Revolutionary Pressures and the Survival of Political Leaders[1]

Alastair Smith (NYU)

Wilf Family Department of Politics
New York University
19 West 4th St,
New York NY 10012
Alastair.Smith@nyu.edu

Leaders face multiple threats to their political survival. In additional 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 are 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 resource 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 various deposition risks. Leaders can be removed by forces within the extant political system. Alternatively leaders 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 undertake policies, and possibly institutional changes, to mitigate these risks. Established leaders beholden to only a small coalition of supporters with access to resources, such as oil and aid, which do not require the economic participation of the citizens are most likely to survive.

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 Smith2008). Leaders want to retain political power and choose policies of private goods and public goods provisions on the basis of doing so. We extend Bueno de Mesquita et al's (2003) analysis of selectorate politics to include revolutionary threats. Thus, in addition to maintaining the loyalty of members of their coalition, leaders need to dissuade the citizenry from joining mass political movements and rebelling. Leaders can dissipate revolutionary threats via two mechanisms. Firstly they can increase the provision of public goods which improves the welfare of the citizens such that their desire for revolutionary change diminishes. Secondly they can suppress the provision of public goods, particularly those such as free press, transparency and communications which help people coordinate and organize, to reduce 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, upon the structure of government finance. While the suppression of coordination goods reduces the ability of people to coordinate politically, it also reduces their ability to coordinate economically and this reduction in productivity leads to less economic activity. When leaders rely upon the taxation of productive economic activity to generate the resources they need to reward their coalition, then suppression becomes is unattractive. However, leaders with access to abundant free resources, those resources such as natural resource rents or foreign aid which do not require the economic participation of the citizens, can suppress coordination with less damage to their revenues.

By incorporating revolutionary threats into selectorate politics the theory address how institutions, free resources and revolutionary threats shape the policies leaders pursue, the prospects for institutional change and whether leader succeed in their survival objectives. Bueno de Mesquita and Smith (2008) examine the issues of policy choice and institutional change. Here the empirical focus is leader survival. Having explained the theoretical ideas, the paper has two empirical thrusts. The first is a direct assessment of how institutions, free resources and mass political movements impact the survival of leaders. The second part of the analysis explores how the survival driven choice of policy influences the likelihood of institutional change and level of mass political movements, factors that subsequently affect future survival. 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

Selectorate Theory

Leaders face multiple threats to their tenure. They might be removed within the purview of existing political institutions. Leaders might also be removed via mass political movements such as revolutions which seek to sweep away the existing institutions and replace them with more inclusive ones. Leaders pick those policies that best help them survive these threats. Bueno de Mesquita and Smith (2008) and Smith (2008) provide a formal extension of Bueno de Mesquita et al's (2003) selectorate politics model with revolutionary change. Here the argument is presented informally.

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, the support of half of which 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 monarchical systems 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 do so leaders 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, the key insight 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 reward. Therefore, leaders shift towards public goods provisions. 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 coalition systems defense spending emphasizes private rewards, such as bloated procurement and the promotion of cronies. Winning coalition size determines the relative mix between private and public goods.

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 (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 amongst 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 can not promise long term access to private goods. This creates a loyalty norm towards 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 rewards 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. Additional, since new leaders have to form relatively large coalitions, their prospects 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.

When coalition size is small and selectorate size is large the loyalty norm is particularly strong. This allows leaders to skim of resources for their own discretionary purposes and provides a cushion in case of a shock. As Bueno de Mesquita (2003) showed, 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 much 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 can not make such a strong commitment as 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 process 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 over, 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.

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 the 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 reduces the cost of risk of exclusion from future coalitions. This 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 loyalty and induces the leader to work harder.

Citizens outside the winning coalition benefit only from public goods. As such they want to increase coalition size. It is therefore unsurprising that 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 build on the selectorate model and consider the organization and support of mass political movements and explore the policies which leaders can take to ameliorate the risk of revolutionary deposition. In order to do so we examine the broader role of public goods within the economy. 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, healthy educated people with access to transport and knowledge of the market are more productive than sickly, ignorant and isolated people. By increasing the provision of public goods the government induces people to work harder and more productively. This increases economic activity and revenues for the government. Certain public goods, such as the freedom of information and assembly, which we shall call coordination goods, determine the ability of the 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 rebel comes to naught.

Revolutionaries want to sweep away existing political institutions and replace them with more inclusive institutions. When deciding whether to support such movements, citizens consider the benefits of revolutionary success – that is, what are the likely benefits they would receive if the revolution 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-- those public goods which help citizens coordinate and organize opposition to the government. This deters citizens from rebelling by reducing the probability that they will succeed. 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 (see also Bueno de Mesquita et al 2002). Revolutionary threats cause leaders to modify these provisions. Whether leaders expand the provision of public goods to buy off revolutionaries or contract public 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. We refer to these resources as free because they are relatively insensitive to the economic input of the citizens. However, as we shall see, 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. In contrast, leaders of smaller coalition systems with access to free resources typically enhance their survival prospects most by contracting coordination goods.

Expanding the provision of public goods increases economic productivity which improves government revenues. However, the shift towards a public goods focus lessens the loyalty norm such that leaders need to work harder to retain the support of coalition members. In general this is the more attractive response to revolutionary threats when coalition size is already reasonably large and when the government relies on taxing the citizens' economic activities to generate revenues.

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 the leader's policy provisions. To survive the leader need to buy the support of her coalition members, which is best done with private goods, and ameliorate the public's demands, which is 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 coalition members. While absent a revolutionary threat, one societal group always opposes another desired shift in institutions, Bueno de Mesquita and Smith (2008) show that following an expansionary response to a revolutionary threat, an expansion of the coalition size can be in the interests of leaders, coalition members and political outsiders. The intuition behind this result is that enlarging the coalition rationalizes the types of policies required to reward supporters and satiate potential revolutionaries while 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 of leaders whose coalition is relatively small and who have access to free resources. The suppression of coordination goods reduces economical productivity. For this reason it tends to be preferred by leaders with alternative revenues to taxation. The suppression of coordination goods removed the revolutionaries' ability to organize. However, coalition members need to be compensated for the loss of these goods. This shifts the focus of policy towards 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 towards 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. Thus, a contraction in the provision of coordination goods is often followed by autocratization, a contraction in coalition size. The latter factor improves survival in the future.

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.

Leader Survival

Data

Our analyses test how revolutionary threats affect the survival of leaders and the extent to which institutions and free resources moderate the effects. In addition to developing direct measures of the levels of mass political movements, we examine tourism and in particular sharp declines in tourism as an indicator of political unrest. Finally we examine the ability of leaders to limit the build up of revolutionary threats and avoid situations likely to be perilous to their political health.

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 (W) and selectorate size (S). These data are constructed using Polity IV data (Marshall and Jaggers 2008) and Arthur Banks' (2007) cross-national time series data. In particular, Bueno de Mesquita et al (2003) 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. See Bueno de Mesquita et al (2003) for details and justifications.

Measures of population size, income (per capita GDP), economic growth and free resources 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 are 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 measure Aid is Official Development Assistance which we express in terms of percentage of GDP.[2]

Our empirical tests require a measure of revolutionary threat. We estimate this via the growth or decline of mass political movements. In particular, we use data on antigovernment demonstrations, riots, general strikes and revolutions from Banks (2007). These data describe the number of each of these events per year in each nation. 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) – mean(ln(1+x)))/(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

[2] 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$).

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. For instance since Banks' measures rely on media coverage it is possible that events are more likely to be recorded, for example, for the US than for Ghana. Different societies also have different norms about protest. For instance, French farmers protest regularly while such events are more uncommon in Britain. This suggests a differing baseline for each nation. To ameliorate these potential problems, we examine changes in the level of mass over the previous three year: $\Delta mass = mass_t - mass_{t-3}$. The use of the three year lag is arbitrary. In earlier analysis of institutional change we focused on an alternative five year lag (Bueno de Mesquita and Smith 2008). The Δmass tell us whether a leader faces an increasing or decreasing level of mass political movements. Later we reassess the question of leader survival using the mass variable directly and find similar results.

We also assess the provision of coordination goods, institutional change and the determinants of mass political protests. We utilize two measures of coordination goods: number of radios and press freedom. We measure radios as the logarithm of per capita radio ownership using data from Banks (2007). We utilize Freedom House's (2008) three point scale of press freedom (0="not free", 1="partially free", 2="free"). These data are available from 1989 to 2006. Between 1980 and 1988, Freedom House report separate press freedoms for broadcast and print media. We average these scores to obtain press freedom data between 1980 and 2006. In our analyses of the determinants of mass political movements we use earthquakes as a measure of shocks beyond a leader's control. 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.

Following our basic assessment of leader survival we reexamine the problem using tourism data as an instrument for political violence. The basis of these analyses is that a high threat of political violence discourages tourists. We obtain tourist data in terms of arrivals of non-resident tourists at national borders. These count data, obtained from the World Tourism Organization's Yearbook of Tourism Statistics (various years), are available from 1986 through 2005, although unfortunately there tends to be much missing data and so these analyses can not be taken as more than illustrative.

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 hold if we use this methods, as shown in the robustness tests in table 4 at the end of the paper, this 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 decline 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 $h(t)=p\,\lambda\,t^{(p-1)}$, where $\lambda=\exp(X\beta)$ where is 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 9. We treat leaders who die of natural causes while in office, those who retire due to ill and those still in office as censored observations.

The Weibull regression in table 1 assesses how institutions, growth in mass political movements and free resources affect political tenure. Model 1 provides a baseline examining 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 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 a comparison of the hazard rate after 1 month in office compared with the hazard rate after 5 years. For a large coalition the hazard rate drop 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 hazard through the standard Xβ terms. In model 1 the positive coefficient estimate on the coalition size variable indicates that in moving from the smallest to largest coalition increase the risk of deposition. However the effect is statistically insignificant. Small coalition systems do not infer an immediate advantage on leaders; rather their incumbency advantage grows over time. 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 diminishes this capacity. This ability is less important in public goods orientated 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 such that we can assess whether income and growth have differential effects 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 Growth+W*growth=0 fails to reject the null hypothesis (chi2=.88, Pr=.35).

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 (Δmass), oil exports as a measure of free resources and the interaction of these variables with coalition size. Model 3 repeats this specification including the controls for income and growth. Model 4 adds the level of aid as an additional measure of free resources.

An increase in the level of mass political events increases the risk of deposition for small coalition leaders, but not large coalition leaders. Across model 2 through 4, 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 30-40%. However, a rising level of mass political activities has no effect on the tenure of large coalition leaders: the sum of the coefficients estimates on Δmass 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. Protest demonstrates an ability to coordinate and organize which enhances 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. In table 4, at the end of this paper, we assess the robustness of the results. In that table we examine the effect of mass movements directly, rather than their change in level as presented here. The direct effects appear at least as strong as those presented in table 1, although for the reasons of cross-sectional differences and reporting biases discussed above we believe the temporal measure are more reliable. We have also replicated the models in table 1 looking at single year difference in mass political events. Those models produce similar substantive results. In table 4 we also estimate leader survival using Cox proportionate hazard, the dominant method used in political science. The theory predicts that underlying hazards change over time differently for different institutions, which makes this approach less appropriate. Despite this problem, the analyses generate similar substantive conclusions: revolutionary threats endanger small coalition leaders, but not large coalition leaders.

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 thereby their revenues. Such leaders are likely to liberalize in response to revolutionary pressures. Enlargement of the coalition size often accompanies such reforms. These developments make survival harder. In contrast, leaders whose revenues are buoyed by free resources, such as oil or foreign aid, can more easily ameliorate revolutionary threats through the suppression of 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 and 4 include measures of oil exports, an important free resource. Model 4 also includes aid receipts. The negative coefficient on the oil variable indicates that, across the various specifications, if small coalition leaders export oil worth 10% of GDP then their risk of deposition is reduced by about 10-20%. The results are not highly statistically significant with the coefficient estimates on oil achieving significance of 5.1% and 5.3% levels in models 2 and 3 in 2-tailed tests. Since the theory makes a directional prediction, these estimates reject the null hypothesis at the 5% level in the more appropriate 1-tailed test. However, the evidence is relatively weak. Free resources do not enhance the survival of large coalition leaders: the sum of

the oil estimate and its interaction with W is indistinguishable from zero. The inclusion of aid receipts in model 4 show no significant relationship between free resources and survival.[3]

Table 2 assesses the threat of mass political movements using tourism data on the proviso that tourists are deterred from visiting places experiencing, or potentially experiencing, wide scale mass protest. The table divides the sample into two parts: observations in which tourism has declined over the previous three years and observations in which it has increased. In general, tourism has tended to increase, as witness by approximately three times more observations for the latter sample than the former. Despite this smaller sample, free resources have a more significant impact on survival when tourism is declining than when it is increasing. That is, free resources have a greater impact on political survival in situations where a decline in tourism indicates a potential revolutionary threat. Free resources allow leaders to suppress revolutionary threats when they arise and a declining level of tourism is an indicator of just such threats.

Overall, the evidence for a direct effect of free resources on the survival of small coalition leaders is somewhat weak. However, as we next show, the indirect effects are substantial. The presence of free resources enables small coalition leaders to avoid circumstances in which survival is difficult. 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 where survival is harder.

Free resources, democratization and the provision of coordination goods

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 (2008) provide a more comprehensive analysis of these issues. Our focus is to understand leader survival and in particular whether free resources and mass political movements direct leaders to take actions that subsequently jeopardize their tenure.

Leaders with initially fairly small coalitions and with access to free resources are more likely to reduce the supply of coordinate 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 policy responses create incentives for institutional change. In table 3 we use the nation-year as the unit of analysis and examine how a leader's response to revolutionary threats depends upon free resources. We show that these responses help leaders avoid revolutionary threats in the first place.

Model 7 in table 3 show regression analysis with region-year fixed effects of the logarithm of radios owned per capita as a continuous measure of coordination goods. Radios provide information. They also indicate the extent to which that information is free. People are less likely to invest in a radio if all they hear is government propaganda. We choose to examine radios rather than other measures of coordination goods such as civil liberties because radios provide a continuous measure. Bueno de Mesquita and Smith (2008) report similar results for a variety of coordination goods.

How governments respond to mass political movements depends upon institutions and the availability of free resources. The negative coefficient estimate of -.023 on the oil variable and positive estimate of 0.030 on the interaction of oil and W indicate that small coalition leaders suppress coordination goods when they have free resources but large coalition leaders do not. Increasing oil exports by 10% of GDP suppresses radio ownership by about a fifth of a standard

[3] Including interactions between the threat and free resource variables (i.e. a specification similar to model 7 and 8) produces very similar results.

deviation for a small coalition system. The effects of free resources become even more pernicious as the level of mass political movements rise. The coefficient estimate for the interaction between oil and Δmass is significant and negative. This indicates that as a small coalition leader faces an increasing revolutionary threat the extent to which she suppresses coordination goods increases as her access to free resources increases. Indeed the 10% increase in oil exports discussed above leads to twice the suppression of radio ownership if accompanied by a 2 standard deviation increase in mass political movements.

Large coalition systems supply more coordination goods as witnessed by the significant coefficient estimate on coalition size. However, neither mass political movements, free resources nor their interactions significantly affect the ownership of radios. The coefficient estimate on the aid variable and its interaction with Δmass reveal a similar pattern to that observed for oil, although the statistical significance is somewhat less.[4]

Model 8, a region-year fixed effects regression of coalition size in three years time, assess how initial institutions and free resources moderate institutional changes in response to mass political movements. The interpretation of the results is remarkably similar to that described for the provision of coordination goods. For initially fairly small coalition systems, free resources tend to reduce future coalition size. This effect becomes even more pronounced when leaders face revolutionary threats. In contrast, free resources and revolutionary threats have relatively little effect on future coalition size in systems with initially fairly large coalitions. Rather than discuss each of the coefficients separately, we believe the implications can be shown more succinctly using a graph. Figure 1 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 (Δmass=-1) and an increasing revolutionary threat (Δmass=2) against level of free resources. The estimates are obtained using a ordered probit model using the specification in model 8. The figure provides a clear picture of the pernicious effects of free resources in retarding democratization. Small coalition nations are less likely to become more inclusive political systems when they have abundant free resources. The threat of mass political movements exacerbates this effect. Van de Walle (2001 p241-242) illustrates this effect 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 analysis includes controls for per capita income. 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 it persists. Bois and Stokes (2003) argue that this result derives from a limited sample and that in a wider sample income drives democratization. The negative, although insignificant, coefficient on per capita income and the significant positive estimate for the interaction between W and wealth supports Przeworski's view, although since our sample is similar to his, this conclusion is vulnerable to all the criticism Bois and Stokes level. However, our analysis suggests that both sets of authors miss the main point and that income effects are very much secondary when compare to the origins of this

[4] The theory predicts that small coalition leaders can skim off discretionary resources for themselves. Leaders that amass private wealth have a potential supply of free resources with which suppress coordination goods in the face of revolutionary threats. To assess this effect we have included a time in office variable together with its interactions with W and Δmass. The estimates show the same pattern as reported for the oil variables.

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 determine the direction of this change.

Consistent with predictions, model 7 and 8 suggest 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, things that help them survive in office.

As a final component to our exploration of leader survival, we examine the determinants of mass political movements since it is these threats that help unseat small coalition leaders. Model 9 assesses the growth of revolutionary threats using a region-year 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. In model 9, the dependent variable is lagged by a single year, however 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). 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 focus point to coordinate opposition. The rallying effect of natural disasters can conveniently be thought of in terms of the traditional Chinese concept of the "mandate of heaven." Leaders receive their mandate from heaven but should leaders rule unwisely then heaven withdraws this right and passes the mandate on (http://en.wikipedia.org/wiki/Mandate_of_Heaven). 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 hence 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.

Not surprisingly, model 9 indicates 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. Economic growth reduces mass political movements as evidenced by the negative coefficient on the growth variable, although the effect is reduced for large coalition systems.

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. However, leaders control coordination goods such as freedom of the press and 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.

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. Although, as we saw in the initial analysis, the direct effect is weak, free resources 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. Unfortunately the mechanism through which small coalition leaders use free resources to survive has pernicious 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 from both within the political system and threats from outside. Leaders can ameliorate revolutionary threats by either increasing the provision of public goods, such that citizens are satiated, or suppress their ability to organize. Access to free resources has 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 2008) concerning policy provision and institutional change, there is a compelling case for the theory.

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Table 1: Revolutionary Threats, Free Resources and Leader Survival

	Model 1	Model 2	Model 3	Model 4
	Weibull Regression	Weibull Regression	Weibull Regression	Weibull Regression
Winning Coalition size (W)	1.267 (1.071)	1.585 (0.836)	1.121 (1.224)	1.117 (1.579)
Selectorate size (S)	-0.899 (0.173)**	-0.86 (0.190)**	-0.777 (0.181)**	-0.842 (0.184)**
Age	0.041 (0.009)**	0.024 (0.011)*	0.029 (0.011)*	0.042 (0.012)**
W*age	-0.043 (0.013)**	-0.022 (0.015)	-0.027 (0.015)	-0.058 (0.018)**
Growing Threat: Δmass		0.325 (0.113)**	0.28 (0.107)**	0.297 (0.121)*
W* Δmass		-0.29 (0.146)*	-0.242 (0.137)	-0.346 (0.184)
Oil (exports as %GDP)		-0.018 (0.009)	-0.02 (0.010)	-0.011 (0.009)
W*oil		0.012 (0.016)	0.014 (0.016)	-0.013 (0.016)
Aid (%GDP)				-0.004 (0.026)
W*Aid				-0.014 (0.040)
Ln(GDPpc)	-0.085 (0.092)		-0.019 (0.104)	-0.16 (0.121)
W*Ln(GDPpc)	0.168 (0.128)		0.065 (0.147)	0.329 (0.179)
Growth	-0.038 (0.006)**		-0.033 (0.013)*	-0.038 (0.015)**
W*Growth	0.016 (0.015)		0.025 (0.023)	0.028 (0.028)
Constant	-2.086 (0.615)**	-2.023 (0.596)**	-1.967 (0.797)*	-1.76 (1.028)
Ancillary Parameter ln_p:W	0.592 (0.103)**	0.519 (0.117)**	0.528 (0.114)**	0.602 (0.189)**
ln_p:Constant	-0.601 (0.076)**	-0.525 (0.094)**	-0.531 (0.093)**	-0.526 (0.116)**
Observations	5831	4138	4086	3003

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 2: Tourism and Political Survival

	Model 5	Model 6
Weibull Regression	Declining Tourism	Increasing Tourism
Winning Coalition size (W)	6.066 (4.641)	1.722 (2.295)
Selectorate size (S)	-2.015 (0.819)*	0.048 (0.671)
Age	0.125 (0.029)**	-0.013 (0.019)
W*age	-0.141 (0.038)**	0.003 (0.025)
Oil (exports as %GDP)	-0.096 (0.042)*	0.017 (0.017)
W*oil	0.145 (0.057)*	-0.052 (0.025)*
Aid (%GDP)	0.031 (0.073)	0.001 (0.047)
W*Aid	-0.06 (0.09)	-0.027 (0.066)
Ln(GDPpc)	-0.294 (0.398)	0.162 (0.199)
W*Ln(GPDpc)	0.295 -0.587)	-0.183 (0.278)
Growth	-0.114 (0.059)	0.075 (0.047)
W*growth	0.103 (0.078)	-0.083 (0.068)
Constant	-4.642 (3.286)	-2.006 (1.852)
Ancillary Parameter ln_p:W	1.123 (0.549)*	0.757 (0.208)**
ln_p:Constant	-0.823 (0.416)*	-0.588 (0.167)**
Observations	421	1173

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 3: The determinants of coordination goods, institutional change and mass political movements.

Regression Analysis with Region-year Fixed effect	Model 7	Model 8	Model 9
Dependent Variable	Ln(Radios)	Future Coalition Size (3years)	mass
Winning Coalition size	2.454 (0.928)**	0.587 (0.227)**	-2.813 (1.605)
Growing Threat: Δmass	0.054 (0.049)	0.012 (0.013)	
W * Δmass	-0.112 (0.077)	-0.008 (0.02)	
Oil (exports as %GDP)	-0.023 (0.003)**	-0.002 (0.001)**	-0.005 (0.005)
W*oil	0.03 (0.006)**	0.002 (0.001)	0.007 (0.01)
Oil* Δmass	-0.008 (0.004)*	-0.003 (0.001)**	
W*oil*Δmass	0.016 (0.008)*	0.004 (0.002)*	
Aid	-0.017 (0.008)*	-0.006 (0.002)**	-0.008 (0.011)
W* aid	0.03 (0.012)**	0.011 (0.003)**	0.016 (0.017)
Aid* Δmass	-0.004 (0.010	0.001 (0.003)	
W*aid* Δmass	0.008 (0.016)	-0.002 (0.004)	
Ln(GDPpc)	0.438 (0.037)**	-0.013 (0.009)	-0.078 (0.064)
W* Ln(GDPpc)	-0.043 (0.056)	0.054 (0.014)**	0.116 (0.096)
Ln(population)	0.058 (0.026)*	0.011 (0.006)	-0.008 (0.044)
W * Ln(population)	-0.139 (0.040)**	-0.019 (0.01)	0.123 (0.066)
Lagged mass			0.455 (0.025)**
Growth			-0.018 (0.009)*
W* growth			0.004 (0.015)
Earthquake			0.209 (0.079)**
W*earthquake			-0.222 (0.110)*
Free Press			0.284 (0.086)**

W* Free Press			-0.27 (0.128)*
Constant	3.29 (0.604)**	0.106 (0.15)	0.71 (1.08)
Observations	2100	2440	1297
Number of region-year dummy	230	254	146
R-squared	0.29	0.58	0.32

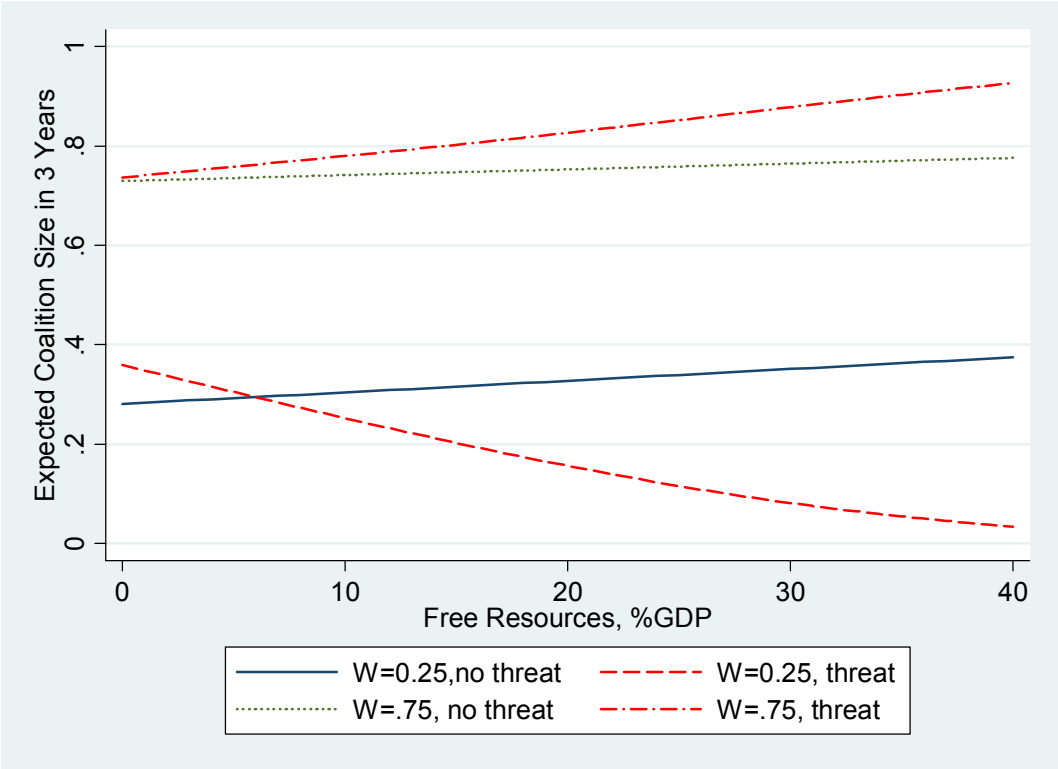
Standard errors in parentheses
* significant at 5%; ** significant at 1%

Table 4: Alternative specifications of leader survival

	Model 10	Model 11	Model 12
	Weibull Regression	Cox Proportionate Hazard	Cox Proportionate Hazard
Winning Coalition size (W)	0.675 (1.253)	1.058 (1.343)	1.53 (0.906)
Selectorate size (S)	-0.683 (0.182)**	-0.828 (0.181)**	-0.938 (0.178)**
Age	0.023 (0.012)	0.02 (0.014)	0.027 (0.010)**
W* age	-0.022 (0.016)	-0.014 (0.017)	-0.019 (0.013)
Mass movement (mass)	0.588 (0.089)**	0.677 (0.101)**	
W*mass	-0.522 (0.135)**	-0.633 (0.143)**	
Growing Threat: Δmass			0.36 (0.105)**
W*Δmass			-0.333 (0.140)*
Oil (exports as %GDP)	-0.011 (0.008)	-0.013 (0.009)	-0.024 (0.012)*
W*oil	0.004 (0.014)	0.006 (0.013)	0.017 (0.020)
Ln(GDPpc)	-0.065 (0.105)	-0.052 (0.110)	-0.012 (0.085)
W* Ln(GDPpc)	0.125 (0.148)	0.100 (0.148)	0.05 (0.100)
Growth	-0.024 (0.015)	-0.032 (0.015)*	-0.04 (0.019)*
W*growth	0.019 (0.024)	0.031 (0.023)	0.036 (0.027)
Constant	-1.71 (0.843)*		
Ancillary Parameter ln_p: W	0.45 (0.109)**		
ln_p: Constant	-0.45 (0.090)**		
Observations	4134	4134	4086

Robust standard errors in parentheses
* significant at 5%; ** significant at 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 6. No threat indicates Δmass=-1; threat indicates Δmass=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.