

# Leader Survival, Revolutions and the Nature of Government Finance<sup>1</sup>

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Leaders face multiple threats to their political survival. In addition to surviving the threats to tenure from within the existing political systems, which is modeled using Bueno de Mesquita et al's (2003) selectorate theory, leaders risk being deposed through revolutions and coups. To ameliorate the threat of revolution, leaders can either increase public goods provisions to buy off potential revolutionaries or contract the provision of those public goods, such as freedom of assembly, transparency and free press, which enable revolutionaries to coordinate. Which response a leader chooses depends upon existing institutions and the structure of government finances. These factors also affect the likelihood and direction of institutional change. Tests of leader survival indicate that revolutionary threats increase the likelihood of deposition for non-democratic leaders. Leaders with access to resources such as foreign aid, or natural resource rents are best equipped to survive these threats and avoid the occurrence of these threats in the first place.

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## Introduction

Survival is the primary objective of political leaders. This study examines how political institutions and the structure of government finances allow leaders to contend with risks to their hold on power. Leaders can be removed by forces within the extant political system.

Alternatively they can be removed by mass political movements, such as revolutions, which seek to sweep away the existing system and replace it with a more inclusive one. Leaders choose policies, and possibly institutional changes, to mitigate these risks. We demonstrate that incumbents are most likely to survive when they are beholden to only a small coalition of supporters and when they have access to resources – such as oil and aid – that do not require significant economic participation by the citizens.

Consistent with a growing theme in the literature, we consider individual leaders as the unit of analysis (see for instance Bueno de Mesquita and Siverson 1995, Goemans 2000, McGillivray and Smith 2008). Leaders want to retain political power and choose policies that shape the provision of private goods and public goods as the basis for doing so. We extend Bueno de Mesquita et al's (2003) analysis of selectorate politics to include revolutionary threats. In addition to maintaining the loyalty of members of their coalition, as in the original selectorate theory, leaders here also need to dissuade the citizenry from joining mass political movements and rebelling. Leaders can dissipate revolutionary threats via two mechanisms. They can increase the provision of public goods, thereby improving the welfare of the citizens and diminishing their desire for revolutionary change. Alternatively, leaders can suppress the provision of public goods, particularly such goods as a free press, transparency and easy communication that help people coordinate and organize. Suppressing these goods reduces the probably of revolutionary

success. We refer to these latter forms of public goods as coordination goods (Bueno de Mesquita and Downs 2006).

Which response leaders adopt to the threat of revolution depends, in part, on the structure of government finance. While the suppression of coordination goods reduces the ability of people to organize politically, it also reduces their ability to coordinate economically, resulting in reduced productivity and diminished economic activity. Leaders who rely on taxing productive economic activity to generate the resources needed to reward their coalition find suppressing public goods to be unattractive. However, leaders with access to abundant, essentially labor-free resources (hereafter free resources) such as natural resource rents or foreign aid can suppress coordination goods with little if any damage to their revenue. Thus, like Besley and Persson (2009), the theory relates the nature of government revenue to policy choice and the trajectory of development. In doing so it provides a political explanation for the so called resource curse, the observation that resource rich non-democratic nations under-perform their impoverished counterparts (Ross 1999; Sachs and Warner 2001).

By incorporating revolutionary threats into the selectorate theory we assess how institutions, free resources and revolutionary threats interact to shape the policies leaders pursue, the prospects for institutional change and whether leaders succeed in their survival objectives. The theory explored here is formally developed in Bueno de Mesquita and Smith (2009) and Smith (2008). The focus of the current paper is an empirical assessment of two aspects of the theory. First we assess how institutions, free resources, and mass political movements impact the survival of leaders. Second we explore how survival-driven policy choices influence the likelihood of institutional change and the level of mass political movements, factors that affect future survival prospects. If, as we believe, a leader's primary concern is survival, then the

theory offers important policy advice with respect to promoting democratization and economic development.

### **A Theory of Selectorate Politics and Revolutionary Change**

The selectorate model, which we use as the basis of domestic political competition, characterizes political institutions according to the number of supporters a leader needs in order to maintain power, the winning coalition ( $W$ ), and the size of the pool from which these supporters are drawn, the selectorate ( $S$ ). Democratic systems tend to have large selectorates and large coalitions. For instance, in a directly elected presidential system  $S$  is effectively all adults. Support from half of the selectorate in such a system ensures political survival ( $W=S/2$ ). In contrast, in a Westminster type parliamentary system, the leader needs to secure the support of half the people in half the districts (i.e.  $W=S/4$ ). Military Juntas or monarchies typically have much smaller selectorates and winning coalitions composed of military elites or aristocrats. Likewise autocratic systems have small winning coalition, although this can vary markedly, as can selectorate size. In addition to allowing comparison across categorical classification of regimes, this framework encapsulates the considerable variance in institutional arrangements within categories.

To survive in office leaders need to maintain the support of members of their winning coalition. To obtain and retain this support they provide both private and public goods. Public goods, such as national defense and environmental protection, benefit all members of society. In contrast, leaders limit access to private goods to their coalition members. Although all public policies have both public and private components, an implication of selectorate theory is that the relative focus of public policy varies with coalition size. As coalition size increases, it becomes

increasingly expensive and difficult for leaders to reward their coalition through private rewards since more people need to be rewarded. Therefore, leaders shift toward providing public goods. Hence in democratic systems, while some, such as defense contractors, benefit privately from the provision of security, the focus of defense spending is to protect the nation from a foreign threat. In contrast, in small winning coalition system the policy focus is skewed towards private goods-bloated procurement contracts for cronies and luxuries for officers are more important than an effective fighting force.

Scholars, such as Baum and Lake (2001), have assessed differences in the provision of public goods between democracies and non-democracies. Others, such as Persson, Roland and Tabellini (2000, see also Persson and Tabellini 2001), assess differences between democratic institutions. For instance, they compare parliamentary and presidential systems. As Geddes (1999; 2003, ch 2) recognizes, non-democratic regimes vary greatly. Her work examines differences between different categorical classifications of authoritarian regimes. One of the advantages of selectorate theory is that its inherently continuous conceptualization of institutions allows comparisons across all regimes, rather than between categorizations.

In addition to determining the mix of goods leaders use, institutions determine how much policy leaders produce. While in the short term political rivals might offer to spend all available resources in order to optimally reward potential supporters, compared to long term incumbents, challengers are disadvantaged by their inability to promise private goods in the future. Suppose a challenger succeeds in convincing some members of the incumbent's coalition to defect and support him. The incumbent is defeated and the challenger becomes the new leader. Although these defectors were essential in order for the challenger to come to power, once in power the new leader might revise his coalition and replace these defectors with other selectors whom he

prefers. Bueno de Mesquita et al (2003) formally model this by assuming each leader has idiosyncratic preferences over the members of the selectorate, preferences they call affinities. Once in office, leaders replace their initial supporters with higher affinity selectors. Such reorganizations of a leader's coalition are common. The incumbent has already had the opportunity to reorganize her coalition. Therefore members of her coalition can be fairly certain that they are among the highest affinity types and can expect to receive private goods from the incumbent for as long as she remains in power. Unfortunately for the challenger, the prospect that he might subsequently reorganize his coalition makes it harder for him to attract support since he cannot credibly promise long term access to private goods. This creates a loyalty norm favoring the incumbent.

The strength of the loyalty norm depends upon institutions and the length of time in office. In large coalition systems leaders rely predominately upon public goods to reward supporters. Since all people receive the benefits of these goods whether they are in the coalition or not, selectors jeopardize relatively little if they defect to a political challenger since few of the rewards are private in nature and so there are comparatively few rewards from which they might be excluded in the future. Additionally, since a new leader has to form a relatively large coalition, the prospect of inclusion in the challenger's long term (i.e. post-transition) coalition is high.

In small coalition systems the loyalty norm is much stronger, particularly when the selectorate is large. In small coalition systems leader rely predominately on private goods to reward their relatively small number of supporters. As a consequence, the welfare of those in the coalition is much higher than that of those outside the coalition. This means that while a challenger might offer a potential defector much more today, members of the current coalition

are reluctant to defect because they might be excluded from access to private rewards in the future. This risk of exclusion is particularly severe when the selectorate is large. Hence leaders survive longer in authoritarian systems when they can draw supporters from large portions of the population, as evidenced by Gandhi and Przeworski (2007) and Geddes (1999).

When coalition size is small and selectorate size is large the loyalty norm is particularly strong. This allows leaders to skim off resources for their own discretionary purposes and provides a cushion in case of a shock. As Bueno de Mesquita et al (2003) show and we shall see again, once such leaders are established in office their risk of removal is much lower than that of large coalition leaders. However, when first coming to office small coalition leaders are more susceptible to removal. The incumbent's advantage derives from her ability to commit to provide her supporters with private goods in the future. Newly installed leaders cannot make such a strong commitment since everyone understands that after coming to power they might want to reorganize their coalition. Newly installed leaders are particularly vulnerable to removal because as soon as one of their supporters suspects they might be replaced, they defect. Once the processes of coalition reorganization and the revelation of the leader's affinities are over, small coalition leaders are very secure in office. However, until this learning process is resolved, such leaders are vulnerable. This suggests hazard rates for leaders decline overtime, with the diminution of risk being greatest in small coalition systems, those in which private goods provision is most salient. When we turn to an empirical assessment of leader survival we cannot use the standard Cox proportionate hazard model because it assumes that changes over time in the underlying hazard that leaders face are the same across all institutions (Box-Steffensmeier and Zorn 2001). Instead we use a parametric Weibull model and model how the hazard rate changes over time as a function of electorate institutions.

Institutions shape both the type and amount of public policy that leaders provide. This induces institutional preferences for the residents of a nation. Leaders prefer small  $W$ , large  $S$  systems since such systems given them the maximum amount of discretion and make political survival easiest. Coalition members have more complex preferences which are driven by two competing effects. As coalition size expands the private goods each coalition member receives are diluted which diminishes coalition welfare. However, this effect is offset by the reduction in leader discretion. As  $W$  expands the increase in coalition size and increased focus on public goods eventually reduces the cost and risk of exclusion from future coalitions. Expanding  $W$  forces the incumbent to work harder on behalf of her supporters and reduces the amount of discretionary resources she can skim off. The former dilution effect is strongest when the provision of private goods is highest. Hence, initially coalition members oppose the expansion of the coalition. However, once the expansion is sufficiently large, the coalition's welfare is increasing in coalition size. Coalition members want to reduce the selectorate size as this diminishes their loyalty, thereby inducing the leader to work harder, spending more to keep the coalition members happy.

Citizens outside the winning coalition benefit only from public goods. As such they want to increase coalition size. It is therefore unsurprising that leaders of mass political movements, such as revolutions, advocate the creation of a more inclusive political system. Of course in reality even when revolutions succeed in deposing the government, they often fail to produce democracy. But sometimes they do. It is this prospect of increasing coalition size which leads people to support revolutionary movements.

### **Mass Political Movements and Revolution**

We extend the selectorate model to explore the actions leaders can take to ameliorate the risk of revolutionary deposition. To do so we examine the broader role of certain public goods within society. In addition to being direct rewards, public goods influence economic productivity and the ability of citizens to organize. People can more productively deploy their labor in the presence of public goods than in their absence. For instance, educated people with access to transport and knowledge of the market are more productive than ignorant and isolated people. By increasing the provision of public goods which facilitate coordination the government induces people to work harder and be more productive. In turn this increases economic activity and revenues for the government. Certain public goods, such as the freedom of information and assembly, which we call coordination goods, determine the ability of citizens to coordinate and organize. The provision of these coordination goods influences the likelihood that a mass political movement succeeds. A person might well be keen to join an anti-government demonstration in a neighboring town. However, if she does not know about the event and has no means of getting there, then her willingness to rebel comes to naught. Revolutions require a critical mass and widespread support in order to gain momentum (Granovetter 1978; Kuran 1989; Lohmann 1994; Oliver et al. 1985; Tilly 1978). It is hard to get the movement started without the ability to organize and coordinate. The provision of coordination goods affects the threat which leaders face from mass political movements.

When deciding whether to support mass movements, citizens consider the benefits of revolutionary success – that is, what are the likely benefits they would receive if the movement succeeded relative to what they receive now—and the likelihood of success. Leaders have two potential ways to deal with revolutionary threats. First leaders can increase the provision of public goods. This improves the welfare of the citizens and diminishes their desire for

revolutionary change. Second, leaders can contract the provision of coordination goods. This deters rebellion by reducing the probability of success. Which strategy leaders pursue to diminish a revolutionary threat depends upon existing political institutions and the structure of government finances.

Leaders face two constraints. They need to prevent revolutions and they need to maintain the support of members in their winning coalition. Above we discussed how coalition size determines the optimal provision of goods to ensure coalition loyalty. Revolutionary threats cause leaders to modify these provisions. Whether leaders expand the provision of public goods to buy off revolutionaries or contract coordination goods provisions to prevent them from organizing depends upon existing institutions and the extent to which the government relies upon taxing productive economic activities for its finances or whether it has access to free resources, such as natural resource rents and foreign aid, that are largely independent of the economic efforts made by the citizens. While we refer to these resources as free because they are relatively insensitive to the economic input of the citizens, we shall see that the term is ironic.

Whether a leader expands public goods or contracts coordination goods depends upon which maximizes her survival prospects now and in the future. In general, expansion is a leader's best option when she already has a reasonably large coalition and when she relies on taxing productive economic activity for revenues. Public goods expansion can also be an attractive response for small coalition leaders who lack access to revenue from free resources, whether from natural resources or from foreign aid. In contrast, leaders of smaller coalition systems with access to free resources typically enhance their survival prospects most by contracting coordination goods.

Providing more public goods increases economic productivity which improves government revenues. However, the shift toward more public goods weakens the loyalty norm, compelling leaders to work harder to retain their coalition's support. In general this response to revolutionary threats grows more attractive when coalition size is already reasonably large, when the government relies on taxing the citizens' economic activities to generate revenues and grows especially large when coalition size is large and free resources are scarce.

While expanding public goods in the short term ameliorates the risk of revolutionary deposition, it creates circumstances which in the long run make survival harder. First, to the extent that some public goods are coordination goods, an expansionary response improves the ability of future revolutionaries to coordinate. Hence in the future the leader is likely to have to make yet further concessions. Buying off potential revolutionaries with public goods also creates inconsistencies within a small coalition leader's policy provisions.

To survive, a small coalition leader needs to buy the support of her coalition members, which is best done with private goods, and also needs to ameliorate the public's demands, which can only be done with public goods. Effectively the leader has two constituencies that want different things. Democratization resolves this inconsistency. By enlarging coalition size, leaders shift the policy demands of the coalition so that the relative shift towards public goods buys the support of both the masses and the coalition members. While absent a revolutionary threat, one societal group always opposes another's desired shift in institutions, Bueno de Mesquita and Smith (2009) show that following an expansionary response to a revolutionary threat, increasing coalition size can be in the interests of leaders, coalition members and political outsiders. The intuition behind this result is that enlarging the coalition (that is, democratizing) rationalizes the types of policies required to reward supporters and satiate potential revolutionaries. Without such

democratization these groups want different goods. Unfortunately for the leader, an expansion of coalition size makes subsequent survival harder.

A contractionary response to a revolutionary threat is generally the preferred response by leaders who have access to free resources and whose coalition is relatively small. The suppression of coordination goods reduces economic productivity. For this reason it tends to be viable primarily for leaders with revenue sources other than direct taxation. The suppression of coordination goods diminishes the revolutionaries' ability to organize. However, coalition members need to be compensated for the loss of these goods. This shifts the focus of policy toward private goods. This has several consequences. First leaders are more likely to prefer this response to a revolutionary threat when coalition size is small because this reduces the number of people who require additional private goods. Second, it increases loyalty (among surviving coalition members) toward the incumbent because it increases the cost of being excluded from the winning coalition. Third, it improves the willingness of the winning coalition to tolerate a contraction of coalition size (see Bueno de Mesquita and Smith 2009). Thus, a contraction in the provision of coordination goods is often followed by autocratization-- a contraction in coalition size. The latter factor improves leader survival in the future.

The theory contributes to debate relating economic development and political development. Political institutions affect economic growth (Barro 1997). However, as Persson and Tabellini (2006) show the devil is in the detail. For instance they show that the type of democratic institutions, economic development at the time of democratization and expectations about the stability of democracy all moderate the impact institutions have on growth. Scholars also debate the impact of economic development on regime change. Przeworski et al (2000) claim income has little impact of the likelihood of democratization, but that once nations become

democratic, income strongly reduces the likelihood of a version to autocracy. In contrast, Boix and Stokes (2003) find support for modernization theory: economic development promotes democratization. Acemoglu and Robinson (2005) contend that it is not the level of income that explains democratization, but rather its distribution. For them, regime change is moderated by income inequality. We argue that policies, institutional change and economic development are shaped by the nature of government revenues (Besley and Persson 2009).

The theory relates how institutions and mass political movements incentivize leaders to provide different policies in order to survive. The theory predicts the consequences of these policy options in diminishing revolutionary threats, the prospects for institutional change and ultimately the ability of leaders to survive. We now turn to an empirical assessment of leader survival.

### **Leader Survival, Institutional Change and Mass Political Movements**

We examine three empirical questions. First, we examine leader survival and show that institutions and the nature of government finance are key factors in determining whether leaders survive. Our analyses test how revolutionary threats – as distinct from revolutions per se – affect the survival of leaders and the extent to which institutions and free resources moderate the effects. We develop a measure of revolutionary threat based upon observations of mass political movements. We show that the direct effect of this threat measure on survival is conditioned by a leader's institutional context and her access to free resources.

Second, we consider institutional change. Free resources and institutions also have an indirect effect on leader survival. Consistent with the theoretical argument we find that mass political movements increase the likelihood of institutional change and that the direction of that institutional change depends upon initial institutions and the level of free resources. Finally,

since mass political events play such an important role in shaping leader survival and the dynamics of institutional change, we consider the factors that determine the level of political protests. The latter tests examine the ability of leaders to limit the build up of revolutionary threats and avoid situations likely to be perilous to their political health. As well as factors over which leaders have discretion, such as the provision of coordination goods, we consider exogenous shocks, in the form of earthquakes, which leaders could not anticipate. This is important to do because if leaders operated in a fully informed environment they would always prevent the emergence of foreseeable threats to their survival. In a less well informed environment some threats will be successfully mounted before the leader sees them coming but still many will be nipped in the bud. Of course, leaders cannot foresee exogenous shocks that could trigger rebellion and so cannot take cost-effective preventative steps beforehand. Earthquakes are just such shocks and so provide a natural experiment in leader responses once credible threats have emerged. Of course earthquakes are not the only shocks which leaders face. Rodrik (1998), for instance, looks at trade shock. Cohen and Werker (2008) assess the impact of natural disasters in terms of causalities. While these alternatives are certainly shocks, their magnitude is, at least in part, determined by policy.

## **Data**

To test how institutions, free resources and revolutionary threats affect leader survival we need data on each of these factors. We use Goemans, Gleditsch and Chiozza's (2008) Archigos data on leaders. These data describe the dates of entry and exit from office for the principal leader of each nation. The data also describe the manner of the leader's exit, leader age and whether the leader was subsequently punished after leaving office.

We measure institutions using Bueno de Mesquita et al's (2003) measures of winning coalition size (W) and selectorate size (S). These variables are constructed using indices of variables contained within the Polity IV data (Marshall and Jaggers 2008) and Arthur Banks' (2007) cross-national time series data. The index for coalition size relies on four variables. Two of these variables are concerned with executive recruitment. Bueno de Mesquita et al (2003) argue that as executive recruitment is opened to all and as the process becomes competitive then leaders are more likely to become beholden to more people – a large coalition. Hence the polity variables reflecting open executive recruitment and competitive executive recruitment are used as indicators of a large coalition system. They also utilize the polity variable for a competitive party system as an indicator for large coalition size. Finally they argue that military regimes tend to be supported by small groups. Hence, non-military regime is used as a component of the index which indicates a large coalition size.

Bueno de Mesquita et al (2003) specific coding of W and S is as follows. They add one point to the index for each of the following conditions: if the Banks' regime type variable is non-military, if XRCOMP is greater than or equal to 2 (meaning the chief executive is not chosen by heredity or in rigged, unopposed elections), if XROPEN is greater than 2 and if PARCOMP equal 5 (indicating the presence of a competitive party system). This variable is normalized between 0 and 1 by dividing by 4. Selectorate size is created using Banks' legislative selection variable, which is coded zero if no legislature exists, one if selection is non-elective, such as by heredity or ascription, and two if the legislature is elected. This variable is standardized between 0 and 1 by dividing by 2. The presence of a legislature, and the extent to which it can be drawn from the general public rather than a narrow segment of society, indicates whether the recruitment of political supporters is confined to a small group or is inclusive of a broad range of

the population. See Bueno de Mesquita et al (2003) for details and a discussion of the justifications for these coding decisions.

Measures of population size, income (per capita GDP), economic growth and the free resources oil and aid were obtained from the World Bank's (2007) World Development Indicators. Oil and Aid are two important free resources. The variable Oil measures net fuel exports and is constructed using the measures of fuel exports and imports as a percentage of merchandise exports and imports. We report net Oil exports as a percentage of GDP for exporters and report Oil as zero for net importers. The free resource variable Aid is defined as Official Development Assistance which we express in terms of percentage of GDP.<sup>2</sup> Free resources are those resources which the government can spend without the need for tax revenue. Morrison (2009) provides a direct assessment of these resources by taking the difference between total government spending and government tax revenues. We use his data and analyze Non-tax revenue as a percentage of GDP.

Tests of the theory require a measure of the revolutionary threat which leaders face. We develop a measure based upon the occurrence of mass political movements such as anti-government demonstrations, riots, general strikes and revolutions using data drawn from Banks (2007). Scholars have assessed various aspects of political instability. For instance, Longregan and Poole (1990) examine the risk of coup. Alesina and Perotti (1996) and Alesina et al (1996) assess the risk of government collapse from all sources, constitutional or not. Our approach necessitates a focus on mass political movements, rather than other forms of threat to tenure. We follow the measurement strategy advocated by Lenin (1912), who assessed the prospects of

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<sup>2</sup> In particular we use TX.VAL.FUEL.ZS.UN---Fuel exports (% of merchandise exports), TM.VAL.FUEL.ZS.UN---Fuel imports (% of merchandise imports), TX.VAL.MRCH.CD.WT---Merchandise exports (current US\$), TM.VAL.MRCH.CD.WT---Merchandise imports (current US\$), and DT.ODA.ALLD.CD---Official development assistance and official aid (current US\$).

revolution using data on strike participation. In particular, we construct an index on the level of mass political events based on the Banks (2007) data coding of anti-government demonstrations, riots, general strikes and revolutions. We create an index of mass political movements as follows. First for each of the measures ( $x$ =demonstrations, riots, strike, revolutions), we created a standardized version of the variable:  $z = (\ln(1+x) - \text{mean}(\ln(1+x))) / (\text{standard deviation}(\ln(1+x)))$ . Each of these standardized variables has mean zero and variance one. We then create an index, mass, by summing the four standardized variables and dividing by four.

The mass variable provides a measure of mass political events in each nation in each year. Unfortunately, we have concerns about reporting biases and societal norms. Banks' measures rely on media coverage. Differing levels of press penetration mean it is possible that events are more likely to be recorded in, for example, the US than in Ghana. Different societies also have different norms about protest. For instance, French farmers protest regularly while such events are less common in Britain. This suggests a differing baseline for each nation in terms of both occurrence and reporting. To ameliorate these potential problems, we examine changes in the index rather than use the index of mass political events directly.

Specifically we look at how the level of mass political events has changed over the previous three years:  $\Delta \text{mass} = \text{mass}_t - \text{mass}_{t-3}$ . The  $\Delta \text{mass}$  variable tells us whether a leader faces an increasing or decreasing level of mass political movements. The use of the three year lag is arbitrary. In their assessment of institutional change, Bueno de Mesquita and Smith (2009) examined a five year lag. We obtain similar substantive results whether we consider a 1, 3 or 5 year difference in mass or if we examine the impact of mass directly. We report results only for the three year difference.

As a measure of coordination good, we utilize Freedom House's (2008) measure of press freedoms. From 1989 through 2006, Freedom House reports press freedom on a three point scale (0= "not free", 1= "partially free", 2= "free"). For the years 1980 through 1988, Freedom House report separate scores for broadcast and print media. To create as long a time series as possible, we average the broadcast and print media and treat this average as comparable to the single, post-1988 score.

When examining leader survival we control for repression, which is a potential substitute for a change in the provision of public goods, using Cingranelli and Richards' (1999) index of physical integrity. This variable, which we call Repression, scales nations between zero and eight based upon the level of torture, extrajudicial killing, political imprisonment and disappearances, in which low numbers indicate no respect for human rights and a high score is associated with government respect for rights.

When assessing the determinants of mass political movements we include a measure of unforeseen events beyond a leader's control using data on earthquakes. We use Brancati's (2007) compilation of the Centennial Earthquake Catalog (Engdahl and Villasenor 2002) of earthquakes beyond 5.5 on the Richter scale. From 1975 to 2000 these data provide an ordinal scale for the magnitude of the earthquake activity in each nation in each year, from 0 for no major earthquake to 3 for the most devastating quakes. We use the magnitude of the quakes rather than their human impact since, to at least a certain extent, the latter depends upon the government willingness to prepare and respond to such eventualities and political systems shape this response (Cohen and Werker 2008).<sup>3</sup> Table 1 provides summary statistics for the main variables.

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<sup>3</sup> Interestingly, regime type moderates the effect of natural disasters on mass movements. The occurrence of disasters has little effect on mass movements in large coalition systems. Yet, such systems are sensitive to the number of casualties. In contrast in small coalition systems, natural disasters increase mass political events, but an increased number of deaths retards such events.

## Leader Survival

Selectorate theory predicts a decline in the hazard rate over time in office and that this decline in risk is greatest for small coalition leaders. The popular workhorse of survival analysis is the semi-parametric Cox proportionate hazard model. Although the results with respect to government finance and revolutionary threats hold if we use this method, the Cox model assumes an underlying hazard that differs only by a proportionate effect due to the independent variables. Such an assumption is inconsistent with the theoretic prediction that the hazard rate declines more sharply over time for small coalition systems. To account for this effect, we use a parametric Weibull model in which the hazard rate at time  $t$  is  $h(t) = \lambda t^{(p-1)}$ , where  $\lambda = \exp(X\beta)$ .  $X$  is the vector of independent variables and  $p$  is an ancillary shape parameter which describes how the hazard changes over time. A value of  $p$  less than one indicates a declining hazard over time. Given the prediction that the hazard rate decreases more sharply over time for small coalition systems, we model the ancillary parameter as a function of coalition size,  $W$ . We implement all analyses using the likelihood procedures in Stata 10. We treat leaders who die of natural causes while in office, those who retire due to illness and those still in office as censored observations.

The Weibull regression in table 2 assesses how institutions, growth in mass political movements and free resources affect political tenure. Model 1 provides a baseline that examines institutions, leader age, level of economic development and economic growth. The estimates of the ancillary parameter support the hypothesis that hazard rates decline over time and do so more sharply for small coalition systems. In particular, the estimated value of  $p$  for the smallest and largest coalition systems are  $p=.548$  and  $p=.991$ , such that while the hazard remains fairly constant for large coalition systems, the risk of removal declines rapidly for small coalition leaders. To get an idea of the substantive impact of these effects, consider the hazard rate after 1

month in office compared with the hazard rate after 5 years. For a large coalition leader the hazard rate drops by an insignificant 4% over this time. In contrast, for a small coalition leader the risk of deposition after 5 years is less than a sixth of what it was in the first month. This pattern is robust throughout all the analyses.

In addition to affecting how the hazard rate changes over time, political institutions also influence the hazard through the standard  $X\beta$  terms. In model 1 the positive coefficient estimate on the coalition size variable indicates that moving from the smallest to largest coalition size increases the risk of deposition. However the effect is statistically insignificant. Small coalition systems do not confer an immediate advantage on leaders; rather their incumbency advantage grows over time as anticipated by the theory. Selectorate size also influences survival. As predicted by the theory, when the leader can choose supporters from a larger pool this improves survival.

Age is an important determinant of leader survival in small coalition systems, but not in large coalition systems. The positive coefficient estimate of .041 on the age variable indicates that the risk of deposition increases by about 4% for each additional year of a small coalition leader's age. For a large coalition leader ( $W=1$ ) the effect of age is the sum of the coefficients on age and its interaction with  $W$ . This aggregate effect is indistinguishable from zero. Age matters in non-democratic systems but not in democratic ones. This is perhaps not surprising since an autocrat's tenure depends upon her ability to promise private goods in the future and ill health and decrepitude diminishes this capacity. The ability to promise future private goods is less important in public goods oriented large coalition systems. This pattern remains robust throughout all the analyses.

Model 1 also contains controls for the level of economic development, measured as the logarithm of per capita GDP, and economic growth. The model also includes the interactions of these variables with coalition size so that we can assess whether income and growth have differential effects on leader survival in small and large coalition systems. Of these four coefficients, only the coefficient on economic growth is significant, indicating that an increase in economic growth of 1% reduces the risk of deposition by about 4% for a small coalition leader. The joint hypothesis test that  $\text{Growth} + W * \text{Growth} = 0$  fails to reject the null hypothesis ( $\chi^2 = .88$ ,  $\text{Pr} = .35$ ). Economic growth has no discernable effect on the survival of leaders in the largest coalition systems.

The patterns revealed in this base case are repeated throughout the analyses. Age and economic growth affect survival in small coalition systems. However, in large coalition systems the effects are muted and indistinguishable from zero. Selectorate size increases the ease of survival. The effect of coalition size is seen over time. In small coalition systems the risk of deposition diminishes as tenure increases. The diminution of risk over time is less as coalition size increases. Having established these baselines we now examine the effects of free resources and mass political movements.

Model 2 examines the effect of a growing revolutionary threat and free resources by including variables for the change in the level of mass political movements over the previous 3 years ( $\Delta\text{mass}$ ), measures of Non-tax revenues (as a % of GDP) and the interaction of these variables with coalition size. Models 3 and 4 repeat this specification but rather than consider all Non-tax revenue, they consider specific free resources: Oil (as a % of GDP) in model 3 and Oil and Aid (as a % of GDP) in model 4. Model 5 returns to the impact of Non-tax revenues and adds controls for the level of repression.

An increase in the level of mass political events increases the risk of deposition for small coalition leaders, but not large coalition leaders. Across models 2 through 5, a one standard deviation increase in the level of mass movements over the previous three years increases the risk of deposition for a small coalition leader by about 20-30% (although the effect is not statistically significant in model 5). However, a rising level of mass political activities has no effect on the tenure of large coalition leaders: the sum of the coefficient estimates for  $\Delta_{\text{mass}}$  and its interaction with  $W$  is indistinguishable from zero. As the theory predicts, mass political events do not greatly increase the danger faced by large coalition leaders. The citizens in such nations generally enjoy the right of assembly and have little incentive to rebel since they already enjoy the large coalition institutions which they might hope to create via revolution. In contrast, autocrats are placed in jeopardy if their citizens engage in mass political events. Protests demonstrate the ability of opponents to coordinate and organize, enhancing the likelihood of revolutionary success. The citizens in small coalition systems have incentives to rebel and mass political movements indicate that they can. This revolutionary threat endangers a leader's survival.

The effect of mass political movements is robust to the operationalization of its measure. To assess the robustness of the results we have also tested the direct effect of the mass variable and its impact appears at least as strong as the effects reported in table 2. However because of cross-sectional differences and the reporting biases discussed above, we believe the temporal change measures are more reliable. We have also replicated the models in table 2 looking at one year and five year differences in mass political events. Those models produce similar substantive results.

How leaders respond to revolutionary threats depends in part on the structure of

government finances. Leaders who rely on taxing productive economic activity can not easily suppress coordination goods because this harms the economy and, therefore, the revenues they need to buy political support. Such leaders are likely to liberalize in response to revolutionary pressures. Enlargement of the coalition often accompanies such reforms. These developments make survival harder.

In contrast, leaders whose revenues are buoyed by such free resources as oil or foreign aid can more easily ameliorate revolutionary threats by suppressing coordination goods. This response enhances the salience of private goods as political rewards and promotes contraction of the winning coalition, both of which augment leader survival.

Models 2, 3, 4, 5 include free resources measured as either Non-tax revenues, or Oil and Aid. Each of these models reveals a similar pattern. There is a negative coefficient on the free resources variable, be it measured as Non-tax revenue, Oil or Aid.<sup>4</sup> This indicates that if small coalition leaders gain access to additional free resources then their risk of deposition is reduced. An increase in non-tax revenues worth 10% of GDP reduces a small coalition leader's deposition risk by around a half. Model 3 suggests increasing oil by about 10% of GDP reduces a small coalition leader's deposition risk by about 20%. Model 4 includes variables for the level of aid. The estimates on the free resource variables in this equation are insignificant. Model 5 includes controls for the level of repression within a society. These repression variables do not affect leader survival. Neither do they appear to disrupt the pattern of how mass political threats and free resources determine survival. Free resources also help individual small coalition leaders retain power. Scholars such as Ulfelder (2007), Smith (2004), Morrison(2009) and Ross (2001) report that oil bolsters regime survival. Our results indicate that these results also carry over to

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<sup>4</sup> It is noteworthy that these indicators measure distinct aspects of free resources. The correlation between Non-Tax Revenue and Oil is 0.12 and the correlation between Non-Tax Revenue and Aid is 0.16.

individual small coalition leaders. In contrast, in large coalition systems, free resources do not enhance leader survival: the sum of the estimates for the free resources variable and its interaction with W is indistinguishable from zero.<sup>5</sup>

In addition to the direct effect of free resources on leader survival, there are substantial indirect effects that help keep resource rich small coalition leaders in power. The presence of free resources enables small coalition leaders to avoid circumstances, like mass movements, that threaten their survival. In particular, free resources enable leaders to avoid increasing the provision of coordination goods and to resist demands for democratization. The former allows them to avoid mass political movements in the first place, and the latter helps leaders avoid institutional settings in which survival is harder.

### **The provision of coordination goods and democratization**

Whether a leader faces a revolutionary threat and whether she has access to free resources shapes the provision of coordination goods and the prospects for subsequent democratization. Bueno de Mesquita and Smith (2009) construct an index of coordination goods using variables which reflect civil liberties, communications, freedom of assembly and government transparency. Consistent with theoretical predictions made here, they find that leaders in small coalition systems with access to free resources suppress coordination goods in response to a growing revolutionary threat. This contraction in coordination goods does not occur for small coalition leaders lacking free resources. Absent a growth in the revolutionary threat, the impact of free resources on the provision of coordination goods is weaker and less significant. In large coalition systems changes in the level of mass political movements and access to free resources have little impact on the provision of coordination goods.

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<sup>5</sup> Including interactions between the threat and free resource variables (i.e. a specification similar to models 6 through 10) produces very similar results.

Others find similar results. For instance, Egorov et al (2007) examine Freedom House's press freedom scores. In a series of careful empirical tests, they show that increases in oil revenues, known oil reserves and oil prices reduce press freedom in non-democratic systems. Yet, oil has little effect on press freedoms in democracies. Given the establishment of these results, we do not reassess the provision of coordination goods. We focus instead on institutional changes and the occurrence of mass political movements.

Leaders with initially fairly small coalitions and with access to free resources are more likely to reduce the supply of coordination goods as a revolutionary threat grows, while leaders with fairly large coalitions and without access to free resources are more likely to increase the provision of coordination goods. These policies shape the incentives for future institutional change and the rise of mass political movements. Table 3 uses nation-years as the unit of analysis and assesses how revolutionary threats and free resources interact to affect institutional change over three years. Model 6 uses Non-tax revenues as a measure of free resources. Model 7 looks at free resources measured as Oil, and models 8 and 9 examine the effects of both Oil and Aid. Models 6, 7 and 8 control for temporal and regional differences using region-year fixed effects. In contrast model 9 considers country fixed effects.

The analyses in models 6 through 9 support the theoretical predictions that the impact of revolutionary threats and free resources on institutions are conditional. Consider model 7. The coefficient estimates on  $\Delta_{mass}$ , Oil and Oil\*  $\Delta_{mass}$  are .0211, -0.0014 and -.0033 respectively. Free resources have a pernicious effect on political development. As the level of oil or aid increases, future coalition size is likely to decline. Oil revenue worth 10% of GDP means coalition size is expected to decline by about .014, on the zero to one scale of coalition size, over a three year period. Free resources have a second pernicious effect in that they modify the effects

of revolutionary threats. The positive coefficient estimate on  $\Delta_{\text{mass}}$  indicates that, absent free resources, coalition size is likely to increase in response to a growth in mass political events; that is, smaller coalition systems are likely to evolve into larger coalition systems in response to a credible mass threat when they lack free resources, including not receiving significant foreign aid. However, the negative coefficient on the interaction variable,  $\Delta_{\text{mass}} * \text{Oil}$ , indicates that when a leader has access to free resources, increases in mass political movements are likely to result in contractions rather than expansions of the winning coalition. These results are consistent with earlier findings that oil wealth (Ross 2001, Ulfelder 2007, Smith 2004, Jensen and Wantchekon 2004) and aid (Knack 2004, Morrison 2007) enhances regime survival.

In large coalition systems, free resources and mass political movements have relatively little effect on future political institutions. For each of the models in table 3, the sum of the coefficients on the free resource variables and their interaction with  $W$  is indistinguishable from zero. This means free resources have relatively little effect on future coalition size in systems which already have fairly large coalitions. Similarly the sums  $\Delta_{\text{mass}} + W * \Delta_{\text{mass}}$  and  $\text{resources} * \Delta_{\text{mass}} + W * \text{free resources} * \Delta_{\text{mass}}$  are indistinguishable from zero. Indeed it is almost uncanny how the estimates of the interactions with  $W$  terms nearly perfectly cancel out the effects seen in small winning coalition systems.

The substantive impacts of the factors shown in table 3 can be seen in figure 1, which plots predicted coalition size three years into the future for initially fairly small ( $W=.25$ ) and fairly large ( $W=.75$ ) coalition sizes under conditions of a mildly declining revolutionary threat ( $\Delta_{\text{mass}}=-1$ ) and an increasing revolutionary threat ( $\Delta_{\text{mass}}=2$ ) against level of free resources. The estimates are obtained using the specification in model 8.

The figure provides a clear picture of the pernicious effects of free resources in retarding democratization. Absent any free resources, small coalition nations are likely to experience an increase in coalition size, and this tendency is enhanced if the nation experiences a growth in mass political movements. This is seen by comparing the two lower lines. On the left hand side of the figure, at zero free resources, small coalition systems are likely to increase their coalition size, with the bigger increase being anticipated in nations experiencing mass political threats. However, as access to free resources increases, the expected future coalition size declines. That is, both the lower lines in figure 1 slope downwards. Further, the dashed line, which represents a nation with a revolutionary threat, declines faster than a nation not facing a revolutionary threat. Free resources lead to autocratization, particularly when leaders face a rising level of mass political protest. Van de Walle (2001 p241-242) illustrates these effects in practice. He suggests that the withdrawal of support by international financial institutions at moments of crisis promoted democratization in Benin and Zambia. In contrast France's financial support of the governments in Cameroon and Cote d'Ivoire enabled these regimes to survive crises without reform. The analysis provides important policy advice for those interested in promoting democratization.

The pernicious effect of free resources is not apparent for large coalition systems. Indeed figure 1 suggests that the presence of free resources and mass political threats in a nation which already possess a fairly large coalition may accelerate the expansion of coalition size. This is shown by the positive slopes of the top upper lines in figure 1 and that the dash-dot line, which represents the mass political threat case, is above the dotted line (the no threat case).

The analyses of institutional change include controls for per capita income and its interaction with coalition size. There is contentious debate about the relationship between

income and democratization. Przeworski et al (2000) suggest that while wealth does not promote democracy, it helps ensure that it persists. Boix and Stokes (2003) argue that this result derives from a limited sample and that in a wider sample income drives democratization. In three of the four models there is a negative, although insignificant, coefficient on per capita income and a significant positive estimate for the interaction between W and wealth. This would appear to support Przeworski's view. However, model 7, with a significant positive coefficient on the wealth variable, supports the modernization view of democracy. Our sample suffers from many of the data coverage criticisms that Boix and Stokes level against Przeworski's analyses so it is hard to be conclusive. However, our analysis suggests that both sets of authors miss the main point and that income effects are very much secondary when compared to the origins of this income and political pressures. The inclusion of the income variables improves the model fit by less than 1% (comparison of R-squared). Political pressures in the form of mass political movements drive institutional change and free resources shape the direction of this change. In comparison to whether a nation earns its wealth via free resources or productive economic activity, the overall level of wealth is a secondary consideration.

Consistent with predictions, the nature of government finance and initial institutions shape the policy response and institutional change that mass political threats induce. In large coalition systems, mass political movements and free resources have relatively little effect. In contrast, in small coalition systems, free resources allow leaders to suppress coordination goods and resist democratization, thereby helping them survive in office.

### **Revolutionary threats and the growth of mass political movements**

Mass political movements jeopardize a small coalition leader's grasp on power. In this final empirical section we assess what determines whether or not leaders face mass political

movements. Models 10 through 13, in table 4, assess the growth of revolutionary threats using a fixed effects regression model. The dependent variable is the level of mass political movements (mass). The right hand side variables include the lagged level of mass movements ( $mass_{t-1}$ ), institutions and free resources. The dependent variable is lagged by a single year; a three year lag gives similar results. In addition to variables which measure free resources, income, size and economic growth, the model assesses the impact of the leader's chosen policies and shocks beyond the leader's control. In particular we assess how the provision of coordination goods promotes or retards mass political movements using Freedom House's measure of Free Press.

Natural disasters are beyond the control of leaders (although the consequences are not, Cohen and Werker 2008). Bommer (1985) provides illustration of how earthquakes and floods promoted protest in Nicaragua and how these contributed to the downfall of President Somoza. Natural disasters provide a focal point for coordinating opposition. On a more practical level, disasters can serve as demonstrations of the government's abilities. They also often lead to large numbers of people being displaced and gathered together into shelters or refugee camps, making them potentially easy to mobilize. Disasters also strain government resources. We use a single measure of disasters, Earthquakes. Although certain countries are more vulnerable than others, leaders can not anticipate particular quakes. We assess whether these shocks affect the level of mass political movements. These unanticipated events provide a useful natural experiment. As suggested earlier, endogenous factors that can lead to mass movements should be anticipated by survival-oriented leaders. They should be expected to take actions to nip such threats in the bud before they become credible challenges to their continued hold on power. As such, in the absence of uncertainty, equilibrium behavior by leaders should prevent the emergence of credible threats. But, of course, they cannot efficiently prevent the threatening consequences

from exogenous shocks like earthquakes. That is why, within the logic of a strategic perspective such as selectorate theory, that earthquakes or other natural disasters provide a useful natural experiment for challenges to leader survival.

Not surprisingly, models 10 through 13 indicate that the best predictor of mass political activity is the level of activity in the previous year, as indicated by the highly significant coefficient estimate for lagged mass. Once previous levels of mass protest are controlled for, neither institutions nor free resources appear significant, indicating that leaders have taken appropriate steps to mediate the growth of threats to their continuation in office. Economic growth reduces mass political movements, as evidenced by the negative coefficient on the growth variable, although the effect is only significant in models 11 and 13. Within large coalition systems economic growth has no effect on the level of mass political protest.

Earthquakes lead to an increase in mass political movements in small coalition systems, but not in large coalition systems. A serious earthquake increases the level of protest by about a fifth of a standard deviation in the smallest coalition systems. This is a risk beyond the control of political leaders. In contrast, leaders control the provision of coordination goods, such as freedom of the press. These factors have a similar magnitude of effect as an earthquake. In particular, in a small coalition system, the change from “not free” to “partially free” or from “partially free” to “free” leads to slightly greater growth in mass movements than the occurrence of a serious earthquake. Press freedom has no significant impact in large coalition systems.

Models 14 and 15 provide further support for these conclusions by assessing the likelihood that a nation experiences a high level of mass political movements: BigThreat, defined as  $mass > 2$  (around 3% of the data). Both the provision of coordination goods and unforeseen events such as earthquakes make mass protest likely in small coalition systems.

Mass political movements create opportunities for democratization. When confronted by a rising protest movement, leaders without access to free resources typically increase public goods provisions to satiate potential revolutionaries. This response encourages future reform. First, the shift to a public goods focus encourages leaders to enlarge coalition size. Second, to the extent that public goods are also coordination goods, buying off protestors today strengthens their ability to coordinate and protest in the future. Once leaders embark on the process of liberalization, their desire to survive the joint threats of selectorate politics and revolutionary threats is best achieved by more liberalization. Once the ball is rolling it is difficult to stop without access to free resources.

Free resources enable small coalition leaders to survive in office. Free resources also enable leaders to suppress coordination goods and resist calls for democratization. Retaining a small coalition system helps established incumbents survive, as does reducing revolutionary threats, which is achieved by suppressing coordination goods. Although some of the factors that lead to protest are beyond a leader's control, such as the occurrence of earthquakes, the ability of leaders to suppress coordination goods plays an important role in limiting mass political movements. The mechanism through which small coalition leaders use free resources to survive has insidious effects on political and economic development.

### **Conclusions**

Survival is the primary objective of political leaders. This study examines how political institutions and the structure of government finances allow leaders to contend with various deposition risks. Theoretically we extend the Bueno de Mesquita et al (2003) analysis of leader removal and consider endogenous institutional change. Citizens outside the winning coalition want to create more inclusive political institutions. Leaders must contend with threats both from

within the political system and from outside. Leaders can ameliorate revolutionary threats by either increasing the provision of public goods, such that citizens are satiated, or by suppressing their ability to organize. Access to free resources plays an important role in this decision. Without such revenues leaders find it hard to embark on the suppression response to mass political movements because the economic contraction it causes make it harder for leaders to continue buying their coalition's loyalty.

Rather than a modernization theory of development (Lipset 1959), these arguments suggest the important factor in democratization is not the wealth of a nation, but rather the source of this wealth. If leaders need to tax productive economic activities to generate revenues then the prospects for democratization are much stronger than if leaders gather resources without having to generate policies that encourage people to work.

The underlying assumption of the theory is that leaders seek to survive in office. The empirical analysis focuses on how a leader's ability to do so depends upon institutions, access to free resources and revolutionary threats. The evidence on leader survival supports the theoretical predictions. When combined with previous evidence (Bueno de Mesquita and Smith 2009) concerning policy provision and institutional change, there is a compelling case for the theory.

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Table 1: Summary Statistics for Main Variables

Variables	Mean, (Standard Deviation)	Source
Coalition Size, W	.58 (.30)	Bueno de Mesquita et al (2003)
Selectorate Size, S	.87 (.32)	
Age	54.7 (12.1)	Archigos
Non-Tax Revenue	8.68 (9.03)	Morrison (2009)
Oil (exports as %GDP)	2.69 (9.41)	World Bank, World Development Indicators
Aid (%GDP)	7.08 (11.67)	
Ln(GDPpc)	7.43 (1.55)	
Growth	3.79 (6.49)	
Ln(population)	15.31 (2.02)	
Earthquake	.21 (.56)	Brancati (2007)
Press	.95 (.85)	Freedom House

Table 2: Revolutionary Threats, Free Resources and Leader Survival

		Weibull Regression					
		Model 1	Model 2	Model 3	Model 4	Model 5	
Xβ	Winning Coalition size (W)	1.267 (1.071)	0.737 (1.473)	1.121 (1.224)	1.117 (1.579)	1.505 (2.177)	
	Selectorate size (S)	-0.899*** (0.173)	-1.381*** (0.337)	-0.777*** (0.181)	-0.842*** (0.184)	-1.509*** (0.509)	
	Age	0.0406*** (0.00890)	0.0311** (0.0158)	0.0289** (0.0113)	0.0425*** (0.0121)	0.0145 (0.0225)	
	W*age	-0.0431*** (0.0126)	-0.00920 (0.0194)	-0.0273* (0.0151)	-0.0576*** (0.0178)	0.000907 (0.0292)	
	Growing Threat: Δmass		0.262** (0.123)	0.280*** (0.107)	0.297** (0.121)	0.138 (0.188)	
	W* Δmass		-0.231 (0.157)	-0.242* (0.137)	-0.346* (0.184)	-0.183 (0.215)	
	Non-tax revenue (%GDP)			-0.0601** (0.0266)		-0.0918** (0.0396)	
	W* Non-tax revenue			0.0808** (0.0405)		0.131** (0.0532)	
	Oil (exports as %GDP)				-0.0201* (0.0103)	-0.0107 (0.00932)	
	W*Oil				0.0141 (0.0161)	-0.0134 (0.0162)	
	Aid (%GDP)					-0.00427 (0.0265)	
	W*Aid					-0.0135 (0.0396)	
	Ln(GDPpc)	-0.0848 (0.0915)	-0.00562 (0.137)	-0.0188 (0.104)	-0.160 (0.121)	0.121 (0.180)	
	W*Ln(GDPpc)	0.168 (0.128)	0.0152 (0.194)	0.0652 (0.147)	0.329* (0.179)	-0.123 (0.246)	
	Growth	-0.0271*** (0.00610)	-0.0498** (0.0220)	-0.0327** (0.0134)	-0.0380*** (0.0147)	-0.0759** (0.0373)	
	W*Growth	0.0156 (0.0153)	0.00297 (0.0359)	0.0254 (0.0228)	0.0283 (0.0284)	0.0419 (0.0547)	
	Repression					0.00105 (0.118)	
	W*Repression					-0.120 (0.147)	
	Constant	-2.086*** (0.615)	-2.022** (0.817)	-1.967** (0.797)	-1.760* (1.028)	-1.708 (1.344)	
	Ancillary parameter, ln(p)	W	0.592*** (0.103)	0.475*** (0.170)	0.528*** (0.114)	0.602*** (0.189)	0.608*** (0.182)
		Constant	-0.601*** (0.0762)	-0.470*** (0.141)	-0.531*** (0.0933)	-0.526*** (0.116)	-0.535*** (0.150)
	Observations		5831	2105	4086	3003	1452

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Robust standard errors in parentheses

Table 2: The Determinants of Institutional Change.

VARIABLES	Model 6	Model 7	Model 8	Model 9
	Future Coalition Size, W (3 years)			
Winning Coalition size W	0.892*** (0.143)	0.840*** (0.115)	0.587*** (0.227)	0.995*** (0.263)
Growing Threat: $\Delta$ mass	0.0225 (0.0150)	0.0211*** (0.00783)	0.0118 (0.0128)	0.0120 (0.0117)
W * $\Delta$ mass	-0.0180 (0.0217)	-0.0205* (0.0108)	-0.00814 (0.0196)	-0.0108 (0.0178)
Non-tax revenue (%GDP)	-0.00343*** (0.000938)			
W* Non-tax revenue	0.00324** (0.00159)			
Non-tax Rev* $\Delta$ mass	-0.000232 (0.00145)			
W* Non-tax Rev* $\Delta$ mass	-5.79e-05 (0.00221)			
Oil (exports as %GDP)		-0.00144** (0.000593)	-0.00201*** (0.000713)	0.000370 (0.000905)
W*Oil		0.000320 (0.00121)	0.00159 (0.00149)	-0.000465 (0.00187)
Oil * $\Delta$ mass		-0.00329*** (0.000838)	-0.00291*** (0.000978)	-0.00282*** (0.000893)
W* Oil* $\Delta$ mass		0.00481*** (0.00154)	0.00433** (0.00182)	0.00429*** (0.00166)
Aid			-0.00585*** (0.00187)	0.00127 (0.00220)
W*Aid			0.0108*** (0.00282)	0.00188 (0.00342)
Aid* $\Delta$ mass			0.00148 (0.00263)	-0.000476 (0.00244)
W*Aid* $\Delta$ mass			-0.00178 (0.00401)	0.00126 (0.00371)
Ln(GDPpc)	0.0166** (0.00679)	-0.000870 (0.00625)	-0.0128 (0.00937)	-0.00288 (0.0175)
W*Ln(GDPpc)	0.00347 (0.00822)	0.0313*** (0.00705)	0.0538*** (0.0138)	0.0350** (0.0172)
Ln(Population)	0.00727 (0.00627)	0.0134*** (0.00453)	0.0108* (0.00637)	0.147*** (0.0145)
W*Ln(Population)	-0.0111 (0.00800)	-0.0208*** (0.00604)	-0.0188* (0.00978)	-0.0441*** (0.0123)
Constant	-0.0489 (0.121)	-0.0440 (0.0951)	0.106 (0.150)	-2.094*** (0.251)
Observations	1753	3305	2440	2440
R2	0.716	0.649	0.584	0.396
R-squared	0.716	0.649	0.584	0.396
Fixed Effects	170 region-years	275 region-years	254 region-years	120 countries

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

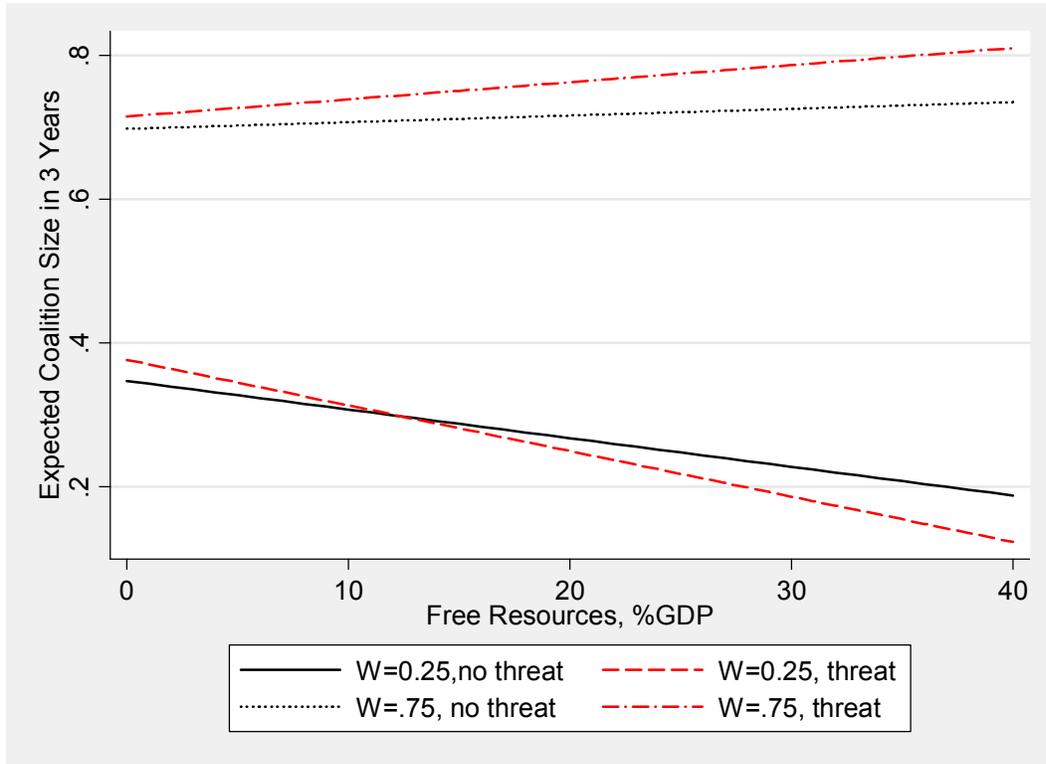
Table 3: The Determinants of Mass Political Movements

VARIABLES	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
	Level of Mass Political Movements: mass				BigThreat: Is mass>2, Y/N?	
Lagged mass	0.461*** (0.0255)	0.455*** (0.0254)	0.203*** (0.0282)	0.257*** (0.0279)		
Winning Coalition size (W)	-0.509 (1.010)	-2.813* (1.605)	0.576 (2.394)	-3.747 (2.311)	-3.101 (7.775)	-13.27 (10.81)
Non-Tax Revenue	-0.00547 (0.00600)		-0.00729 (0.00986)		-0.0418 (0.0628)	
W*Non-Tax Revenue	0.0125 (0.00978)		0.0119 (0.0143)		0.106 (0.117)	
Oil (exports as %GDP)		-0.00503 (0.00494)		-0.00532 (0.00628)		-0.155 (0.163)
W*Oil		0.00697 (0.00987)		0.00752 (0.0124)		0.138 (0.216)
Aid (%GDP)		-0.00789 (0.0114)		0.00483 (0.0153)		-0.251* (0.142)
W*Aid		0.0157 (0.0169)		0.00774 (0.0227)		0.346* (0.188)
Ln(GDPpc)	0.0480 (0.0533)	-0.0781 (0.0641)	-0.198 (0.179)	-0.243 (0.165)	0.334 (0.438)	-0.725 (0.510)
W* Ln(GDPpc)	-0.109 (0.0688)	0.116 (0.0960)	-0.0364 (0.160)	0.222 (0.154)	-0.657 (0.562)	0.998 (0.772)
Growth	-0.00778 (0.00912)	-0.0185** (0.00885)	-0.0130 (0.00913)	-0.0161* (0.00866)	-0.0569 (0.0742)	-0.0880 (0.0620)
W*Growth	-0.00501 (0.0150)	0.00373 (0.0148)	0.00242 (0.0150)	0.00285 (0.0147)	0.0172 (0.121)	0.0140 (0.101)
Ln(population)	0.0326 (0.0434)	-0.00827 (0.0437)	0.361* (0.217)	0.0958 (0.146)	0.231 (0.337)	0.238 (0.256)
W* Ln(population)	0.0723 (0.0548)	0.123* (0.0658)	-0.0148 (0.114)	0.149 (0.0937)	0.578 (0.447)	0.424 (0.412)
Earthquake	0.197** (0.0832)	0.209*** (0.0789)	0.246** (0.101)	0.252** (0.0990)	1.063** (0.514)	1.053** (0.449)
W* Earthquake	-0.272** (0.112)	-0.222** (0.110)	-0.253* (0.131)	-0.277** (0.138)	-1.601** (0.763)	-1.451** (0.673)
Free Press	0.295*** (0.114)	0.284*** (0.0862)	0.134 (0.143)	0.309*** (0.116)	1.765* (0.989)	1.909*** (0.692)
W * Free Press	-0.183 (0.156)	-0.270** (0.128)	-0.218 (0.213)	-0.451** (0.176)	-2.263 (1.605)	-2.143* (1.146)
Constant	-0.846 (0.861)	0.710 (1.080)	-4.123 (3.478)	0.157 (2.648)	-10.63* (6.151)	-2.571 (6.688)
Observations	1282	1297	1282	1297	1285	1299
Fixed Effects	122 region- years	146 region- years	99 countries	113 countries		

Standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Figure 1: Predicted future coalition size, free resources and the presence or absence of revolutionary threats.



Predictions based on an ordered probit estimate using the specification in model 8. No threat indicates  $\Delta_{mass}=-1$ ; threat indicates  $\Delta_{mass}=2$ . Free resources refer to oil export and aid receipts. The estimates are for a nation of 10 million people with \$2000 per capita income.