agents influence turnout in popular rebellions. Or, how networks that structure communication between agents affect turnout by focusing on the difference between spontaneous participation and participation controlled by key agents—information gatekeepers—who enjoy greatest credibility.

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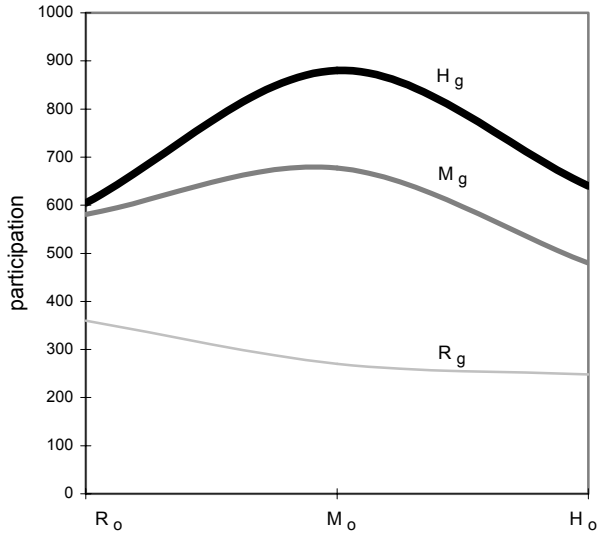
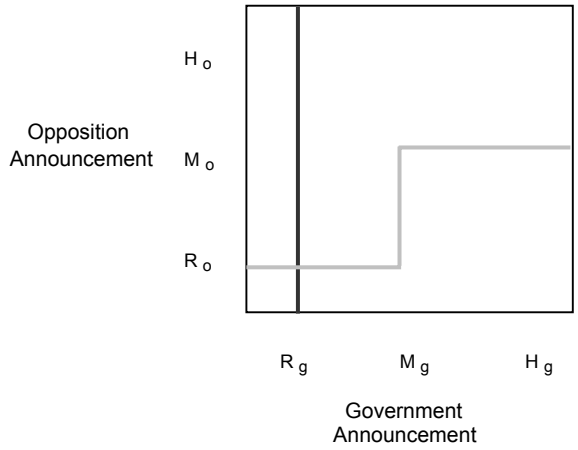
Figures and Tables

Figure 4.1
Agent Participation: Uniform Threshold Distribution



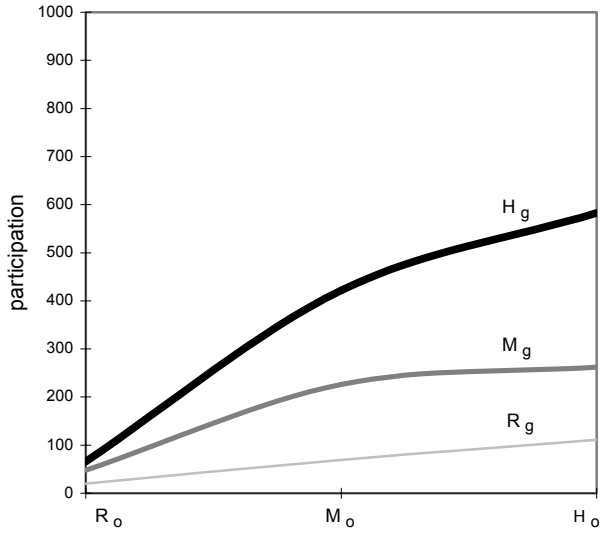
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). The y-axis counts the total number of times two-thirds or more of the population participated over the course of 1000 episodes or runs of the model for nine different parameter settings.

Figure 4.2
Best Response Mapping: Uniform Threshold Distribution



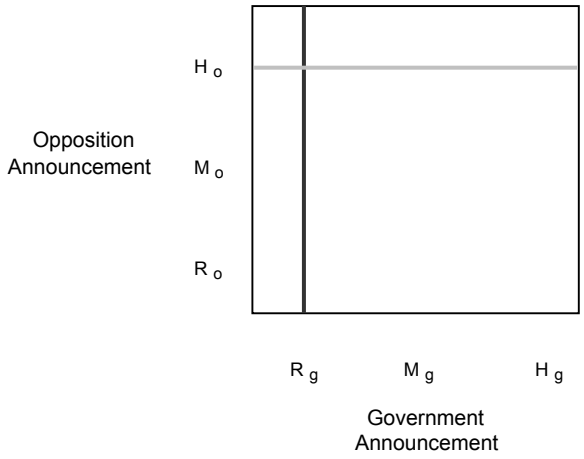
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). Under a uniform threshold distribution, both government and opposition make realistic announcements. Once play moves off the equilibrium path, the opposition's strategy is to make realistic announcements when the government does, and to make moderately optimistic announcements when government announcements are moderately or highly optimistic.

Figure 4.3
Agent Participation: High Threshold Distribution



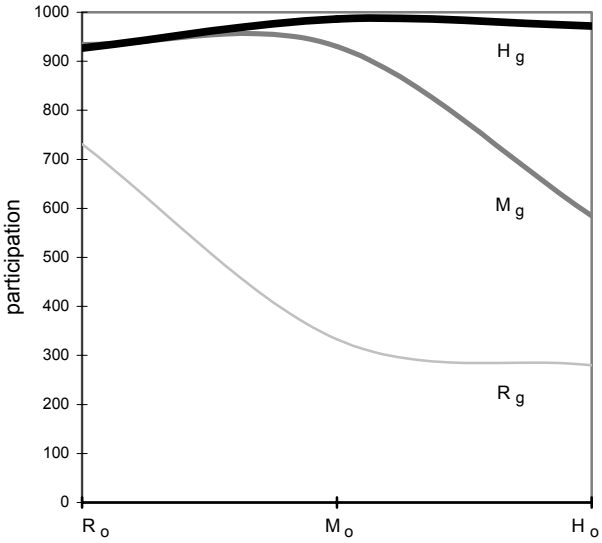
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). The y-axis counts the total number of times two-thirds or more of the population participated over the course of 1000 episodes or runs of the model for nine different parameter settings.

Figure 4.4
Best Response Mapping: High Threshold Distribution



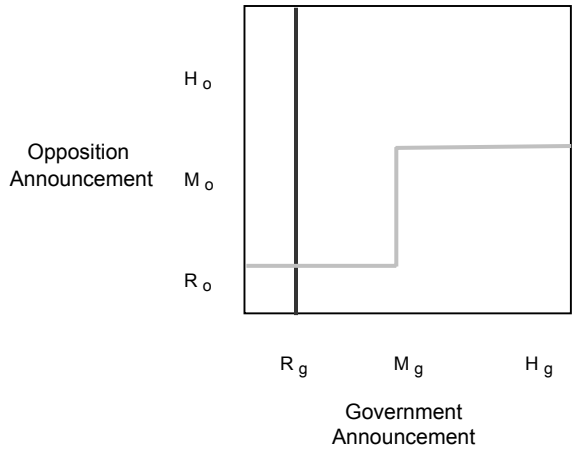
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). This figure demonstrates that given a high threshold distribution, both government and opposition have a dominant strategy of making realistic announcements.

Figure 4.5
Agent Participation: Low Threshold Distribution



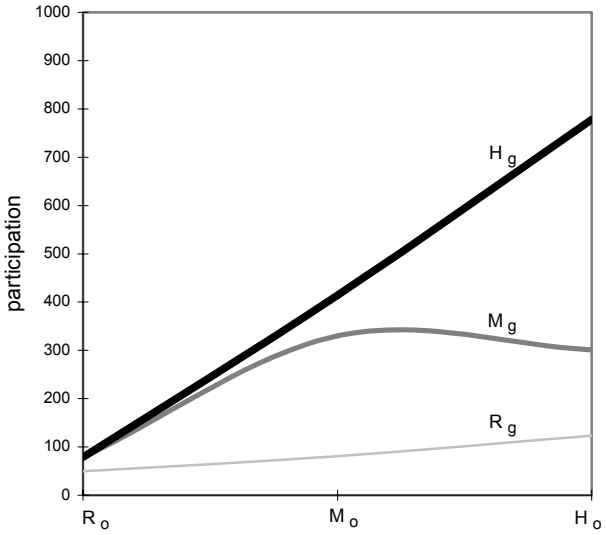
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). The y-axis counts the total number of times two-thirds or more of the population participated over the course of 1000 episodes or runs of the model for nine different parameter settings.

Figure 4.6
Best Response Mapping: Low Threshold Distribution



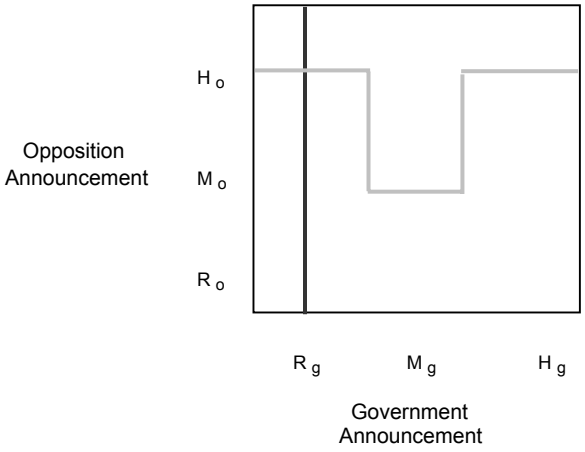
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). Under a low threshold distribution, both government and opposition make realistic announcements. Once play moves off the equilibrium path, the opposition's strategy is to make realistic announcements when the government does, and make moderately optimistic announcements when government announcements are moderately or highly optimistic.

Figure 4.7
Agent Participation: Bi-Polar Threshold Distribution



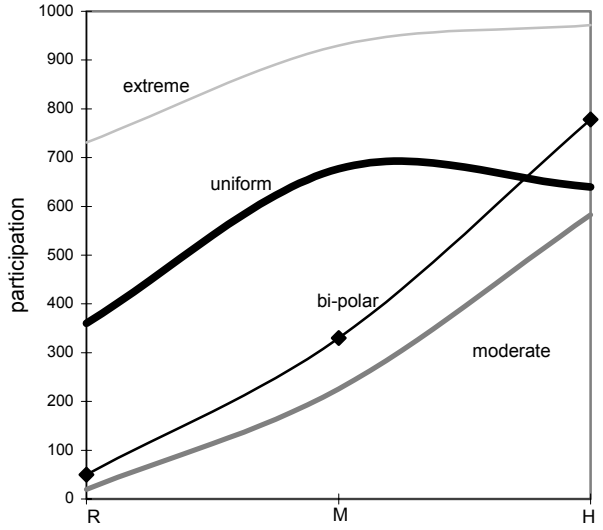
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). The y-axis counts the total number of times two-thirds or more of the population participated over the course of 1000 episodes or runs of the model for nine different parameter settings.

Figure 4.8
Best Response Mapping: Bi-Polar Threshold Distribution



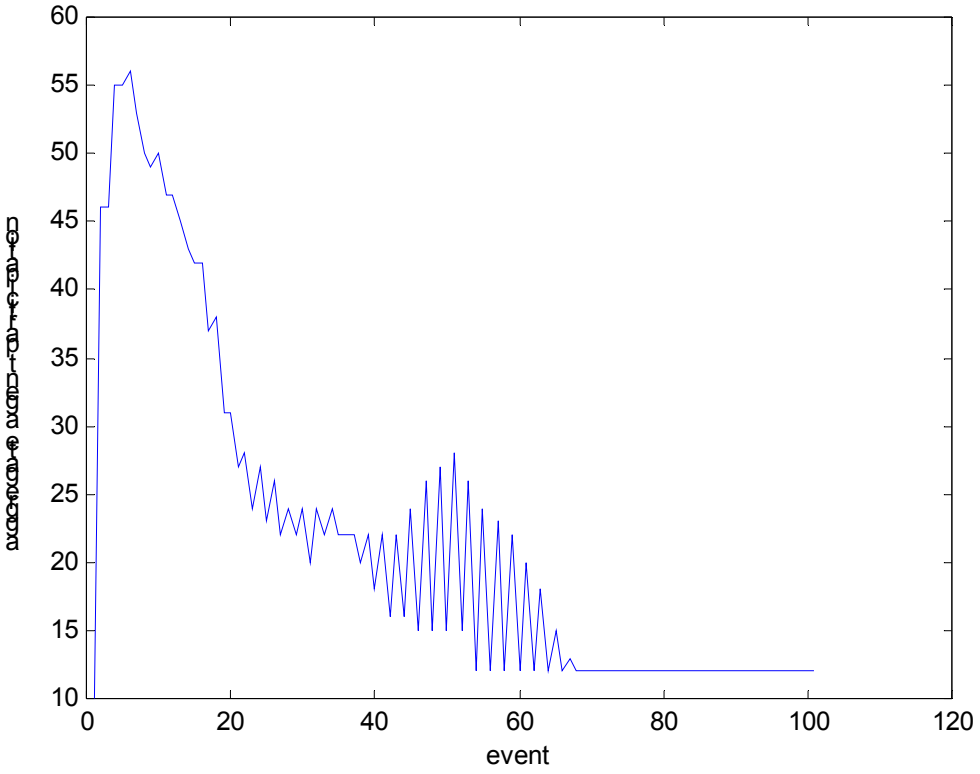
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). Under a uniform threshold distribution, both government and opposition make realistic announcements. Once play moves off the equilibrium path, the opposition's strategy is to make highly optimistic announcements when government announcements are realistic or highly optimistic, and to make moderately optimistic announcements when the government does so.

Figure 4.9
Agent Participation: A Comparison Across Threshold Distributions



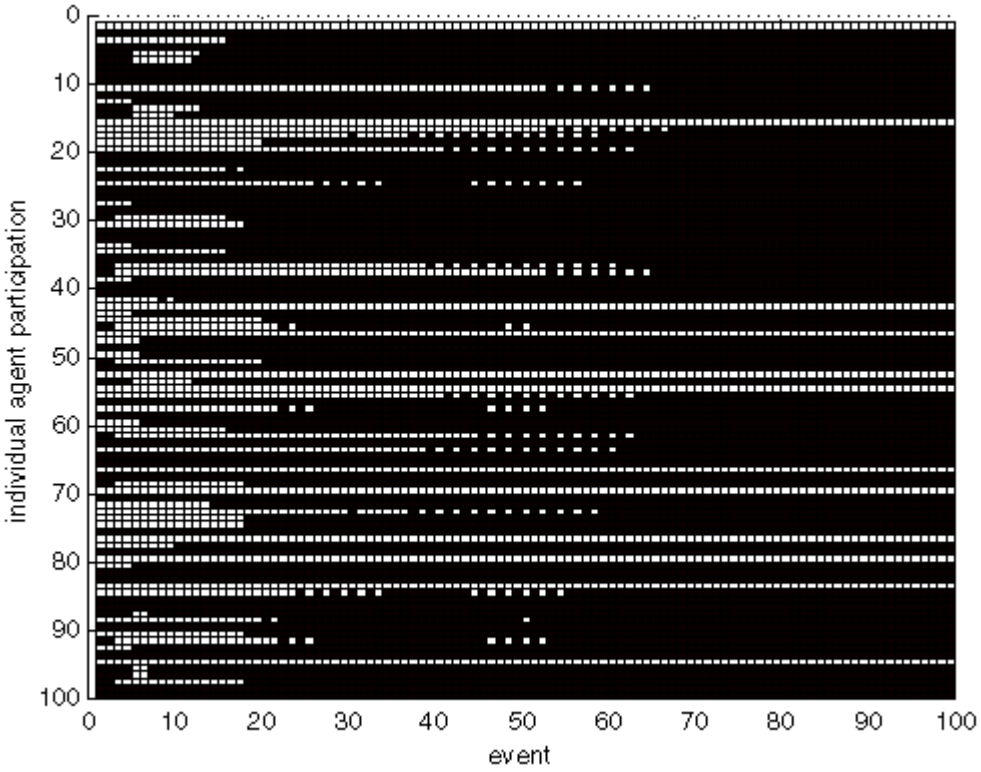
Note: (R) denotes a realistic announcement, (M) a moderately optimistic announcement, and (H) a highly optimistic announcement, whereas the subscripts denote government (g) and opposition (o). The y-axis counts the total number of times two-thirds or more of the population participated over the course of 1000 episodes or runs of the model for nine different parameter settings.

Figure 4.10
Agent Participation: Event-Based History for a Single Run of the Model



Note: These results are derived from 1 episode or run of the model, with 100 agents for 100 events.

Figure 4.11
Agent Participation: Individual Histories for a Single Run of the Model



Note: These results are derived from 1 episode or run of the model, with 100 agents for 100 events. Each row records an individual agent's history of participation (white=participated, black=refrained).

Table 1.0
Simulation Data

Uniform Distribution	R_o	M_o	H_o	mean	stdev
R_g	360	270	248	293	59
M_g	581	677	480	579	99
H_g	605	880	640	708	150
mean	515	609	456		
stdev	135	311	197		

High Threshold Distribution	R_o	M_o	H_o	mean	stdev
R_g	20	69	111	67	46
M_g	48	226	262	179	115
H_g	66	422	583	357	265
mean	45	239	319		
stdev	23	177	241		

Low Threshold Distribution	R_o	M_o	H_o	mean	stdev
R_g	731	333	280	448	247
M_g	934	930	585	816	200
H_g	927	986	972	962	31
mean	864	750	612		
stdev	115	362	347		

Bi-Polar Distribution	R_o	M_o	H_o	mean	stdev
R_g	50	81	123	85	37
M_g	78	330	301	236	138
H_g	79	414	778	424	350
mean	69	275	401		
stdev	16	173	339		

Note: figures in each cell are derived from 1000 runs of a model with 100 agents and 100 events.

Notes

AUTHORS' NOTE: We are grateful to Michael Bratton, Irfann Nooruddin, and two anonymous reviewers for their constructive comments on previous drafts. An earlier version of this article was presented at the 2001 annual meeting of the American Political Science Association. All faults remain our responsibility alone.

[1]That is, once the number of dissenters begins to outweigh the state's repressive capacity, the marginal risk of speaking out against the government begins to drop.

[2] We agree, however, that these factors offer important partial explanations.

[3] We believe that protesters in states that are wealthier and more democratic—where the costs of dissent are much smaller—may have somewhat different motivations. Some scholars have found, for example, that for some participants, joining a protest is a pleasurable social activity that is an end in itself. In highly repressive states, we believe that this is a far less important motivation. Social movements in Western states have been investigated by many, including Tarrow 1989, Opp 1989, Klandermans 1997, and Finkel and Muller 1998.

[4] As Lichbach [1995, 361-362] notes, many scholars make the same argument: that for a rebellion to succeed, participants must first believe that victory is possible:

Hobbes's [1640] third condition of revolution is the "hope of success"...Gottschalk [1944, 5] identifies "hopefulness of success" as a cause of revolution. Lasswell and Kaplan [1950, 46-47] argue that "in the face of the necessity of continued sacrifice without expectations of ultimate success, solidarity may progressively weaken and ultimately break down..." Hoffer [1951, 18] argues that dissidents must maintain an "extravagant hope" that victory is not far away. Johnson [1964, 99] recognizes that one accelerator of revolution is "an ideological belief held by a protesting group that it can...succeed in overcoming the elite's armed might.

Karklins and Petersen [1993] draw on this argument as well, suggesting that the Eastern

European protests of 1989 were facilitated by a set of assurance games.

[5] Ginkel and Smith, for example, acknowledge that the probability that a regime can survive a popular rebellion will influence the likelihood of an actual rebellion; however, they treat the likelihood of regime survival as exogenous. We treat it as endogenous, since it not only influences the actions of the crowd, it is directly affected in turn by the crowd's actions. Thus, our model shows how popular beliefs about the regime's durability can become self-fulfilling prophecies.

[6] In game theoretic models (GTM), the characteristics of players are typically determined exogenously and player 'types' typically tend to be fixed—e.g., 'weak' or 'strong' states in deterrence games. It follows that it is extremely difficult to change the characteristics of players in GTM, unlike the agents in agent-based models (ABM), who can alter their preferences and even their traits in response to new environmental conditions and via other processes of adaptation. Thus for problems such as ours, ABM are more suitable than GTM because they address the dynamic nature of the problem, accommodate requisite heterogeneity of agents and environments, and build in the ability of agents to adapt in response to the conditions they encounter and the experiences they undergo.

[7] For example, the 1988 protests in Burma, and the protests that swept Eastern Europe in 1989.

[8] This could help account for the contagion effects of democratic uprisings in Latin America in the 1970's and 1980's, Eastern Europe in 1989, and Sub-Saharan Africa between 1990 and 1994.

[9] Once the Gorbachev government suggested it would not intervene militarily to protect the communist governments of Eastern Europe, the perceived vulnerability of the East German government almost certainly rose, as activists correctly guessed that the state's own army would not intervene to protect the government.

[10] Bates, de Figueiredo, and Weingast [1998] discuss the problem of signal credibility. Cho and Kreps [1987] and Banks and Sobel [1987] provide complete explanations of signaling games.

Lohmann [1993] uses a signaling model to explain mass political action.

[11] Of course, there is nothing intrinsically democratic about the use of symbolic leadership: in Cambodia, the opposition Khmer Rouge built substantial support against the Lon Nol government by gaining the endorsement of King Sihanouk.

[12] Using noncompetitive elections as a type of announcement, however, can be hazardous for the government. Elections that are fully noncompetitive can produce a signal that has little credibility. To gain credibility, governments must give the opposition at least the appearance of a fair vote. Sometimes this backfires and the opposition does unexpectedly well, or triumphs outright—for example in Brazil (1974), India (1977), Uruguay (1980), South Korea (1985), the Philippines (1986), Chile (1988), and Burma (1990).

[13] We have no strong prior assumptions about the factors that determine each party's selection of a strategy; our goal is to explore the consequences of these strategies, not their determinants.

[14] As one student activist put it, "We have been unable to detect the direction of Mother Megawati's thoughts" (*Far Eastern Economic Review,* 3/12/98).

[15] Indeed, Megawati became President in July 2001.

[16] No independent observers believed that in a free election Suharto's ruling party would win 74 percent of the vote. See, for example, Bird 1998.

[17] This makes a total of 9000 runs for each of the four threshold distributions we examine. In all, 36,000 runs of the model were conducted for the analysis.