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Last step to the throne: the conflict between rulers and their successors

Congyi Zhou

Wilf Family Department of Politics, New York University, New York, USA
Corresponding author. Email: cz536@nyu.edu

Abstract

I model the dynamic between ruler and successor. The ruler cultivates a successor for a smooth power transition but fears being ousted by him, while the successor fears being removed by the ruler. The successor accumulates power while not threatening the ruler, and he prolongs their relationship by maintaining a low profile. The ruler gradually becomes more intolerant of the successor's growing power but, as his life nears its end, has less incentive to replace the successor. Thus conflict is most probable in the middle of their relationship; moreover, a predetermined succession order could increase its likelihood by restricting the ruler's choice. In the multi-candidate case, the strong candidate has some advantage but conflict is more likely to occur.

Key words: Authoritarian regimes; conflict; dynamic game; game theory; succession

1. Introduction

One of the most important issues in an autocracy is how to arrange for the succession of leadership. Svolik (2012) reports that, following World War II, most leadership changes in authoritarian regimes were non-constitutional. Hence selecting a successor and arranging a power transition, if properly handled, enable the ruler to maintain a particular regime.

Yet rulers face a trade-off in the succession procedure. On the one hand, allowing the heir apparent to accumulate power facilitates the transition when a ruler dies or steps down. On the other hand, a successor who is delegated too much power may seek to claim the throne earlier than the ruler desires. Herz (1952) refers to this phenomenon as the "crown prince problem". Although this problem has been recognized in Tullock (1987), several questions remain unanswered. Selecting and cultivating successors may take years. When should a ruler choose the successor? How can the "crown prince problem" affect the long-term relationship between rulers and their successors? This study attempts to fill these gaps by presenting a dynamic model for analyzing the long-term relationship between a ruler and her successor.

The crown prince problem underscores the successor's incentive to maximize his power; however, there is still another source of conflict in the succession procedure. In particular, a dilemma for both the ruler and the successor is that the fear of being prematurely replaced motivates the ruler to monitor the successor's behavior and, perhaps, to remove him from that position; hence the successor fears being stripped of his title. It follows that, in assuming his position is not secure, the successor may challenge the ruler—that is, even before accruing enough power to do so with any reasonable expectation of success.

This paper argues that the conflict between ruler and successor may be caused by mutual fear and not by the successor's greed. This fear shapes the two parties' interaction, leading each to adjust the strategic behaviors over time toward the end of moderating the successor's power accumulation and thereby maintaining mutual trust.

In the model, a successor can choose different levels of effort to increase his power in each period—during which he can also decide whether to challenge the ruler. In turn, a ruler who is not challenged decides—depending on how much power her heir has already accrued—whether to strip the successor of that position. The ruler's health is expected to worsen with time, which results in non-monotonic equilibrium strategies being followed by both parties. The ruler monitors the successor's behavior during each period. In equilibrium, this monitoring becomes stricter over time and, if the successor's power exceeds a certain threshold, the ruler will revoke the successor's title. Yet a ruler who is near the end of her life has no incentive to replace the successor. Thus the successor's equilibrium strategy in each period is based on two thresholds in his level of power that trigger different responses from the ruler. When the successor's power is low, the ruler's monitoring is also low and so the successor exerts considerable effort to obtain more power. When the successor's power is greater but not yet sufficient to challenge the ruler, keeping a low profile is his optimal choice. Once the successor's power is great enough that he constitutes a potential threat to the ruler, the successor should focus on increasing his power—that is, in preparation for the conflict to arise from the ruler's anticipated attempt to replace him.

According to the baseline model, if the ruler can head the regime for a long period then the ruler–successor relationship comprises three phases. During the *honeymoon* phase, at the beginning of the successor's tenure, the probability of conflict is zero owing to the low threat he poses. As the ruler's life nears its end, there is a *power transition* phase in which the probability of conflict is low simply because the ruler is dying and therefore has no incentive to replace the successor. Between these phases is a middle, *mutual suspicion* phase in which the likelihood of conflict cannot be ignored—especially if the successor has accumulated considerable power and the ruler remains healthy.

Allowing the successor to accrue power is a power-sharing procedure (Francois *et al.*, 2015). One prominent emphasis in the study of rulerships is that rulers face the threat of betrayal by high-level officials (Tullock, 1987; Wintrobe, 2000; Gregory, 2009; Svolik, 2012; McMahon and Slantchev, 2015; Debs, 2016; Bueno de Mesquita and Smith, 2017). Even so, a ruler needs the support of skilled lieutenants to defend herself and the regime from outside threats (Myerson, 2008; Svolik, 2009; Egorov and Sonin, 2011; McMahon and Slantchev, 2015)—support that requires credible institutions to guarantee payoffs for political stability (Gandhi and Przeworski, 2007; Myerson, 2008; Gandhi, 2013). Egorov and Sonin (2011) and Zakharov (2016) focus on this loyalty–competence trade-off involving the ruler's chosen agents. Konrad and Mui (2017) explicitly question whether a power-sharing model implies that rulers truly need successors.

This paper differs from the previous research on power-sharing models in three respects. First, its assumption that the ruler's health worsens with time means that the two parties' interests are initially unaligned but eventually converge. In this setup, the changing equilibrium strategies result from changes in the two parties' respective preferences. In the game's early stage, the ruler is more concerned about maintaining her reign than about ensuring a smooth power transition; however, she tends to care more about that transition when her health worsens. This change in preference plays a key role in the parties' middle-stage relationship difficulties.

Second, the equilibrium results presented here indicate that conflict between these two parties may arise from a mutual fear of being ousted by the other. The model also explicitly shows that the successor (i) can maintain the ruler's trust by adopting a non-monotonic strategy and (ii) may—to protect his own position—end up challenging the ruler when he hasn't accumulated enough power.

Third, the model focuses on incentives created by the need to guarantee succession and therefore the model setup abstracts from the possibility of a ruler needing support from her successor to maintain the regime before she dies. This setup reflects not only the value of designating successors to help guarantee a smooth power transition but also the observation that rulers need time

to cultivate their successors. In Syria, for example, Hafez al-Assad spent six years building popular support for Bashar al-Assad. Both Kim Il-sung (in North Korea) and Chiang Kai-shek (in Taiwan) made a series of power arrangements to ensure that their sons inherited power.

The baseline model bears several implications, especially for institutional design. On the one hand, if some form of institutional protection is in place for the succession process, such as primogeniture, then the successor is less motivated to challenge the ruler and so the ruler's fear of being ousted declines; thus the probability of conflict is reduced.

On the other hand, a predetermined order of succession may actually increase the probability of conflict. The ruler's optimal time to designate a successor is when the successor poses no threat to the throne. Yet the ruler lacks this timing flexibility when the succession order is predetermined, which means that conflict may occur immediately if the successor has accrued enough power. This result extends studies that address the institutionalization of authoritarian regimes (Geddes, 2003; Boix and Svolik, 2013; Pepinsky, 2014; Frantz and Stein, 2017). Our results derived here suggest that such institutionalization is a double-edged sword—as shown (in Section 2.4) by modern examples reflecting Saudi Arabia's succession rules. Finally, the baseline model is extended to the case of multiple potential successors. Apart from the ruler's motivation to protect her power, she may replace a successor deemed insufficiently competent to assume the throne. This dynamic renders the weaker candidate's position precarious because he will not be chosen unless his competence approaches that of the stronger candidate. Yet even though a strong candidate is thus advantaged in the succession game, a ruler who has "backups" for the current successor will be less tolerant of that heir apparent accruing power—which in turn will reduce interparty trust and so may well lead to conflict.

This paper's model is also related to succession's *coordination problem*, which underlies the ruler's need to appoint a successor (Bueno de Mesquita *et al.*, 2003; Gandhi and Przeworski, 2007; Magaloni, 2008; Svolik, 2012). By appointing a clear successor, the ruler gives her elite supporters a long-term incentive to remain loyal (Kurrild-Klitgaard, 2000; Brownlee, 2007). Empirical and case studies (Kurrild-Klitgaard, 2000, 2004; Iqbal and Zorn, 2008; Eisner, 2011; Blaydes and Chaney, 2013; Kokkonen and Sundell, 2014) also test the coordinate problem and analyze the length of rulers' reigns and their depositions.

The paper proceeds as follows. Section 2.1 and 2.2 explain the model's setup and equilibrium strategies. Section 2.3 presents the strategic implications and comparative statics. The predetermined order of succession is analyzed in Section 2.4; and the multi-candidate case is discussed in Section 3. Section 4 concludes with a summary of findings.

2. Baseline model

2.1 Model setup

I consider an infinite-horizon environment with two strategic players: a ruler and a candidate for the successor position. The ruler takes the throne at the beginning of period 1; the candidate is endowed with initial power $\widetilde{S} \in [0, 1]$, which represents his power relative to that of the ruler.

Each period t consists of four stages. At stage 1 of any period t, if the successor position is vacant, then the ruler must decide whether to formally designate the candidate as her successor. If the position is not vacant at stage 1, then the ruler makes no decision. Thereafter, nature will randomly determine whether the ruler dies in period t with probability p_t, which is interpreted as the ruler's health condition. I assume that $p_{t-1} < p_t$, which captures the deterioration of a ruler's health with age, and also that $\lim_{t \to \infty} p_t = 1$, which means death is unavoidable if the game lasts a long enough time.

If a ruler dies naturally after stage 1 yet the successor position is vacant, then the game ends with the regime's unexpected chaos or even a collapse. However, if the successor position is *not*

vacant and the ruler dies, then the successor assumes the throne with probability $\min\{S_{t-1} + w, 1\}$. Here S_{t-1} represents the successor's power inherited from the preceding period, and w ($0 < w < 1$) is a lump-sum power increase, interpreted as the strength of institutional protection or of political will. This setup captures the difficulty of arranging a smooth power transition in autocracies. When a ruler dies, if the designated successor exhibits weakness in assuming power, the new crown may be challenged immediately by other forces. Institutional protection (w) reflects the efforts of autocracies to protect power transitions by establishing a constitutional procedure, such as by adopting primogeniture or passing an act of settlement.

If the ruler is still alive after stage 1 but has not designated a successor, then no strategic move (by either party) will be initiated until the next period ($t + 1$). If the end of stage 1 finds that the ruler is still alive and a successor has been designated, then the game proceeds to the next stage.

At stage 2, the successor attempts to increase either high (h) or low (l) power. A successor who seeks a relatively high amount of additional power (i.e., who adopts the effort strategy h) increases his power by H with probability p_h but increases it by only L with probability $1 - p_h$, where $0 < L < H < 1$. If the successor's strategic choice is l, then his power can increase only by L.[1] Thus, the successor's total power in period t is realized as $S_t = S_{t-1} + H(\text{or}L)$. That is, the successor's power is now equal to that inherited from the preceding period (S_{t-1}) plus, H or L, of his attempt to accrue power in this period.

At stage 3, both players observe S_t and the successor decides whether to challenge the ruler—sample, via a palace coup or an open rebellion. If the successor does mount a challenge, then the game ends with him either seizing the throne with probability $\min\{S_t, 1\}$ or losing his position with probability $1 - \min\{S_t, 1\}$. If the successor chooses to remain loyal, then the game proceeds to stage 4.

At stage 4, the ruler must decide whether or not to strip the successor of his title. If she does, then the game ends and the successor loses that position. If instead the ruler lets him remain as successor, then the game continues to the next period.

The timing of events within period t can be summarized as follows:

Stage 1 (Designation Stage). If the position of successor is vacant, then the ruler decides whether to designate one. Nature determines whether the ruler remains alive throughout this period. If the ruler is still alive and a successor has been designated, then...

Stage 2 (Power Acquisition Stage). The successor may choose to increase his power.

Stage 3 (Challenge Stage). Both players observe the successor's current power (S_t), after which the successor decides whether to challenge the ruler. If the successor remains loyal, then...

Stage 4 (Ruler's Decision Stage). The ruler decides whether to strip the successor of his title.

Payoffs. The game's payoff structure is summarized in Table 1. For any candidate who is never designated as a successor, the payoff is normalized to zero. The payoff to a candidate who is appointed successor depends on whether he assumes the throne. This successor receives a lump-sum payment R, the expected value of the regime, if he becomes the new ruler; but if he loses the title of successor or fails to seize power after the ruler's death, he receives $-b$ (where $b > 0$). Given that the designation of a successor serves to enhance the loyalty of elites and to prepare for the future of the regime, seizing the highest power is presumably the unique goal of the successor. Any wealth accrued by the successor cannot last unless he can take the throne. In history, the ends of successors stripped of their titles tend to be tragic. Twenty-seven stripped crown princes can be identified in the Chinese history since 221 B.C.; 21 of them were either executed by the monarch who stripped their titles or by the next monarch assuming the throne. Therefore, the cash flow that the successor may gain is ignored in the game.

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[1]The low outcome L is nonzero, which captures the idea that elites—in light of the succession order—will tend to gather around the designated successor even if he does not actively build such support.

Table 1. Payoffs

	Cash flow in each period	Lump-sum payment when the game ends			
		Take the throne		Fail to take the throne	
Successor	0	R		$-b$	
		Die naturally	Be overthrown	Die naturally	No successor
Ruler	r	ηR	$-b$	0	0

The ruler in power receives cash flow r in each period. If no conflict occurs between the two parties and if the successor assumes the throne upon the ruler's death—but under no other circumstances—then the ruler receives an additional lump-sum payment of ηR ($0 < \eta < 1$); this payment is a measure of how much the ruler cares about the regime's future or her legacy. In any period, a ruler who is overthrown by the successor incurs a lump-sum loss equal to $-b$. If no successor is designated or if the successor loses his title in any period t, then the ruler continues to receive cash flow r (until he dies) but will not receive additional payments because he has no successor. All payments are discounted by the factor $\delta \in (0, 1)$.

Equilibrium Concept: The model's equilibrium concept follows the subgame perfect equilibrium (SPE). The ruler and successor take action sequentially in each period. The state variables are the successor's power at the beginning of each stage (S) and the ruler's health (p_t).

2.2 Equilibrium strategies

This section characterizes the equilibrium strategies for each player. Before calculating those strategies, we present two assumptions.

Assumption: 1 $p_h(H - L) + L < w$

Under this assumption, the successor's power increase that is due to institutional protection w is *greater* than the highest expected power increase from a single period $p_h(H - L) + L$. The implication is that a nontrivial effort is required for autocrats to institutionalize the transition of power.

Assumption 2: In any period t,

$$p_t w \eta R + (1 - p_t)[-(b + k_t)H + k_t] > (1 - p_t)k_t,$$

where $k_t \equiv r + r \sum_{i=t+1}^{\infty} \delta^{i-t} \prod_{j=t+1}^{i} (1 - p_j)$.

This assumption indicates that during any period t, the total cash flow that a ruler can collect (the right-hand side of the inequality) is *less* than his expected utility when a successor who is initially powerless (i.e., for whom $S_{t-1} = 0$) achieves a large increase in power and then challenges the ruler (the left-hand side of the inequality). This assumption implies that, if a successor has no initial power, then his maximum single-period increase in power is not sufficient to threaten the ruler. The motive for assuming this is the need to avoid a situation in which a low-power successor quickly becomes powerful enough to challenge the ruler and leaves no time for the ruler to react. To begin the analysis, we will first calculate the equilibrium strategies when the candidate has been appointed as successor. This calculation is then followed by a discussion of the optimal time for the ruler to designate a successor.

At the ruler's decision stage (stage 4) of any period t, the expected utility of a ruler who strips her successor's title is k_t (calculated in Assumption 2). If the successor is not removed from that

position, then the ruler's expected payoff is

$$\underbrace{r}_{\text{payoff in } t} + \delta \underbrace{(p_{t+1} \overbrace{\min(S_t + w, 1)\eta R}^{\text{ruler dies}} + (1 - p_{t+1}) \overbrace{V^m_{t+1,2}(S_t)}^{\text{ruler lives}})}_{\text{expected payoffs since } t+1};$$ (1)

here $V^m_{t+1,2}(S_t)$ is the ruler's value function at stage 2 of period $t + 1$. As the ruler's health worsens over time (i.e., as p_t to 1), her payoff from stripping the successor converges to r while the payoff from retaining him converges to $r + \delta \min(S_t + w, 1)\eta R$; note that this sum is strictly greater than r. In other words, if no successor is available then it becomes more likely that the regime will collapse after the ruler's death. So as her life approaches its end, a ruler should be more concerned about maintaining the regime than about betrayal by her successor—from which it follows that the former will not strip the latter of his designation. This notion is expressed formally as follows.

Lemma 1: There exists a period $\bar{t}^m$ after which the ruler will not strip the successor of that title.

Lemma 1 stipulates the existence of a period $\bar{t}^m$ that separates the game into two parts. Let us first consider the subgame after period $\bar{t}^m$; for this purpose, we need to only consider the successor's strategy. After that, we can address—within a finite-horizon environment—each party's equilibrium strategies in the periods preceding $\bar{t}^m$.

Given that being stripped of his position no longer concerns the successor after period $\bar{t}^m$, he will choose a strategic effort level h to increase his power at the power acquisition stage (stage 2) of any such period. Therefore, we need only consider the conditions under which a successor will challenge the ruler at the challenge stage (stage 3). A successor who challenges the ruler receives a payoff of $\min(S_t, 1)(R + b) - b$; for a loyal successor, the payoff is

$$\delta \underbrace{(p_{t+1} \overbrace{(\min(S_t + w, 1)(R + b) - b)}^{\text{ruler dies}} + (1 - p_{t+1}) \overbrace{V^c_{t+1,2}(S_t)}^{\text{ruler lives}})}_{\text{expected payoffs since } t+1},$$ (2)

The successor compares these two payoffs and thereby follows a cut-off rule: when he is powerful enough to challenge the ruler, the successor prefers to seize power as soon as possible. However, if he has not accrued sufficient power then the successor's optimal decision is to remain loyal. This result is summarized in the following proposition.

Proposition 1: A unique SPE exists for any subgame starting in period $\bar{t}^m$. In any period $t \geq \bar{t}^m$, if a designated successor exists, then the following statements hold.

(1) The successor attempts to increase high power (h) at the power acquisition stage.
(2) At the challenge stage, a threshold $\bar{s}^c_t$ exists such that the successor will challenge the ruler if $S_t > \bar{s}^c_t$ but will otherwise remain loyal.
(3) The "challenge threshold" $\bar{s}^c_t$ adopted by the successor increases with time, and it is bounded from below by $\bar{s}_{\lim}$. That is $\bar{s}_{\lim} \leq \bar{s}^c_t \leq \bar{s}^c_{t+1}$, where $\bar{s}_{\lim} = b/(R + b) + \delta(p_h(H - L) + L + w)/(1 - \delta)$.

Part 3 of this proposition indicates that the successor has incentive to seize the throne early because at that point, when he has lower power, the reward is substantially larger. Yet remaining loyal is a better and safer option, regardless of the timing, if the successor's power is weaker than a

specific threshold, $\bar{s}_{\mathrm{lim}}$. The relationship of these bounded thresholds described in the third part of this proposition is shown in Figure 1 (a).

We can now discuss the equilibrium strategies adopted *before* period $\bar{t}^m$. During these periods, the ruler cares more about maintaining her own reign than about enabling a smooth future power transition. Thus, if the successor becomes strong enough to threaten the throne, the ruler will no longer tolerate him accruing additional power. To stave off such a threat, the ruler must set a "tolerance threshold" $\bar{s}_t^m$ in each period and then, if that threshold is exceeded, strip the successor of his position. The ruler may set different tolerance thresholds in different periods because her goal is simply to ensure that, in each period, the successor's increase in power remains within an acceptable range—namely, such that $\bar{s}_{t-1}^m \le \bar{s}_t^m$. Additionally, the more powerful is the successor, the less *additional* power the ruler wants the successor to accrue. Hence the ruler's control tightens as the successor's power increases over time: $\bar{s}_t^m - \bar{s}_{t-1}^m \ge \bar{s}_{t+1}^m - \bar{s}_t^m$.

These circumstances differ—except for the successor's continued incentive to seize the throne earlier than expected by the ruler—than those prevailing in periods that follow $\bar{t}^m$ a successor who risks being stripped of his title may challenge the ruler to protect that position. It follows that the threshold at which the successor challenges the ruler cannot exceed the latter's tolerance threshold; that is, $\bar{s}_t^c \le \bar{s}_t^m$.

In the relatively late periods, a successor may be able to accumulate sufficient power that his challenge thresholds become strictly lower than the ruler's tolerance thresholds ($\bar{s}_t^c < \bar{s}_t^m$); see Figure 1(b). The reason is that the successor's incentive to take the throne early dominates the incentive to protect his position. In this scenario, the successor will definitely choose h to increase his power at the power acquisition stage. However, the successor's "greed" incentive is bounded from below by $\bar{s}_{\mathrm{lim}}$, which implies that he will not challenge the ruler unless fully prepared to do so. This situation is most likely to occur during the early periods of a ruler–successor relation. As a consequence, the successor will establish a challenge threshold that is *equal* to the tolerance threshold: $\bar{s}_t^c = \bar{s}_t^m$. In this situation, a successor challenging the ruler can be viewed as a proactive strategy adopted to protect the former's position. Thus the successor's strategy at the power acquisition stage exhibits the non-monotonically increasing property illustrated in Figure 1(c). More precisely: the successor's decision to increase power depends on the difference between his power in the previous period, S_{t-1}, and his challenge threshold $\bar{s}_t^c$. If the gap is large (i.e., if S_{t-1} is much less than the threshold $\hat{s}_{t,h}^c$), then a weak successor poses no threat to the ruler; therefore the ruler will unlikely strip such a successor of his position. In that case, the successor can take advantage of the opportunity to increase his power as much as possible (and so chooses h). Yet if a successor becomes powerful enough to warrant increased attention from the ruler— that is, if $\hat{s}_{t,h}^c < S_{t-1} \le \hat{s}_{t,l}^c$—then the former must keep a low profile (and so chooses l) to avoid conflict with the latter because the successor is not yet strong enough to win that battle. Finally, if the gap is small ($S_{t-1} > \hat{s}_{t,l}^c$), then the successor will definitely be incentivized to initiate conflict at the challenge stage. Hence the successor must increase his power as much as possible (and so chooses h) to prepare for conflict with the ruler. Proposition 2 stipulates each party's equilibrium strategies.

Proposition 2: In any period $t < \bar{t}^m$, if there is a designated successor after stage 1, then the following statements hold.

(1) The ruler's strategy has a unique threshold $\bar{s}_t^m$ such that she strips the successor of his title if $S_t > \bar{s}_t^m$; and keep the successor's position otherwise. Furthermore, $\bar{s}_t^m$ weakly increases and becomes stricter over time, i.e., $\bar{s}_{t-1}^m \le \bar{s}_t^m$ and $\bar{s}_t^m - \bar{s}_{t-1}^m \ge \bar{s}_{t+1}^m - \bar{s}_t^m$.

(2) For the successor, there exists a time $\hat{t} \le \bar{t}^m$ such that in a relative late period $\hat{t} \le t \le \bar{t}^m$, the successor always tries to add more (h) power and sets his challenge threshold equal to the ruler's tolerance threshold; that is, $\bar{s}_t^c = \bar{s}_t^m$.
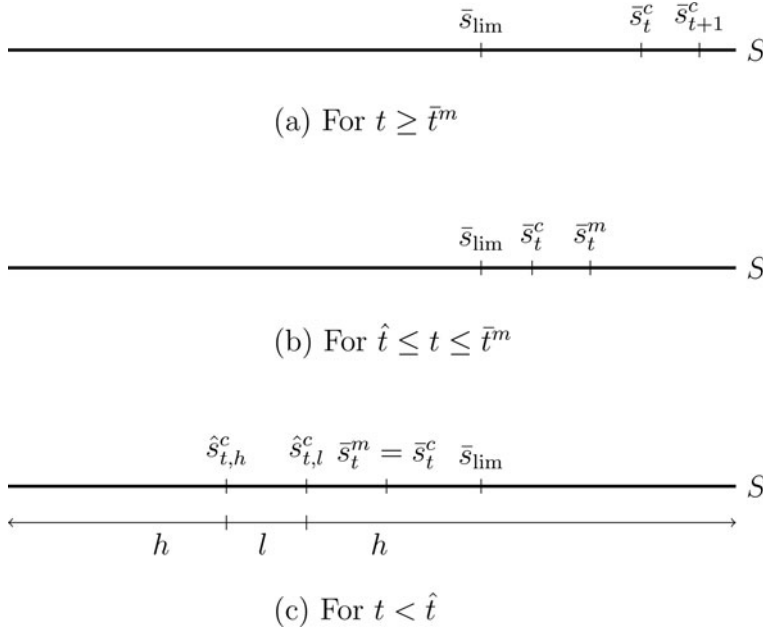
Figure 1. Successor's equilibrium cut-off strategies for challenging the ruler.

Note: The terms $\bar{s}_t^c$ and $\bar{s}_t^m$ represent (respectively) the successor's challenge threshold and the ruler's tolerance threshold; $\bar{s}_{\text{lim}}$ is the lower bound of each challenge threshold when $t \geq \bar{t}^m$. In parts (a) and (b) of this figure, the successor always chooses a high effort level (h) at the power acquisition stage. In part (c), $\hat{s}_{t,h}^c$ and $\hat{s}_{t,l}^c$ are the successor's thresholds that determine his choice between h and l at the power acquisition stage.

(3) In a relatively early period ($t < \hat{t}$), the successor's strategy depends on two thresholds: $\hat{s}_{t,h}^c \leq \hat{s}_{t,l}^c$. He tries to accrue a high level of power if $S_{t-1} < \hat{s}_{t,h}^c$ but only a lower level of power if $\hat{s}_{t,h}^c \leq S_{t-1} < \hat{s}_{t,l}^c$. In the latter case, however, he will switch back to exerting effort h if $\hat{s}_{t,l}^c \leq S_{t-1}$. The successor's challenge threshold is strictly lower than the ruler's tolerance threshold—that is, $\bar{s}_t^c < \bar{s}_t^m$.

Having characterized the parties' equilibrium behaviors following designation of a successor, we can now address the question of when the ruler should appoint a successor. The ruler faces a trade-off: a successor who is designated too early will be better able to accumulate sufficient power to mount a challenge, but choosing a successor too late may lead to chaos when the ruler dies.

According to Propositions 1 and 2, the threat from a successor depends on his accumulation of power. Nonetheless, it is unwise for the ruler to leave the position of successor unfilled. This generalization holds because, for any initial level of the successor's power $\widetilde{S}$, the value function of a ruler who designates his successor in period t is $p_t \min \{\widetilde{S} + w, 1\} \eta R + (1 - p_t) V_{t,2}^m(\widetilde{S})$. Here $V_{t,2}^m(S)$ is the ruler's value function at the power acquisition stage of period t, a payoff that is strictly greater than zero when t is sufficiently large. The payoff to a ruler who decides *never* to appoint a successor is $(1 - p_t) k_t$, and this payoff eventually converges to zero. Thus there is a period during which it makes more sense for the ruler to appoint a successor than to leave the position vacant. For the extreme case where $\widetilde{S} = 1$, the successor could challenge the ruler at any time after being so designated; in that case, no heir apparent will be appointed until the ruler's life is nearly over. Hence we may conclude that, for any candidate with initial power $\widetilde{S}$, the ruler's optimal time to designate a successor is bounded from both above and below. This outcome is summarized as follows.

Proposition 3: (i) Given an initial power $\widetilde{S}$, there exist two periods—t' and t'', with $1 \leq t'(\widetilde{S}) \leq t''(\widetilde{S})$—such that the ruler will not designate a successor sooner than t' or later than t''.

(ii) Both t' and t'' are weakly increasing functions of $\widetilde{S}$ and H, while the lower bound of the optimal designation time, t', increases in b.

This proposition states that the optimal time for the ruler to choose a successor lies in the range $[t', t'']$, referred to hereafter as the *designation interval*. The more powerful is the candidate, the later the ruler should designate him as successor. Meanwhile if the candidate may accumulate power faster (large H) or the loss of ruler in the conflict is large (b), the ruler also wants to designate the successor later.

Remarkably once a successor is appointed, the game will last at most some finite number of periods. Because if no conflict occurs after the designation, the successor's power will exceed 1 after $1/L$ periods. In this situation, the ruler–successor relationship cannot be stabilized although the game proceeds under an infinite time horizon.[2]

2.3 Equilibrium outcomes and comparative statics

The previous section describes the equilibrium behavior of the ruler and her successor. This section aims to assess the likelihood of conflict (or possible equilibrium outcomes) between them and to identify the leading cause of such conflict. The resulting analysis establishes the dynamic, macroscopic change in the relationship between these two parties.

Suppose a successor is designated in period t. Then conflict will arise if (i) the ruler remains alive in the current period, $\prod_{i=1}^{t} (1 - p_i)$; (ii) no conflict will arise before the current period ($S_i < \bar{s}_i^c$ for all $i < t$) and the successor's power exceeds his challenge threshold ($S_t \geq \bar{s}_t^c$). Hence we can formally express the *conflict probability* (CP) in period t as follows:

$$\mathrm{CP}_t \equiv \Pr\left(S_t \geq \bar{s}_t^c \cap (S_i < \bar{s}_i^c, \forall i < t)\right) \prod_{i=1}^{t} (1 - p_i).$$

Proposition 3 implies that a ruler who remains in good health will not designate a successor who could pose an immediate threat to the throne. Thus, when the successor is finally appointed, the gap between his initial power and his challenge threshold is large enough to preclude immediate conflict. The two parties enjoy a "honeymoon" phase during this period. When the ruler's health begins to deteriorate (i.e., as $1 - p_t \to 0$), the probability of conflict likewise converges to 0 when t is sufficiently large. It is intuitive that a ruler who is likely to die soon has no motivation to strip the successor of his position. These results are formalized in the next proposition.

Proposition 4: Suppose that, on the equilibrium path, a successor is designated in period t^a. Then the following statements hold.

(1) If the successor's endowed initial power $\widetilde{S}$ is less than a constant $\hat{S}$, then there is a period $t^h(t^a, \widetilde{S})$ of no conflict before t^h (CP$_t = 0$).
(2) The conflict probability converges to zero: $\lim_{t \to \infty} \mathrm{CP}_t = 0$.

Part 1 of the proposition corresponds to the ruler–successor honeymoon phase during the early periods (i.e., before t^h) following the heir apparent's selection. This phase occurs provided that the successor's initial power is not too high ($\widetilde{S} < \hat{S}$). The second part characterizes the "power

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[2]This result is formalized in Appendix C Corollary A.1

transition" phase. During this phase, the successor is still incentivized to undertake an early challenge to the ruler; however, the upper bound on the probability of such conflict is reduced by the ruler's declining health.

However, a direct transition does not need to occur from the honeymoon phase to the power transition phase. Under certain conditions, the probability of conflict cannot be ignored indefinitely. Thus we have the following proposition.

Proposition 5: If the successor's initial power is low (sufficiently small $\widetilde{S}$) and the ruler begins her reign in a healthy condition and remains healthy for a long period (sufficiently small p_1 and $p_t - p_{t-1}$), then the conflict probability is bounded away from zero in some periods after t^h: $CP_t \geq \bar{c} > 0$.

Accordingly, if a candidate with low initial power is designated successor early in the ruler's reign, then the former must maintain a long-term relationship with the latter—who is presumed to be in good physical condition at this point. The resulting equilibrium strategies imply that a successor may take advantage of the honeymoon phase to increase his power substantially. After such an immediate power increase achieved via the effort level h, the ruler can no longer ignore her successor's accumulated power; hence their relationship enters a "mutual suspicion" phase in which the successor must (at least temporarily) try to maintain a low profile and avoid possible conflict. However, keeping a low profile will not prevent conflict if the ruler remains healthy for a sufficiently long period. When a ruler's tolerance threshold tightens faster than the speed at which her successor's power increases, the latter must attempt to increase his power in preparation for conflict. Under these circumstances, the conflict probability rises and so cannot be ignored.

Propositions 4 and 5 imply that, the two parties' preferences are misaligned at the beginning of the game, but converge with time. So any successor who seeks to maintain a long relationship with the ruler is in a race against time. There is no conflict in the honeymoon phase because the successor poses no threat to the ruler, while the reason of no conflict in the power transition phrase is due to the aligned preferences. Therefore, the conflict is unlikely to occur under certain situations (the degenerated cases of Propositions 4 and 5). If the ruler's health deteriorates in a relative high rate, then the honeymoon phase maybe thus directly connected with the power transition phase, or the successor can maintain his position by keeping a low profile until the ruler losses the incentive to strip his position (the simulation results can be found in Appendix B).

Although arranging a smooth power transition is difficult under autocracy, history is replete with efforts to provide institutional protection (e.g., primogeniture) to apparent heirs. If institutional protection is increased (larger ω), then the ruler is less concerned about being betrayed and hence is less motivated to strip the successor of his position. With his designation thereby further secured, the successor has little incentive to challenge the ruler. The results are a reduction in the parties' mutual fear and perhaps a considerably earlier designation. These considerations lead to following summary proposition.

Proposition 6: (i) For a given initial power $\widetilde{S}$, there exists a $\widetilde{w}$ such that both t' and t''—the lower and the upper bounds (respectively) of the designation interval—are weakly decreasing in the institutional protection w when $w < \widetilde{w}$. In addition, $\widetilde{w}$ decreases with $\widetilde{S}$. (ii) If an optimal designation period t^a does not change with w, then the length of the honeymoon phase ($t^h - t^a$) is weakly increasing in w. If $\widetilde{S}$ and p_t satisfy the conditions stipulated in Proposition 5, then the conflict probability's lower bound $\bar{c}$ is weakly decreasing in w. (iii) If t^a is decreasing in w, H is less than a threshold $\overline{H}$, and $\widetilde{S}$ and p_t satisfy the conditions stipulated in Proposition 5, then the conflict probability's lower bound $\bar{c}$ may weakly increase in w.

The first two parts of Proposition 6 indicate that the increase in the institutional protection can lead to an earlier designation or decrease the conflict rate. The last part of this proposition shows that when the increase of w causes an earlier designation, the ruler faces a risk that the successor will have more time to accumulate power, which may lead to a conflict. When the successor's power increase is limited ($H < \overline{H}$) in each period, then the ruler may tolerate a relative small increase in the conflict probability and choose to designate the successor earlier.

An adjusted primogeniture was the prevailing custom in ancient China, which illustrates the effect of the institutional protection of succession under autocracy. Under the traditional polygamy, the relative ranks of imperial consorts play a key role in imperial succession, which ranks heirs according not only to the birth order but also to the mother's status. The position of empress is always unique, and the son of an empress has priority over other princes in the succession order. Still, this succession tradition provided at least some institutional protection for a successor whose mother was the empress. It took an average of 1.56 years for the ruler to appoint a new crown prince if the prince's mother was an empress; otherwise, the appointment process consumed an average of 3.56 years. Following designation of a successor, the conflict rate was 8.7 percent (4 out of 46) for the son of an empress but more than twice that (20.1 percent) for other designated successors. These examples accord with the model in showing that increased institutional protection may result in both an earlier designation and a lower rate of conflict.

2.4 Predetermined succession order

The analysis so far has been restricted to the case where the ruler can designate a successor in any period. This arrangement gives a ruler the flexibility to handle possible conflict with her successor. In reality, however, the ruler is not always afforded that flexibility. One example of legislation providing for a clear succession order is the Act of Settlement established by England in 1701. The motive for such approaches is that stipulating a predetermined order of succession prevents the chaos caused by more ambiguous succession customs and the resulting destructive power struggles.

Yet a predetermined order of succession is, as mentioned previously, a double-edged sword. On the one hand, it may provide increased protection for the successor's position and thereby reduce the likelihood of conflict (Proposition 6). On the other hand, a predetermined procedure leaves the ruler with limited flexibility, which could lead to conflict because designating a successor at the game's outset might not be the ruler's optimal choice (Proposition 3).

The negative effect of a predetermined succession order could be significant when the successor has considerable power. By Proposition 3, the ruler is inclined to appoint a powerful successor only in the later periods of her reign. Unless her health has already begun to deteriorate, the ruler prefers a situation where the gap between the successor's initial power and his own tolerance threshold is large enough that immediate conflict can be avoided. In contrast, if a ruler is in good health and if her health is slow to deteriorate, then the existence of a predetermined successor could eliminate the two parties' honeymoon phase and thus result in immediate conflict.

Corollary 1: Suppose that a candidate with initial power $\widetilde{S}$ is designated as successor in period 1 and that p_1 is not too large. Then there will be conflict in that period if the ruler's health deteriorates slowly (i.e., if $p_t - p_{t-1}$ is bounded by a constant).

In today's world, absolute monarchy still exists in the Gulf countries. In Saudi Arabia, ruler–successor conflicts embody the negative effect of a predetermined succession order. A "deputy crown prince" position has been used to identify the heir of the current heir. Thus a successor who assumes the throne has a (predetermined) successor who was chosen by the former ruler. The succession order in Saudi Arabia follows *agnatic seniority* in that the throne is handed down among the sons of a single individual (here, Ibn Saud). This type of succession implies that

the age gap between rulers and their successors is small. Moreover, successors have already amassed considerable power when they are appointed, which can create conflicts with the ruler.

After the death of two successive heirs in one year, King Abdullah designated Prince Salman bin Abdulaziz as his successor in 2012 and appointed Prince Muqrin as the deputy crown prince in 2014. When Salman ascended to the throne in 2015 and so Muqrin became crown prince, Prince Nayef was designated as deputy crown prince. Yet once in power, King Salman immediately stripped that successor position from the 71-year-old Muqrin. Moreover within two years of the 51-year-old Nayef being appointed crown prince, he was deposed by King Salman and replaced by his 31-year-old son: Mohammad bin Salman.

Although the House of Saud attempted to enhance institutional protection by establishing the deputy successor position to predetermine the order of succession, power struggles between rulers and their heirs will likely intensify and lead the kingdom to forgo such protections.

The succession procedure in Saudi also implies the difference between agnatic seniority and primogeniture. The age gap among siblings in general is less than that between father and sons. Therefore, when a sibling is appointed as the successor, he may have already accrued considerable power that poses a threat to the ruler's throne. Conversely, the large age gap between rulers and their children alleviates this threat. This result is also consistent with the evidence from Kokkonen and Sundell (2014), which explains why the primogeniture prevailed in ancient Europe. A formal result is presented as follows:

Corollary 2: The conflict is more likely to happen when the succession is ordered by agnatic seniority than by primogeniture, i.e., the conflict is more likely to happen under large $\widetilde{S}$.

3. Multi-candidate selection

In this section, the model is extended to a context in which more than one candidate can be chosen as the successor. For simplicity, we shall assume that only two candidates (candidates 1 and 2) are eligible for the successor title at the beginning of the game. Each candidate has an initial power endowment $\widetilde{S}^i$, where $i \in \{1, 2\}$. The ruler can decide when to designate her heir apparent.

When a candidate is designated as successor in period t, the game proceeds as in the baseline model described in Section 2.1. If a selected heir apparent successfully challenges the ruler in any period, he becomes the new ruler and the game ends. Any successor who loses his title can never again be appointed successor. In that case, the ruler decides whether and when to select the next successor.

In this game, those in the candidate pool have no active move. This setup precludes an "ordinary" candidate—that is, one who has not been cultivated by the ruler to become a future leader and so does not face an appointed successor's dilemma—initiating a coup or open rebellion. I also ignore the possibility that other candidates will conspire to sabotage the relationship between the ruler and any candidate successor.

We consider the scenario with a fixed succession order, such as one determined by birth order. In such cases, the ruler must designate candidate 1 *before* designating candidate 2. If the first chosen successor is stripped, then the game between the ruler and the remaining candidate is exactly the same as in the baseline model with the unique candidate. The subsequent analysis here therefore focuses on the interaction between a ruler and his first chosen successor. To simplify the presentation, in this section I highlight the difference between the one- and two-candidate cases; details regarding their equilibrium strategies are given in the appendix.

When there are two candidates, the ruler has a backup to fill the position if the first chosen successor is stripped of his title. Therefore, apart from the motivation to protect her own power, the ruler has another incentive to replace the existing successor—namely, if the current successor is not competent enough to assume the throne and carry on her legacy. Therefore, the first successor always faces a risk of losing the position due to competition, even if the ruler's

health deteriorates (the formal result is in the appendix). In this situation, a weak successor will be pressured because his title will be stripped if he cannot prove his ability to seize the throne. Whether a weak candidate still has the opportunity to succeed the throne depends on the initial power gap between the candidates. When Candidate 1 has less initial power than Candidate 2 and this power gap is sufficiently large, then the optimal strategy for the ruler is to strip the first successor of his title to make space for Candidate 2. Moreover, conflict will occur right after the designation, because the ruler will not want to risk the first successor dethroning him. When the initial power gap is small, then designating Candidate 1 could be a safer choice for the ruler as long as the sacrifice of the competency is not too large. These results are summarized as follows.

Proposition 7: If candidate 1 has lower initial power than candidate 2 $(\widetilde{S}^1 < \widetilde{S}^2)$, then there exists a $d_2 \gtrless 0$ such that the ruler and her first successor will not immediately conflict only if $\widetilde{S}^1 \geq \widetilde{S}^2 - d_2$.

This proposition implies an immediately conflict will occur if candidate 1's initial power is too low $(\widetilde{S}^1 < \widetilde{S}^2 - d_2)$.

When candidate 1's initial power is greater than that of candidate 2, the former experiences no direct competitive pressure from the latter. However given that the first successor is replaceable, the ruler will be more concerned about maintaining her grip on the throne than about the particulars of a power transition. Hence she will prefer to choose any successor in a later period, thereby avoiding (or at least forestalling) potential challenges. The ruler's tolerance threshold for the existing successor will tighten in this case, which could increase the probability of conflict. Thus we have our next proposition.

Proposition 8: (i) If $\widetilde{S}^1 > \widetilde{S}^2$, then both the lower and the upper bounds (i.e., t'_1 and t''_1) of the first successor's designation interval are weakly greater than their counterparts in the single-candidate case; that is, $t'_1 \geq t'$ and $t''_1 \geq t''$. (ii) If the optimal designation time for the first successor does not differ from that in the single-candidate case, then the duration of this successor–ruler's honeymoon phase will be weakly lower than that in the single-candidate case.

This proposition implies that the probability of conflict will increase with the number of candidates for the successor position. In ancient China, particularly when successors' mothers were not empresses, it took a ruler an average of 3.14 years to appoint a successor when no other son was available, but 3.72 years to appoint a successor when more than one candidate was available. This descriptive phase is consistent with the first part of Proposition 8. The second part of this proposition indicates that the probability of conflict will increase with the number of candidates for the successor position. In ancient China, 13.1 percent of crown princes who had no more than 5 brothers, had conflicts with emperors; this conflict rate increased to 17.6 percent for 6–10 brothers and to 30 percent when the successor had more than 10 brothers.[3]

Now, the analysis can be easily extended to the scenario that the ruler to freely choose the successor. The weak candidate has no chance to be selected as the first successor if the initial power gap between him and the strong candidate is large. When the power gap is small, the weak candidate may obtain a chance to become the successor first. However, the power gap restriction is stronger in this situation because the ruler does not have to designate the weak candidate first. Thus, to gain the opportunity to be named heir apparent, the weak candidate must provide the ruler a higher expected payoff (i.e. be more capable).

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[3]The average number of such sons is 7, with a standard deviation of 6.

Corollary 3: If there are two candidates for whom $\widetilde{S}^1 > \widetilde{S}^2$ and the ruler is free to designate his successor, then the weaker candidate will be chosen as the first successor only if his initial power is close to that of the strong candidate—that is, only if $\widetilde{S}^1 - \widetilde{S}^2 < \tilde{d}_2$ and $0 \le \tilde{d}_2 \le d_2$.

Proposition 7 and Corollary 3 together imply that, as one might expect, a strong candidate may have an advantage in the race to succession. These results offer another explanation for why primogeniture prevails under authoritarian regimes. In such regimes, it is typical for the oldest son to have more time (than do his younger brothers) to establish coalitions and garner support. Imperial Chinese monarchs had more flexibility to choose a successor when their empresses had no sons. Among the 98 successors in our data set whose mothers were not empresses and who had at least one brother, 70 were the oldest living son when they were appointed. Among those who were not the oldest but were still chosen as successor, I find that three of these seven successors were only one year younger than the oldest living sons of corresponding rulers. These facts imply that, when the chosen successors were not the oldest living sons, they were nonetheless competitive candidates despite not necessarily being the strongest ones. This conclusion is consistent with the model's prediction.

4. Conclusion

This paper proposes a dynamic game to endogenize the relationship between rulers and their successors. The model captures the essential ruler–successor conflict that arises from a mutual fear of being ousted by the other party. Until her life nears its end, the ruler constantly monitors the successor's increasing power. At the same time, a successor who is not strong enough to threaten the ruler will devote his efforts to accruing additional power. When his power has increased enough to make the ruler suspicious, the successor should maintain a low profile to avoid conflict. Yet when he is sufficiently powerful to arouse the ruler's suspicion, the successor should strive to accrue still more power in preparation for contesting the throne.

There are several noteworthy implications of the model developed here. First, conflict between a ruler and her successor is more likely to occur during the middle stage of their relationship. Second, although institutional protection for power transitions can reduce the likelihood of conflict, a predetermined succession order may increase that likelihood. Finally, a ruler who can choose from among (say) two candidates prefers the weaker one only if his capabilities differ little from those of the stronger candidate; if the stronger candidate is chosen, this tends to occur later and requires the ruler to monitor him strictly.

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