



Stability of revolutionary governments in the face of mass protest

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ABSTRACT

Why do some newly introduced revolutionary governments face anti-government demonstrations and swiftly exit office, while others are able to establish political regimes that last for decades? Historical evidence finds revolutionary governments in the first decade of twenty-first century to be three times more vulnerable to mass protest than a hundred years ago. What can explain this trend? This paper relates the stability of newly emerged revolutionary governments to the political composition of the protest that brings a new incumbent to power and in factors that can shape it. Our theoretical model, incorporating protest into a dynamic Downsian framework, features the significant role of protest coordination, communication technology, ideology, and the coercive capacity of the regime. This paper contributes to the literature in several ways. First, it discusses a new historical trend of instability of revolutionary governments. Second, it proposes a model that helps to understand the growing instability of revolutionary regimes, as well as conditions that undermine stability. In equilibrium, it is possible to have a revolutionary government overthrown by popular uprising, despite the fact that it gained power on the wave of popular support. Third, we demonstrate that under a set of conditions, the new incumbent would always come from a different part of political spectrum compared to the current leader.

1. Introduction

Revolutionary and post-revolutionary regimes of the past century tended to be rather stable. For instance, authoritarian regimes including those in Mexico (83 years), the USSR (74 years), China (68 years and counting), Vietnam (64 years and counting), and Cuba (59 years and counting), were born during revolution. However, more recent governments, that gained power on the wave of popular protest, fail to achieve this stability (e.g., Philippines in 2011 or Egypt in 2011). In the past, the main danger for new governments lay in elite coups. The data for 316 political regimes between 1945 and 2002 suggests that most of the non-constitutional exits of the newly established governments were caused, almost exclusively, by them (Svolik, 2009). It is not surprising then, that existing formal literature on the subject focuses on coups as the primary way of non-constitutional political replacements (Bueno de Mesquita and Smith, 2015; Gehlbach et al., 2016). At the same time, the beginning of the 21st century saw major popular protests against new incumbents who gained power on the wave of popular protests against the previous incumbent. In this paper, we suggest that it is not a coincidence, but a new trend that is worth scientific exploration. A century-long trend reveals that newly emerged revolutionary governments face popular unrest with greater frequency than before (see Fig. 1). We investigate the vulnerability of newly emerged revolutionary governments to popular protest by looking at 66 countries that experienced almost two hundred cases of revolution

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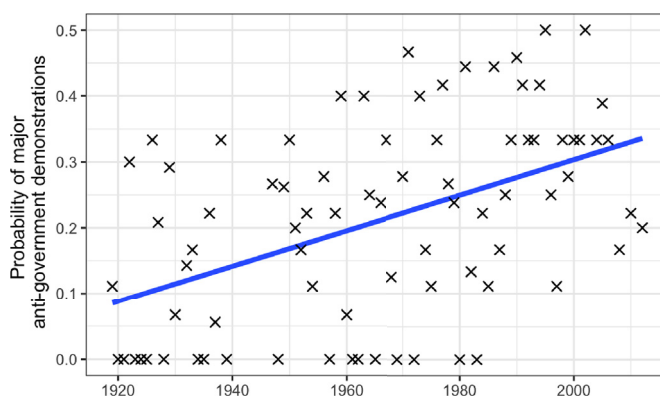


Fig. 1. Probability of a newly established revolutionary government to face major anti-government demonstrations within the first three years of its rule. *Source:* authors calculations based on data from Cross-National Time-Series Data Archive (Banks and Wilson, 2017). *Note:* Each point represents a year. For each revolution we coded if a newly established government faced at least one major anti-government demonstration in the first, second, and third year of its rule. Next, we aggregated the data at the year level.

from 1920 to 2013. In order to do so, we used the Cross-National Time-Series Data Archive (CNTS, Banks and Wilson, 2017).¹ The data² suggests that new incumbents who came to power as a result of a revolution in the first decades of twenty-first century were three times more vulnerable to mass protest than a hundred years ago: in 1920s new revolutionary governments faced mass protests in less than 10 percent of all cases. This number has exceeded 30 percent in the first decade of the millennium. This trend is visible in the data with different specifications of time periods and in different subsamples (Figs. A1 and A2). The susceptibility of the incumbents who came to power on the wake of popular protests to new waves of popular unrest during the Arab Spring is a good example of this historical trend. A case in point is first post-Mubarak government in Egypt, which swiftly collapsed in mid-2013 after a year of almost uninterrupted protests. Scholars have explored the role of social media and links it creates in a society in a spontaneous collective action which drives mass urban mobilizations and brings together disparate groups of individuals who previously did not engage in anti-regime behaviors (Beissinger, 2013; Steinert-Threlkeld, 2017; Tufekci and Wilson, 2012).

At first glance, this historical dynamics seem to be explained by the change in the ideological nature of the revolutionary leaders. Indeed, socialist governments of the twentieth century are believed to not tolerate anti-government demonstrations. In contrast, modern revolutionary leaders appealing to the values of democracy should allow citizens to stage anti-government protest. This explanation, however, is not supported empirically. The historical increase in the chance for the newly established governments to face protest collective actions appears to be extremely robust to the exclusion of revolutionary cases that brought at least some democratization to a nation's political regime. We check this hypothesis by combining CNTS data with nation's polity score from Polity 4 Project (Marshall et al., 2017). We follow the methodology proposed by Colgan (2012) that codes "democratizing" revolutions as those that increased country's polity score by at least five units. We further check if this trend survives by changing the thresholds for "democratization" and the time period that defines the rapidity of occurrence of protests against new incumbent. The sensitivity analysis in Figs. A1 and A2 finds that the time trend remains the same after revolutions that increased nation's democracy by five, four, or less units are consecutively excluded from the sample. It also shows that the trend survives if only the first year or two of the new government are considered. Similar (though less stable) trend is observed if only successful new protests are considered (see Fig. A3).

To explain the rising susceptibility of new revolutionary governments to mass protests, we consider changes in availability of communication technologies, protest coordination and coercive capacity of the state. We develop a new theory that focuses on the political composition of the protest that brings the new government to power and on how factors above shape it.

We continue the work of Guriev and Treisman (2018), Levitsky and Way (2013), Meirowitz and Tucker (2013) and other scholars to address the question of stability of governments, and propose a novel way of looking at the stability of newly established revolutionary regimes. First, our theory helps to understand why some newly introduced revolutionary governments face antigovernment demonstrations and exit the office in a short period of time, while others establish political regimes that last for decades. Second, it explains why these governments are becoming more vulnerable to mass protest in the historical perspective.

In order to do so, we take regularities that were observed during modern protests (widely discussed in context of the Arab Spring (Khondker, 2011; Lynch, 2011; Mourta and Salem, 2011) and the Ukrainian revolution of 2013 (Diuk, 2014) as building blocks and

¹ For each country that experienced a revolution in the current year, we code if a newly established government faced at least one major anti-government demonstration in the first, second, or third year of its rule. Next, for each year with at least one revolutionary case, we take all countries that experienced a revolution during this year and calculate a proportion of those countries where newly established government faced major anti-government demonstrations within next three years. If a revolution lasted for more than a year, we consider only its last year in our calculations.

² Fig. 1 provides evidence of the growing number of protests against newly established revolutionary governments, which illustrates our argument that with improvement of access to new communication technologies the stability zone of the incumbent shrinks (see Propositions 3 and 4). Fig. A3 of Appendix A illustrates the change in the probability of successful revolts against newly established revolutionary governments.

provide a theoretical model that accounts for different types of equilibria. Our building blocks are the emergence of communication technologies that are not easily controlled by the incumbent, the leaderless nature of the protests, and the ability of incumbent to employ his or her coercive capacity to suppress the popular protests. The resulting model allows for the possibility of unsuccessful protests, and protests that are “one-shot deals”, bringing stability after the incumbent is replaced (Meirowitz and Tucker, 2013). It also features protests that occur even after the successful change of leadership. In our model, the political dynamics of protests depends on the combination of several factors: the coercive capacity of the incumbent, the policy position of the leader in power, the opportunity costs of participating in protests, and the efficiency of communication technology. We solve the model under the assumption that the citizens are impatient, and leave the remaining cases as open problems.

There are several moving forces in the model. First, the expected revolutionary incumbent is determined as the Condorcet winner: he or she comes from the median of the protest. Recent cases of revolutions illustrate validity of this assumption. For example, the median activist headed the anti-government movement in Ukraine's 2004 “Orange Revolution”. While anticipating upcoming presidential elections, ideologically diverse Ukrainian activists jointly mobilized citizens against the current prime-minister and the head of the cabinet, Viktor Yanukovich. This spectacular mobilizational success was largely due to two factors. They included the common belief in the rigged nature of the upcoming elections and the ability of opposition activists to construct a negative coalition across diverse policy groupings (Beissinger, 2007). The prominent activists of the united opposition included Oleksandr Moroz (*Socialist Party of Ukraine*), Petro Symonenko (*Communist Party*), Yulia Tymoshenko (*Fatherland*), Volodymyr Lytvyn (*For United Ukraine*), Yury Zahorodny (*Social Democratic Party*), and Viktor Yushchenko (*Our Ukraine*). The head of *Our Ukraine*, Viktor Yushchenko, was recognized as the leader of the united protest. After authorities announced the results of elections, mobilized protesters took control over the major governmental buildings and abandoned the official score. While it is challenging to approximate the distribution of political preferences of the revolutionary citizens of 2003 and 2004, it is possible to infer policy positions of groups they led by reading their political manifests for 2002 parliament elections. According to comparative manifesto project (Werner et al., 2018), for most of the existing scales Victor Yushchenko's *Our Ukraine* movement hold exactly the median position across opposition forces.³

Second, emergence of the new incumbent is possible at the opposite side of the policy space. To the extent that the subset of protesters is smaller than the set of population, the expected new incumbent would not be representing the median of society on the whole. This would not cause political instability if the participation in revolution was difficult, or if the incumbent has high capacity to suppress the protest. As information technology makes it easier to inform population about the protest, the greater share of people who are interested in changing the incumbent are taking to the streets. Those protests become more numerous and harder to suppress, even if the share of population that benefits from changing the incumbent remains small. These protests can bring to power the incumbent that is actually further from the median bliss point of society, generating instability. Thus, the role of communication and information technology is the second crucial moving force in our model that significantly influences the outcome.

This paper contributes to the literature in several ways. It discusses a new historical trend of instability of revolutionary governments. It also proposes a model that helps to understand the growing instability of revolutionary regimes, as well as conditions that help ensure stability. We demonstrate that under a set of conditions, the new incumbent would always come from a different part of political spectrum compared to the current leader.

The rest of the paper is organized as follows: Section 2 briefly outlines the existing literature on the incumbent's survival in the context of mass protests. Section 3 contains the theoretical model, while section 4 discusses implications of the model's findings to a set of cases. The final section concludes. In Appendices we provide additional empirical evidence, formal proofs of statements, and consider extension for the model with endogenous incumbent.

2. Incumbent's survival and popular protests: literature review

In his prominent work Olson (1971) highlights the difficulties of collective action, especially when they call for cooperation of multiple agents. Yet revolutions and mass protests happen, and their frequency increased over time. Common reasons that provoke mass protest and force governments from office include low economic performance (see Vassallo, 2016 for a review), large-scale policy failures (De Mesquita et al., 1999), corruption (Bicchieri and Rovelli, 1995), electoral fraud (Tucker, 2007; Egorov and Sonin, 2014), and others. Contentious collective action can also be driven by the changes in technological conditions that ease protest coordination (Enikolopov et al., 2017, 2018; Hassanpour, 2014; Steinert-Threlkeld, 2017). Scholars of politics have explored methods governments employ to forestall collective action since the pioneering studies of Kuran (1991), Przeworski (1991), Lohmann (1994), and Wintrobe (2000). Their ideas were developed in other studies, including Casper and Tyson (2014), Egorov et al. (2009), Hollyer et al. (2015), Little (2016), Meirowitz and Tucker (2013), Kricheli et al. (2011), Shadmehr and Bernhardt (2011), Yared and Padró i Miquel (2012), and others. Following the recent paper by Guriev and Treisman (2018), one can conclude that, in general, governments can boost repression capacity, making convincing state propaganda, censoring independent media, and co-opting the elite or potential opposition to prevent uprisings.

In their paper, Levitsky and Way (2013) focus on the mechanisms that non-democratic revolutionary governments exploit to build durable political regimes. To achieve political stability leaders need to destroy independent power centers, establish strong ruling parties, and enhance coercive capacity to eliminate the possibility of coups and mass protests. While the difference in the governments' capacity to successfully fulfill these requirements is helpful in explaining the overall variation in the durability of

³ See Appendix D for more details of this case.

different revolutionary regimes, it provides no clues for understanding the historical growth of the vulnerability of newly established governments to contentious collective actions.

Economic and political grievances are often cited as the root of popular unrest (see Collier and Hoeffler, 2004 for a review). Gurr (1968) argues that poverty, economic deprivation and other negative living conditions are driving factors of protest activity. For Blattman and Miguel (2010), grievances are rooted in patronage benefits and distribution of public goods. Similarly, Finkel et al. (1989) argue that grievances stem from dissatisfaction with provision of public or collective goods. We incorporate this line of reasoning into our theory by suggesting that citizens are likely to protest if the current incumbent implements a policy position that is too far from their citizen's bliss point (compared to policy of his or her contender). In our model, an incumbent's policy position not only affects the probability of successful protest forming against them, but also portrays the policy position of the next incumbent and the protest dynamics overall, as would be discussed in detail in section 3.

The literature also describes the set of conditions under which anti-government collective action becomes viable. For instance, the literature on the social foundations of democracy contends that the rich will turn to repression to prevent transitions under conditions of high inequality, emphasizing the importance of a coercive apparatus (Acemoglu and Robinson, 2006b; Boix, 2003). Similarly, Ross (2001) suggests that dictators in resource rich countries use the rents from oil and mineral reserves to sponsor repression, and thus prevent collective action that could lead to democratization. Using a panel of 1950–2002 data, Albertus and Menaldo (2012) find that increased repression under autocracy harms the prospect of democratization. In line with this strand of literature, our model incorporates the ability of the incumbent to suppress the protest as one of its factors. Yared and Padró i Miquel (2012) develop a dynamic principal-agent model in which an incumbent delegates the prevention of riots and protests to an agent who has an advantage in maintaining security. At the same time, Rubin (2014) shows that cascades which induce massive equilibrium changes are more likely to occur in regimes with ability to impose more than one type of sanctions (economic, legal, political, social, or religious). In this case, authorities are better at suppressing subversive actions when external shocks are small and citizens have little incentive to incur numerous types of sanctions. Citizens are more likely to misrepresent their preferences in such regimes but larger shocks are more likely to trigger a cascade to a significantly different equilibrium. In this paper, we do not model the ability of an incumbent to invest in military capacity, assuming instead that he or she already made this investment at the optimal level. Meirowitz and Tucker (2013) suggest that the protest becomes a one-shot deal, as the citizens observe the low quality of the incumbent in power and become pessimistic about the pool of possible replacements, suggesting that revolutionary governments should be rather stable. In our model, and in line with observed trends in Fig. 1, protests might recur, even after a successful regime change.⁴ Kricheli et al. (2011) analyze the conditions that facilitate civil uprising in hostile regimes and find that more repressive autocratic regimes make people unwilling to protest. Part of our analysis is consistent with this framework (regimes that have greater coercive capacity are more stable); still, the protest in our model is motivated by entirely different dynamics and can endure even after a successful replacement of the incumbent.

Another strand of literature features the role of media and communication technologies in protest occurrence. New technologies have been long recognized as facilitating not only more efficient economic interactions, but also lowering the costs of political collective action against the incumbent (Magaloni, 2006; Svolik, 2012; Tilly and Tarrow, 2006). Internet enables many-to-many communication instead of one-to-one, and facilitates in-group coordination in political action—the functions that previously belonged to other organizational technologies (Weinstein, 2006). Iskander (2011) observes that during the 2011 protests, information snowballed not only from person to person but from one person's network to another's via Facebook and Twitter.⁵ Furthermore, Hassanpour (2014) and Hollyer et al. (2015) show that a sharp media disruption such as shutting down the internet or cellular networks at the outset of a protest can backfire. First, such policies come at a high price for the national economy. Second, they often provoke new groups to join the protest. Exception to the rule is China where the national government successfully took control over ICT and have used it against potential protesters (King et al., 2013, 2014; Roberts, 2015). In general, shutting down the Internet-based communication technology is more difficult than seizing control over traditional media (Wilson, 2015). One possible explanation is the difference in relative technical literacy between the population and the government. If it is large, new forms of communication facilitate the dissemination of information. When it is small, governments are able to successfully exercise information control (Willson, 2004). While this nuance is important for understanding the role of ICT on collective action, in this study we focus on the information dissemination and disregard technological literacy as a factor of the protest dynamics. In a similar way, Little (2016) examines the role of communication technology in the facilitation of protest. Information includes both the level of dissatisfaction with the regime and logistics of protests—when, where, and how potential protests occur. Little shows that the latter, rather than the former type of information leads to larger and more cohesive protests. Casper and Tyson (2014) argue that recent protests in Egypt and Libya aggregated information on public preferences and provided elites with a signal, which helped them to coordinate (see also Shadmehr and Bernhardt, 2011 and Shadmehr, 2014). In Guriev and Treisman (2018) the dynamics of mass protests is driven by the interaction of elites who control the media and the political leader who exploits propaganda apparatus. In contrast, our model focuses on communication technologies that cannot be easily controlled by either. In our case, the costs and availability of such technologies

⁴ Bidner and Francois (2013) show how the existence of a group of intolerant-to-transgressions voters can generate enduring political change within a fixed set of formal institutions: the rational citizens can become intolerant to transgressions, assuming that the next leader would perform better, if they believe that there are enough people that do not tolerate transgressions.

⁵ Importance of social media during the Arab Spring is highlighted in Iskander (2011) and Valenzuela et al. (2012). Farrell (2012) uses the example of the Kefaya movement to illustrate the genesis of online activism in Egypt: when the Internet was available to about 10% of population in 2004, the impact was small. By 2006, it played a significant role in organization of street protests in Cairo and Alexandria (Lim, 2012). Steinert-Threlkeld (2017) carefully documents the role of social media for information and coordination during Arab Spring.

make a significant contribution to the outcome of the game. Indeed, if protesters need to create communication infrastructure by themselves their own mediums of communication (such as underground newspapers or radio stations), their penetration would be highly limited compared to modern access to mobile or broadband networks, which incumbents cannot control without imposing high costs on the economy.

While the vulnerability of a new incumbent has been common knowledge for centuries, starting with the work of Machiavelli (1964),⁶ published originally in 1532, the interest in formal modeling of protests is relatively recent. Acemoglu and Robinson (2001) and Acemoglu and Robinson (2006b) analyze the case where a disenfranchised and relatively poor majority forces democratization in periods of low opportunity costs (recessions), while elites, a better-off minority, can mount a coup and win the power back. In either case, the opposition group rises when the relative cost of mounting a protest falls for this group. The role of opportunity costs of collective action was investigated by Campante and Chor (2012) on the example of Arab Spring. They show that the Arab nations increased the pool of individuals who had completed primary and attained some secondary schooling but who had not seen that education rewarded in the labor market. They further expand their analysis to cross-country level using World Values Survey and find that rising education levels coupled with macroeconomic weakness is associated with increased incumbent turnover, as well as subsequent pressures toward democratization (Campante and Chor, 2014). In a recent paper Dorsch and Maarek (2018) show that when leaders extract rent from the economy on behalf of the elite they increase the probability of facing a revolt in the street. The dynamic model of rent-seeking policies, coupled with information shocks and the empirical investigation of the panel of non-democratic countries, suggests that diverse economic shocks increase the probability of mass protests. The magnitude of the effect depends on the extent to which business regulation is market-distorting Dorsch et al. (2015); Dorsch and Maarek (2014), thus highlighting the interaction between political grievance and adverse economic shocks. Chassang and Padro-i Miquel (2009) provide a formal model of civil conflict, in which countries are more likely to lapse into conflict when they suffer a negative income shock. In contrast, we do not assume the existence of separate groups with distinct, inter-group homogenous preferences. Furthermore, our dynamics of political change does not require the occurrence of significant economic shocks.

Finally, a number of authors have considered the incentives to rebel based on the information about the type of the incumbent (competent or incompetent (Egorov et al., 2009; Guriev and Treisman, 2018), popular or unpopular (Chen and Xu, 2017; Egorov and Sonin, 2014), or those with high and low repressive capacity (Edmond, 2013; Huang, 2015)). In our model, all this information is available for citizens that have access to media and cannot be manipulated by the incumbent. Rather, the incumbent can choose his or her policy position (as discussed in Appendix C) in order to improve his or her chances of staying in power. As shown by Campante et al. (2017), the effect of internet can vary across different forms of political participation, and can change over time. The more detailed review of literature exploring the effect of mass media on politics can be found in Stromberg (2015).

In this paper, we follow the path outlined in the literature, and include economic grievances in the form of opportunity costs of protesting and incumbent's distance from citizen's ideal point. We also consider the coercive capacity of government as an additional barrier to success of the protest. We add the extent of ICT penetration among citizens into our framework, focusing on its organizing role. These lessons from existing literature allow us to discuss a new historical trend of instability of revolutionary governments and offer some new insights.

3. Theory

3.1. Model

We assume that the citizens (and their ideal policy positions) are uniformly distributed over the set $[0, 1]$ that represents a standard, one-dimensional policy space. In the spirit of citizen-candidates models (Osborne and Slivinski, 1996; Besley and Coate, 1997), we assume that position x^D of the (initial) incumbent is exogenously given on $[0, 1]$.⁷ Citizen i experiences disutility if the incumbent's policy position is far from her ideal policy x_i . The utility of the citizen i , given that the incumbent's position is x , is denoted by $v_i(x)$ and equals:

$$v_i(x) = -|x - x_i|.$$

In our model, each citizen either participates in a protest or not. According to this decision, all citizens can be classified into two groups: those who participate in a protest against the incumbent x^D , and those who stay at home. We assume that protesters form a segment $P = [a, b]$ in the set of all citizens, such that $a, b \in [0, 1]$ and $a < b$.⁸ For each set $Y \subseteq [0, 1]$, let $\bar{Y}$ denote the complementary set $[0, 1] \setminus Y$. Then, if P is a protest, then $\bar{P}$ is the set of all citizens who do not protest.

One of the key characteristics of the protest is the policy that will be implemented in the case of successful removal of the incumbent. Among the protesters, there is one who is able to propose a policy that defeats any other proposal by a protester in

⁶ One of the first well-documented examples is the three-month rule of the Roman Emperor Pertinax, who emerged in 193 as the incumbent after the uprising against the Commodus. He held a wide popular support, but was unable to secure the support of his guard as the hopes of Praetorians for large monetary rewards waned (Sporerri, 2005).

⁷ We consider an extended version of the model with endogenous incumbent in Appendix C.

⁸ Our results extend to the case when the protest is any Lebesgue-measurable subset of $[0, 1]$, i.e. not necessarily connected.

pairwise comparison, a Condorcet winner. If the protest is segment $[a, b]$, this policy position will be $x^P = \frac{1}{2}(a + b)$.⁹ We call the citizen whose ideal point is x^P , *the expected new incumbent*.

We denote the personal cost of participation in a protest by c . It is convenient to think of these costs as opportunity costs of spending time in collective action; it encompasses all potential risks, independent of the outcome of the protest. In our analysis, citizens choose to protest whenever the expected new incumbent is better than the current leader, taking into the account the individual costs of participation in protest, ignoring the fact that the expected new incumbent might be replaced in the future periods.

Let us define several characteristics of the protest.

Definition 1. Protest P is said to be a *rational protest* against the incumbent x^D , if all the protesters prefer protesting to staying home: $v_i(x^P) - c \geq v_i(x^D)$ for each $i \in P$. Rational protest P is called a *coherent protest* against the incumbent x^D , if those who do not participate in a protest find it in their benefit of not protesting: $v_j(x^P) - c < v_j(x^D)$ for each $j \notin P$.

In case of a rational protest, every participant should get a positive utility from the change of the incumbent if the protest is successful. Thus, the coherent protest requires the rationality of both those who participate in the protest and those who choose to stay at home.

Next, we introduce a parameter that describes the availability of the information about the protest. We assume that each citizen i is aware of the date and time of the actual protest with probability δ and is not aware with the probability $1 - \delta$. With steam locomotive and regular mail, communication tools of the 19th century, δ is low, and many of those who would have been glad to pay c to replace the incumbent with the expected new incumbent stay at home, as they are not aware of the protest taking place. With Facebook and Twitter, the value of δ is much higher. Formally, Nature determines whether the citizen is aware of potential protest. If no, this citizen stays at home and has no strategic decisions to make. If yes, this citizen has to decide to join or to abstain. Since there are continuously many citizens uniformly distributed over the policy space, we can suppose that for each point $i \in [0, 1]$ the share of informed citizens with ideal point i is exactly δ . Thus, for any given protest P , the share of those who actually take to the street is δP .

The success of the protest depends only on the number of people taking to the streets. Let m be the share of the population needed to overthrow the incumbent. This parameter may be interpreted as the military capacity of the incumbent. The higher m , the more protesters are needed to succeed. Mathematically, the crucial role in the model will be played by the ratio $\frac{m}{\delta}$ of military capacity m to the information parameter δ , rather than the values of m and δ themselves. To keep things tractable, we will use variable $\mu = \frac{m}{\delta}$. However, one may also think of both parameters separately, as they characterize different aspects of a political environment. Also, comparative statics with respect to either of them is more meaningful than one of the ratio.

Definition 2. A coherent protest P is *successful* if the number of actual protesters exceeds the military capacity of the incumbent: $\delta|P| \geq m$. If protest P is successful, then the expected new incumbent x^P becomes the *new incumbent*. The incumbent x^D is called *stable*, given parameters c , δ , and m , if there exists no successful protest against him.

Our approach makes our citizens behavioral players in spirit of [Passarelli and Tabellini \(2013\)](#). A certain economic grievance can trigger the individual decision to join the protest (given it is sufficient to outweigh the costs of rioting) if enough members of the same group take to the streets ([Kuran, 1989, 1991](#); [Lohmann, 1994](#)). In our case, this grievance comes from distance of policy preferences of a given individual from the policy of the current incumbent. Since the individual cannot influence the choice of incumbent via democratic procedures, taking to the streets and joining the collective action becomes the only action available to him (or her) to influence the policy. At the same time, the emergent protest does not have a hierarchical structure that would predetermine the choice of incumbent other than selecting a protester with the largest support among the fellow protest participants. This makes the median protester the expected new incumbent.

Successful protests against the incumbent may or may not exist, depending on parameters and the incumbent's initial position. We start our analysis with a one-shot model ($T = 1$) and then turn to the T -periods case, where $T = 2$ and $T = \infty$ appear to be the most important cases. If $T > 1$, the life-time payoff V_i of the citizen i is the discounted sum of their single-period payoffs:

$$V_i = \sum_{t=1}^T \psi^{t-1} v_i, \quad \psi \in [0, 1).$$

Note that this payoff depends on the sequence of incumbents' positions in all periods. Some strategic farsighted citizens could potentially prefer not to protest in period t and, thus, establish the worse incumbent in period $t + 1$ in order to obtain the better incumbent in period $t + 2$. An important special case of impatient (but still rational!) citizens corresponds to $\psi = 0$. In this case, citizens decide whether to protest or not based on the comparison of incumbent and the expected new incumbent. We solve the model for the case $\psi = 0$ and leave the case of arbitrary ψ as an open problem.

⁹ The fact that the revolutionary incumbent comes from the median policy preference among the protest is the result of application of a plausible selection procedure (the Condorcet pairwise comparison). The model could be solved with other types of assumptions, including selecting the most extremist protester. However, we think that those assumptions could be hardly axiomatized which makes such assumptions less credible.

3.2. Analysis

We start by analyzing the one-period case ($T = 1$) and consider the statics of coherent protests.

3.2.1. $T = 1$ period

First, it is easy to see that the incumbent never participates in a rational protest against himself. Formally, if P is a rational protest against incumbent x^D , then $x^D \notin P$.

Second, any rational protest has a simple form: if P is a rational protest against the incumbent x^D , then either $P = [0, a]$ for some $a \in (0, 1)$, or $P = [b, 1]$ for some $b \in (0, 1)$. Taking into account that $x^D \notin P$ and P is a segment, P must lie on one of the sides from x^D . Then, the expected new incumbent x^P will be from the same side. Consider some citizen k participating in the protest P whose ideal policy is farther to x^D than x^P . Compare k with even more radical citizen j with ideal policy 0 or 1, depending on the side. If inequality $v_i(x^P) - c \geq v_i(x^D)$ holds for $i = k$, the same inequality must hold for $i = j$. Then, there is no case of a rational protest that exists on $[0, 1]$ but includes neither 1 nor 0.

The next step is to characterize coherent protests as follows. If P is a coherent protest against the incumbent x^D and $P = [0, a]$ for some $a \in (0, 1)$, then $c < x^D$ and $a = \frac{2}{3}(x^D - c)$. The marginal supporter of the protest has a preferred policy position that ensures his or her indifference between taking to the streets or staying at home. Therefore, we obtain $-\frac{a}{2} - c = -(x^D - a)$, or $a = \frac{2}{3}(x^D - c)$. Inequality $c < x^D$ now follows from $a > 0$. Similarly, if P is a coherent protest against the incumbent x^D and $P = [b, 1]$ for some $b \in (0, 1)$, then $c < 1 - x^D$ and $b = \frac{1}{3}(2x^D + 1 + 2c)$.

Vice-versa, for any $x^D > c$ one can construct a coherent protest $P = [0, a]$ by taking $a = \frac{2}{3}(x^D - c)$. If $x^D < 1 - c$, there exists a coherent protest $P = [b, 1]$, where $b = \frac{1}{3}(2x^D + 1 + 2c)$.

Combining these observations, we arrive at a full characterization of coherent protests.

Proposition 1. *For any incumbent x^D and for any individual cost of protest c , there exist no more than two coherent protests against x^D . They can be described as follows.*

- (i) *Suppose that individual costs of protests are relatively low, $c < \frac{1}{2}$. Then for a radically left incumbent, $x^D < c$, there exists a coherent protest on the right; for a radically right incumbent, $x^D > 1 - c$, there exists a coherent protest on the left; and for a non-radical incumbent, $c < x^D < 1 - c$, there exist coherent protests on both sides of political spectrum.*
- (ii) *Suppose that individual costs of protests are relatively high, $c > \frac{1}{2}$. When the incumbent is radically left, $x^D < 1 - c$, there exists a coherent protest on the right; for a radically right incumbent, $x^D > c$, there exists a coherent protest on the left; and there are no coherent protests when the incumbent is non-radical, $1 - c < x^D < c$.*

In order to analyze the dynamics of political change, we need to find the position of the expected new incumbent in the case of a coherent protest. Recall that the expected new incumbent comes from the median of the protest. Then, in the case of a coherent protest on the right, the expected new incumbent has a preferred policy position

$$x^P = \frac{1}{3}(x^D + 2 + c),$$

while in the case of a coherent protest on the left, his or her position is

$$x^P = \frac{1}{3}(x^D - c).$$

Let us now consider the aftermath of a protest. If coherent protest P occurs on the left, then $P = \left[0, \frac{2}{3}(x^D - c)\right]$. Hence, the protest P is successful if and only if $\frac{2}{3}(x^D - c) \geq \mu$, or, equivalently,

$$x^D \geq \frac{3}{2}\mu + c.$$

Naturally, the more right-wing the incumbent is (the larger x^D is), the wider is the range of parameters μ and c , which make a successful protest on the left possible. If coherent protest P occurs on the right, then $P = \left[\frac{1}{3}(2x^D + 2c + 1), 1\right]$. Thus, the success of the protest P is determined by the following condition: $1 - \frac{1}{3}(2x^D + 2c + 1) \geq \mu$, or, equivalently,

$$x^D \leq 1 - c - \frac{3}{2}\mu.$$

The range of leftist incumbents against which the successful protest exists is wider when the costs of collective actions c and the minimal number of participants in a successful protest μ are low.

Therefore, there are several different types of incumbent positions with respect to the existence of successful protests. Using the fact that $\frac{3}{2}\mu + c > 1 - c - \frac{3}{2}\mu$ is equivalent to $c > \frac{1-3\mu}{2}$, we obtain the following result.

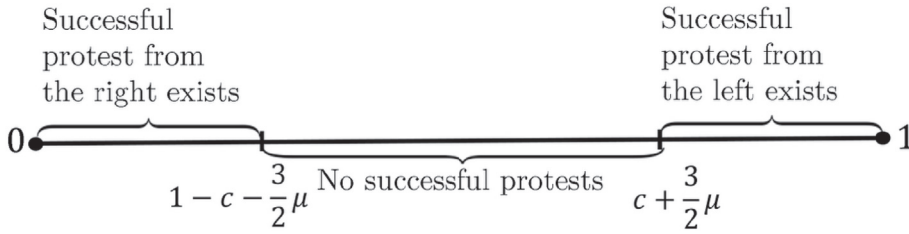


Fig. 2. Vulnerability of incumbents when the costs of protest are high ($c > \frac{1-3\mu}{2}$).

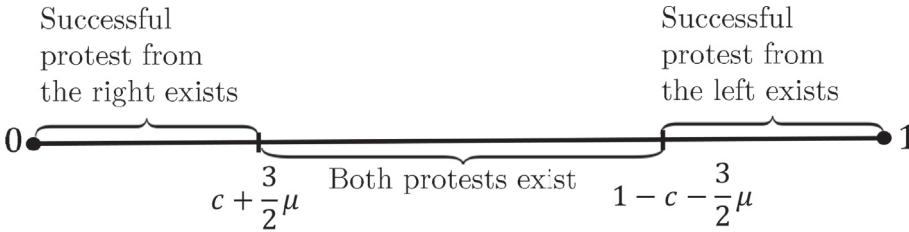


Fig. 3. Vulnerability of incumbents when the costs of protest are low ($c < \frac{1-3\mu}{2}$).

Proposition 2.

- (i) Suppose that the individual costs of protest are relatively high: $c > \frac{1-3\mu}{2}$. The “extremist” incumbent that is located on segments $[0, 1 - c - \frac{3}{2}\mu]$ and $[\frac{3}{2}\mu + c, 1]$ will be successfully overthrown from the right or from the left, respectively, while the “centrist” incumbent located on segment $(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c)$ is stable.
- (ii) Suppose that the costs of protest are relatively low: $c < \frac{1-3\mu}{2}$. The incumbent located on the segments $[0, \frac{3}{2}\mu + c]$ and $[1 - c - \frac{3}{2}\mu, 1]$ will be successfully overthrown from the right and from the left, respectively, while for the incumbent from the segment $(\frac{3}{2}\mu + c, 1 - c - \frac{3}{2}\mu)$ there are successful protests on both sides.

Figs. 2 and 3 illustrate the results described in Proposition 2.

With high costs of protest c , larger μ (the military capacity of the incumbent relative to the informational capacity of protesters) guarantees a larger zone of stability with respect to the incumbent’s policy. A leader, who has a strong and loyal police force (high m), or face disorganized, technologically backward protesters (low δ), might allow himself to conduct a relatively extreme policy without risking a loss of power. In contrast, a leader with weak police (low m) facing media-savvy opposition (high δ) has a small zone of comfort, if any; he or she needs to stick close to the median citizen ideal point. With low c , any incumbent cannot survive a protest, and the centrist ones face successful protests from both sides of the spectrum.

Fig. 4 (a, b, c) map protest zones on the plane (x^D, c) given different values of parameter $\mu = \frac{m}{\delta}$. The zone of the successful “right” protest is shaded with squares, the zone of successful “left” protest is marked by inclined lines, and the zone with the possibility of successful protests on both sides is uniformly colored. The zone of dictator stability remains white. Comparative statics with respect to m , the military capacity, is the same as for μ ; comparative statics with respect to δ , which parametrizes information penetration, has the opposite sign. A higher military capacity of the incumbent makes the stability zone larger; the higher m is, the more participants are needed to replace the incumbent, and thus the incumbent might take the position further away from a larger number of citizens. When the opposition faces less problems with transmitting information to its followers (δ is higher), the stability zone shrinks. With the same costs and incumbent’s policy position, the more people turn out for protest.

3.2.2. $T = 2$ periods

Let us now consider the case when a successful protest is followed by a successful protest in the next period. It is straightforward to demonstrate that for a protest to continue into multiple periods (possibly infinitely), there should be a successful protest in two consecutive periods. The two-period case ($T = 2$) is of special importance for us: if the leader emerging in “+2” period has the same (or symmetric relative to the median policy) position as the initial (time “0”) leader, this means that he or she is vulnerable for the same structural reasons that made his or her advance possible. In such a case, there is a possibility of infinite “oscillations” with no

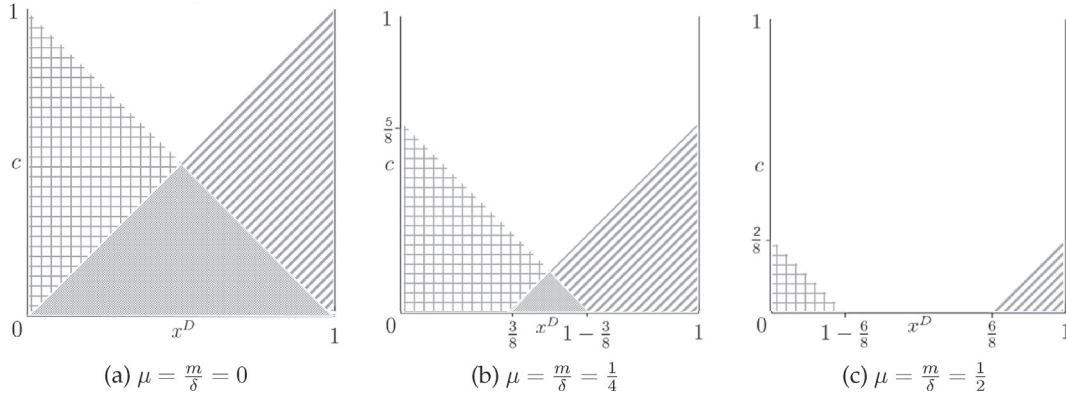


Fig. 4. Protest zones.

convergence, even in the very-long run. In contrast, if the incumbent that emerged after a successful protest is stable, there will be no protests thereafter. Our next goal is to identify the range of parameters for which stability is possible.

Proposition 3 describes the set of “stability zones” as a function of parameters c , μ , and x^D . The proof is relegated to [Appendix B](#).

Proposition 3.

- (i) Suppose that the individual costs of protests are high: $c > 1 - 2\mu$. If the incumbent is located in the “center”, $x^D \in \left(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c\right)$, there are no successful protests against him. If the incumbent is “extreme”, $x^D \in \left[0, 1 - c - \frac{3}{2}\mu\right]$ or $x^D \in \left[\frac{3}{2}\mu + c, 1\right]$, the new incumbent that emerges after a successful protest is in the zone of incumbent stability.
- (ii) Suppose that the individual costs of protests are intermediate: $1 - 2\mu > c > \frac{1-3\mu}{2}$. If the incumbent is located in the “center”, $x^D \in \left(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c\right)$, then there are no successful protests. If $x^D \in \left[0, \frac{4c+9\mu-4}{2}\right)$ or $x^D \in \left(\frac{6-4c-9\mu}{2}, 1\right]$, then a single protest in period 1 results in a stable incumbent. Finally, if $x^D \in \left[\frac{4c+9\mu-4}{2}, 1 - c - \frac{3}{2}\mu\right]$ or $x^D \in \left[c + \frac{3}{2}\mu, \frac{6-4c-9\mu}{2}\right]$, the incumbent is overthrown in period 1, and the new incumbent is again in the unstable zone (and thus is overthrown in period 2).
- (iii) Suppose that the individual costs of collective action are low, $c < \frac{1-3\mu}{2}$. There are no stability zones, and there will be successful protests in all periods.

Proposition 3 demonstrates that if the costs of collective action are sufficiently high ($c > 1 - 2\mu$), the protest will not persist for more than one period. Indeed, if the initial incumbent is centrist, $x^D \in \left(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c\right)$, his or her position in office is secure. If the incumbent is extremist, either left-wing, $x^D \in \left[0, 1 - c - \frac{3}{2}\mu\right]$, or right-wing, $x^D \in \left[\frac{3}{2}\mu + c, 1\right]$, then the new incumbent that emerges as a result of the protest in the first period is in the stability zone, and his or her position is secure afterwards. This finding is rather intuitive: as costs of collective action are high, the initial incumbent must be sufficiently extremist to provoke a successful protest. In this case, a protest against him needs to be wide enough to guarantee that the new leader is close to the center, and hence, does not provoke enough displeasure to be successfully removed from power. In sum, if the costs of collective action together with the military capacity are large enough ($c + 2\mu > 1$), the protests cannot last for more than one period.

If the costs of protest are low ($c < \frac{1-3\mu}{2}$), then for the incumbent’s positions that satisfy inequalities $c + \frac{3\mu}{2} < x^D < 1 - c - \frac{3\mu}{2}$ there exist a possibility of a successful protest on each side of the political spectrum (see [Proposition 2](#), part (ii)). Analyzing multi-period equilibria would require imposing additional assumptions about the selection among these two possible protests. For the sake of brevity, we do not analyze this case.

The case of intermediate costs of collective actions ($1 - 2\mu > c > \frac{1-3\mu}{2}$) is the most interesting. In this case, the leader’s position might oscillate between left and right wing of the political spectrum. We consider this case in details in the next subsection.

3.2.3. $T = \infty$ periods

Throughout this subsection we assume that the costs of collective action are intermediate ($1 - 2\mu > c > \frac{1-3\mu}{2}$). Let $\{x_n^D\}$ denote the sequence of the leader positions during the chain of successful protests, $x_1^D = x^D$. We next need to consider the convergence properties of two sequences, the sequence $\{y_n = x_{2n-1}^D\}$ of leader’s positions in odd periods and the sequence $\{z_n = x_{2n}^D\}$ of leader’s positions in even periods, $n \geq 1$. As our formal results ([Proposition 4](#)) demonstrate, infinite oscillation is indeed possible: an incum-

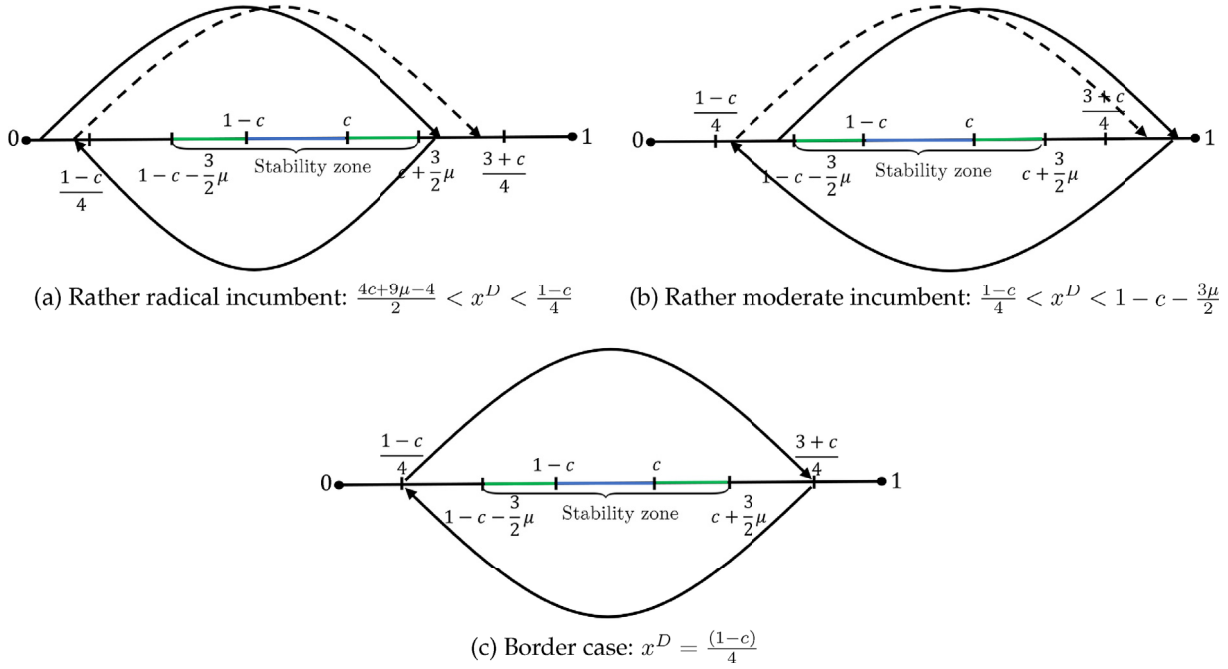


Fig. 5. Dynamics of leaders positions.

bent that is brought down by protests on the opposite side is either not centrist enough or lacks the military capacity to protect himself. Yet [Proposition 4](#) goes beyond establishing the mere possibility of infinite oscillation.

Proposition 4. Suppose that the costs of collective action are intermediate: $1-2\mu > c > \frac{1-3\mu}{2}$.

- (i) If the incumbent is centrist, $1-c-\frac{3}{2}\mu < x^D < c+\frac{3}{2}\mu$, then x^D is stable.
- (ii) If the incumbent is leftist, $x^D < \frac{4c+9\mu-4}{2}$, then the new incumbent $x^P = \frac{1}{3}(x^D + 2+c)$ that emerges after a successful protest in the first period is stable. Similarly, if $x^D > \frac{6-4c-9\mu}{2}$, then the new incumbent $x^P = \frac{1}{3}(x^D - c)$ is stable.
- (iii.a) If $\frac{4c+9\mu-4}{2} < x^D < \frac{1-c}{4}$ ($\frac{1-c}{4} < x^D < 1-c-\frac{3}{2}\mu$, resp.) then the sequence of odd-period leader's positions $\{y_n\}$ is strictly increasing (resp., decreasing) and converges to $\frac{1-c}{4}$; the sequence of even-period leader's positions $\{z_n\}$ is strictly increasing (resp., decreasing) and converges to $\frac{3+c}{4}$.
- (iii.b) If $c+\frac{3}{2}\mu < x^D < \frac{3+c}{4}$ ($\frac{6-4c-9\mu}{2} > x^D > \frac{3+c}{4}$, resp.) then the sequence of odd-period leader's positions $\{y_n\}$ is strictly increasing (resp., decreasing) and converges to $\frac{3+c}{4}$; the sequence of even-period leader's positions $\{z_n\}$ is strictly increasing (resp., decreasing) and converges to $\frac{1-c}{4}$.

Parts (i) and (ii) of [Proposition 4](#) are corollaries from [Proposition 3](#), part (ii). Parts (iii.a) and (iii.b) follow from [Lemmas 5, 3](#), and [4](#) (see [Appendix B](#)). [Fig. 5a](#) and [b](#) illustrate part (iii.a) of [Proposition 4](#). Suppose that the initial incumbent's position is moderately extremist — close neither to the center, nor to the margins of the political continuum. In this case, positions of the subsequent incumbents will oscillate from one side to the other. Starting on the left side, the even-period policy position converges toward the limit point $\frac{3+c}{4}$, and the odd period positions — to $\frac{1-c}{4}$. Both left and right subsequences of incumbent's positions are monotonic. If $\frac{4c+9\mu-4}{2} < x^D < \frac{1-c}{4}$, they are increasing ([Fig. 5a](#)), and for $\frac{1-c}{4} < x^D < 1-c-\frac{3}{2}\mu$, they are decreasing ([Fig. 5b](#)).

The list of possible parameter combinations in [Proposition 4](#) skips the case of “pure” oscillation. If $x^D = \frac{1-c}{4}$, then both $\{x_{2n-1}^D\}$ and $\{x_{2n}^D\}$ are constant sequences, $x_{2n-1}^D = \frac{1-c}{4}$ and $x_{2n}^D = \frac{3+c}{4}$. In the symmetric case, if $x^D = \frac{3+c}{4}$, then both $\{x_{2n-1}^D\}$ and $\{x_{2n}^D\}$ are constant sequences, $x_{2n-1}^D = \frac{3+c}{4}$ and $x_{2n}^D = \frac{1-c}{4}$ (see [Fig. 5c](#)). This case is non-generic in the sense that any deviation from the parameter values that make it possible leads to one of the cases analyzed in [Proposition 4](#).

Table 1
Predicted outcomes.

Parameter					Outcome
	μ	c	x^D		
	Coercive capacity Communication costs	Individual costs of protest	Radicalism of the incumbent		
1.a	High	High	Not radical	→	No significant protests
1.b	Low	High	Not radical		
2.a	High	Low	Not radical	→	Significant protests, incumbent survives
2.b	High	High	Radical		
3.a	High	Low	Radical	→	Stable revolutionary government
3.b	Low	High	Radical		
4.a	Low	Low	Radical	→	Unstable revolutionary government
4.b	Low	Low	Not radical		

4. Implications and illustrations

4.1. Implications

In this section, we describe general implications of our theory. There are four different scenarios: “no significant protests”, “significant protests, incumbent survives”, “stable revolutionary government”, and “unstable revolutionary government”. The theoretical model yields specific predictions about the outcomes of popular unrest in different parameter configurations as a function of the leader’s coercive capacity, the informational capacity of the opposition, and the incumbent’s policy. We distinguish four qualitatively different outcomes, as summarized in [Table 1](#).

In case 1, there are no successful protests, as the costs of collective action are high and the incumbent is not radical, so few people are willing to take to the streets (see [Proposition 3\(i\)](#)). Essentially, this follows from the assumption that citizens choose to protest each time when the expected new incumbent is preferred over the current leader. In a sense, cases 1 and 2 illustrate the inability of citizens to overcome the collective action problem.

Case 3 corresponds to combinations of parameters that generate a “one-shot deal”, consistent with findings of [Meirowitz and Tucker \(2013\)](#) and our [Proposition 3\(ii\)](#). The key mechanism here is different: the new incumbent that emerges after protest is not radical (as he or she was chosen from a wide protest against a former radical incumbent), positions in the stability zone, so that there is no successful protest against him.

If both costs of protest and military capacity are low (case 4), there will be protests in two periods independent of the initial incumbent’s position (see [Proposition 3\(iii\)](#)). That means that the new incumbent who came to office through the popular revolution will lose power in a new wave of protests, driven by the same mechanics. The model also suggests that the relative policy positions of the incumbents are determined by the mechanics of the model: e.g., if the incumbent is radical, the new incumbent will be less radical and vice-versa (see [Proposition 3\(i, ii\)](#)).

4.2. Illustration: Cuban revolution of 1952 and Egypt in 2011–2012

This section provides a short illustration of our model for both stable and unstable cases and draws attention to rising vulnerability of revolutionary regimes to contentious collective action. For this purpose, we chose two countries – Cuba in 1950s and Egypt in 2010s. At the onset of revolutions, the opportunity cost of protesting were low in both cases. [Charles \(1988, 123\)](#) notes that in Cuba, “during 1958, unemployment grew from 7 percent in March to 18 percent in December.” In Egypt, the share of unemployed people in the labor force was reached 11.85%, according to World Bank data and continued rising. This points to the case of low c in our model. The major difference in these cases for the purpose of our illustration lies in the different degree of incumbent’s ability to suppress means of communication between the potential protesters. In case of Cuban Revolution and its aftermath the cost of informing citizens of upcoming action required the creation of means of communication, which could be controlled by the new incumbent. In case of Egypt, the communication technology was already in place, and the cost of controlling it was prohibitively high.

Both Hosni Mubarak and Fulgencio Batista, political leaders of two countries which pursued policy that targeted foreign capital and business, left labor unprotected, thus being far from the ideal point of the median citizen. The coercive capacity of both Batista and Mubarak was high (see data from [Sarkees and Wayman, 2010](#)).

Despite these similarities, the protest dynamics and political outcomes in the Cuba and Egypt cases were starkly different. While the opposition activities against Batista in Cuba lasted for seven year, the revolutionary regime established by Fidel Castro after the final unrest (provoked by rigged presidential elections of 1957) had been exceptionally stable. The Egyptian revolution of 2011 which replaced Mubarak with the leader of Muslim Brotherhood, Mohammed Morsi, lasted for only 18 days. But in contrast with the case of Cuba, the new round of protests in Egypt started immediately after Morsi’s ascension to power in June 2012. On July 3, Morsi was ousted, and the head of the Supreme Constitutional Court was appointed as the provisional president. Now the Muslim Brotherhood,

which took part in the anti-Mubarak protests and was the backbone of Morsi's rule, withdrew its support of the government that came to power as a result of the protests from the other side of political spectrum. In June 2014, an Egyptian court confirmed death sentences against the leader of the Muslim Brotherhood and 182 of its supporters.

While presuming the coercive capacity of the regime, opportunity costs, and incumbent's distance to the median citizen to be similar, our approach suggests the organization of protest communication to be the key factor to explain the difference in the post-revolutionary outcomes of these two cases.

In 2011, Egypt had the largest number of Facebook and Twitter users in the Arab world, with more than 50% of them concentrated in Cairo (Mourtada and Salem, 2011). Tufekci and Wilson (2012, 369) surveyed protesters to find that "about 92% of the respondents used phones in general and 82% used phones for communicating about the protests. About half had a Facebook profile (52%) and almost everyone who had one used it for communicating about the protests (51%). Twitter was used in general by 16% of the respondents, and for communicating about the protests by 13%." Using social media, activists offered advice on multiple protest-relating techniques, including use of technology to escape government surveillance, handling rubber bullets, and setting up barricades (Kirkpatrick and Sanger, 2011; Lynch, 2011). The April 6 Movement, a youth movement largely relying on Facebook and social media for communication, was one of the primary organizational resources of the January 25 protests. Thus, information and communication technology was high in Egypt, corresponding to high δ of the model. As a result, and in line with predictions of our model, people who took to the street in Egypt did not have to appeal to citizens with more moderate political persuasions.

In contrast, Castro had to create his own communication mediums to inform and coordinate potential protesters. To this end, he formed underground newspaper *El Acusador* ("The Accuser") and used it in a recruitment drive (Coltman, 2008, 65). Starting in 1958, revolutionary movements utilized radio communication by establishing *Radio Rebelde*. It was used to as vital source of communication between revolutionary cells due to increased government restrictions on the Cuban press. Establishing of a Radio Rebelde as both communication and a propaganda tool was costly. Castro had to arrange a secret airlift of suitable radio equipment, and each guerrilla column had to acquire radio equipment and a transceiver. Even then, the radio could broadcast only nightly: at 7:00 and 9:00 p.m. over 20 m and at 8:00 and 10:00 p.m. over 40 m. In addition, Batista frequently jammed the signal. All these factors highlight the high cost of establishing communication and information technology, compared to modern ICT and social media. ("The Unique Story of TI4NRH," Don Moore, 1993; *Monitoring Times*). Thus, information and communication technology has a high cost on Cuba corresponding to low δ of the model. Moreover, due to low level of media availability, our model predicts that Castro had to appeal to a larger spectrum of political supporters to generate a successful protest. Indeed, we know that he avoided association with communist party of Cuba in fear of alienation of political cadres (Bourne, 1986, 73; Coltman, 2008, 66–67).

By contrasting the cases of the Cuban Revolution of 1952–1959 and of Egypt in 2011–2012 through the lenses of our model, one can suggest that otherwise similar regimes differed in costs of communication, resulting in Cuba to represent "stable revolutionary government" case (3.a), while Egypt to move to "unstable revolutionary government" case (4.a), with completely different protest dynamics. Indeed, in the aftermath of Cuban Revolution, Castro swiftly consolidated power and established regime that have been lasted for decades. Despite the fact that ICT availability rose around the world, it remained restricted in Cuba. Under current regulations, all materials intended for publication on the Internet must first be approved by the National Registry of Serial Publications. Service providers may not grant access to individuals not approved by the government (Azul, 2011). As early as 2006, Cuba was considered to be the "Enemy of the Internet" by Reporters without Borders (2014), and Freedom House ranked its internet freedom below that of China, Iran and Syria. The tight control over the internet is coupled with control over distribution of devices that can facilitate internet access.¹⁰ This situation contrasts sharply with that of Egypt, where the Internet was not actively suppressed until the onset of protests, and the 2011–2012 case illustrates the dynamics of the protests, suggested by our theoretical model at high levels of media penetration. Indeed, Mubarak was deposed by Morsi, who, in turn, lost power to a new government on the opposite side of political spectrum.

5. Conclusion

The revolutionary governments of the past were significantly less vulnerable to mass protests than modern ones. Historical evidence finds revolutionary governments of the first decade of the twenty-first century to be three times more vulnerable to mass protest than a hundred years ago. While existing theories focus on explaining overall variation in the durability of different revolutionary regimes, they provide no clues for understanding the historical growth of the vulnerability of newly established governments to contentious collective actions. We present a theory of how the stability of newly emerged revolutionary governments depends on political composition of the protest that brings the new incumbent to power and in factors that can shape it. This theory helps to understand the growing instability of revolutionary regimes, as well as conditions that undermines stability. It shows why revolutionary governments can be overthrown by popular uprising, despite the fact that it gained power on the wave of popular support. It also shows that under a set of conditions, the new incumbent would always come from a different part of political spectrum. We demonstrate the consistency of this model with empirical evidence on the increasing susceptibility of the incumbents that came to power on the wake of popular protests to new waves of popular unrest.

As ICT technologies spread into non-democratic countries, they allowed the citizens who were dissatisfied with the performance of the current government to protest more easily. Our theory assumes that if the unrest was successful and led to a government change,

¹⁰ Alan Phillip Gross, under employment with a contractor for the U.S. Agency for International Development, was arrested in Cuba on 3 December 2009 and was convicted on 12 March 2011 for covertly distributing laptops and cellular phones in Cuba.

the new incumbent would emerge from the crowd of protesters. Our framework helps to interpret the dynamics of the protest in non-democratic countries with impatient citizens and different combinations of coercive capacity of the state, ICT development, opportunity costs of taking to the streets, and the extent of the radicalism of the incumbent. It also aligned well with the increasing instability of revolutionary governments that was discussed in the first section of our paper, as the spread of modern ICT that incumbent can not control makes communication between potential protesters much easier.

It is worth noting that our model assumes exogeneity of citizens' ability to coordinate. At the same time, historical examples show that the ability of the incumbent to regulate communication channels varies over time. In the 19th century, Russian tsar Nicolas I was able to curb the spread of railroads across Russia and thus maintain the high costs of collective action at the expense of economic development (Acemoglu and Robinson, 2006a). While the cost of late arrival of rail transportation might be huge, they are spread over years, if not decades. In the 21st century, Egypt's Hosni Mubarak met the costs of shutting down internet access immediately. Studying the proper way to model the effects of the ability of the incumbent to control information channels on the revolutionary dynamics is one of the research frontiers in the field.

Declarations of interest

None.

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Appendix A

Appendix A provides a historical perspective on the vulnerability of newly emerged revolutionary governments to popular protest from 1920s to 2010s. It also illustrates the robustness of identified trend to different specifications of time periods and in different subsamples.

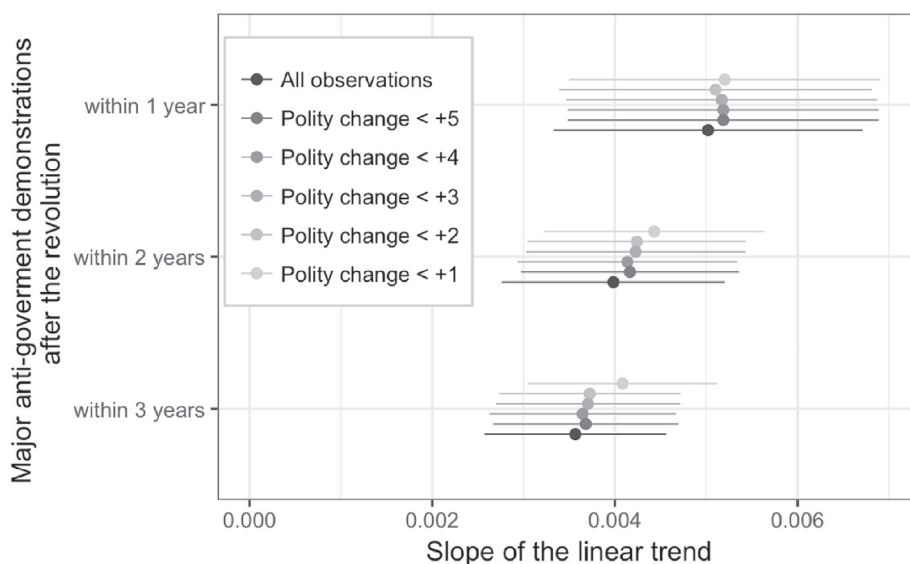


Fig. A1 The slopes of the linear time trend for different specifications of the samples. *Source:* authors' calculations based on data from Cross-National Time-Series Data Archive and Polity 4 Project.

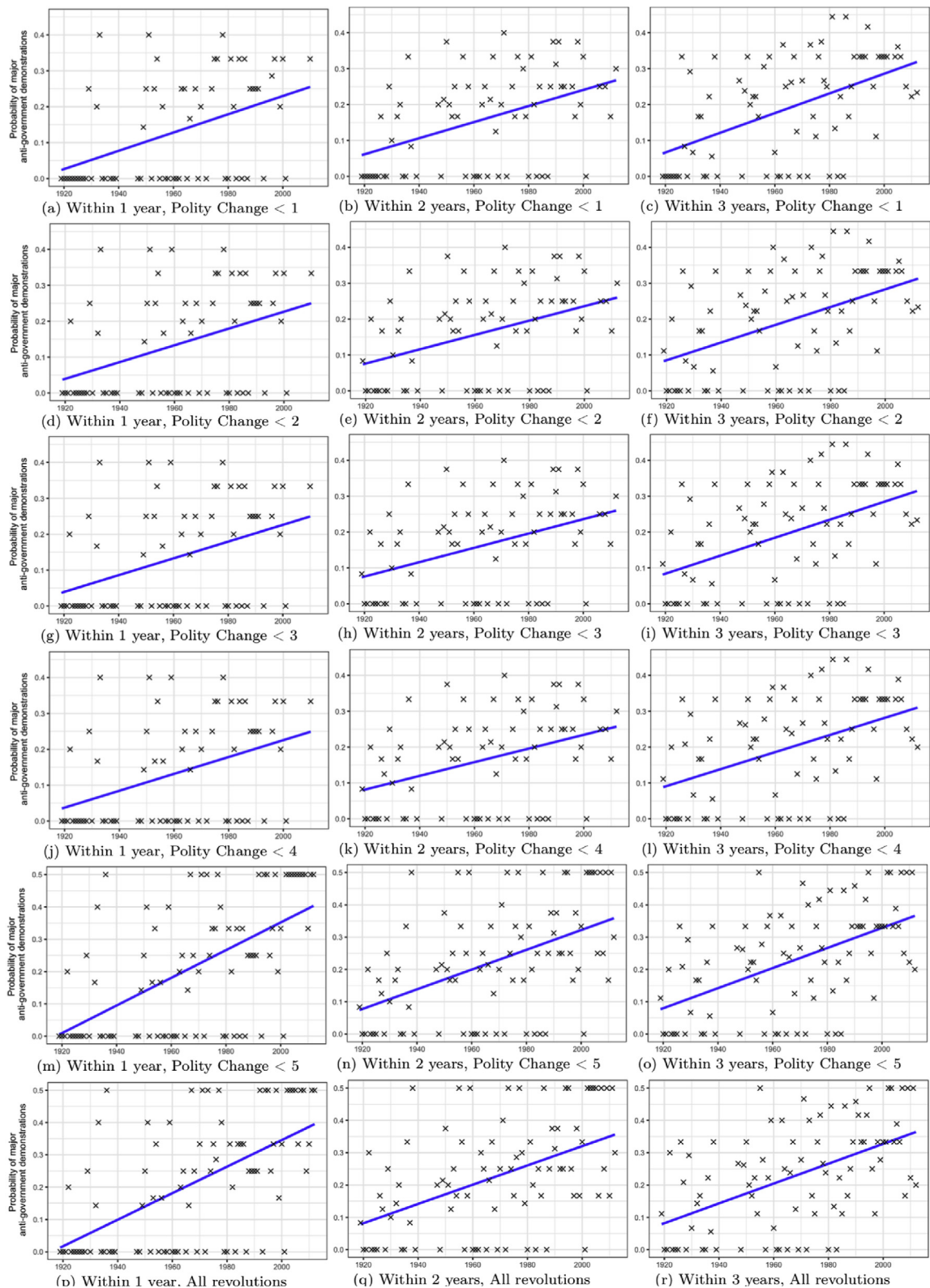


Fig. A2 Historical trends for different subsamples.

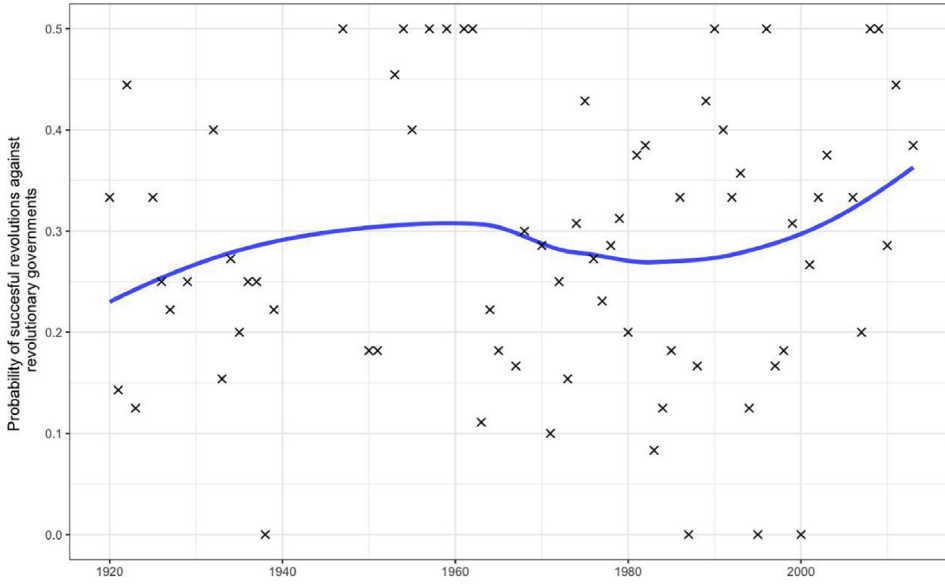


Fig. A3 Historical trend of successful riots against revolutionary government.

Appendix B

Appendix B provides formal details of the dynamics of the model. First, we prove formally the results concerning 2-periods model (Proposition 3). We begin with several helpful observations.

Lemma 1. Let $x^D \in [0, 1 - c]$ and $x^P = \frac{1}{3}(x^D + 2 + c)$. Then

- 1) if $x^D < \frac{1-c}{4}$, then $x^P < \frac{3+c}{4}$;
- 2) if $x^D = \frac{1-c}{4}$, then $x^P = \frac{3+c}{4}$;
- 3) if $x^D > \frac{1-c}{4}$, then $x^P > \frac{3+c}{4}$.

Proof. Compare $x^P = \frac{1}{3}(x^D + 2 + c)$ and $\frac{3+c}{4}$. It is easy to see that

$$x^P \vee \frac{3+c}{4} \Leftrightarrow x^D \vee \frac{1-c}{4},$$

where $\vee \in \{>, <, =\}$. □

Lemma 2. Let $x^D \in [0, 1 - c]$ and $x^P = \frac{1}{3}(x^D + 2 + c)$. Then $1 > x^P > c$.

Proof. Check the inequality $1 > x^P$:

$$\frac{1}{3}(x^D + 2 + c) < 1 \Leftrightarrow x^D + 2 + c < 3 \Leftrightarrow x^D < 1 - c.$$

The latter is true by assumptions. The second inequality follows from the inequality $c < 1$, and the following equivalent transformations:

$$\frac{1}{3}(x^D + 2 + c) > c \Leftrightarrow x^D + 2 + c > 3c \Leftrightarrow x^D > 2c - 2.$$
□

Denote by $R(x)$ the distance of the point x from the median citizen, so that $R(x) = |x - \frac{1}{2}|$. The next proposition follows from Lemma 1.

Lemma 3. Let $x^D \in [0, 1 - c]$ and $x^P = \frac{1}{3}(x^D + 2 + c)$. Then

- 1) if $x^D < \frac{1-c}{4}$, then $R(x^D) > R(x^P)$;
- 2) if $x^D = \frac{1-c}{4}$, then $R(x^D) = R(x^P)$;
- 3) if $x^D > \frac{1-c}{4}$, then $R(x^D) < R(x^P)$.

The same logic can be applied to the protest from the left side.

Lemma 4. Let $x^D \in (c, 1]$ and $x^P = \frac{1}{3}(x^D - c)$. Then $0 < x^P < 1 - c$.

Let $x^D \in (c, 1]$ and $x^P = \frac{1}{3}(x^D - c)$. Then

- 1) if $x^D < \frac{3+c}{4}$, then $R(x^D) < R(x^P)$;
- 2) if $x^D = \frac{3+c}{4}$, then $R(x^D) = R(x^P)$;
- 3) if $x^D > \frac{3+c}{4}$, then $R(x^D) > R(x^P)$.

Using Lemmas 1–4, one can infer the extent of radicalism of the new incumbent compared to the previous one.

Back to 2-periods interaction, we are able now to describe the sequence of replacements.

Proof of Proposition 3. In the case of high cost of collective action $c > \frac{1-3\mu}{2}$, we have to compare the border of the stability zone and the points $\frac{1-c}{4}$, $\frac{3+c}{4}$. It is easy to check that

$$1 - c - \frac{3}{2}\mu > \frac{1-c}{4} \Leftrightarrow c < 1 - 2\mu.$$

Thus, we have two different cases.

Case 1: $c > 1 - 2\mu$. Here we have $1 - c - \frac{3}{2}\mu < \frac{1-c}{4}$. If $x^D \in (1 - c - \frac{3}{2}\mu, \frac{3\mu}{2} + c)$, there are no successful protests against the incumbent. If $x^D \in [0, 1 - c - \frac{3}{2}\mu]$ or $x^D \in [\frac{3\mu}{2} + c, 1]$, the new incumbent will be located in the zone of incumbent stability due to Proposition 5. Hence, 2 scenarios are possible: There would be no protests at all, or the single protest would occur in the period one.

Case 2: $1 - 2\mu > c > \frac{1-3\mu}{2}$. In this case $1 - c - \frac{3}{2}\mu > \frac{1-c}{4}$. If $x^D \in (1 - c - \frac{3}{2}\mu, \frac{3\mu}{2} + c)$, then again there are no successful protests against the incumbent. Let us find the point x , such that $\frac{1}{3}(x + c + 2) = c + \frac{3\mu}{2}$ (i.e., x is such incumbent, that his or her successor is on the border of the stability zone). It is easy to derive from the latter equality that $x = \frac{4c+9\mu-4}{2}$. Consequently, if $x^D \in [0, \frac{4c+9\mu-4}{2})$, or $x^D \in (\frac{6-4c-9\mu}{2}, 1]$, a single protest occurs in period 1. If $x^D \in [\frac{4c+9\mu-4}{2}, 1 - c - \frac{3}{2}\mu]$ or $x^D \in [c + \frac{3}{2}\mu, \frac{6-4c-9\mu}{2}]$, the incumbent is overthrown in the first period, but the new protest occurs against the new incumbent, and he or she is also overthrown in the second period. Finally, if the costs of collective action are low ($c < \frac{1-3\mu}{2}$), then there are no stability zones, and there will always be two periods of successful protests. $\square$

Next, we prove formally the limiting properties of the model for the case of intermediate costs of collective action: $1 - 2\mu > c > \frac{1-3\mu}{2}$ (see Proposition 4).

Lemma 5. Suppose that the costs of collective action are intermediate: $1 - 2\mu > c > \frac{1-3\mu}{2}$. Suppose that $\{x_n\}$ does not stabilize after first two periods. Then, when n tends to infinity,

- 1) if $x^D \in [0, 1 - c - \frac{3}{2}\mu)$, then $y_n \rightarrow \frac{1-c}{4}$ and $z_n \rightarrow \frac{3+c}{4}$;
- 2) if $x^D \in (\frac{3}{2}\mu + c, 1]$, then $y_n \rightarrow \frac{3+c}{4}$ and $z_n \rightarrow \frac{1-c}{4}$.

Proof. First, suppose that $x^D \in [0, 1 - c - \frac{3}{2}\mu)$. Compute the formula for y_n and z_n . Taking into account expressions for the expected new incumbent's position, we get that if $n \geq 2$, then

$$y_n = \frac{1}{3}(z_{n-1} - c) = \frac{1}{3}\left(\frac{1}{3}(y_{n-1} + 2 + c) - c\right) = \frac{1}{9}y_{n-1} - \frac{2}{9}c + \frac{2}{9}.$$

Consequently,

$$y_n \rightarrow \frac{1-c}{4}.$$

Due to Lemmas 3 and 4, for each $n \geq 1$ the inequalities $R(y_n) > R(z_n) > R(y_{n+1})$ hold. Since $y_n \rightarrow \frac{1-c}{4}$, then $z_n \rightarrow 1 - \frac{1-c}{4} = \frac{3+c}{4}$. The second statement is proved similarly. $\square$

Appendix C

Appendix C contains an extension of the model for the case when the incumbents' positions are endogenous. Given that protests are motivated by policy positions, if the incumbent has a chance to choose policy, he or she might be willing to do so to discourage protesters by catering to their policy preferences. Therefore, we analyze the incumbent's positioning in a strategic environment.

Suppose that in period t the incumbent, whose ideal policy is y_t^D , makes a decision, strategically choosing point x_t^D on the policy space. Denote by $u_t(x_t^D | y_t^D)$ the period t payoff of the incumbent with ideal point y_t^D and policy choice x_t^D . In addition to the utility

V that incumbent derives from staying in power, he or she gets disutility $-|x_t^D - y_t^D|$ from deviating from his or her ideal policy position. Thus, we assume that:

$$u_t(x^D | y^D) = -|y_t^D - x_t^D| + V.$$

Also, let $\chi_t(y^D)$ be the indicator of the event ‘incumbent with ideal point y^D is in power in period t ’ ($\chi_t(y^D) = 1$ if the event is realized and 0 otherwise). Then the lifetime utility $U(x^D | y^D)$ of the incumbent y^D is the sum

$$\sum_t \chi_t(y^D) u_t(x^D | y^D) \beta^{t-1},$$

where $\beta \in [0, 1)$ is a discount factor. Period t payoffs of the players who are not at office, are 0. Finally, we assume that an incumbent, once overthrown, will not come to power again and gets a payoff of 0 in all subsequent periods. We solve this model for a SPNE.

Proposition 5.

1. Suppose that the individual costs of protest are relatively high: $c > \frac{1-3\mu}{2}$. Then a unique subgame perfect Nash equilibrium exists. In this equilibrium,
 - (i) an incumbent with “centrist” personal preferences $y^D \in \left(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c\right)$ chooses $x^D = y^D$ in each period, remains in power infinitely long and gets life-time utility of $\frac{1}{1-\beta} V$.
 - (ii) an incumbent with “leftist” personal preferences $y^D \in \left[0, 1 - c - \frac{3}{2}\mu\right]$
 - a) plays $x^D = y^D$, is overthrown immediately, and gets utility V if $V < \frac{1}{\beta} \left(1 - c - \frac{3}{2}\mu - y^D\right)$;
 - b) plays $x^D = 1 - c - \frac{3}{2}\mu$ in each period, remains in power indefinitely, and gets utility $\frac{1}{1-\beta} \left(V - (1 - c - \frac{3}{2}\mu - y^D)\right)$ if $V > \frac{1}{\beta} \left(1 - c - \frac{3}{2}\mu - y^D\right)$.
 - (iii) an incumbent with “rightist” personal preferences $y^D \in \left[\frac{3}{2}\mu + c, 1\right]$
 - a) plays $x^D = y^D$, is overthrown immediately and gets utility V if $V < \frac{1}{\beta} \left(y^D - c - \frac{3}{2}\mu\right)$;
 - b) plays $x^D = \frac{3}{2}\mu + c$ in each period, remains in power infinitely long and gets utility $\frac{1}{1-\beta} \left(V - (y^D - c - \frac{3}{2}\mu)\right)$ if $V > \frac{1}{\beta} \left(y^D - c - \frac{3}{2}\mu\right)$.
2. Suppose that the costs of protest are relatively low: $c < \frac{1-3\mu}{2}$. Then, given any rule that chooses the next incumbent in the multiple successful protests zone, there exists a unique subgame perfect Nash equilibrium. In this equilibrium, the incumbent plays $x^D = y^D$, gets utility V , and is overthrown immediately.

Proof. Fix an arbitrary strategy profile. All actions available to incumbent in an arbitrary vertex of the game tree may be split into two types:

- 1) actions that do allow the incumbent to stay in power for the next period;
- 2) actions that do not allow the incumbent to stay in power for the next period.

First, we will show that the same incumbent plays either the same action of type 1 or the same action of type 2 at all his or her vertices. If the incumbent’s ideal point allows him to stay in power, the incumbent obviously plays his or her ideal point. Now assume that the incumbent’s ideal point is the action of type 2. Then, this action is strictly better than any other action of type 2. Thus, any leaving incumbent plays his or her ideal point. Finally, suppose that the incumbent plays two different actions of type 1 at his or her two different vertices. Since the incumbent’s ideal point is the action of type 2, all actions of type 1 lie on the same side of the ideal point on the policy space. Therefore, there is always a strictly better action out of any two actions of type 1. This means that the incumbent could profitably deviate in one of the above mentioned vertices. It follows that the set of initial parameters determines the number of period t ($t = \infty$ is also possible), such that in periods $1, 2, \dots, t - 1$ incumbents choose their ideal points and are replaced by each other as assumed by dynamics of the basic model, and then the sequence stabilizes — the same incumbent chooses the same policy in the stability zone in each period starting from period t . Option $t = \infty$ is characterized by the absence of the stabilization point and corresponds to the dynamics in the basic model from the previous sections. How large should the reelection bonus V be in order to make the reelection more profitable for the incumbent than implementing the ideal policy? Centrist incumbent $y^D \in \left(1 - c - \frac{3}{2}\mu, \frac{3}{2}\mu + c\right)$ is able to secure his or her first-best outcome since choosing their ideal point guarantees reelection. Thus, point 1(i) is explained. Extremist incumbents have two options: either they play $x^D = y^D$, are overthrown immediately and get utility V , or they play the nearest border of the stability zone in each period. If $y^D \in \left[0, 1 - c - \frac{3}{2}\mu\right]$, the incumbent compares V and $\frac{V - (1 - c - \frac{3}{2}\mu - y^D)}{1 - \beta}$; if $y^D \in \left[\frac{3}{2}\mu + c, 1\right]$, the incumbent chooses between V and $\frac{V - (y^D - c - \frac{3}{2}\mu)}{1 - \beta}$. This implies statements of points 1(ii) and 1(iii). The statement of Part 2 follows from the fact that there are no stability zones if $c < \frac{1-3\mu}{2}$. $\square$

Proposition 5 provides a strategic foundation for our preceding analysis. Even when personal policy preferences of the leader are extreme, he or she still has a chance to keep power by moving policy away from his or her ideal point. He or she is willing to do so if the utility of being in power and maintaining policy within the stability zone for life exceeds the one-period utility of setting policy at his or her own ideal point. The ability to survive by “pandering” depends on the military capacity relative to the organizational capacity of the opposition (higher $\mu = \frac{m}{\delta}$ makes survival easier and the loss of utility smaller) and personal cost of protest (with higher c , the move away from the incumbent’s ideal point is smaller in equilibrium).

Proposition 5 allows for further intuitive comparative statics. When the military capacity of the incumbent is high, he or she needs to sacrifice less in moving away from his or her ideal point. In other words, military strength and the absence of well-organized opposition makes it possible for a long rule with a relatively extreme policy choice. A militarily weak dictator has to pander more to maintain his or her rule; with the same personal preferences, his or her life-time utility is lower than that of a strong dictator (high m) or one that face a disorganized opposition (low δ). Vice versa, a leader with relatively moderate personal preferences (y^D) might be able to survive for many periods, even if his or her military capacity is relatively weak and the opposition is relatively well organized.

Combining the results of **propositions 3, 4 and 5**, one may derive the dynamics of the incumbents’ appearance. Taking into account the monotonicity of odd and even subsequences of incumbents’ ideal points in **Proposition 4** point (iii), we conclude that stabilization in a strategic environment may arise only after the first or the second period. If the sequence of incumbents does not stabilize after two periods (i.e., in the third period, there is a third different incumbent), it will never be stable. Stabilization after the first period is achieved in two cases: either the initial incumbent has the ideal point in the stability zone, or the utility bonus V of retaining power is large enough to shift the policy to the stability zone. Stabilization after the second period happens if V is low and the initial incumbent is extreme, so that the second incumbent either has the ideal point in the stability zone, or V is large enough to make him to shift the policy to the stability zone.

Appendix D

Appendix D provides additional information on the political preferences of the protesters during Ukraine’s 2004 “Orange Revolution”. **Fig. D1** depicts the distributions of their preferences on two scales: traditional left-right spectrum and support for democracy.

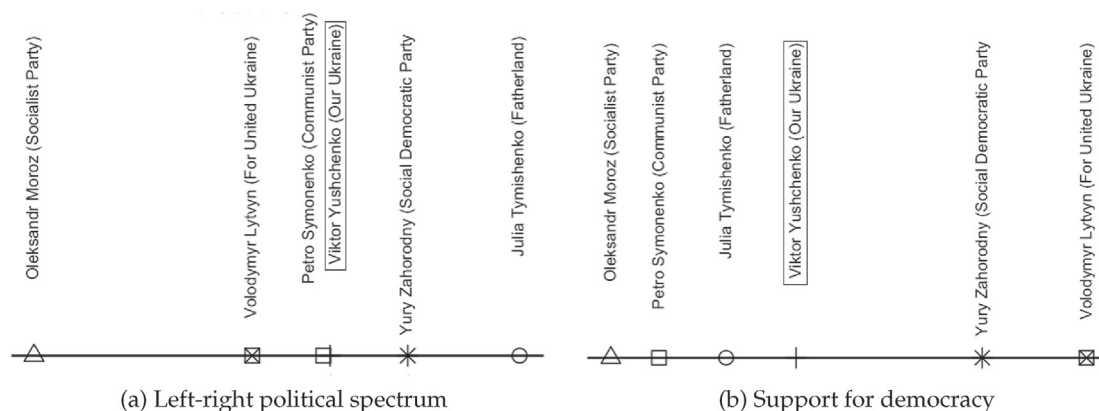


Fig. D1 Distributions of preferences across protesters in Ukraine based on the declared policy positions in 2002 parliament elections. *Source:* Werner et al. (2018).

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