Persistence of Bad Leaders

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February 10, 2012
Preliminary version, do not circulate

Abstract

We study the selection of competent leaders. We focus on two dimensions of democracy: *de facto* and *de jure* democracy, and allow the overthrow of leaders via a revolution. We find two thresholds that determine the leadership outcomes: 1) the compromise threshold, and 2) the revolution threshold. If the more competent leader satisfies the compromise threshold, he comes into power without a fight. If the revolution threshold is satisfied, the more competent leader comes into power after a successful revolution. Otherwise, the less competent leader, the incumbent, remains in office. The relative size of the two thresholds determines whether a revolution is possible. While the revolution threshold is determined by the fraction of private rents, *de facto* and *de jure* democracy levels, the compromise threshold is only determined by the fraction of private rents and *de facto* democracy level.

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1 Introduction

Leaders, especially those with the executive power of a country, play a crucial role in determining a country's economic performance. A central role of a political regime is to ensure the selection of a competent leader[1]. While being equally important, a regime's ability to deal with shocks and changing environment is less often emphasized. It strongly influences whether the most competent leaders are in power (Acemoglu et al., 2010). When incompetent leaders persist in power, it leads to unsatisfactory economic outcomes.

A change in environment may change a former competent leader into an incompetent one. Take the example of a switch from wartime to peacetime. Skills that are necessary for successful wartime differ from those that ensure good management of the economy during peacetime. Although both UK and the former Soviet Union experienced the transition from the World War II to a peacetime, Joseph Stalin stayed in power after the war while Winston Churchill was defeated in the 1945 election. Even after Stalin's death, the former Soviet Union selected leaders similar to Stalin. Nikita Khrushchev and Leonid Brezhnev were both loyal party members with a strong military background. Eventually, their attempt to govern without meaningful economic reforms led to a national economic decline in the mid-1970s.

Our paper focuses on political selection in different political regimes. While being closely related to Acemoglu et al. (2010), we focus on the persistence of incompetent leaders instead of the whole government. This is because after a regime change, most bureaucrats stay while the new leader significantly alters the ruling group and (possibly) policies. Studying the whole government (that consists of both bureaucrats and the ruling group) could be misleading. It is therefore more precise to capture the persistence of bad governments by focusing on leaders.

The main contribution of our paper is incorporating both the Selectorate Theory of Bueno de Mesquita et al. (2003) and the social conflict theory of Acemoglu and Robinson (2006) into political selection. Following Acemoglu and Robinson (2006), we also use the concepts of *de jure* political power and *de facto* political power[2]. The former political power refers to political power originates

[1] In Acemoglu et al. (2010), competence level is defined as the collective utility it can provide to citizens (e.g., the level of public goods it is capable of providing). In a more empirical perspective like Besley et al. (2011), being more competent means being better able to make sensible economic policy choices which lead to better economic performance, i.e. GDP per capita/growth rate. We take the latter approach.

[2] Acemoglu and Robinson (2006) gives more *de facto* political power to the rich elites and more *de jure* political power to the poor majority. Here we give every Selecorate member a equal *de jure* political power but *de facto* political power could be centered in a small Winning Coalition. In Acemoglu and Robinson (2006), policies are determined by the group in power. We assume the Winning Coalition imposes leaders to decide and carry out policies.

from the political institutions (e.g. voting rights) while the latter originates from economic and military resources (e.g. guns). By only looking at the *de jure* democracy level, it overlooks cases like captured democracies, in which everyone has the right to vote but policies are determined by the rich elites (Acemoglu and Robinson, 2008).

Another contribution of our paper is that we demonstrate how the ruling group reacts under the threat of revolution. Acemoglu et al. (2010) suggest that any deviation from perfect democracy will result in an incompetent incumbent government lasting forever. However, if it is allowed to overthrow the government, the result may change. Either revolution can install the more competent leader or the sitting Winning Coalition (i.e. a small group of people with the power to select a leader) will comprise and select the competent leader by themselves.

In particular, we study the equilibria under two thresholds: 1) the compromise threshold below which the Winning Coalition supports the new and more competent leader, and 2) the revolution threshold below which a revolution is launched to support the new leader. If the new leader satisfies the compromise threshold, he comes into power without a fight. If the revolution threshold is satisfied, the new leader is supported and comes into power after a revolution success. Otherwise, the less competent leader, the incumbent, remains in office. The relative size of the two thresholds determines whether a revolution is possible. While the revolution threshold is determined by the fraction of private rents, *de facto* and *de jure* democracy levels, the compromise threshold is only determined by the fraction of private rents and *de facto* democracy level.

The rest of the paper is organized as follows. Section 2 gives a short review of related literature. In Section 3, we start with the basic model with *de facto* democracy level alone, and then extend it to allow for revolution possibilities. In the end, the model considers both *de facto* and *de jure* democracy levels and has revolution possibilities. Section 4 concludes and sheds some lights on future extensions.

2 Literature Review

Motivated by studies of CEO characteristics on firm performance (e.g. Bertrand and Schoar, 2003), there is a growing body of literature on how political leaders influence policy outcomes. There is ample evidence that partisan politics, i.e., the ideological position of political parties (and politicians), matter for economic outcomes (see Hibbs, 1977, and Hibbs, 1992). When politicians implement policies, their choices are influenced by their political viewpoints. However, recent findings show that these choices are not only affected by ideological views, but also by other personal characteristics.

Theoretical models like Besley and Coate (1997) and Osborne and Slivinski (1996) take a citizen-candidate approach to show that in the context of citizens competing with each other for office, talent or virtue affects policy outcomes. There are further empirical works showing the leaders matter. Jones and Olken (2005) focus on leadership changes due to natural deaths and show that unexpected leadership changes trigger changes in countries' GDP growth rate. Likewise, Besley et al. (2011) find that economic growth is enhanced when a country has a more educated leader, whereas Dreher et al. (2009) show that political leaders influence market-liberalizing reforms. In politically unstable countries, Jong-A-Pin and Yu (2010) find that leadership changes after a coup d'etat have a positive effect on economic growth in the least developed countries.

A recent stream of literature looks into the quality dimension of the selection of politicians. Caselli and Morelli (2004)'s model takes a citizen-candidate approach and suggests the key to understand the supply of bad politicians is to find its underlying factors, such as the rents they can earn while in office. Poutvaara and Takalo (2007) analyze how the compensation of elected politicians affects the set of citizens choosing to run. They find increasing the reward may lower the average candidate quality when the campaigning costs are sufficiently high. Gehlbach et al. (2010) examine the circumstances under which business elites decide to run for political office. Yu (2011) explores whether ill-motivated leaders are more likely to come into power via extra-legal political activities, such as coup d'etats and revolutions. Besley and Reynal-Querol (2009) find that democracies are around 20 percentage more likely to select a highly educated leader. More recent study by Acemoglu et al. (2010) link inflexibility of political regimes with the persistence of bad governments.

In Acemoglu et al. (2010), they focus on one dimension of democracy, *de veto power of the Incumbent*, and take its reverse measure as the level of regime inflexibility. They show that when the incumbent government has no veto power, the regime selects the most competent government (i.e.a government that is able to deliver the optimal level of collective utility to its citizens, Acemoglu et al., 2010). Otherwise, a less competent government can emerge and persist. They put an emphasis on the flexibility of political regimes in forming governments, since flexible political regimes deliver more competent governments. When the incumbent has the veto power to prevent changes, the bad government persists. Empirical evidence (e.g. Dreher and Lamla, 2010) has shown that economic and political disturbances reduce the probability of having the same leader remaining in office.

Our paper is also linked with a stream of literature on coalition and its formation. In Bueno de

Mesquita et al. (2003), only a small group of citizens have voting rights (the Selectorate) within an autocracy. Leaders are picked by a Winning Coalition, which is a small powerful subgroup of the Selectorate that can sustain a leader. The fear of losing their Coalition membership and access to private rents leads the Winning Coalition to stick with the less competent incumbent. This effect is most severe when the Winning Coalition is small and stable. Acemoglu et al. (2011) provide a general framework for the analysis of the dynamic formation of constitutions, coalitions and clubs. Acemoglu et al. (2008) study the formation of a ruling coalition in non-democratic societies where institutions do not enable political commitment.

3 Model

3.1 Game Setting

A state consists of individuals with and without political rights. Those individuals with political rights make up the Selectorate. Denoted by $\mathbf{S}$, the Selectorate is a continuum of individuals who have a saying in political selection. The size of $\mathbf{S}$ is normalized to 1. Within $\mathbf{S}$, there is a subset called the Winning Coalition, which is the smallest group with the power to select a leader. A Winning Coalition can prioritize its leadership choice with political power over the rest of the Selectorate (Bueno de Mesquita et al., 2003). The size of the Winning Coalition is equal to w, $w \in [0, \frac{1}{2}]$. The complementary set of $\mathbf{W}$ (within $\mathbf{S}$) is the rest of the Selectorate, denoted by $\mathbf{R}$, and has size of $1-w$.

The dynamics in Winning Coalition formation has been shown in Ray (1999), Konishi and Ray (2003), Acemoglu et al. (2008) etc. Instead of further exploring this direction, we focus on how existing coalitions and selectorates influence the selection of leaders. Therefore, we assume w to be exogenously given and fixed.

We take a citizen-candidate approach, where individuals vote for two candidates, the Incumbent (C_0) and the Challenger (C_1). Each one has a competence level, c_k and $k = 0, 1$, which determines the level of aggregate output (Y) and is commonly known by $\mathbf{R}$ and $\mathbf{W}$.

$$Y = c_k$$

The aggregate output is divided into public rents and private rents. While fraction g of Y goes to public rents, fraction x of Y goes to private rents. We impose a budget constraint for the leader, i.e. $x + g = 1, x \in (0, 1), g \in (0, 1)$. He can divide the output into public rents and private rents, but he cannot give more rents by borrowing from the future or less rents to save for the future.

All output has to be consumed within the production period. Moreover, x and g are exogenous and common knowledge. They are compatible with the optimal size of w at an equilibrium (See Bueno de Mesquita et al., 2003 for example)[3].

The aggregate public rents (i.e. $c_k g$) are evenly shared among the Selectorate, while the aggregate private rents (i.e. $c_k x$) are equally shared among Coalition members. A member of **R** (denoted by R) only receives his share of the public rents while a Winning Coalition member (denoted by W) received both public and private rents. Thus, payoff functions for an R and a W are:

$$\begin{aligned} U^R &= c_k g, \text{ for } k \in \{0,1\} \\ U^W &= c_k g + c_k \frac{x}{w}, \text{ for } k \in \{0,1\} \end{aligned}$$

Take the historical example of the former Soviet Union. The Selectorate consists of the communist party members, which is a fraction of the whole populace. The communist party members have the rights in political selection and entering the Communist Party Politburo (i.e. the Winning Coalition of the former Soviet Union). The Politburo is the highest ruling body and determines the top government positions, which includes the General Secretary of the communist party. Although party member has access to benefits that are not enjoyed by average citizens (e.g. sufficient food), a Politburo member has even more private rents, such as large mansion, private jet etc.

For a Selectorate member, the probability of being a coalition member after a leadership change equals w, which is the ratio of the size of the Winning Coalition over the size of the Selectorate. The value of w depends on the mix of qualities required for the membership and how the qualities are distributed, such as arms, capital and abilities. Since the Winning Coalition has the power to select the leader, w represents the *de facto* democracy level, i.e. whether power is evenly distributed among individuals with political rights. When w goes to 0, power is extremely centered in a few hands. When power is evenly distributed, a majority of the Selectorate is needed to impose a leader. Since the private rents are shared among the Coalition members, the Winning Coalition is the smallest group with the joint *de facto* power equal to the rest of the Selectorate. In the case of a perfect *de facto* democracy, the Winning Coalition only needs one half of the Selectorate. Thus, w ranges from 0 to $\frac{1}{2}$.

If there is no change in leadership (i.e.C_0 stays in power), Coalition members will remain the same. If there is a change in leadership, a **R** member has a probability of becoming a Winning Coalition member while the current Coalition member might lose his membership. Each individual's proba-

[3]If we assume the state is at an equilibrium and w is given, x and g become exogenous as well.

bility depends on two factors: 1) whether he is a Coalition member before the change; and 2) his relative distance from the Incumbent and the Challenger.

Within a given Winning Coalition, members are uniformly distributed on a Hotelling line[4] with a fixed length of 1. The Incumbent and the Challenger are positioned on the two ends. A Winning Coalition member's location is determined by his distance from the Challenger (denoted by d^W) and his distance from the Incumbent (i.e. $1 - d^W$). W's relative distance from the Challenger and Incumbent represents his pairwise preference[5] for the two candidates. If a member is closer to the Challenger, then he prefers the Challenger and a leadership change. The relative distance is common knowledge. Moreover, a Coalition member has an insider advantage over the rest of the Selectorate. This advantage endows him with a higher chance of being a Winning Coalition member after a leadership change. The insider advantage can originate from, e.g. insider information, which makes him better able to judge his chance of staying in the coalition. The extent of this advantage, captured by α, is assumed to be exogenous and common knowledge. After a leadership change, W's probability of staying in the Coalition equals $\frac{1}{2} + \frac{\alpha}{2}(1 - d^W)$. The probability ranges from $\frac{1}{2}$ to $\frac{1}{2} + \frac{\alpha}{2}$[6], with the mean equals $\frac{1}{2} + \frac{\alpha}{4}$.

Similar to the Winning Coalition, members of $\mathbf{R}$ are also uniformly distributed on a Hotelling line[7] with a fixed length of 1. The two candidates are positioned on the opposing ends. R's distance from the Challenger equals d^R while his distance from the Incumbent is $1 - d^R$. As d^R goes to 0, a member of the rest of the Selectorate prefers[8] the Challenger increasingly more than the Incumbent. Corresponding to a Winning Coalition member's insider advantage, a member of the rest of the Selectorate has an outsider disadvantage (also captured by α) which makes his chance of becoming a Coalition member lower than average. R's specific probability of becoming a Coalition member after a leadership change amounts to $\frac{w}{2(1-w)}(1 - \alpha d^R)$. This probability range from $\frac{w}{2(1-w)}(1 - \alpha)$ to $\frac{w}{2(1-w)}$ with a mean of $\frac{w}{2(1-w)}(1 - \frac{\alpha}{2})$[9].

[4] The position of Coalition members on the line is conditioned on the composition of the given Winning Coalition. With a new Winning Coalition, previous Coalition members change their location with regard to the preferences of the newly added Coalition members.

[5] The preference is policy irrelevant. W strictly prefers the candidate who provides him with higher utility level. When the two candidates offers the same policy platform and provides the same utility level, W will prefer the candidate whose position is closer to the other.

[6] To ensure $\frac{1}{2} + \frac{\alpha}{2} \leq 1$,$\alpha$ cannot be larger than 1.

[7] How members of $\mathbf{R}$ are distributed on the line is conditioned on the composition of the given $\mathbf{R}$. After a leadership change, members of $\mathbf{R}$ update their location conditioning on the new set of $\mathbf{R}$.

[8] The preference is also policy irrelevant here.

[9] By combining the R's and W's probability, it amounts to the average probability of w, since $[\frac{w}{2(1-w)}(1 - \frac{\alpha}{2})] \times (1 - w) + [\frac{1}{2} + \frac{\alpha}{4}] \times w = w$

3.2 Basic game

We start with a simple static model with two periods. In the beginning of Period 0, the Incumbent is in power. He is more competent than the Challenger. With the Incumbent, there is an optimal Winning Coalition and Selectorate as those equilibrium sets derived in Acemoglu et al. (2008), i.e. $\mathbf{W^0}$ and $\mathbf{S^0}$ respectively. At the end of period 0, output is distributed among members of the Winning Coalition and the rest of the Selectorate. Thus, the payoff received by W^0 and R^0 are:

$$U^{W^0}(0) = c_0 g + c_0 \frac{x}{w},$$

$$U^{R^0}(0) = c_0 g.$$

In the beginning of Period 1, there comes a shock. The shock alters C_1 and C_0's competence levels and makes C_1 more competent. Although now c_0 is smaller than c_1, the shock is not big enough to change the existing *de facto* power distribution: w remains the same. Then, $\mathbf{W^0}$ decides whether to compromise. If so, it votes for the Challenger to replace the Incumbent. The voting process takes a majority rule. Since there are two alternatives, truthful voting is the dominant strategy for members of the Winning Coalition. They vote according to their expected payoffs at the end of Period 1. After Winning Coalition members decide to support which candidate, the rest of the Selectorate is assumed to always accept their decision. Thus, if C_0 gets more than one half of the votes from the sitting Winning Coalition, he will stay in power. Otherwise, C_1 comes into power.

At the end of Period 1, if the Incumbent stays in power, output level remains at c_0 and the composition of the Winning Coalition and the Seletorate remains the same. However, if the Challenger comes into power, the aggregate output becomes c_1 and the composition of Winning Coalition and the rest of the Selectorate changes. Public and private rents are given to the new Winning Coalition members (W^1's) and the new rest of the Selectorate members (R^1's).

For a Winning Coalition member with a distance from the Challenger of d^W, his expected payoff in the beginning of Period 1 has the following form:

1. The Incumbent (C_0) comes into power :

$$EU^{W^0}(0) = c_0 g + c_0 \frac{x}{w}$$

2. The Challenger (C_1) comes into power:

$$EU^{W^0}(1) = \frac{c_1 x}{w}(\frac{1}{2} + \frac{\alpha}{2}(1 - d^W)) + c_1 g$$

We look for the member at d^W that is indifferent between the Incumbent and the Challenger.

$$\begin{aligned} EU^{W^0}(0) &= EU^{W^0}(1) && (1)\\ c_0 g + c_0\frac{x}{w} &= \frac{c_1 x}{w}(\frac{1}{2}+\frac{\alpha}{2}(1-d^W)) + c_1 g && (2)\\ d^W &= 1+\frac{1}{\alpha}+\frac{2w}{\alpha}\frac{g}{x}-\frac{2w}{\alpha}\frac{g}{x}\frac{c_0}{c_1}-\frac{2}{\alpha}\frac{c_0}{c_1} && (3)\end{aligned}$$

The sitting Winning Coalition will pick the Challenger when $d^W > \frac{1}{2}$, which requires the following inequality:

$$\frac{c_0}{c_1} < \frac{\frac{2w}{\alpha}\frac{g}{x}+\frac{1}{\alpha}+\frac{1}{2}}{\frac{2w}{\alpha}\frac{g}{x}+\frac{2}{\alpha}} = 1+\frac{(\alpha-2)x}{4w+4(1-w)x} \quad (4)$$

Since the budget constraint is satisfied, we further denote $T_c = 1+\frac{(\alpha-2)x}{4w+4(1-w)x}$. It is the compromise threshold for the ratio of the Incumbent's competence level over the Challenger's competence level. When $\frac{c_0}{c_1} < T_c$ [10], the sitting Winning Coalition will compromise and pick the more competent Challenger. Otherwise, the Incumbent stays in power.

Based on the equation of T_c, we take derivatives with respect to w, and then x, which leads to the following results:

1. With respect to the *de facto* democracy level:

$$\frac{\partial T_c}{\partial w} = \frac{4x(1-x)(2-\alpha)}{(4w+4(1-w)x)^2} > 0$$

2. With respect to the fraction of private rents:

$$\frac{\partial T_c}{\partial x} = \frac{4w(\alpha-2)}{(4w+4(1-w)x)^2} < 0$$

In this basic model where the Selectorate accepts the choice of the Winning Coalition, we study when the Winning Coalition will compromise and pick the Challenger. We find that the sitting Winning Coalition will select the more competent Challenger when the ratio of the Incumbent's competence level over the Challenger's competence level is higher than a threshold. In other words, the Winning Coalition will compromise when the Challenger is sufficiently more competent. If the Challenger has the same competence level as the Incumbent, a leadership change will never happen. The reason is that a Winning Coalition member requires a sufficient increase in his private and

[10] As shown, $T_c = 1+\frac{(\alpha-2)x}{4w+4(1-w)x}$. Since w ranges from 0 to $\frac{1}{2}$, and α is no larger than 1, T_c is strictly below 1.

public rents that the Challenger can bring to compensate the potential loss of his private rents. Meanwhile, sticking with the Incumbent ensures the Coalition members' access to private rents.

The threshold for compromises can be affected by two factors: 1)the *de facto* democracy level (w), and 2)the ratio of private rents over output (x). As the *de facto* democracy level goes up, the threshold for compromises goes up as well. It indicates that the Winning Coalition will compromise more easily as *de facto* political power gets more evenly distributed among the Selectorate. The reason is that a even power distribution reduces the private rents a Coalition member receives. Moreover, a higher w lowers the probability of losing the private rents. Thus, the Winning Coalition will put a lower requirement for the Challenger.

If a large share of output is granted to the Winning Coalition as the private rents, it increases the Coalition members' potential loss from supporting the Challenger. Thus, the Coalition members will stick with the less competent incumbent as long as they receive high private rents.

3.3 Extended game: Revolution

In this section, we extend the basic model (in Section 3.2) by having a two-stage voting game in Period 1. Now after the Winning Coalition votes for the candidates, the rest of the Selectorate can reject their decision by launching a revolution. In both stages, individuals vote simultaneously and rationally according to their expected payoffs at the end of Period 1.

Start again with Period 0 as described above. In the beginning of Period 1, the same type of shock (as described in the previous section) occurs. Then, the two-stage voting process goes as follows(see Figure 1).

Stage 1: the Winning Coalition votes for the candidates
The voting process takes a majority rule. If C_0 gets more than one half of the votes, $\mathbf{W^0}$ proposes C_0 as the leader of Period 1 to $\mathbf{R^0}$. Otherwise, $\mathbf{W^0}$ proposes C_1 .
Stage 2: the rest of the Selectorate votes on revolution
If $\mathbf{W^0}$ proposes C_1, $\mathbf{R^0}$ will always accept it (See appendix for proof). At the end of Period 1, C_1 comes into power, Y reaches c_1. and a new Winning Coalition, $\mathbf{W^1}$, is formed.[11].
If $\mathbf{W^0}$ proposes C_0, $\mathbf{R^0}$ decides whether to accept it. If $\mathbf{R^0}$ accepts, there will be no revolution and C_0 comes into power. Output stays at c_0. The Selectorate and Winning Coalition remain the same.

[11]The possibility of being a Winning Coalition member after a leadership change is described in Section 2

If $\mathbf{R^0}$ rejects, it starts a revolution, which has a success rate of p_s and destroys a ρ fraction of the final output [12].

1. If a revolution succeeds, the Challenger, C_1, comes into power and Y becomes $(1-\rho)c_1$. A new Winning Coalition, $\mathbf{W^1}$, is formed.
2. If a revolution fails, the Incumbent, C_0, comes into power and Y drops to $(1-\rho)c_0$. The sitting Winning Coalition stays the same.

Finally, public and private rents are given to the Winning Coalition members and Selectorate members at the end of Period 1.

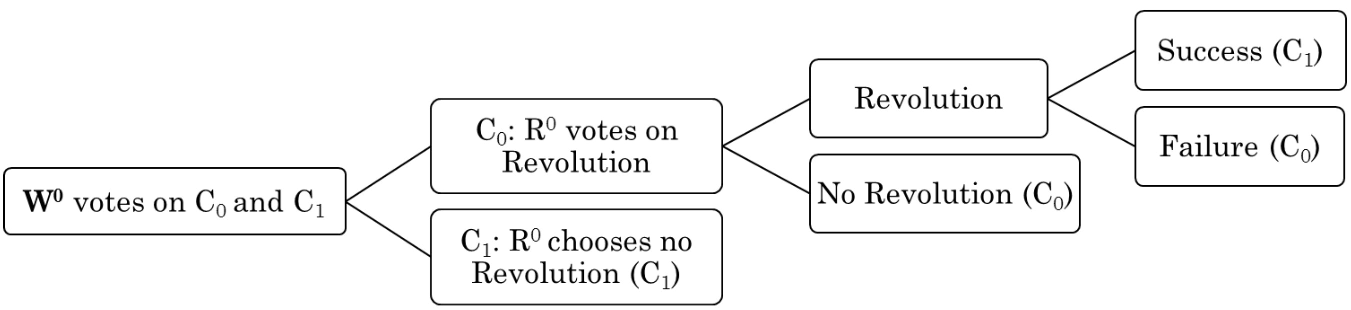

Figure 1: Game tree for the extended game

3.3.1 The rest of the Selectorate votes on revolution

Here we use backward induction and start with $\mathbf{R^0}$'s decision upon proposed candidates. Since the expected payoffs of rejecting the Challenger is always lower than accepting him, $\mathbf{R^0}$ always accepts if $\mathbf{W^0}$ compromises and proposes C_1. We only consider the case when $\mathbf{W^0}$ does not compromise and proposes C_0. R^0 compares his expected payoffs if he accepts C_0 with payoffs if he rejects C_0 and starts a revolution.

For a member of $\mathbf{R^0}$ with a distance from the Challenger of d^R, his payoff at the end of Period 1 has the following form:

1. Voting for the Incumbent (C_0)

$$EU^{R^0}(0) = c_0 g = c_0(1-x) \tag{5}$$

[12] Here we assume: $p_s \in [0,1]$ and $\rho \in [0,1]$ are common knowledge

2. Voting for the Challenger (C_1)

$$EU^{R^0}(1) = (1-\rho)p_s[\frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1 g] + (1-\rho)(1-p_s)c_0 g \quad (6)$$

$$= (1-\rho)p_s[\frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1(1-x)] + (1-\rho)(1-p_s)c_0(1-x) \quad (7)$$

We look for the member of $\mathbf{R^0}$ that is indifferent between the Incumbent and the Challenger.

$$EU^{R^0}(0) = EU^{R^0}(1) \quad (8)$$

$$d^R = \frac{1}{\alpha} + \frac{2(1-x)(1-w)}{\alpha x}\left[1 - \frac{c_0}{c_1}\left(\frac{\rho + p_s - \rho p_s}{(1-\rho)p_s}\right)\right] \quad (9)$$

If d^R is larger than $\frac{1}{2}$, then a revolution will be launched. Thus, we look for the revolution threshold for $\frac{c_0}{c_1}$ by solving the following inequality:

$$d^R = \frac{1}{\alpha} + \frac{2(1-x)(1-w)}{\alpha x}\left[1 - \frac{c_0}{c_1}\left(\frac{\rho + p_s - \rho p_s}{(1-\rho)p_s}\right)\right] > \frac{1}{2} \quad (10)$$

$$\frac{c_0}{c_1} < \frac{p_s(1-\rho)}{p_s + \rho - p_s\rho}\left[1 + \frac{\alpha x}{2(1-w)(1-x)}(\frac{1}{\alpha} - \frac{1}{2})\right] \quad (11)$$

We further denote $T_r = \frac{p_s(1-\rho)}{p_s+\rho-p_s\rho}\left[1 + \frac{\alpha x}{2(1-w)(1-x)}(\frac{1}{\alpha} - \frac{1}{2})\right]$. It is the revolution threshold for the ratio of the Incumbent's competence level over the Challenger's competence level. When $\frac{c_0}{c_1} < T_r$ [13], the rest of the Selectorate will support the more competent Challenger and start a revolution. Otherwise, the rest of the Selectorate will accept the Incumbent as the leader.

In order to study how the revolution threshold changes according to w and x, we calculate the first derivatives of T_r with respect to w and x. The results are as follows:

1. With respect to the *de facto* democracy level:

$$\frac{\partial T_r}{\partial w} = \frac{p_s(1-\rho)}{p_s + \rho - p_s\rho}\frac{(2-\alpha)x}{4(1-x)(1-w)^2} > 0$$

2. With respect to the fraction of private rents:

$$\frac{\partial T_r}{\partial x} = \frac{p_s(1-\rho)}{p_s + \rho - p_s\rho}\frac{(2-\alpha)}{4(1-w)(1-x)^2} > 0$$

[13] T_r is not strictly above 1.

In this extended model, the rest of the Selectorate can reject the proposal of the Winning Coalition. If the Winning Coalition sticks with the Incumbent, the rest of Selectorate would rather support a more competent Challenger to obtain higher public rents and a chance of becoming a Winning Coalition member. However, the Challenger has to be competent enough since a revolution destroy a fraction of the economy and could fail. When a revolution is too costly or too hard to succeed, the rest of the Selectorate would be better off by sticking with the Incumbent rather than supporting the Challenger. Moreover, like how the Winning Coalition picks which candidate to propose, if the Challenger is at the same competence level as the Incumbent, the rest of the Selectorate will not support him either.

The revolution threshold (T_r) can be affected by two factors: 1)the *de facto* democracy level (w), and 2)the ratio of private rents over output (w). The revolution threshold is higher in *de facto* democracies than in *de facto* autocracies. It suggests that when *de facto* political power is evenly distributed among enfranchised individuals, individuals are more willing to support a more competent Challenger. The reason is that as w increases, the members of the rest of the Selectorate get a chance of becoming Winning Coalition members. Then it is worthwhile for them to risk a partial of their public rents to get additional private rents.

Meanwhile, if x is high, it means a large share of output goes to the Winning Coalition as the private rents. It also increases the expected gains of a revolution for the rest of the Selectorate. Now after a successful revolution, not only the rest of the Selectorate will receive a higher level of public rents (because of a higher c_1), but also a potential high level of private rents. This motivates the rest of the Selectorate to support the Challenger and engage in a revolution.

3.3.2 The Winning Coalition votes on candidates

Before the rest of the Selectorate votes on candidates, $\mathbf{W^0}$ votes whether to propose the Incumbent (C_0) or the Challenger (C_1) as the future leader. Due to full information, $\mathbf{W^0}$ can anticipate the responses from $\mathbf{R^0}$. $\mathbf{R^0}$ will always accept, if C_1 is proposed. However, the less competent candidate, C_0, will be proposed, and $\mathbf{R^0}$ may reject by launching a revolution. If $\mathbf{R^0}$ accepts C_0, we are back with the basic model studied in Section 3.2. It implies that if $\frac{c_0}{c_1} > T_c$, the Incumbent will be proposed and stays in power; otherwise, the Challenger will come into power. Here we consider the case where $\mathbf{R^0}$ will not accept $\mathbf{W^0}$'s proposal but will start a revolution. Thus, we compare a Winning Coalition member's expected payoff of proposing the Incumbent (C_0) with proposing the Challenger (C_1) when $\frac{c_0}{c_1} < T_r$. By taking $\mathbf{R^0}$'s responses into consideration, a Winning Coalition member's expected payoff becomes:

1. $\mathbf{W^0}$ proposes C_0

$$EU^{W^0}(0) = (1-\rho)p_s[(\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1 g] + (1-p_s)(1-\rho)(c_0\frac{x}{w}+c_0 g) \tag{12}$$

$$= (1-\rho)p_s[(\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x)] + (1-p_s)(1-\rho)[c_0\frac{x}{w}+c_0(1-x)] \tag{13}$$

2. $\mathbf{W^0}$ proposes C_1

$$EU^{W^0}(1) = (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1 g \tag{14}$$

$$= (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x) \tag{15}$$

When comparing the payoffs of voting for the Incumbent with the payoffs of voting for the Challenger, there exists a Winning Coalition member at d^W who is indifferent between C_1 and C_0 under the revolution threat. The member has a distance from the Challenger as follows:

$$EU^{W^0}(0) = EU^{W^0}(1)$$

$$(1-\rho)p_s[(\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x)]+(1-p_s)(1-\rho)[c_0\frac{x}{w}+c_0(1-x)] = (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x)$$

$$d^W = 1+\frac{1}{\alpha}+\frac{2(1-x)w}{\alpha x}-\frac{2}{\alpha}\frac{(1-p_s)(1-\rho)}{(1-p_s+p_s\rho)}\frac{c_0}{c_1}\left[1+\frac{(1-x)}{x}w\right] \tag{16}$$

If d^W is larger than $\frac{1}{2}$, the Winning Coalition will compromise and propose the Challenger to the rest of the Selectorate. To find the compromise threshold under the revolution threat, we solve the following inequality for $\frac{c_0}{c_1}$:

$$d^W = 1+\frac{1}{\alpha}+\frac{2(1-x)w}{\alpha x}-\frac{2}{\alpha}\frac{(1-p_s)(1-\rho)}{(1-p_s+p_s\rho)}\frac{c_0}{c_1}\left[1+\frac{(1-x)}{x}w\right] > \frac{1}{2} \tag{17}$$

$$\frac{c_0}{c_1} < \frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}\frac{\frac{2w}{\alpha}\frac{(1-x)}{x}+\frac{1}{\alpha}+\frac{1}{2}}{\frac{2w}{\alpha}\frac{(1-x)}{x}+\frac{2}{\alpha}} \tag{18}$$

$$\frac{c_0}{c_1} < \frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}T_c \tag{19}$$

We further denote the compromise threshold under a revolution threat for $\frac{c_0}{c_1}$ as T_{rc}. Moreover, based on (19), we find that T_{rc} is equivalent to $\frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}T_c$. It shows that the compromise threshold under a revolution threat equals the compromise threshold without a revolution threat times a factor $\frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}$. Since the factor is larger than 1, it implies that the revolution threat from the rest of the Selectorate reduces the Winning Coalition's benefits from staying royal to the Incumbent. Therefore, the Winning Coalition will lower their requirement for the Challenger's competence level. The revolution threat will result in more switches to the Challenger proposed by the Winning Coalition.

To what extent the Winning Coalition will lower their requirement for the Challenger depends on 1) how costly a revolution is (ρ), and 2) the success rate of a revolution (p_s). When a revolution does not cost a large portion of the output and succeeds with a high possibility, the revolution threat from the rest of the Selectorate is very credible. It also means that the potential costs of sticking with the Incumbent goes up for the Winning Coalition. Thus, when p_s and ρ are high, the Winning Coalition is better off by compromising and proposing the Challenger.

To show how the compromise threshold under a revolution threat changes according to w and x, we take derivatives of T_{rc} with respect to w, and then x. The results are as follows:

1. With respect to the *de facto* democracy level:

$$\frac{\partial T_{rc}}{\partial w} = \frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}\frac{\partial T_c}{\partial w} > 0$$

2. With respect to the fraction of private rents:

$$\frac{\partial T_{rc}}{\partial x} = \frac{(1-p_s+p_s\rho)}{(1-p_s)(1-\rho)}\frac{\partial T_c}{\partial x} < 0$$

In this stage, the Winning Coalition votes on whether to compromise under a revolution threat. As shown above,the revolution threat makes the Winning Coalition compromise more easily. Meanwhile, there are two additional factors in determining the compromise threshold. Like the situation without a revolution threshold, the Winning Coalition lowers its requirement for the Challenger as the *de facto* democracy level goes up. The lower chance of losing his private rents makes the sitting Coalition member less royal to the Incumbent. Meanwhile, the Winning Coalition also requires a lower competence level for the Challenger if a smaller portion of the output goes to their private rents. The reason is that with a lower level for private rents, the cost for compromises (i.e. losing the private rents) drops as well. The Winning Coalition is better off to support the Challenger and have higher public rents.

3.3.3 Equilibria

In the extended model, the Winning Coalition decides whether to compromise while the rest of the Selectorate votes on whether to start a revolution. In the above subsections, we discover the compromise threshold without a revolution threat (T_c), the compromise threshold under a revolution threat (T_{rc}), and the revolution threshold (T_r). Their relative sizes determine the leader outcomes and whether a revolution is possible. Moreover, we also find that the compromise threshold without a revolution threat (T_c) is strictly lower than the compromise threshold under a revolution threat (T_{rc}), which means the Equilibria hold for T_{rc} hold for T_c as well. This finding narrows the discussion on Equilibria to two thresholds: T_r and T_{rc}.

We start with situations where the compromise threshold under a revolution threat is larger than, or equivalent to, the revolution threshold (i.e. $T_{rc} \geq T_r \geq T_c$ or $T_{rc} \geq T_c \geq T_r$). In these situations, if the Challenger is competent enough to satisfy the revolution threshold ($\frac{c_0}{c_1} < T_r$), his competence level also satisfies the compromise threshold ($\frac{c_0}{c_1} < T_{rc}$)[14]. The 2-stage voting process starts with the Winning Coalition votes on whom to propose to the rest of the Selectorate. If the compromise threshold is satisfied, the Challenger will be proposed and the rest of Selectorate will accept him. Thus, when $T_{rc} \geq T_r$, revolution will never occur. Leadership outcomes are as follows:

If $T_{rc} \geq T_r \geq T_c$ or $T_{rc} \geq T_c \geq T_r$,

1. If $\frac{c_0}{c_1} < T_{rc}$, the Winning Coalition propose the Challenger and the rest of the Selectorate accepts him. The Challenger comes into power.

2. If $\frac{c_0}{c_1} \geq T_{rc}$, the Winning Coalition propose the Incumbent and the rest of the Selectorate accepts him. The Incumbent comes into power.

If the compromise threshold under a revolution threat is smaller than the revolution threshold, i.e. $(T_c <)T_{rc} < T_r$, revolutions become possible. If the Challenger is competent enough to meet the compromise threshold under a revolution threat, the Winning Coalition will propose him and the rest of the Selectorate will accept him. However, if the Challenger is competent enough to satisfy the revolution threshold but not the compromise threshold, the rest of the Selectorate will reject the Incumbent and start a revolution. Whether the Challenger will come into power depends on the outcome of the revolution. Lastly, if the Challenger's competence level cannot satisfy the revolution threshold, then the Incumbent will be proposed and come into power without a revolution. Thus, we get:

[14] The same reasoning holds for T_c.

If $T_{rc} < T_r$,

1. If $\frac{c_0}{c_1} < T_{rc}$, the Winning Coalition propose the Challenger and the rest of the Selectorate accepts him. The Challenger comes into power.

2. If $T_{rc} \leq \frac{c_0}{c_1} < T_r$, the Winning Coalition propose the Incumbent and the rest of the Selectorate starts a revolution. The Challenger comes into power if the revolution succeeds. Otherwise, the Incumbent comes into power.

3. If $T_r \leq \frac{c_0}{c_1}$, the Winning Coalition propose the Incumbent and he comes into power without a revolution.

3.4 Extended game: *de jure* democracy

In this section, we discussed the impact of *de jure* democracy level on the extended game with revolution possibilities. So far, we have only studied within the Selectorate, how the Winning Coalition interacts with the rest of the Selectorate to make leader choices. In other words, we only considered how *de facto* democracy influences leadership changes.

In reality, not every individual living in a country has a saying in political selection. Thus, we introduce another infinite set, the Residents (denoted by $\mathbf{N}$). The set includes every individual living in the state, with or without political rights. Thus, the Selectorate is a subset of the Residents($\mathbf{S} \subset \mathbf{N}$). The ratio of the size of the enfranchised individuals ($|S|$) over the size of the Residents (denoted by $|N|$) represents the *de jure* democracy level of a state.

We denote s as the ratio of $|S|$ over $|N|$. s is externally determined by the state's political system and ranges from 0 to 1. When s goes to 1, it means every individual living in the state has a saying in political selection, which is a perfect *de jure* democracy. On the opposite, when s is close to 0, most residents in the state is deprived of their political rights. The state becomes a perfect *de jure* autocracy.

Having both enfranchised and disenfranchised individuals implies that when the revolution fails, the rest of the Selectorate members may lose their political rights by engaging in a revolution. A fraction s of the rest of the Selectorate will stay in the Selectorate while the rest will be replaced by the disenfranchised individuals. However, if a revolution succeeds, all sitting Winning Coalition members will be disenfranchised and be replaced by some of the rest of Selectorate. Some from the disenfranchised group will become members of the rest of the Selectorate.

After a revolution success, the rest of the Selectorate will have an average probability of w to become a Coalition member while each member's specific probability depends on his distances from the Challenger. Take a member of the rest of the Selectorate for instance, if he is located in the middle of the Hotelling line, he has the average probability of becoming a Coalition member, i.e. w. If his distance from the Challenger is d^R, his chance of becoming a Coalition member becomes $\frac{w}{1-w} + \frac{\alpha}{1-w}(\frac{1}{2} - d^R)$. As d^R is uniformly distributed from 0 to 1, a **R** member's specific probability ranges from $\frac{w}{1-w} - \frac{\alpha}{2(1-w)}$ to $\frac{w}{1-w} + \frac{\alpha}{2(1-w)}$[15].

As a disenfranchised individual, he has no political rights and receives no rents. No matter a revolution succeeds or fails, he has nothing to lose but gain a chance of becoming a member of the rest of the Selectorate. Thus, revolution means potential access to the public rents for them. Since participating in a revolution is always a better option to the disenfranchised, they will always support the rest of the Selectorate to launch a revolution. Meanwhile, the disenfranchised is the less resourceful group in the state. It alone cannot start a revolution.

With the same game setting as in Section 3.3, we would like to see how *de jure* democracy level influences the revolution threshold and the compromise threshold under a revolution threat. We start with the rest of the Selectorate voting on revolution and then discuss about the Winning Coalition voting on compromises.

3.4.1 The rest of the Selectorate voting on revolution

For some members of the rest of the Selectorate, a revolution failure now will make them lose their public rents. Whether the chance of losing public rents is high depends on the level of *de jure* democracy level. For a member of $\mathbf{R^0}$ located at d^R, his payoff at the end of Period 1 becomes:

1. Voting for the Incumbent (C_0)

$$EU^{R^0}(0) = c_0(1 - x) \tag{20}$$

2. Voting for the Challenger (C_1)

[15] α is sufficiently small so that a **R** member's specific probability ranges from 0 to 1.

$$EU^{R^0}(1) = (1-\rho)p_s[(\frac{w}{1-w} + \frac{\alpha}{1-w}(\frac{1}{2} - d^R))\frac{c_1 x}{w} + c_1 g] + (1-\rho)(1-p_s)sc_0 g \quad (21)$$

$$= (1-\rho)p_s[(\frac{w}{1-w} + \frac{\alpha}{1-w}(\frac{1}{2} - d^R))\frac{c_1 x}{w} + c_1(1-x)] + (1-\rho)(1-p_s)sc_0(1-x) \quad (22)$$

Again we look for the member located at d^R that is indifferent between the Incumbent and the Challenger.

$$EU^{R^0}(0) = EU^{R^0}(1) \quad (23)$$

$$d^R = \frac{1}{2} + \frac{w}{\alpha} + \frac{(1-x)w}{x\alpha}(1-w) - \frac{(1-(1-\rho)(1-p_s)s)}{(1-\rho)p_s}\frac{c_0}{c_1}\frac{(1-x)w}{x\alpha}(1-w) \quad (24)$$

Similar to the approach in Section 3.3.1, we look for the revolution threshold for $\frac{c_0}{c_1}$ where d^R is larger than $\frac{1}{2}$:

$$d^R = \frac{1}{2} + \frac{w}{\alpha} + \frac{(1-x)w}{x\alpha}(1-w) - \frac{(1-(1-\rho)(1-p_s)s)}{(1-\rho)p_s}\frac{c_0}{c_1}\frac{(1-x)w}{x\alpha}(1-w) > \frac{1}{2} \quad (25)$$

$$\frac{c_0}{c_1} < \frac{p_s(1-\rho)}{1-(1-p_s)(1-\rho)s}[1 + \frac{x}{(1-w)(1-x)}] \quad (26)$$

We denote the new revolution threshold as T_r', which equals $\frac{p_s(1-\rho)}{1-(1-p_s)(1-\rho)s}[1+\frac{x}{(1-w)(1-x)}]$. And we get whether T_r' is smaller or greater than T_r is ambiguous. It depends on the value of s, x, w, ρ and p_s.[16].

The reason why the relationship between T_r' and T_r is ambiguous is that the existence of the disenfranchised increases R's chance of becoming a Coalition member after a revolution success and his loss after a revolution failure. Now a revolution failure does not only mean destroying a partial of the economy but also potentially losing one's public rents.[17] As the revolution costs more, the rest of the Selectorate will raises its requirement for the Challenger. However, the higher chance of getting private rents also will make the rest of the Selectorate lower its requirement for the Challenger. Whether the gains outweighs the losses depends on the value of those parameters.

Meanwhile, if the state is a perfect *de jure* democracy ($s = 1$), T_r' is higher than, or equivalent to, T_r. It implies that when the whole populace has political rights, the loss after a revolution failure remains the same while R's chance of getting private rents rises after a revolution success. Thus, **R** will require a lower competence level from the Challenger. As the state gets more *de jure* autocratic (s goes to 0), the requirement for the Challenger gets higher.

[16] Proof will be provided upon request

[17] In the Static setting, the loss of political rights does not matter much. However, in the dynamic setting, the loss of political rights could mean a loss of potential private rents in the next round.

As $T_r' = \frac{p_s(1-\rho)}{1-(1-p_s)(1-\rho)s}[1 + \frac{x}{(1-w)(1-x)}]$ shown, the new revolution threshold does not only depend on *de facto* democracy level but also on *de jure* democracy level. It suggests when there exists the disenfranchised group, the rest of the Selectorate take two dimensions of democracy into consideration. Meanwhile, the ratio of private rents over total output (x) also matters for the new revolution threshold. Therefore, we calculate the following derivatives:

1. With respect to the *de jure* democracy level:

$$\frac{\partial T_r'}{\partial s} = (1 + \frac{x}{1-x})\frac{(1-\rho)^2 p_s(1-p_s)}{(1-(1-p_s)(1-\rho)s)^2} > 0 \tag{27}$$

2. With respect to the *de facto* democracy level:

$$\frac{\partial T_r'}{\partial w} = \frac{(1-\rho)p_s}{(1-(1-p_s)(1-\rho)s)}[\frac{x}{(1-x)(1-w)^2}] > 0 \tag{28}$$

3. With respect to the fraction of private rents:

$$\frac{\partial T_r'}{\partial x} = \frac{(1-\rho)p_s}{(1-(1-p_s)(1-\rho)s)}[\frac{1}{1-x} + \frac{x}{(1-x)^2}] > 0 \tag{29}$$

Why the new revolution threshold increases with regard to x follows the same reasoning as depicted in Section 3.3.1. The reason why the new revolution threshold goes up with respect to the *de jure* democracy level is that as s goes to 1, the possibility of losing public rents after a failed revolution goes down as well. As the potential loss gets lower in a *de jure* democracy, the Winning Coalition would lower their requirement on the Challenger and more easily support a revolution. However, in a *de jure* autocracy, the access to the public rents alone will make the rest of the Selectorate more royal to the Incumbent.

Furthermore, as *de facto* democracy level increases, the rest of the Selectorate also set a lower requirement for the Challenger's competence level. The reason is that as w increases, the members of the rest of the Selectorate get a higher probability of becoming Winning Coalition members. Then it becomes rewarding for them to risk a partial of their public rents to get additional private rents.

3.4.2 The Winning Coalition votes on candidates

Similar to Section 3.3.2, we consider the case that the Winning Coalition votes on candidates under a revolution threat (when $\frac{c_0}{c_1} < T_r'$). Conditioning on **R**'s response (i.e.a revolution), a Winning

Coalition member's expected payoff now becomes:

1. $\mathbf{W^0}$ proposes C_0

$$EU^{W^0}(0) = (1-\rho)p_s 0 + (1-p_s)(1-\rho)c_0(\frac{x}{w}+g) \quad (30)$$
$$= (1-p_s)(1-\rho)c_0(\frac{x}{w}+1-x) \quad (31)$$

2. $\mathbf{W^0}$ proposes C_1

$$EU^{W^0}(1) = (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1 g \quad (32)$$
$$= (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x) \quad (33)$$

Here we compare the payoffs of voting for the Incumbent with the payoffs of voting for the Challenger. There exists a member of the sitting Winning Coalition who is located at d^W and indifferent between C_1 and C_0. The member's distance from the Challenger calculated is as follows:

$$EU^{W^0}(0) = EU^{W^0}(1)$$
$$(1-p_s)(1-\rho)c_0(\frac{x}{w}+1-x) = (\frac{1}{2}+\frac{\alpha}{2}(1-d^W))c_1\frac{x}{w}+c_1(1-x)$$

$$d^W = 1+\frac{1}{\alpha}+\frac{2w}{\alpha}\frac{(1-x)}{x}-(1-p_s)(1-\rho)\frac{c_0}{c_1}\left[\frac{2}{\alpha}+\frac{2w(1-x)}{\alpha x}\right] \quad (34)$$

We look for the new compromise threshold under revolution threat by solving the following inequality:

$$d^W = 1+\frac{1}{\alpha}+\frac{2w}{\alpha}\frac{(1-x)}{x}-(1-p_s)(1-\rho)\frac{c_0}{c_1}\left[\frac{2}{\alpha}+\frac{2w(1-x)}{\alpha x}\right] > \frac{1}{2} \quad (35)$$
$$\frac{c_0}{c_1} < \frac{1}{(1-p_s)(1-\rho)}\frac{\frac{2w}{\alpha}\frac{(1-x)}{x}+\frac{1}{\alpha}+\frac{1}{2}}{\frac{2w}{\alpha}\frac{(1-x)}{x}+\frac{2}{\alpha}} \quad (36)$$
$$\frac{c_0}{c_1} < \frac{1}{(1-p_s)(1-\rho)}T_c \quad (37)$$

We denote the new compromise threshold under revolution threat as T'_{rc}, and T'_{rc} is equal to $\frac{1}{(1-p_s)(1-\rho)}\left[1+\frac{(\alpha-2)x}{4w+4(1-w)x}\right]$[18]. By comparing T'_{rc} with T_{rc} and T_c, we get the following relation-

[18] T'_{rc} is not strictly above 1.

ship:

$$T'_{rc} = \frac{1}{(1 - p_s + p_s\rho)} T_{rc} = \frac{1}{(1 - p_s)(1 - \rho)} T_c$$

$$T_c \leq T_{rc} \leq T'_{rc}$$

As shown above, the revolution threat makes the compromise thresholds with it higher than the threshold without it. Meanwhile, the Winning Coalition will now definitely lose both their public and private rents after a successful revolution. Since previously a Winning Coalition will only lose his private rents with a probability, the cost for being royal to the Incumbent becomes much higher for Coalition members now. Thus, they will lower their requirement for the Challenger and compromises more easily.

Another thing worth noticing is that the *de jure* democracy level does not play a role in determining the new compromise threshold. The reason is that after a revolution failure, the Coalition members will lose all their rights even their chance of being a Selectorate member. Meanwhile, like the cases in T_c and T_{rc}, both the *de facto* democracy level (w) and the ratio of private rents over total output (x) affect the new compromise threshold:

1. With respect to the *de facto* democracy level:

$$\frac{\partial T'_{rc}}{\partial w} = \frac{1}{(1 - p_s)(1 - \rho)} \frac{\partial T_c}{\partial w} > 0$$

2. With respect to the fraction of private rents:

$$\frac{\partial T'_{rc}}{\partial x} = \frac{1}{(1 - p_s)(1 - \rho)} \frac{\partial T_c}{\partial x} < 0$$

Similar to Section 3.3.2, the Winning Coalition is more willing to compromise and propose the Challenger as the *de facto* democracy level increases and the ratio of private rents over total output goes down. The difference is that now a small change in w or x will change the compromise threshold more extensively than it will do before. It is caused by the greater loss of a Coalition member after a revolution failure.

3.4.3 Equilibria

In this section, the *de jure* democracy level plays a role in determining leadership changes. Now after a revolution success, the entire Winning Coalition will lose all their rents and become disenfranchised. If the revolution failed, a fraction of the rest of Selectorate has to change places with some members of the disenfrachised. Similar to Section 3.3.3, we find the new compromise threshold under a revolution threat (T'_{rc}), and the new revolution threshold (T'_r). Their relative sizes determine the leader outcomes and whether a revolution is possible.

Let us start the case where the new compromise threshold under a revolution threat is larger than, or equivalent to, the revolution threshold (i.e. $T'_{rc} \geq T'_r$). Then, even if the Challenger is competent enough to satisfy the revolution threshold ($\frac{c_0}{c_1} < T'_r$), the Winning Coalition would have already proposed the Challenger as the leader to the rest of the Selectorate ($\frac{c_0}{c_1} < T'_r \leq T'_{rc}$). Thus, when $T'_{rc} \geq T'_r$, revolution will never happen. Leadership outcomes are as follows:

If $T'_{rc} \geq T'_r$,

1. If $\frac{c_0}{c_1} < T'_{rc}$, the Winning Coalition propose the Challenger and the rest of the Selectorate accepts him. The Challenger comes into power.
2. If $\frac{c_0}{c_1} \geq T'_{rc}$, the Winning Coalition propose the Incumbent and the rest of the Selectorate accepts him. The Incumbent comes into power.

In the case where the new compromise threshold under a revolution threat is smaller than the new revolution threshold, i.e. $T'_{rc} < T'_r$, revolutions become possible. Suppose that the Challenger is competent enough to meet the new compromise threshold under a revolution threat. The Winning Coalition will propose him and the rest of the Selectorate will accept him. However, if the Challenger is competent enough to get support from the rest of the Selectorate but not from the Winning Coalition, the rest of the Selectorate will reject the Incumbent and start a revolution. Lastly, if the Challenger's competence level cannot satisfy the new revolution threshold, then the Incumbent will come into power without a revolution. Thus, we get:

If $T'_{rc} < T'_r$,

1. If $\frac{c_0}{c_1} < T'_{rc}$, the Winning Coalition propose the Challenger and the rest of the Selectorate accepts him. The Challenger comes into power.
2. If $T'_{rc} \leq \frac{c_0}{c_1} < T'_r$, the Winning Coalition propose the Incumbent and the rest of the Selectorate starts a revolution. The Challenger comes into power if the revolution succeeds. Otherwise, the Incumbent comes into power.
3. If $T'_r \leq \frac{c_0}{c_1}$, the Winning Coalition propose the Incumbent and he comes into power without a revolution.

The difference from Section 3.3.3 is that it is more likely to have $T'_{rc} \geq T'_r$ than $T'_{rc} < T'_r$ now. As proven above, whether T'_r is larger or smaller than T_r is not certain. Meanwhile, T'_{rc} is definitely larger than (at least equal to) T_{rc}. Thus, it is more likely that revolution will never happen and the Winning Coalition determines the outcome of the leader.

4 Conclusion

In this paper, we use a static model to study political selection in different political regimes. Particularly we study how the Winning Coalition and the rest of Selectorate interact with each other in the presence of revolution possibilities. The sizes of these groups define two dimensions of democracy: 1)*de facto* democracy, and 2)*de jure* democracy. We find two thresholds that determine the leadership outcomes. They are: 1) the compromise threshold, and 2) the revolution threshold. If the Challenger has an adequate competence level for the compromise threshold, he is proposed and comes into power without a fight. If the revolution threshold is satisfied, the Challenger becomes the leader after a successful revolution. Otherwise, the less competent leader, the Incumbent, remains in power

If it is easier to satisfy the compromise threshold than the revolution threshold, then the Challenger comes into power when he is sufficiently competent. It is a case where a revolution never occurs. However, if the revolution threshold is easier to be satisfied, a revolution occurs if the Challenger is competent enough for the rest of the Selectorate to support a revolution but not enough for the Winning Coalition to compromise.

In the presence of a revolution threat, the thresholds are largely influenced by two factors: 1)*de facto* democracy level, and 2) the fraction of output that goes to the private rents. As the *de facto* democracy level or the fraction of the private rents over output increase, the rest of the Selectorate lowers their requirement on the Challenger's competence level. The reason is that as these two factors go up, the potential access to private rents becomes rewarding for the rest of the Selectorate to risk a fraction of their public rents. Meanwhile, the Winning Coalition is more willing to support the Challenger if the *de facto* democracy level goes up or the fraction of the private rents over output goes down. Interestingly, the fraction of private rents over output motivates the rest of the Selectorate to support the Challenger while demotivating the Winning Coalition by making the cost of compromise too high. The private rents and probability of losing it (because of uneven *de facto* political power distribution) ensures the royalty of the sitting Winning Coalition towards the Incumbent.

In addition to a revolution possibility, we further include another dimension of democracy, i.e. *de jure* democracy. We find that the rest of the Selectorate becomes more supportive of the Challenger (and a revolution) as the *de jure* democracy level goes up. The underlying reason is that as the disenfranchised group gets smaller in the state, the probability of losing one's public rents goes to zero for members of the rest of the Selectorate. However, whether the state is a *de jure* democracy does not affect the Winning Coalition's decision to select which leader. For them, only the distribution of *de facto* political power matters.

There are a number of issues that we do not address but will be incorporated in future works. First of all, we will introduce asymmetric information such that the Winning Coalition knows the Challenger's competence level but the Selectorate does not. Secondly, we can impose a different budget constraint by allowing politicians to subtract rents. Thirdly, this static model will be further extended into tractable dynamic model by allowing the Challenger to change the ratio of private rents over output, *de jure* and *de facto* democracy levels. Meanwhile, the Incumbent can counter the Challenger's offer by changing the level of private rents and *de facto* democracy beforehand. In the dynamic setting, the Incumbent will have the advantage in terms of counteroffering the Challenger in advance, but he suffers from being unable to change the Sitting Winning Coalition. Last but not least, the model has empirical implications. These issues will be explored in the future.

5 Appendix

5.1 $\mathbf{W^0}$ proposes C_1: $\mathbf{R^0}$ will always accept

When $\mathbf{W^0}$ proposes C_1, the payoff for $\mathbf{R^0}$ to accept is:

$$EU^{R^0}(1) = \frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1 g \tag{38}$$

If $\mathbf{R^0}$ decides to reject and votes for C_0 by launching a Revolution, its action will destroy fraction ρ of the output and has a p_s probability of success. Then, $\mathbf{R^0}$ member's payoff becomes:

$$EU^{R^0}(0) = (1-\rho)\left[p_s c_0 g + (1-p_s)\left(\frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1 g\right)\right] \tag{39}$$

$$c_1 > c_0 \rightarrow c_1 g > c_0 g$$

$$p_s \in [0,1] \rightarrow p_s c_0 g + (1-p_s)\left(\frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1 g\right) \leq \frac{w}{2(1-w)}(1-\alpha d^R)\frac{c_1 x}{w} + c_1 g$$

Since $\rho \in [0,1]$,$EU^{R^0}(0) \leq EU^{R^0}(1)$.When $\mathbf{W^0}$ proposes C_1, the payoff for $\mathbf{R^0}$ to accept is higher than (or at extremes, equivalent) to reject and vote for C_0.

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