Accountability in One-Party Government: Rethinking the Success of Chinese Economic Reform

by

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This paper develops a new argument for the Chinese Communist Party's success in implementing the post-Mao economic reform. We build a three-player political agency model, showing that the credibility of the threats of deposition by the selectorate and of revolts by citizens are both crucial factors in determining policy outcomes in the authoritarian political system. As the effective size of the selectorate and the cost of revolution vary dramatically across time, our results explain why different types of economic policy arise in different periods in China. (JEL: D02, H11, D74, P30)

"Of all China's problems, the one that trumps everything is the need for stability."[1] – Deng Xiaoping

1 Introduction

China began its economic transition more than thirty years ago under the same authoritarian political system that had ruled the country since 1949. With a consistent annual average economic growth rate of about 9 percent for more than 30 years,

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[1] Deng Xiaoping, "China Will Tolerate No Disturbances," speech, March 4, 1989.

China has emerged as the second largest economy in the world. This exceptional economic performance challenges our general understanding of the mechanisms of autocratic regimes.

We believe it is important to understand why since 1976 the Chinese leaders have been accountable to the public in promoting economic growth, while before Mao's death the same political regime was an economic disaster. It may be tempting to treat such cases as exceptional, explaining them away as oddities in which rulers used their power to pursue development for idiosyncratic reasons. We do not believe this to be the case. Instead, we see the politicians' behaviors and policy choices – which differed dramatically in different periods during China's development – as equilibrium outcomes that depend on institutional details.

Our main objective in this paper is to study the effects of China's political institutions on the leaders' accountability and thus on their economic decisions. "Accountability" is a term derived from democratic settings, defined as a capacity of institutional structure to hold incumbents accountable to the public and responsive to public wishes (Ferejohn, 1999). This notwithstanding, we believe that, though nondemocratic leaders are sensitive to popular support in other ways than are democratic leaders, even autocrats cannot fully ignore the popular perception of their policies. To this aim, we have developed a political-economy model that explains the dramatic changes of Chinese leaders' behaviors in different periods as shifts from one equilibrium to another. These shifts were due to changes in the structure of de facto power in the Chinese political system. Our basic argument is that for the Chinese leadership to retain political power within the authoritarian system, they must simultaneously appease two threatening forces. The first comes from the political elites who might organize a coup; the second, from the unenfranchised citizens who might initiate a revolt. The incentives of political survival and grabbing short-term private rent altogether drive the leaders' strategic calculations on the policies they want to implement. As the balance of power among the political leaders, the political elites, and the unenfranchised citizens shifted in different periods, we observe different kinds of policy outcomes.

The remainder of the paper is organized as follows. In the next section we review the relevant literature. Section 3 presents the model, which is analyzed in section 4. Section 5 applies the model to explain the China puzzle. In section 6, we outline two alternative theories and discuss whether either of these appears to give a better description of the historical events than our preferred story. The first, which we refer to as the ideology view, explains the shifts of policies in China as a result of the conflict between dogmatic Marxists and pro-capitalism reformists in the top Chinese leadership (see Zou, 1991). The second theory is that for the Chinese leaders to retain power, they need to create a system of political patronage; and the different patterns of policymaking in China in different periods are related to the changing needs of politicians (see Naughton, 2008). Although these two theories are widely accepted explanations of policy shifts in China, our interpretation is that the change of leadership accountability as a result of the change of the structure of power in the authoritarian political system was the major factor that explains the

changing ruling patterns in different periods in China. Finally, the last section offers a conclusion.

2 *A Review of the Literature*

The existing literature on the political economy of autocracies suggests that accountability in nondemocratic governments comes from the *selectorate*,[2] which comprises insiders who have the ability to depose a leader. Bueno de Mesquita et al. (2003) developed a new framework to analyze autocracies, concluding that the larger the selectorate, whose support is necessary for the incumbent politician to remain in power, the higher the level of public goods provided by the government. In a series of recent papers, Bueno de Mesquita and Smith (Bueno de Mesquita and Smith, 2009, 2010; Smith, 2008) extend their model to include three players, with the citizens now included as another player who might threaten the leader through revolution. They find that when the size of the winning coalition is very small, the leader's optimal response to a revolutionary threat is to reduce public-goods provision (Bueno de Mesquita and Smith, 2009). However, their finding cannot explain China's economic development after the 1990s. After the 1989 Tiananmen crackdown, the size of the winning coalition in China became very small, and according to their theory the best response for the leader should have been to reduce public-goods provision to avert the threat of a revolution. But in fact, the Chinese leaders' choices were exactly contrary. The first contribution of our paper is that we provide a theory deeply rooted in institutional details that are highly specific to contemporary Chinese politics. Our theory not only explains China's economic development in the first stage of the reform in the 1980s, but also explains China's economic development in the second stage of the reform since the 1990s. Our theory incorporates Acemoglu and Robinson's (2001, 2006) insights into the revolutionary threat from the citizens, which per se can be an effective check on the leaders' behavior.

Besides, Bueno de Mesquita and Smith (2009) do not consider incomplete information, which is extremely important for studying accountability, as shown by Besley (2006) and Besley and Kudamatsu (2008). Incomplete information matters here because the heart of the means for achieving accountability is to overcome moral hazard and adverse selection in the principal–agent relationship between the ruled and the ruler. Besley and Kudamatsu (2008) find that the threat of being ousted by coup from the selectorate could curtail rent extraction by autocratic leaders, and an autocratic government works well when the power of the selectorate does not depend on the existing leaders' remaining in office. But Besley and Kudamatsu's (2008) model neglects the potentially important role of the citizens as well, suggesting that autocratic leaders' strategic behaviors are only affected by the selectorate. The second contribution of our paper is to create a model that incorporates in-

[2] The term selectorate was first used by Shirk (1993) to study elite politics in China.

complete information on the leaders' types, as well as the participation of both the selectorate and the citizens as effective players, as incentive tools for the ruler. We find that under specific conditions both the selectorate and the citizen can restrain politicians from opportunistic behavior.

Concerning the existing literature on China's economic miracle, it largely agrees on interpreting the reform process as a "gradualist" approach, which is contrasted with the "big bang" reforms experienced in Russia and Eastern Europe.[3] However, different views emerge with respect to the role of state policies. Some attribute China's remarkable economic growth to the capacity of local governments to promote economic growth as a consequence of the progrowth incentives generated by the country's fiscal and political decentralization.[4] Of course, local actors have important roles in the history of Chinese reforms, but only as players in a game directed from Beijing (Cai and Treisman, 2006). The Chinese national leaders played a crucial role as well: all the critical economic policies were made by them according to their positions in the authoritarian political system. Actually the central government is the most important institution in any dictatorial country, and its involvement is essential for any kind of policy. This point has been confirmed yet again during the dramatic changes of economic policies in the past sixty-odd years in China.

3 *The Model*

The model aims to analyze accountability in China and from this focus derives its simplifications. It is a standard model in the tradition of Besley's principal–agent approach (Besley, 2006), though we consider two principals, the selectorate and the citizens. It inherits from Besley's approach the fact of being simultaneously a screening and a moral-hazard model, where paradoxically the incentive mechanism works when there is pooling. The game we use is characterized by incomplete information regarding the type of incumbent leader, by having two periods, and by having three players: one agent – the (feminine) incumbent leader (L), and two principals – the (plural) citizens (Z) and the (neuter) selectorate (S). This means that all agents in the same group (leader, selectorate, or citizens) share the same preferences and are capable of making joint decisions. This assumption avoids two topics that, although relevant, would possibly obscure the main focus of our analysis: the collective-action problem and the mechanism for aggregating different preferences. The collective-action problem is particularly important for citizens in dictatorships; however, our model relies on the role of threats of rebellion, which are a real problem for any authoritarian polity. Moreover, we use the cost of revolution, μ, as a synthetic way of modeling the costs of citizens' collective action, following Acemoglu and Robinson (2006).

[3] For a discussion, see Perkins (1988), McMillan and Naughton (1992), Naughton (1995, 2007), Murrell (1991, 1992), Rawski (1995), Lin, Cai, and Li (1996).

[4] For a discussion, see Oi (1992), Montinola, Qian, and Weingast (1995), Qian and Weingast (1996, 1997), Qian and Roland (1998), Xu and Zhuang (1998), Xu (2011).

The incumbent leader moves first, choosing the economic policy. The citizens choose after the leader: in autocracies the citizens do not have the power to choose the leader, but they have the de facto power to initiate a revolution to try to overthrow the regime. The last player to move is the selectorate, the group of people that in a given political regime has the actual possibility of deposing a leader.[5] As usual, the timing is quite arbitrary; we decide to leave the last move to the selectorate to model the elite as a last-resort player, who has the possibility of intervention once things have gone too far.

The leader can be either congruent ($T = C$) with probability π, or noncongruent ($T = N$) with probability $1 - \pi$. Each type of the leader in each period $t = 1, 2$ is privately informed of the true state of nature $\theta_t \in \{0, 1\}$ and has to make a discrete *general-interest* policy denoted by $e_t \in \{0, 1\}$. The general interest requires the leader to the true state of nature, but this would also mean that she forgoes her private benefits. The public payoff from the general-interest policy is Δ if $e_t = \theta_t$, and 0 if $e_t \neq \theta_t$. From picking $e_t \neq \theta_t$, the noncongruent leader gets a private benefit r_t, which is drawn according to a c.d.f. $G(r_t)$ with $E(r_t) = \overline{r}$, $G(\Delta) = 0$, and $G(r_t) > 0$ for $r_t > \Delta$, while the congruent leader gets 0. Note that the interpretation of the dictator's type could be quite broad: the noncongruent type could be a politician whose competence is limited and who therefore finds it costly to correctly adapt the policy to the signal, or it could capture the case of a dictator who gives in to a special interest group that wants the opposite of a public-good policy, or finally it could mean a leader with an ideological disposition she wishes to pursue notwithstanding the actual situation (i.e., the private signal), as may have been the case of Mao. However, the exact interpretation is not crucial for most of the discussion; formally, the crucial role of the dictator's type is just to provide her an opportunity to credibly precommit to a specific policy in order to build her reputation, which allows her to grab next-period private rents.

To gain the loyalty of the selectorate, the leader pays a patronage to the selectorate by using direct payment or high-level government appointments. Hence the citizen gets 0 patronage[6] and the selectorate gets X/ϕ, where ϕ is a measure of the *effective* size of the selectorate. This means that the leader cannot use redistributive policies to avoid citizen revolts. The reason for this assumption are twofold: first, we believe that such policies are not credible if they are not associated with a change in the political regime from autocracy to democracy, as argued in Acemoglu and Robinson (2001, 2006); second, we focus on the incentives for promoting congruent policies, whereas the full analysis of redistributive policies would require the introduction of taxation and thus a distortion in production.

[5] Following Shirk (1993), we identify the selectorate at the beginning of the reform era with the revolutionary elders and top military leaders; later, the selectorate was expanded to a much larger coalition, including the younger generation of Chinese Communist Party (CCP) leaders, the members of the Central Committee, and other high-ranking officials of the central and local party and government apparatus.

[6] Of course, this is just normalization.

A crucial role is played by the "effective" size of the selectorate ϕ. In the standard selectorate theory developed by Bueno de Mesquita et al. (2003), ϕ is simply the relative proportion of the selectorate in the whole population. According to Gilli and Li (2013), the selectorate in Mao's era was a small number of powerful people in his inner circle. This weak selectorate expanded significantly after Mao's death. At the beginning of the reform, the selectorate was made up of the revolutionary elders and top military leaders. Later, the selectorate was expanded to a much larger coalition including the younger generation of CCP leaders, members of the Central Committee, and other high-ranking officials of the central/local party and government institutions. But the country's population is huge compared to the size of its elite. It thus may be tempting to treat China as a country close to being a one-man dictatorship, in spite of the fact that the absolute size and the power of the selectorate varied dramatically in different periods. This is not correct, for three reasons. First, the citizens are not the entire population, but are the disenfranchised yet politically active players, a small proportion of the nominal population. Second, what really matters for the accountability mechanism is the balance of de facto power among different players, and power and size are correlated. Finally, a commonly adopted interpretation of the power a player possesses is the ability to affect the result of the game. However, an increase in a coalition's size does not always mean an increase in its power, as there are increasing costs in increasing the size (Straffin, 1994). In order to make the analysis tractable, we simplify this general idea by assuming that the benefit of an increase in the effective size ϕ of the selectorate, which means a larger probability of being reappointed, is accompanied by the cost of a diluted payoff X/ϕ. Hence, we call ϕ the *effective* size of the selectorate, and it should be interpreted as a summary statistic for a wide variety of institutional characteristics that limit the power of the autocrat. Accordingly, $1-\phi$ is the effective size of the set of politically active disenfranchised citizens.

If the citizens choose to revolt (it does not matter whether the revolution succeeds or fails), the game reaches an absorbing state, as in Acemoglu and Robinson (2006). In this case, the payoffs of the selectorate and of the leader will both be zero, to model the huge political failure following any attempt at citizens' revolting, no matter whether it is successful or not. On the other hand, if the revolution succeeds, the citizens will receive $(X-\mu)/(1-\phi)$, where μ is the cost of revolting for the citizens; while if it fails they will receive a zero payoff. Both these payoffs are realized at the beginning of the second period. We also assume a conflict technology as simple as possible: the revolution succeeds with probability $1-\phi$, i.e., the probability of success is linearly increasing in the effective number of citizens. This treatment of revolution is simple, yet effective in catching the essential aspects of the dramatic changes implied by a citizens' revolt: it means that the citizens will revolt to get a redistribution, not to induce a specific economic policy, while the incumbent leader and the selectorate are ousted from the polity. The reason for this modeling choice is that we do not aim to analyze the transition from a dictatorship to a democracy, but the constraints on the otherwise arbitrary dictator's behavior due to credible revolution's threats. In this analysis, a crucial role is played by the cost of revolution

for the citizens, μ. Once more, we treat μ as a summary statistic for a wide variety of institutional characteristics that limit the de facto power of the citizens, i.e., their possibility of credibly threatening the removal of the ruler.

If the citizens choose not to revolt, the game continues, the selectorate gets its utility from the leader's policy, and then it decides whether to support or to remove her. If the selectorate supports the leader, then she still holds office in the subsequent period. If the selectorate decides to oust the leader, she will be removed with certainty, as a leader without the selectorate's support cannot survive. When the incumbent leader is ousted from power, a new one will be appointed and form a new selectorate. We assume the effective size of the new selectorate remains the same as that of the old one and the new leader will randomly select the members of the new selectorate from the pool of the population; hence, if the incumbent leader is removed by the selectorate in the first period, then each member of the old selectorate has a probability ϕ of being included in the new selectorate. Different from Bueno de Mesquita et al. (2003), we assume that the selectorate size is stationary and exogenous: it would not be difficult to assume an exogenous dynamic process for ϕ, but it would add no further explicative power. Finally, we assume that the new leader randomly picks the members of the new selectorate from the pool of the whole population, so that if the selectorate changes the incumbent leader, it then would have a probability ϕ of being included in the new coalition. Of course, polities can be characterized by more or less formalized mechanisms that regulate the selectorate recruitment; however, it is not difficult to check that any selection probability that is a monotonic transformation of ϕ would not change the qualitative results of this paper. The point is that in this model ϕ is a reduced form of the selectorate's strength in its bargaining with the incumbent leader: the greater ϕ, the higher the number of members of the selectorate that the incumbent leader has to appease to retain power, the smaller the patronage that she can concede to each of them, and thus the bigger the incentive to provide congruent policies to increase the selectorate's payoff.

To sum up, the timing of the model is as follows:

(1) Nature determines (θ_1, r_1) and the type of the leader, $T \in \{C, N\}$. These three random variables are stochastically independent, and their realization is private information of the leader.
(2) The type-T leader chooses a policy, and the payoffs for each player in period 1 are realized. Denote by $\lambda_1^T : r_1 \longmapsto [0, 1]$ the probability of choosing a congruent policy.
(3) The citizens observe the effect of the policy chosen by the leader, but not her type. On the basis of this information, they decide whether to initiate a revolution. Denote by $\alpha : \{0, \Delta\} \longmapsto [0, 1]$ the probability of revolting.
(4) If the citizens revolt, the game stops; the citizens will receive a payoff $(X - \mu)/(1 - \phi)$ with probability $1 - \phi$, and 0 otherwise, while in any case both the leader and the selectorate will get zero. If there is no revolt, the selectorate observes the effect of the policy chosen by the leader but not her type and, on

the basis of this information, decides whether to retain the incumbent leader. Denote by $\rho : \{0, \Delta\} \longmapsto [0, 1]$ the probability of retaining the leader when there has been no revolt.

(5) If there is no revolt and the incumbent leader is ousted from power by a selectorate coup, a new leader will enter the office, and she will be congruent with probability π. The new leader will form her own coalition, and the members of the selectorate who deposed the previous leader will have a probability ϕ of being included in the new one.

(6) If there is no citizens' revolt, then Nature determines (θ_2, r_2). The period-2 type-$T \in \{C, N\}$ leader observes Nature's choice and chooses a policy, the payoffs of each player in period 2 are realized, and the game ends.

The first-period payoff functions of the players are

$$U^N = \begin{cases} \Delta + \frac{X}{\phi} & \text{if } e_1 = \theta_1, \\ r_1 + \frac{X}{\phi} & \text{if } e_1 \neq \theta_1, \end{cases} \qquad U^S = \begin{cases} \Delta + \frac{X}{\phi} & \text{if } e_t = \theta_t, \\ \frac{X}{\phi} & \text{if } e_1 \neq \theta_1, \end{cases}$$

$$U^C = U^Z = \begin{cases} \Delta & \text{if } e_1 = \theta_1, \\ 0 & \text{if } e_1 \neq \theta_1, \end{cases}$$

whereas in the second period they get

$$U^N = \begin{cases} \Delta + \frac{X}{\phi} & \text{if } e_2 = \theta_2 \text{ and there was neither revolt nor coup,} \\ r_2 + \frac{X}{\phi} & \text{if } e_2 \neq \theta_2 \text{ and there was neither revolt nor coup,} \\ 0 & \text{if there was either revolt or coup,} \end{cases}$$

$$U^C = \begin{cases} \Delta & \text{if } e_2 = \theta_2 \text{ and there was neither revolt nor coup,} \\ 0 & \text{if } e_2 \neq \theta_2 \text{ and there was neither revolt nor coup,} \\ 0 & \text{if there was either revolt or coup,} \end{cases}$$

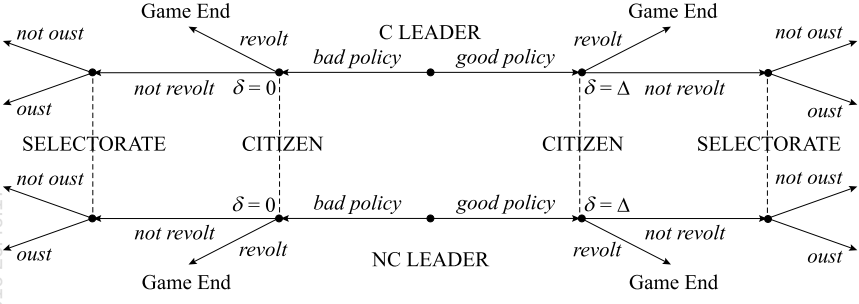
$$U^Z = \begin{cases} \Delta & \text{if } e_2 = \theta_2 \text{ and there was no revolt,} \\ 0 & \text{if } e_2 \neq \theta_2 \text{ and there was no revolt,} \\ \frac{X-\mu}{1-\phi} \text{ with probability } 1-\phi & \text{if there was a revolt,} \\ 0 \text{ with probability } \phi & \text{if there was a revolt,} \end{cases}$$

$$U^S = \begin{cases} \Delta + \frac{X}{\phi} & \text{if } e_2 = \theta_2 \text{ and there was neither revolt nor coup,} \\ \frac{X}{\phi} & \text{if } e_2 \neq \theta_2 \text{ and there was neither revolt nor coup,} \\ 0 & \text{if there was a revolt,} \\ \Delta + \frac{X}{\phi} \text{ with probability } \phi & \text{if } e_2 = \theta_2 \text{ and there was no revolt, but a coup,} \\ \Delta \text{ with probability } 1-\phi & \text{if } e_2 = \theta_2 \text{ and there was no revolt, but a coup,} \\ \frac{X}{\phi} \text{ with probability } \phi & \text{if } e_2 \neq \theta_2 \text{ and there was no revolt, but a coup,} \\ 0 \text{ with probability } 1-\phi & \text{if } e_2 \neq \theta_2 \text{ and there was no revolt, but a coup.} \end{cases}$$

Without loss of generality, we assume a unitary discount factor.[7]

The basic game structure is reported in the figure.

Figure
The Basic Game Structure



4 The Equilibria

We use sequential equilibrium (SE) as the solution concept instead of the more common notion of perfect Bayesian equilibrium, since we have to analyze a three-player game, and SE encompasses the notion of consistency, which implies that players' beliefs on the true type of the leader agree off the equilibrium path. The players' sequential rational choices are derived backwards, working on each player's information set. Note that the selectorate and the citizens have two possible information sets: for each information set, we derive the players' beliefs using the Bayes rule whenever possible, or a standard forward induction argument anytime there is indeterminacy. To make the statement of results succinct, here we only report the equilibria in the interesting portion of the parameter space, which can be used to explain the logic of the reform process in China over the last thirty years. We report the calculations and the rest of equilibria in the appendix.

PROPOSITION 1 *(1) When* $\phi \leq X/(X + \pi\Delta)$ *and* $\mu \in [X - \pi\Delta, X]$ *there exists a unique SE outcome, where the noncongruent leader would pursue her own interest with positive probability and because of this she will be overthrown by a citizens' revolt: this is the case of a* roving-bandit equilibrium outcome. *On the other hand, if the policy is congruent, then we will have no revolt: this is the case that we call* revolt-enforced efficient equilibrium*, since the noncongruent leader has the maximum possible incentive to behave correctly.*

(2) When $\phi \geq X/(X + \pi\Delta)$ *and* $\mu \in [X - \pi\Delta, \infty)$*, there exists a unique SE outcome, where the noncongruent leader would pursue her own interest with positive probability and because of this she will be dismissed by the selectorate: this is the*

[7] The players' payoffs in each corresponding information node are reported in the process of deriving the equilibrium, which can be found in the appendix.

case of a roving-bandit equilibrium outcome; on the other hand, if the policy is congruent, then we will have no revolt. This is the case that we call selectorate-enforced efficient equilibrium*, since the noncongruent leader has the maximum possible incentive to behave correctly. Note that in this case the citizens are not active players.*

(3) When $\phi \leq X/(X+\pi\Delta)$ and $\mu \in [X, +\infty)$, there exists a unique SE outcome, where the noncongruent leader would pursue her own interest with certainty and, this notwithstanding, she will remain in power: this is the case that we call kleptocratic equilibrium*.*

Table 1 and Table 2 summarize the set of equilibrium outcomes as a function of the selectorate size, the first-period private benefit, and the costs of the citizens' threat of revolution.

Table 1
Equilibria when $\mu \in [X - \pi\Delta, X]$

	$r_1 \geq \Delta + \beta(\overline{r} + X/\phi)$	$r_1 \leq \Delta + \beta(\overline{r} + X/\phi)$
$\phi \geq X/(X+\pi\Delta)$	roving-bandit equilibrium	citizen-enforced efficient equilibrium
$\phi \leq X/(X+\pi\Delta)$	roving-bandit equilibrium	citizen-enforced efficient equilibrium

Table 2
Equilibria when $\mu \in [X, +\infty)$

	$r_1 \geq \Delta + \beta(\overline{r} + X/\phi)$	$r_1 \leq \Delta + \beta(\overline{r} + X/\phi)$
$\phi \geq X/(X+\pi\Delta)$	roving-bandit equilibrium	selectorate-enforced efficient equilibrium
$\phi \leq X/(X+\pi\Delta)$	kleptocratic equilibrium	kleptocratic equilibrium

When the cost of revolution is enormous – that is, $\mu \in [X, +\infty)$ – the citizens are not active, and the selectorate is the only disciplinary device to make the leader accountable, the effectiveness of which depends on the effective size of the selectorate. If the selectorate is powerless, it will choose to retain the incumbent leader even if its members are certain that the leader is noncongruent, as the probability of being in a newly appointed selectorate is too minimal. In this situation, the *kleptocratic equilibrium* arises, because the noncongruent leader, knowing that she will always be supported, will always choose to implement the noncongruent policy. When the selectorate is sufficiently large, its members have the incentive to remove the noncongruent incumbent. Knowing this, the noncongruent leader might implement the congruent policy, if her expected payoff from holding office exceeds today's personal rents. This is how the *selectorate-enforced efficient equilibrium* arises.

However, if the cost of revolution is not extremely high – namely, $\mu \in [X - \pi\Delta, X]$ – then the citizens become active. This significantly changes the equilibria, as the

kleptocratic equilibrium no longer exists, because after a noncongruent policy the citizens have a credible incentive to revolt. Hence, even when the selectorate is captured by the patronage of X (its effective size is small and X/ϕ is thereby large enough to disincentivize the leader's removal), the citizens can discipline the leader by credibly threatening a revolt if the leader is noncongruent. Due to this threat, the ruler will adopt growth-enhancing policies even when it is not accountable to the selectorate. This is how the *citizen-enforced efficient equilibrium* arises.

Note that this analysis also emphasizes that the possibility of a *roving-bandit equilibrium* can never be avoided, as it is partially independent from the prevailing political institutions and does not depend on leader accountability to the citizens or the selectorate. Instead, it depends primarily on the particularly high realization of the private rents that the leader can seize. This notwithstanding, the possibility of achieving an efficient equilibrium is significantly higher when the citizens play an active role.

5 *Contemporary Chinese Political Economy and our Model*

In this section, we illustrate our theory by outlining the major events in China in the past sixty-odd years and relating them to the changes in the power of the selectorate and of the citizens.

5.1 *The Mao Era, 1949–1976*

In the Mao era, the central decision-making of the CCP was dominated by Mao Zedong. During this era, the size of the selectorate was extremely small and the cost of revolution was extremely high. People who dared to question the rule of the Communist Party or the Chairman's infallible capability to map out the correct road to socialism had come to miserable ends. The selectorate lived in the leader's shadow, and the citizens lived under the cult and the repression of the supreme leader. The politics in this era was characterized by despotism, and the economic policies were characterized by impoverishment of the population. The calamities of the Great Leap Forward and of the Cultural Revolution caused hundreds of millions of deaths. As both the selectorate and the citizens lost their power, the overall policy regime can be described by case 3 of Proposition 1, the situation characterized by the kleptocratic equilibrium.

5.2 *The First Phase of the Reform, 1977–1989*

On the surface, China's reform era looks like a mere change in economic policies without a major corresponding political reform. Nevertheless, as a matter of fact, the post-Mao period started with astonishing political changes, which resulted in a change of the central leadership and of the central decision-making process of CCP. As widely discussed in Gilli and Li (2013), the expansion of the effective size of the selectorate was the most important institutional change in the post-Mao

Chinese political system, as the top leader no longer held sole power as a dictator, but rather needed the approval of members in the selectorate. This is exactly what Shirk (1993) called "reciprocal accountability," a relationship where neither side has a definitive right and the lines of authority run in both directions. Top leaders of the party appoint the subordinate officials of the party and government, and in turn the officials in the Central Committee choose (or at least ratify the choice of) the leaders (Shirk, 1993, p. 83).

Deng Xiaoping took measures to prevent the concentration of power in too few hands and recruited new, better technically trained members into the party. This policy also helped Deng to build a new, larger coalition to support himself and to compete with Hua Guofeng, who was Mao's hand-picked successor. From the end of the 1970s, the CCP began to transform itself from a personality-ruled party into a system governed by clear lines of authority and collective decision-making institutions. In particular, Hu Yaobang and Zhao Ziyang sustained the push to liberalize polity in China through some broad, though tentative, measures to reform the political system, including the abolition of party committees within government agencies and the separation of the functions of the party and government (Huang, 1998). Also, the ranks of the People's Liberation Army (PLA) were cut from 4 million to 3 million, and the military members of the Politburo fell from 57 percent in 1977 to 10 percent in 1992. As a result, the selectorate expanded from a tiny number of powerful people in Mao's inner circle, to a much larger coalition including the younger generation of CCP leaders, members of the Central Committee, and other high-ranking officials of the central or local party and government apparatus. The enlarged effective size of the selectorate created effective checks and balances on the leader, and it explains the accountability of the Chinese central government after Mao's death, even though the cost of revolution for citizens remained enormous in this period. As a result of the significant broadening of elite power, with the role of the selectorate as disciplinary device becoming more effective, the incumbent leader became accountable and could credibly commit herself to opening the market and promoting economic growth. The overall policy regime during this period can be described by case 2 of Proposition 1, the situation described as *efficient equilibrium* because of the effective constraint from the selectorate. Note that the constraint from the citizens is still missing in this period, due to the enormous cost of revolution.

5.3 Trapped Political Reform, 1989–1992

The gradual progress of political reform stopped after the crackdown of the 1989 student movement. The Tiananmen tragedy, together with the failure of the Soviet Union's political reforms, had profound influences on the reform process. After the military crackdown in early June 1989, a purge of Zhao Ziyang and his followers began. In late June 1989, the Fourth Plenum of the Thirteenth Central Committee announced the removal of Zhao Ziyang from all his posts, and Jiang Zemin was named general secretary of the party. From September 1989 to February 1990,

altogether 38,000 cadres were examined by central party organs, while 370,000 cadres were examined by provincial party organs, so as to safeguard political and ideological loyalty (Heilmann and Kirchberger, 2000). Some people left China and others lost power. Attempts to create a more powerful Central Committee, to separate functions of the party and government, and ultimately to realize inner-party democracy, were prevented, since political competition and an even more powerful Central Committee were now considered threats to stability (Guo, 2004). In the meantime, the revolutionary elders could no longer exercise strong control over policy-making, because of their increased age and deteriorated health. The Central Advisory Commission was abolished in 1992, symbolizing an end to the elders' power. As a result, the selectorate stopped growing in size and power, and lost parts of its relevance. Consequently, power was concentrated in the Politburo Standing Committee and, in particular, in the hands of the supreme leader – Jiang Zemin – who, from then on, simultaneously assumed the three most important political positions in China: general secretary of the CCP, president of China, and chairman of the Central Military Commission. Moreover, Jiang fashioned an effective system to exercise power by balancing the reformist Zhu Rongji and the conservative Li Peng. In this way, Jiang retained for himself the final say on the most important issues (Naughton, 2008). The role of the military in politics was further reduced after the purge of the PLA's General Yang Baibing, who had attempted to restore the military's role in politics in 1992. And later, all the lucrative business activities of the PLA were banned. In a word, the effective size of the selectorate began to shrink after the Tiananmen tragedy, and the equilibrium where the leader implementing the congruent policy due to the checks from the selectorate no longer held, as the balance of power shifted to favor the leader. This is exemplified by the selectorate's routine acquiescence once a general agreement is reached among the top leadership (Oksenberg, 2001).

As the role of the selectorate for constraining the leader's behavior had been weakened, kleptocratic equilibrium would prevail again, and the leader would have incentives to shift away from policies that promote the general interest, implementing instead policies that maximize his own power and control over the economy. Compared to the market economy, which is associated with a booming private sector, enhanced competition, free flow of information, and liberalization of ideology (which could lead to democratization), the central planned economy does provide politicians the maximum power to control society and economy. Not surprisingly, the Chinese leadership recommitted to public ownership and central planning. Specific measures were carried out to curtail the growth of the nonstate sector and to reverse price deregulation. As a result, the number of micro private businesses (private entities with seven or fewer employees) in China declined by 15 percent in 1989. The number of private businesses (with more than seven employees) decreased by over 50 percent, from over 200,000 in 1988 to a little above 90,000 by the end of 1989. It remained at this level throughout 1990 and only rose slightly, to 107,000, in 1991 (Coase and Wang, 2012, p. 105). The overall policy regime during this period shifted back to kleptocratic equilibrium.

5.4 The Second Phase of the Reform, from 1993 Onwards

However, in spite of stalled political reforms and weakened restraints from the selectorate, Beijing renewed the commitment to market reform. It seemed that the Chinese central leaders were still accountable to the general interest. We wonder what held the Chinese leaders accountable. We argue that this occurred because the citizens began to play an active role in the 1990s. Hence, the leaders pursued the general interest not because of selectorate's control, but rather because they were afraid of a possible citizens' revolt. The overall policy regime during this period can be characterized by case 1 of Proposition 1, the case described as efficient equilibrium, because of the effective constraint from the threat of a citizens' revolt.

5.4.1 Maintain Social Stability, a New Source of Accountability

In 1989, the Communist system in China was almost ended by the massive nationwide protests, and remained standing only because workers and peasants, whose lives had been improved greatly in the preceding decade of strong economic growth, had been largely absent from the demonstrations. In other words, the survival of the Chinese political regime was due to the previous years of congruent economic policies. Deng hoped that the Tiananmen crackdown would not slow down economic reforms. But the purge of Zhao Ziyang and his sympathizers – plus the sudden collapse of communist regimes in Europe in 1989–1991 – led to the rise of hard-liners who sought to roll back political and economic reforms. In 1989–1990, they engineered a wrenching reversal of the trend toward economic reform through a combination of austerity (tightening up on wages and prices as well as on investment and credit funds for business expansion), recentralization (all investment decisions reverted to the provincial or central level), and subsidies to bail out state enterprises. As a consequence the Chinese economy was hit hard. The GNP growth rate fell from 11.2 percent in 1988 to 3.9 percent in 1989. In small cities and towns, nearly 20 million industrial workers lost their jobs in 1989 and 1990 (Vogel, 2011, p. 660). At the same time, in rural areas, local governments were forced to issue credit notes to peasants in payment for grain, which caused widespread discontent. The potential threats of labor and rural unrest made the leaders extremely anxious, because they viewed these as the most threatening form of protest. Moreover, the recent experience of Tiananmen protests and the collapse of the whole Eastern Bloc and Soviet Union made the CCP's top leaders feel that continued economic development was crucial for the survival of the regime. Deng Xiaoping believed that to prevent political unrest, the party needed to maintain rapid economic growth. In March, 1990, Deng lectured Jiang Zemin, Yang Shangkun, and Li Peng about the importance of economic development: "Why do the people support us? Because over the last ten years our economy has been developing. [...] If the economy stagnated for five years or developed at only a slow rate [...] what effects would be produced? This would be not only an economic problem but also a political one" (Deng, 1993, pp. 342f.). In 1991, Deng reiterated what he had said in 1990, as

Beijing leaders had not been moved by his previous warning. However, his efforts failed yet again. Consequently, in the spring of 1992, Deng made a dramatic move: he took his special train to the south to light a prairie fire for market reform, claiming that if China's economic reform were reversed, the party would lose the people's support and could be overthrown at any time. During his tour, he gave a series of speeches with ringing endorsements of the bold and successful economic reforms in the areas he visited, including a barely disguised threat that those who did not support reforms should quit. The signal given to provincial and local leaders was: invest, invest, invest. He repeated several times that "[w]hoever is opposed to reform must leave office." Deng's southern tour in 1992 proved to be a watershed event and led to the dramatic economic boom and building craze that characterized much of the 1990s.

Although the selectorate had lost power, the political considerations of Deng and other leaders showed that from the beginning of the 1990s, the citizen accountability channel worked as a substitute for the disabled checks and balances from the selectorate. The effective constraints from the threat of a citizens' revolt explain the Chinese leaders' continued commitment to economic growth and market reform, as they believed that stability would be threatened by social and political upheaval if economic growth slowed seriously. Pursing high economic growth to maintain social stability has proved an effective solution, as robust economic growth improves living standards and creates new opportunities to promote the acceptance of the current system. As former premier Zhu Rongji stated in his March 2003 valedictory, "[d]evelopment is the fundamental principle, and the key to resolving all problems which China currently faces. We must maintain a comparatively high growth rate in our national economy." Zhu also argued that the pace of reform had to be balanced against the risks of unrest.[8] In particular, the government has based its economic policies on an algorithm derived from its priority on stability. The economy must grow at an annual rate of 7% or more in order to create a certain number of jobs, and keep unemployment rates at levels that will prevent widespread labor unrest (Shirk, 2007, p. 55). These explicit growth targets to maintain social stability remain in the minds of all Chinese leaders as they develop domestic policies. From Jiang Zeming's initiation of the "Development of the West" campaign in the late 1990s, to Hu Jingtao's proclaimed goal of a "harmonious society," all leaders have intended to improve the lives of poor Chinese citizens in general, and poor farmers in particular, to avoid social unrest. More recently, the global financial crisis together with the Arab Spring triggered excessive nervousness of China's leaders. In response, the Chinese government moved swiftly to inject hundreds of millions of dollars into the economy, aimed at protecting jobs and maintaining stability. Although market reforms have the potential to compromise CCP interests vested in the old central planning system, China's leaders have had the resolution to pursue a reformist agenda, as they link domestic stability, and thus their power, to the state of the economy.

[8] Zhu Rongji, "Report on the Work of the Government," speech, March 5, 2003.

5.4.2 The Reduced Cost of Revolution and Rising Social Conflict in China

Our model shows that in order to ensure the effectiveness of the citizen accountability channel, the cost of revolution should be neither too small nor too large. If the cost of revolution is too small, the country will become a failed state, like some sub-Saharan African countries; if the cost of revolution is too large, there will be no willingness to revolt even if citizens suffer under bad policies, as exemplified by North Korea. Although in our model we treat the cost of revolution as an exogenous variable, the cost of revolution can be influenced by leadership policies, which may exercise strict control over the threats of potential social unrest, strengthening their coercive power. However, the mechanism determining the cost of revolution in autocracies is not the focus of this work. Once the changes in the cost of revolution are consolidated, economic outcomes are shaped according to the political game previously outlined.

In this subsection, we argue that in China the cost of revolution has decreased gradually from enormous in the 1980s to large in the 1990s. In the past, Chinese authorities tended to attribute social unrest to enemy conspiracies, reflecting the classic Leninist insistence that social and economic protests in a Communist country cannot simply emerge; they must be instigated (Tanner, 2004). Therefore, any kind of unrest was suppressed with tough measures, which made the cost of revolt enormous in the 1980s. However, the 1989 Tiananmen democracy movement made the Chinese leaders aware of their vulnerability to revolt and therefore led them to change course in a number of ways in dealing with the collective protests (Shambaugh, 2008; Minzner and Wang, 2013). Gradually, the authorities began to recognize the economic causes of unrest, with some even claiming that economic conflicts ultimately underlie all social protests. At the same time, more and more sympathetic views arose. For example, a surprising number of analysts in the public security system displayed open sympathy for the worker and peasant protesters, whom the police were supposed to suppress. They frankly conceded that many protesters were victims of crooked managers who drove their factories into bankruptcy through illicit dealings or who absconded with company assets (Tanner, 2004). More importantly, Chinese authorities began to recognize that it was no longer convenient to fully repress all kinds of protest, and tolerating narrow protests might actually make the regime more stable than ruthlessly suppressing discontent and driving it underground (Lorentzen, 2013). Therefore, instead of simple repression, the new implicit goal of the central authorities was to forge an internal security strategy that would permit the effective containment of unrest, while at the same time addressing some of the underlying economic and policy-related causes, in an attempt to prevent the protests from becoming a major threat to the regime's stability (Tanner, 2006). The new strategy developed by the state, which combines preventive repression and expedient concession, has actually encouraged popular protests with "opportunistic troublemaking" tactics. For example, the *xinfang* system, which was a part of mass-line politics intended for controlled participation, has provided strong incentives and facilitating conditions for popular contention (Chen, 2012). Since the

1990s, the Chinese protesters have developed a set of effective tactics by exploiting contradictions and ambiguities within the current state institution, so that they can exert an appropriate level of pressure on the government without incurring too high a risk (Chen, 2012).

As a result of the shifts in the leaders' attitude and strategy, the cost of revolution in China has been decreasing. Moreover, since the 1990s, the power of the Internet in facilitating the circulation of information and coordination of collective actions (Xiao, 2011), even under censorship (King, Pan, and Roberts, 2013), has made collective actions by the citizens a more credible threat to the Chinese leaders. Consequently, there has been a surge in social unrest since the early 1990s. Although there are no reliable official statistics, recent trends show that social conflicts are increasing in number and size and are becoming better organized. By comparing the numbers of "mass incidents" reported in different sources, we find that the number has surged from 8,700 in 1993, to 32,000 in 1999, to 58,000 in 2003, to approximately 74,000 in 2004, and still more rapidly to 180,000 in 2010.[9] The size of the incidents can be measured by the number of people involved in protests, which reached 3.76 million in 2004, compared with 730,000 a decade earlier (Shirk, 2007, p. 56). These incidents take various forms, from peaceful small-group petitions and sit-ins to marches and rallies, labor strikes, merchant strikes, student demonstrations, ethnic unrest, and even armed conflict and riots.

The decreased cost of revolution has assured the effectiveness of accountability to the citizenry in China since the beginning of the 1990s. Nonetheless, the cost of revolution in China still remains very high, and is far from falling into the range of the "too small" category associated with the failed-state equilibrium. When any major social unrest occurs that might jeopardize social stability and challenge the rule of the CCP, the government resorts to tight controls and repression. However, the cost of revolution is no longer enormous, and thus the government makes concessions and responds to citizens' demands, especially when these are seen to be popular nationwide.

6 *Alternative Theories of the Political Economy of China's Transition*

We have documented that the changes of the structure of power inside the authoritarian political system were important in explaining the changes of Chinese rulers' incentives to pursue public interest in the form of economic growth. Although this account supports our main argument, it is useful to review alternative theories of the political economy of China's economic transition.

6.1 The Ideology View

This theory is that the power struggles between the *left* and the *right* wings of the CCP have shaped the history of China since 1949. The left consists of dogmatic

[9] The sources of these numbers include: Tanner (2004), Keidel (2005), Shirk (2007), and *Bloomberg News*, May 27, 2011.

Marxists, and Mao Zedong is its symbol. Those on the right are pro-capitalism reformists, and the prominent members of this group were Liu Shaoqi and Deng Xiaoping. Before the death of Mao in 1976, the left dominated the right, though the latter sometimes became influential and led to conflict. Shortly after 1976, power began to shift back to the right, and Deng Xiaoping, who was a reformist, became the de facto ruler and strongly pushed for economic reform. The ideological conflict, however, continues. During the student protest in 1989, most reformists, except Deng Xiaoping, preferred a smooth and peaceful solution. But unfortunately the protest ended in tragedy, and many reformists lost power due to their deprecated political stance. As a result, the left became dominant again, and the economic reform stagnated. However, the most important reformist, Deng Xiaoping, kept his position, and in 1992 he performed the Southern Tour, after which economic reform became the consensus in the Communist Party. This idea of ideological conflict and its consequences for China's business cycle have been documented and formalized in Zou (1991).

It is undoubtedly true that changes in the ruling ideology have a real effect on China's path of development. In our view, however, it does not explain thoroughly why the Chinese leaders could be accountable to the public in promoting economic growth in the reform era but not in the Mao era. Indeed, the argument simply equates the "left" with dogmatic Marxists and the "right" with pro-capitalism reformists, which is unwarranted. When Mao launched the Cultural Revolution to attack the "capitalist roaders," for him a "capitalist roader" was someone who was thinking and acting independently, not fully following his leadership – not someone who really supported capitalism. Deng Xiaoping was targeted in 1966 by Mao as "the number-two person in authority pursuing the capitalist road," but he was undoubtedly a loyal follower of Marxism and had also been a loyal follower of Mao. For example, during the "anti-rightist campaign" in 1957, Deng strongly supported Mao in attacking the outspoken intellectuals; and during the Great Leap Forward, Deng, like many other party loyalists, restrained himself from criticizing Mao (Vogel, 2011, pp. 40f.). Once again, Deng showed that he was not a "capitalist" leader when he ordered the crackdown at Tiananmen Square in 1989.

But the major problem of the ideology argument probably is that it provides no clue to the leaders' accountability, leading to the following conclusion: the historical policy failure in China was only because of the domination of the left ideology and the left-wing leader's wrong choice of the development path that China should follow; it had nothing to do with the authoritarian political system itself. In this way, the ideology argument ignores the role of political institutions in shaping the development path of China.

Baum (1996) and Shih (2008) have further studied the empirical links between factional politics and cycles in China's economic reforms. They knit together the history of China's economic reform with the waxing and waning of informal factions in Chinese politics. Although factions are not fixed in ideology, Baum (1996) and Shih's (2008) findings are quite supportive of Zou (1991). Again, their analysis still provides no clue to the leader's accountability.

6.2 The Patronage View

The basic argument here is that for the CCP to retain power and survive the transition process, it needs to protect and recreate a system of patronage. Qian (2003) explains the importance of using patronage to buy off the vested interests in order to make reform a win–win game. This strategy provides a feasible path toward the goal of institutional reform in China. After Mao Zedong passed away, the top leaders understood that their patronage system had been profoundly damaged by Maoism and the maintenance of the status quo was simply not an option. So they decided to initiate the economic reform, even as they struggled to reassemble the traditional political system. In the initial period of the reform, 1978–1993, power at the top was fragmented among a group of revolutionary elders. The dispersal of policymaking authority among national leaders with diverse agendas resulted in the cautious incrementalism and lack of policy decisiveness. In this period, reforms were characterized by decentralization of power and sharing of resources. During the second period, since about 1993, power at the top has been much less fragmented. The elders were sidelined by age and infirmity. In this period, policymaking became more decisive and able to impose reform-related costs on specific groups. Reforms were characterized by recentralization of resources and a tendency toward a more rule-bound and predictable system. This idea was developed by Naughton (2008), using detailed descriptive analysis.

This argument and our approach share the view that the structure of power shapes the different patterns of economic policymaking in different periods. Moreover, the patronage view, to a large extent, supports our argument concerning the changing power of the selectorate. The reason why power at the top was fragmented in the initial period of the reform is that the power of the selectorate increased. After Mao's death, the equilibrium where the leader maintained sole power no longer held, and the de facto leader, Deng Xiaoping, started to play to the selectorate, which was able to create effective checks on the leader's behavior. And the reason why power at the top became less fragmented since about 1993 is that the power of the selectorate shrank due to the purge of Zhao Ziyang and his followers and the abdication of the elders' power.

However, the patronage view has the important problem that it only considers the structure of power at the top and ignores the important role played by the citizens' threat to revolt. If we do not consider this role of the citizens, we can hardly explain the leader's resolution in pushing forward further economic reforms since the 1990s. In any event, after the reconcentration of power into the top leader's hands, we cannot rule out the possibility that the leader might have incentives to block further reforms, as the institution lacks constraints on him. We can escape this dilemma only if we base our argument on a broader perspective and consider the important role of the citizens' power. Although defeated by the armed forces, the formidable power exhibited by the protesters at Tiananmen Square engraved itself in Chinese leaders' minds. The increased social tensions, combined with the painful memory of 1989, overrode the political leaders' short-run interests in blocking the

reform, and gave them a new willingness to pursue further reforms to maintain economic growth.

7 Conclusion

This paper has offered a model of leadership accountability as a result of the changing structure of power in nondemocratic regimes, and has investigated its implications for policy outcomes. We have applied our model to explain the political economy of China's remarkable transition. We conclude that whereas in the first phase of the reform China fit the pattern whereby a successful autocracy arises because of accountability towards the selectorate, after the Tiananmen incident we rather refer to the equilibria where successful autocracy arises because of accountability towards the citizens. Leaders adopted good policies to promote economic growth, believing that high growth would solve other social problems and that improvements in living standards would quell people's desire for democracy. So far this strategy has worked well, as high economic growth has indeed helped to generate social stability, and social stability in turn has provided China with a peaceful environment in which to develop its economy. However, the two-digit growth rate cannot last forever, as China is facing more constraints than ever before, especially relating to environment, energy, and natural resources. Besides, China will soon become dominated by an aging population, which will be a heavy burden on the economy. At the same time, the gap between rich and poor, the rural–urban conflicts, and ethnic conflicts in areas populated by rent-seeking minorities tend to create more serious social tensions than before. As the strategy of using high growth to maintain social stability will not be effective forever, catching up with long-neglected political reforms could prove a reasonable alternative.

Appendix: Proof of Proposition 1

We use sequential equilibrium (SE) as the solution concept instead of the more commonly used notion of perfect Bayesian equilibrium, since we have to analyze a three-player game and SE encompass the notion of consistency, which implies that players' beliefs on the true type of the leader agree off the equilibrium path.

The selectorate has two possible information sets $\delta \in \{0, \Delta\}$. In each of these two sets, sequential rationality (SR) implies that the selectorate will retain the incumbent leader if and only if

$$P^S(C|\delta)\Delta + \frac{X}{\phi} \geq \pi\Delta + \phi\frac{X}{\phi}. \tag{A1}$$

The players' beliefs $P^S(C|\delta)$ should be derived using Bayes's rule:

$$P^S(C|\delta = \Delta) = \frac{\pi \times \overline{\lambda}^C \times (1 - \alpha(\Delta))}{\left[\pi \times \overline{\lambda}^C + (1 - \pi) \times \overline{\lambda}^N\right] \times (1 - \alpha(\Delta))},$$

$$P^S(C|\delta=0)=\frac{\pi\times\left(1-\overline{\lambda}^C\right)\times(1-\alpha(0))}{\left[\pi\times\left(1-\overline{\lambda}^C\right)+(1-\pi)\times\left(1-\overline{\lambda}^N\right)\right]\times(1-\alpha(0))},$$

where

$$\overline{\lambda}^T=\int_{-\infty}^{\infty}\lambda^T(r_1)dG(r_1),\quad \text{with } T\in\{C,NC\}.$$

By consistency $1-\alpha(0)>0$ and $1-\alpha(\Delta)>0$; hence

$$P^S(C|\delta=\Delta)=\frac{\pi\times\overline{\lambda}^C}{\pi\times\overline{\lambda}^C+(1-\pi)\times\overline{\lambda}^N}=P^Z(C|\delta=\Delta),$$

$$P^S(C|\delta=0)=\frac{\pi\times\left(1-\overline{\lambda}^C\right)}{\pi\times\left(1-\overline{\lambda}^C\right)+(1-\pi)\times\left(1-\overline{\lambda}^N\right)}=P^Z(C|\delta=0).$$

Since by construction $\lambda^C(r_1)=1$ for any r_1 and thus $\overline{\lambda}^C=1$, then

$$P^S(C|\delta=\Delta)=P^Z(C|\delta=\Delta)=\frac{\pi}{\pi+(1-\pi)\times\overline{\lambda}^N}=:\Pi\left(\overline{\lambda}^N\right)\in[\pi,1]$$

with

$$\frac{\partial\Pi\left(\overline{\lambda}^N\right)}{\partial\overline{\lambda}^N}<0,\quad \Pi(0)=1,\quad \text{and}\quad \Pi(1)=\pi\,.$$

Moreover

$$P^S(C|\delta=0)=P^Z(C|\delta=0)=\frac{0}{(1-\pi)\times\left(1-\overline{\lambda}^N\right)}=0\quad\forall\overline{\lambda}^N\in[0,1)\,.$$

Hence the only problematic case is when $\overline{\lambda}^N=1$; that would imply $P^S(C|\delta=0)=P^Z(C|\delta=0)\in[0,1]$. In this case we can use a standard forward induction argument[10] to assume that $P^S(C|\delta=0)=P^Z(C|\delta=0)=0$, since the congruent type has no reason to deviate to a noncongruent policy. We conclude that

$$\forall\overline{\lambda}^N\in[0,1]\quad P^S(C|\delta=0)=P^Z(C|\delta=0)=0\,.$$

Now we can derive the selectorate's SR choice. When $\delta=\Delta$, (A1) is always satisfied, since $P^S(C|\Delta)\in[\pi,1]$; therefore $\rho(\Delta)=1$. When $\delta=0$, so that the selectorate is certain to face a noncongruent leader, (A1) might be satisfied, depending on the parameters.

A.1. Case 1: $\phi\le X/(X+\pi\Delta)$

A.1.1 Sequential Rational Choices of the Selectorate when $\phi\le X/(X+\pi\Delta)$

In this case the selectorate will choose to retain the incumbent leader even if the selectorate is certain that she is not congruent, since the probability of being in the selectorate next period is too small. The only control on the leader's behavior lies with the citizens.

[10] For example, we can apply Cho and Kreps's (1987) intuitive criterion.

A.1.2 Sequential Rational Choices of the Citizens when $\phi \leq X/(X+\pi\Delta)$

The citizens have two possible information sets, which we will denote by $\delta \in \{0, \Delta\}$. SR implies that the citizens will revolt at $\delta \in \{0, \Delta\}$ if and only if $V^C(\alpha = 1|\delta) \geq V^Z(\alpha = 0|\delta)$, i.e.,

$$X - \mu \geq \rho(\delta) P^Z(C|\delta)\Delta + (1 - \rho(\delta))[\pi\Delta + X].$$

When $\delta = \Delta$, $P^Z(C|0) = 0$. If $\mu \leq X$, the only SR choice by the citizens in $\delta = 0$ is $\alpha(0) = 1$. The citizens, observing a bad social policy, perfectly infer that the leader is noncongruent; moreover, they perfectly anticipate that the selectorate will be captured by the leader; hence they will go for a change. On the other hand, if $\mu \geq X$, the citizens are actually passive players that will always accommodate.

Now consider the citizens' sequentially rational behavior in $\delta = \Delta$. We have $\alpha(\Delta) = 1$ if and only if

$$X - \mu \geq \Pi\left(\overline{\lambda}^N\right)\Delta \iff \overline{\lambda}^N \geq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right).$$

Note that

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right) \leq 0 \iff \mu \leq X - \Delta.$$

Therefore, when $\mu \leq X - \Delta$, we have $\alpha(\Delta) = 1$ for any $\overline{\lambda}^N$. On the other hand,

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right) \geq 1 \iff \mu \geq X - \pi\Delta,$$

and thus when $\mu \geq X - \pi\Delta$, we have $\alpha(\Delta) = 0$ for any $\overline{\lambda}^N \leq 1$. Finally,

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right) \in [0, 1] \iff \mu \in [X - \Delta, X - \pi\Delta].$$

The citizens' best responses $\alpha(\overline{\lambda}^N|\delta)^{BR}$ can be summarized as the following:

(1) $\mu \leq X \Rightarrow \alpha(\overline{\lambda}^N|0)^{BR} = 1$ for any $\overline{\lambda}^N$;
(2) $\mu \leq X - \Delta \Rightarrow \alpha(\overline{\lambda}^N|\Delta)^{BR} = 1$ for any $\overline{\lambda}^N$;
(3) $\mu \geq X - \pi\Delta \Rightarrow \alpha(\overline{\lambda}^N|\Delta)^{BR} = 0$ for any $\overline{\lambda}^N$;
(4) $\mu \in [X - \Delta, X - \pi\Delta]$

$$\Longrightarrow \alpha\left(\overline{\lambda}^N|\Delta\right)^{BR} \begin{cases} = 0 & \text{if } \overline{\lambda}^N \leq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right), \\ \in [0, 1] & \text{if } \overline{\lambda}^N = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right), \\ = 1 & \text{if } \overline{\lambda}^N \geq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right). \end{cases}$$

A.1.3 Sequential Rational Choices of the Leader when $\phi \leq X/(X+\pi\Delta)$

The leader would choose $\lambda^N(r_1)$, anticipating the citizens' best reply $\alpha(\overline{\lambda}|\delta)^{BR}$. In particular:

(1) Since $\mu \leq X - \Delta \Rightarrow \alpha(\overline{\lambda}^N|0)^{BR} = \alpha(\overline{\lambda}^N|\Delta)^{BR} = 1$ for any $\overline{\lambda}^N$, then the leader would choose to always get the private rent, since the citizens will revolt anyway, i.e., $\lambda^N(r_1|\alpha(\delta)^{BR}) = 0$ for any r_1. Then $\overline{\lambda}^N = 0$, implying $\Pi(\lambda^N) = 1$. Hence

$$\lambda^N(r_1) = 0 \ \text{ for any } r_1, \quad \alpha(0) = \alpha(\Delta) = 1\,,$$

is part of a unique SE when $\mu \leq X - \Delta$.

(2) Since $\mu \geq X - \pi\Delta \Rightarrow \alpha(\overline{\lambda}^N|0)^{BR} = 1$ for any $\overline{\lambda}^N$ *and* $\alpha(\overline{\lambda}^N|\Delta)^{BR} = 0$ for any $\overline{\lambda}^N$, then the noncongruent leader might prefer to implement a good policy instead of getting the private rent r_1. The noncongruent leader's sequentially rational actions are

$$\lambda^N(r_1) \begin{cases} = 1, & r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ \in [0,1], & r_1 = \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ = 0, & r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right). \end{cases}$$

This means

$$\overline{\lambda}^N = \int_{-\infty}^{\Delta + \left(\overline{r} + \frac{X}{\phi}\right)} G(r_1)dr_1 = G\left(\Delta + \left(\overline{r} + \frac{X}{\phi}\right)\right),$$

which implies $\Pi(\overline{\lambda}^N) > \pi$. Hence we can conclude that

$$\lambda^N(r_1) \begin{cases} = 1, & r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ \in [0,1], & r_1 = \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ = 0, & r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \end{cases} \quad \alpha(0) = 1,\ \alpha(\Delta) = 0\,,$$

is part of a unique SE when $\mu \geq X - \pi\Delta$.

(3) Since $\mu \in [X - \Delta, X - \pi\Delta] \Rightarrow \alpha(\overline{\lambda}^N|0)^{BR} = 1$ for any $\overline{\lambda}^N$ *and*

$$\alpha\left(\overline{\lambda}^N|\Delta\right)^{BR} \begin{cases} = 0 & \text{if } \overline{\lambda}^N \leq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right), \\ \in [0,1] & \text{if } \overline{\lambda}^N = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right), \\ = 1 & \text{if } \overline{\lambda}^N \geq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right), \end{cases}$$

then the noncongruent leader might prefer to implement a good policy instead of getting the private rent r_1. Suppose $\overline{\lambda}^N \leq \pi/(1-\pi)(\Delta/(X-\mu) - 1)$ and thus $\alpha(\overline{\lambda}^N|\Delta)^{BR} = 0$; then

$$EU^N(\lambda(r_1) = 1) \leq EU^N(\lambda(r_1) = 0) \iff r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right).$$

Therefore, when $\phi \leq X/(X+\pi\Delta)$ and $\alpha(\Delta)=0$, the noncongruent leader's sequentially rational actions are

$$\lambda^N(r_1)\begin{cases}=1, & r_1 \leq \Delta+\left(\overline{r}+\frac{X}{\phi}\right),\\ \in[0,1], & r_1=\Delta+\left(\overline{r}+\frac{X}{\phi}\right),\\ =0, & r_1 \geq \Delta+\left(\overline{r}+\frac{X}{\phi}\right).\end{cases}$$

This means that

$$\overline{\lambda}^N=\int_{-\infty}^{\Delta+\left(\overline{r}+\frac{X}{\phi}\right)} G(r_1)dr_1=G\left(\Delta+\left(\overline{r}+\frac{X}{\phi}\right)\right).$$

Hence if

$$G\left(\Delta+\left(\overline{r}+\frac{X}{\phi}\right)\right)\leq\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right),$$

then

$$\lambda^N(r_1)\begin{cases}=1, & r_1 \leq \Delta+\left(\overline{r}+\frac{X}{\phi}\right),\\ \in[0,1], & r_1=\Delta+\left(\overline{r}+\frac{X}{\phi}\right),\\ =0, & r_1 \geq \Delta+\left(\overline{r}+\frac{X}{\phi}\right),\end{cases}\quad \alpha(0)=1,\ \alpha(\Delta)=0,$$

is part of a unique SE when $\mu\in[X-\Delta;\ X-\pi\Delta]$; otherwise we need to look for mixed-strategy behavior, since $\lambda^N(r_1)=0$ for any r_1 would imply $\alpha(\Delta)=0$, which in turn would imply $\lambda^N(r_1)=1$ for any r_1, inducing however $\alpha(\Delta)=1$ as best reply, which implies $\lambda^N(r_1)=0$, so that we are back at the starting point without any fixed point. Note that $\phi\leq X/(X+\pi\Delta)$ implies that $\alpha(0)=1$ is a strictly dominant action for the citizens, who then cannot mix in $\delta=0$. Hence, a mixed behavioral strategy for the citizens is just a number $\alpha\in[0,1]$. As seen before, the citizens' best reply correspondence in $\delta=\Delta$ is

$$\alpha\left(\overline{\lambda}^N|\Delta\right)^{BR}\begin{cases}=0 & \text{if } \overline{\lambda}^N\leq\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right),\\ \in[0,1] & \text{if } \overline{\lambda}^N=\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right),\\ =1 & \text{if } \overline{\lambda}^N\geq\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right).\end{cases}$$

Now consider the noncongruent leader's expected payoff from playing a mixed strategy $\lambda(r_1)$ when $\alpha(0)=1$ and $\alpha(\Delta)\in[0,1]$:

$$EU^N(\lambda^N(r_1),\alpha)=-\lambda^N(r_1)\left[r_1-\Delta-\left(\overline{r}+\frac{X}{\phi}\right)+\alpha(\Delta)\left(\overline{r}+\frac{X}{\phi}\right)\right]+r_1+\frac{X}{\phi}.$$

Consider the three possible situations one by one.

(a) If $\overline{\lambda}^N\geq[\pi/(1-\pi)][\Delta/(X-\mu)-1]$, then the noncongruent leader's best reply is $\lambda^N(r_1)^{BR}=0$, which is not consistent with the condition

$$\overline{\lambda}^N=\int_{\Delta}^{+\infty}\lambda^N(r_1)dG(r_1)\geq\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right).$$

(b) If $\overline{\lambda}^N \leq [\pi/(1-\pi)][\Delta/(X-\mu)-1]$, then the noncongruent leader's best reply is

$$\lambda^N(r_1)^{BR} = \begin{cases} 0 & \text{if } r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ 1 & \text{if } r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \end{cases}$$

which might be consistent with the condition

$$\overline{\lambda}^N = \int_{\Delta}^{+\infty} \lambda^N(r_1) dG(r_1) = G\left(\Delta + \left(\overline{r} + \frac{X}{\phi}\right)\right) \leq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right),$$

depending on the characteristics of the cdf G and of the structural parameters.

(c) Finally, if $\overline{\lambda}^N = [\pi/(1-\pi)][\Delta/(X-\mu)-1]$, then the noncongruent leader's best reply is

$$\lambda^N(r_1)^{BR} = \begin{cases} 0 & \text{if } r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right), \\ 1 & \text{if } r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right), \end{cases}$$

which is consistent with the condition

$$\overline{\lambda}^N = \int_{\Delta}^{+\infty} \lambda^N(r_1) dG(r_1) = G\left(\Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right)\right) = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right)$$

for an opportune value of $\overline{\alpha} \in [0, 1]$ that depends on the characteristics of the cdf G and of the structural parameters. In other words, the equation

$$G\left(\Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right)\right) = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right)$$

implicitly defines an equilibrium mixed behavioral strategy $\overline{\alpha} \in [0, 1]$.

The following proposition sums up this discussion and the calculations:

PROPOSITION A1 *Suppose $\phi \leq X/(X + \pi\Delta)$. Then we have the following SE depending on the parameters' values:*

(1) when $\mu \in [0, X - \Delta]$, there exists a unique SE where

$$\lambda^C(r_1) = 1, \quad \lambda^N(r_1) = 0, \quad \alpha(0) = 1, \quad \alpha(\Delta) = 1, \quad \rho(0) = 1, \quad \rho(\Delta) = 1;$$

(2) when $\mu \in [X - \Delta, X - \pi\Delta]$, there exists a possibly mixed SE where

$$\lambda^C(r_1) = 1, \quad \lambda^N(r_1) = \begin{cases} 0 & \text{if } r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right), \\ 1 & \text{if } r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}\left(\overline{r} + \frac{X}{\phi}\right), \end{cases}$$

$$\alpha(0) = 1, \quad \overline{\alpha}(\Delta) \in [0, 1], \quad \rho(0) = 1, \quad \rho(\Delta) = 1,$$

where $\overline{\alpha}(\Delta)$ is implicitly defined by the equation

$$G\left(\Delta + \left(\overline{r} + \frac{X}{\phi}\right) + \overline{\alpha}(\Delta)\left(\overline{r} + \frac{X}{\phi}\right)\right) = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu} - 1\right);$$

(3) when $\mu \in [X - \pi\Delta, X]$*, there exists a unique SE where*

$$\lambda^C(r_1) = 1, \quad \lambda^N(r_1) \begin{cases} = 1 & \text{if } r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ \in [0,1] & \text{if } r_1 = \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ = 0 & \text{if } r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \end{cases}$$

$$\alpha(0) = 1, \quad \alpha(\Delta) = 0, \quad \rho(0) = 1, \quad \rho(\Delta) = 1;$$

(4) when $\mu \in [X, +\infty)$*, there exists a unique SE where*

$$\lambda^C(r_1) = 1, \quad \lambda^N(r_1) = 0, \quad \alpha(0) = 0, \quad \alpha(\Delta) = 0, \quad \rho(0) = 1, \quad \rho(\Delta) = 1.$$

A.2 Case 2: $\phi \geq X/(X + \pi\Delta)$

A.2.1 Sequential Rational Choices of the Selectorate when $\phi \geq X/(X + \pi\Delta)$

In this case, when $\delta = 0$ the selectorate will choose to remove the incumbent leader, because it is certain that she is not congruent and the probability of being part of the future selectorate is big enough; hence the unique SR action is $\rho(0) = 0$. In this situation, the selectorate is disciplining the leader (reciprocal accountability as analyzed in Gilli and Li, 2013), and the citizens would take this into account. On the other hand, we have seen that if $\delta = \Delta$, then in any SE the selectorate will choose to retain the incumbent leader, i.e., $\rho(\Delta) = 1$.

A.2.2 Sequential Rational Choices of the Citizens when $\phi \geq X/(X + \pi\Delta)$

As seen before, the expected continuation utilities the citizens will get in δ are

$$V^Z(\alpha = 1|\delta) = (1 - \phi) \times \frac{X - \mu}{1 - \phi} + \phi \times 0 = X - \mu,$$

$$V^Z(\alpha = 0|\delta) = \rho(\delta)P^Z(C|\delta)\Delta + (1 - \rho(\delta))[\pi\Delta + X].$$

Since $\rho(0) = 0$ and $\rho(\Delta) = 1$, then

$$V^Z(\alpha = 0|0) = X + \pi\Delta \quad \text{and} \quad V^Z(\alpha = 0|\Delta) = P^Z(C|\Delta)\Delta = \Pi(\overline{\lambda}^N)\Delta.$$

Hence

$$\alpha(0) = 0 \iff X - \mu \leq X + \pi\Delta,$$

which is always satisfied; hence the only SR choice by the citizens in $\delta = 0$ is $\alpha(0) = 0$. The fact is that the citizens anticipate that the selectorate will remove the leader if $\delta = 0$, so they prefer to free-ride on the selectorate. Now consider the citizens' rational behavior in $\delta = \Delta$:

$$\alpha(\Delta) = 1 \iff X - \mu \geq \Pi\left(\overline{\lambda}^N\right)\Delta \iff \mu \leq X - \Pi\left(\overline{\lambda}^N\right)\Delta$$

$$\iff \overline{\lambda}^N \geq \frac{\pi}{1 - \pi}\left(\frac{\Delta}{X - \mu} - 1\right).$$

Note that

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right)\leq 0 \iff \mu \leq X-\Delta\,.$$

Therefore, when $\mu \leq X-\Delta$, then $\alpha(\Delta)=1$ for any $\overline{\lambda}^N$. On the other hand,

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right)\geq 1 \iff \mu \geq X-\pi\Delta\,,$$

and thus when $\mu \geq X-\pi\Delta$, then $\alpha(\Delta)=0$ for any $\overline{\lambda}^N \leq 1$. Finally

$$\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right)\in[0,1] \iff \mu \in [X-\Delta,\, X-\pi\Delta]\,.$$

The citizens' best responses $\alpha(\overline{\lambda}^N|\delta)^{BR}$ can be summarized as follows:

(1) $\mu \leq X \;\Rightarrow\; \alpha(\overline{\lambda}^N|0)^{BR}=0$ for any $\overline{\lambda}^N$;
(2) $\mu \leq X-\Delta \;\Rightarrow\; \alpha(\overline{\lambda}^N|\Delta)^{BR}=1$ for any $\overline{\lambda}^N$;
(3) $\mu \geq X-\pi\Delta \;\Rightarrow\; \alpha(\overline{\lambda}^N|\Delta)^{BR}=0$ for any $\overline{\lambda}^N$;
(4) $\mu \in [X-\Delta,\, X-\pi\Delta]$

$$\Rightarrow \alpha\left(\overline{\lambda}^N|\Delta\right)^{BR}\begin{cases}=0 & \text{if } \overline{\lambda}^N \leq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right),\\ \in[0,1] & \text{if } \overline{\lambda}^N = \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right),\\ =1 & \text{if } \overline{\lambda}^N \geq \frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right).\end{cases}$$

A.2.3 Sequential Rational Choices of the Leader when $\phi \geq X/(X+\pi\Delta)$

The analysis of the leader when $\phi \geq X/(X+\pi\Delta)$ follows the previous one of section A.1.3, considering the different SR actions of citizens and selectorate; hence it is omitted.

The following proposition sums up this discussion and the calculations:

PROPOSITION A2 *Suppose $\phi \geq X/(X+\pi\Delta)$. Then we have the following SE depending on the parameters' values:*

(1) when $\mu \in [0,\, X-\Delta]$, there exists a unique SE where

$$\lambda^C(r_1)=1, \quad \lambda^N(r_1)=0, \quad \alpha(0)=0, \quad \alpha(\Delta)=1, \quad \rho(0)=0, \quad \rho(\Delta)=1\,;$$

(2) when $\mu \in [X-\Delta,\, X-\pi\Delta]$, there exists a possibly mixed SE where:

$$\lambda^C(r_1)=1, \quad \lambda^N(r_1)=\begin{cases}0 & \text{if } r_1 \geq \Delta+\left(\overline{r}+\frac{X}{\phi}\right)+\overline{\alpha}\left(\overline{r}+\frac{X}{\phi}\right),\\ 1 & \text{if } r_1 \leq \Delta+\left(\overline{r}+\frac{X}{\phi}\right)+\overline{\alpha}\left(\overline{r}+\frac{X}{\phi}\right),\end{cases}$$

$$\alpha(0)=0, \quad \overline{\alpha}(\Delta)\in[0,1], \quad \rho(0)=0, \quad \rho(\Delta)=1\,,$$

where $\overline{\alpha}(\Delta)$ is implicitly defined by the equation

$$G\left(\Delta+\left(\overline{r}+\frac{X}{\phi}\right)+\overline{\alpha}(\Delta)\left(\overline{r}+\frac{X}{\phi}\right)\right)=\frac{\pi}{1-\pi}\left(\frac{\Delta}{X-\mu}-1\right);$$

(3) when $\mu \in [X - \pi\Delta, +\infty)$*, there exists a unique SE where*

$$\lambda^C(r_1) = 1, \quad \lambda^N(r_1) \begin{cases} = 1 & \text{if } r_1 \leq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ \in [0,1] & \text{if } r_1 = \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \\ = 0 & \text{if } r_1 \geq \Delta + \left(\overline{r} + \frac{X}{\phi}\right), \end{cases}$$

$$\alpha(0) = \alpha(\Delta) = 0, \quad \rho(0) = 0, \quad \rho(\Delta) = 1\,.$$

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