Credible Commitment under Asymmetric Information: A Formal Model of Autocratic Succession

Shaoping Li

Assistant Professor
School of Economics and Management
Huzhou Normal University
Email: shaoping66@163.com

Abstract

Why do autocratic successions systematically oscillate between violent collapse and institutional stagnation? We develop a dynamic signaling game to analyze succession under asymmetric information without exogenous third-party enforcement. Using Imperial China as our primary empirical setting, we demonstrate that to maximize absolutist rents, rulers structurally incentivize rent-seeking intermediaries to endogenously capture information channels, mathematically forcing even loyal heirs into preemptive rebellion (e.g., the Han Dynasty). Faced with this security dilemma, the state's second-best solution is extreme information obfuscation exemplified by the Qing Dynasty's "Secret Reserve" system. While obfuscation suppresses short-term violence by neutralizing intermediary capture, we show it triggers severe adverse selection, systematically destroying the political human capital of future executives. By contrasting these dynamics with Western Europe's polycentric institutional constraints, this paper provides a formal micro-foundation for both the "ultra-stable" stagnation of absolute autocracies and the executive human capital deficit underlying the Great Divergence.

JEL Codes: D73, D74, N45, P48
Keywords: Credible Commitment, Autocracy, Signaling Game, Institutional Involution, Great Divergence

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Abstract

Why do autocratic successions systematically oscillate between violent collapse and institutional stagnation? We develop a dynamic signaling game to analyze succession under asymmetric information without exogenous third-party enforcement. Using Imperial China as our primary empirical setting, we demonstrate that to maximize absolutist rents, rulers structurally incentivize rent-seeking intermediaries to endogenously capture information channels, mathematically forcing even loyal heirs into preemptive rebellion (e.g., the Han Dynasty). Faced with this security dilemma, the state's second-best solution is extreme information obfuscation—exemplified by the Qing Dynasty's "Secret Reserve" system. While obfuscation suppresses short-term violence by neutralizing intermediary capture, we show it triggers severe adverse selection, systematically destroying the political human capital of future executives. By contrasting these dynamics with Western Europe's polycentric institutional constraints, this paper provides a formal micro-foundation for both the "ultra-stable" stagnation of absolute autocracies and the executive human capital deficit underlying the Great Divergence.

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1. Introduction

The transfer of supreme power is arguably the most vulnerable moment in the lifecycle of any political organization. In autocratic regimes, where power is highly concentrated and institutional constraints are weak, succession frequently precipitates violent conflict, elite purging, and systemic collapse. This historical regularity presents a profound puzzle: Why did Imperial China—a civilization equipped with a highly sophisticated, rationalized bureaucracy and deeply internalized Confucian moral-legal codes—repeatedly fail to institutionalize a stable, non-violent succession mechanism? While Western Europe gradually evolved from the bloody dynastic struggles of the Middle Ages toward rule-bound, "constrained" successions anchored by parliaments and the Church, the Chinese imperial system oscillated between two tragic extremes. It vacillated between the violent physical breakdown of the "Open Succession" (as seen in the Han Dynasty's catastrophic Witchcraft Incident in 91 BC) and the institutionalized opacity of the "Secret Reserve" system (perfected by the Qing Dynasty in the 18th century), which traded immediate stability for long-term adverse selection.

Standard historical accounts often attribute these succession crises to idiosyncratic factors—such as the paranoia of aging emperors, the opportunistic intrigues of court eunuchs, or the inherent psychological toll of absolute power. While these narrative approaches capture the drama of high politics, they fail to explain the systemic, almost mathematical regularity of these institutional failures across millennia. In the political economy literature, scholars following the tradition of North and Weingast (1989), Greif (1994, 2006), and Acemoglu and Robinson (2006) have correctly identified the absence of "credible commitment" as the root of the institutional divergence between the East and the West. More recently, the literature on the logic of political survival (Bueno de Mesquita et al., 2003), autocratic succession (Tullock, 1987; Kurrild-Klitgaard, 2000), and the politics of authoritarian rule (Myerson, 2008; Svolik, 2012; Guriev and Treisman, 2019) has highlighted the inherent commitment problems in autocratic power-sharing. However, the existing frameworks often treat the

breakdown of succession rules as a static black box. Specifically, they overlook the crucial, endogenous role of *information transmission* in an absolutist setting, failing to capture how power concentration, information asymmetry, and the self-interested agency of bureaucratic intermediaries conjointly force rational actors into a sub-optimal equilibrium.

Building on the foundational insights of strategic information transmission (Crawford and Sobel, 1982), this paper addresses this gap by conceptualizing monarchical succession as a dynamic signaling game of incomplete information lacking a third-party enforcer. The stability of the ruler-heir relationship relies on two institutional parameters: Rule Independence (α), representing the presence of exogenous third-party constraints, and Information Transparency (β), representing the accuracy of signals regarding the heir's loyalty. Through this formal framework, we propose a stark economic intuition: **Information opacity ($\beta \to 0$) is not an idiosyncratic error by the autocrat, but the systemic cost they are forced to pay to maintain absolutist rents when independent third-party enforcement ($\alpha \to 0$) is structurally prohibited.**

Our formal model demonstrates that in a regime where the ruler refuses to share power with an independent adjudicator ($\alpha \to 0$), the penalty for intermediaries who send false signals becomes structurally asymmetric. Anticipating that the extremely risk-averse ruler will always purge a suspected heir to ensure biological survival, competing intelligence agencies and bureaucratic intermediaries face a classic Prisoner's Dilemma. Their strictly dominant strategy is to collude and universally signal a threat, creating a "Pooling Equilibrium" that entirely captures and distorts the information channel. Faced with the extreme penalty of being purged due to this informational noise, the heir's only rational response is to launch a preemptive rebellion. Thus, extreme centralization mathematically breeds extreme violent instability. Unlike existing literature that views autocratic information distortion as a cultural outcome or a manifestation of irrational 'Emperor's paranoia,' we characterize it as the subgame-perfect equilibrium of an information-constrained environment, where the ruler acts as a rational agent minimizing the risk of institutional intermediary capture.

Departures from Existing Literature

To appreciate the theoretical contribution of this formal framework, it is necessary to contrast our mechanism with the three dominant paradigms in the existing literature regarding autocratic succession and the Qing Dynasty's institutional evolution.

First, traditional historiography frequently attributes the breakdown of succession mechanisms to idiosyncratic historical shocks and the psychological paranoia of aging autocrats. For instance, the genesis of the Qing "Secret Reserve" system is conventionally narrated as Emperor Yongzheng's psychological reaction to the traumatic "Nine-Lord Contention" (the succession struggle among the nine sons of the Kangxi Emperor) during his father's reign. Our model departs from this psychological determinism. By endogenizing information transmission, we demonstrate that intermediary capture and succession crises are not exogenous historical accidents; they constitute a subgame-perfect equilibrium dictated by the extreme risk aversion of a rational autocrat operating without third-party enforcement ($\alpha \to 0$). Information distortion is a structural mathematical feature of absolute power, not a personality flaw.

Second, the political science and "New Qing History" literature often interpret the Secret Reserve as a highly successful institutional synthesis of Inner-Asian traditions and Han bureaucratic norms. These accounts tend to view extreme secrecy as a rational, evolutionary modernization that effectively resolved the succession dilemma by balancing meritocracy with biological stability. We fundamentally challenge this evolutionary optimism. Our framework re-evaluates the Secret Reserve as a profound *institutional involution*. While it successfully neutralized the short-term security dilemma, it was merely a second-best mathematical necessity that fundamentally altered the signaling environment. By forcing princes to rely on "orthogonal signaling" (moral docility) rather than political coalition-building, the system actively selected against dynamic statecraft, guaranteeing long-term adverse selection.

Finally, while the macro-sociological literature (e.g., Weberian analyses of Chinese bu-

reaucracy), as well as recent political economy studies on imperial state capacity (Sng, 2014; Bai and Jia, 2016), correctly identify the tension between the absolute monarchy and bureaucratic factionalism, it predominantly focuses on the distributional outcome—the ultimate triumph of imperial centralization over the "Outer Court." Our model extends this analysis by introducing the *general equilibrium cost* of this triumph. By driving information transparency to zero ($\beta \to 0$) to eradicate factionalism, the autocrat simultaneously destroyed the "market for political futures." We show that the very mechanism used to defeat the bureaucracy also stripped future executives of their principal-agent networks, directly manufacturing the executive paralysis that doomed the empire during the 19th-century geopolitical crises.

In sum, existing literature treats the Secret Reserve as a successful historical anomaly; we formalize it as a sub-optimal institutional equilibrium, providing a unified micro-foundation for the macro-historical stagnation of the Chinese imperial structure.

To empirically evaluate the observable implications of this formal model, we employ a Comparative and Historical Institutional Analysis (CHIA) integrated with rigorous Process Tracing. Rather than relying on broad statistical correlations, we transform our formal equilibrium conditions into testable causal footprints across three distinct institutional environments.

First, we examine the Han Dynasty's Witchcraft Incident to demonstrate how the physical isolation of the emperor allowed intermediaries to monopolize the information channel, inexorably driving a loyal crown prince to armed rebellion.

Second, we analyze the Qing Dynasty's "Secret Reserve" system, revealing it not as a step toward modernization, but as a second-best institutional involution. Unable to increase α, the Qing state actively forced β to zero by hiding the heir's identity. While this obfuscation successfully eliminated the target for intermediary capture and solved the short-term security dilemma, it fundamentally altered the signaling mechanism for the princes. To avoid being perceived as a threat, princes were forced to minimize any observable administrative or

military capacity. We document this empirically by introducing a novel proxy: *pre-accession administrative tenure*. We show that while early Qing emperors accumulated decades of political capital and coalition-building experience prior to accession, late Qing heirs were systematically quarantined from the bureaucracy, ascending the throne with zero political capital.

Finally, we introduce Western Europe as a comparative control group. By examining the European evolution of polycentric power structures, we illustrate how the integration of independent organizations—such as the Church and early parliaments—effectively increased Rule Independence ($\alpha \to 1$). We argue that the strict determinacy of European primogeniture was not a cultural exogenous given, but an endogenous institutional commitment device demanded by these third-party enforcers, which effectively buffered the system against informational shocks. H **This study makes three primary contributions to the political economy of authoritarian institutions and economic history:**

First, we theoretically endogenize information capture in autocratic regimes. Building on the credible commitment literature (North and Weingast, 1989; Svolik, 2012), our model demonstrates that information distortion by rent-seeking intermediaries is not a random historical friction, but a subgame perfect equilibrium dictated by the ruler's insistence on absolute power. We provide a rigorous micro-mechanism for why autocracies inevitably suffer from informational echo chambers and succession crises.

Second, we introduce a novel, executive-level political economy channel to the "Great Divergence" literature (Pomeranz, 2000; Acemoglu, Johnson, and Robinson, 2005; Rosenthal and Wong, 2011). While existing accounts focus on property rights or inclusive markets to explain Qing China's stagnation relative to Western Europe, we highlight an equally fatal divergence in *executive human and political capital*. While the macro-empirical literature has robustly demonstrated that individual leaders deterministically drive economic and institutional outcomes in unconstrained regimes (Jones and Olken, 2005), our model provides a structural micro-foundation for this phenomenon. We demon-

strate exactly how the Secret Reserve system endogenously and systematically destroyed the political capital of late imperial leaders before they even reached the throne. The structural unintended consequence of the Qing's institutional involution is that executive capacity was structurally minimized at the exact historical moment when exogenous geopolitical shocks demanded maximum statecraft, creating a devastating "scissors effect" that paralyzed the empire.

Third, we provide a formal micro-foundation for the macro-historical phenomenon of cyclical stagnation. In the context of Chinese historiography, Jin and Liu (1984) famously conceptualized the imperial system as an "Ultra-stable Structure" that constantly reconstructed itself without institutional breakthrough. By integrating formal game theory with comparative process tracing, we map abstract equilibrium conditions into testable historical footprints, explaining exactly *how* the apex of this structure repeatedly triggered its own resets, oscillating between violent physical collapse and paralyzing institutional involution.

The remainder of this paper is organized as follows. Section II presents the formal game-theoretic model of succession and information collusion. Section III utilizes process tracing to test the model against the empirical evidence from the Han Dynasty. Section IV analyzes the Qing Dynasty's information obfuscation and quantifies the resulting adverse selection. Section V provides the comparative analysis of the constrained succession model in Western Europe. Section VI concludes with theoretical implications for modern authoritarian regimes.

2. The Formal Model

To formalize the micro-mechanisms of autocratic succession and institutional involution, we develop a dynamic signaling game of incomplete information. The model demonstrates how the absence of exogenous institutional constraints translates into the endogenous capture of information, thereby triggering preemptive rebellion. The formal mathematical proofs for all propositions are provided in the Mathematical Appendix.

2.1. Setup and Sequence of Play

The game consists of three risk-neutral players: the Ruler (R), the Heir (H), and a Bureaucratic Intermediary (M). The Intermediary represents the intelligence apparatus, inner-court attendants, or favored ministers who control the flow of information to the apex of power.

The sequence of the game unfolds as follows:

1. **Nature** draws the Heir's true type $\theta \in \{L, A\}$, where L denotes a "Loyal" heir content to wait for a natural succession, and A denotes an "Ambitious/Threatening" heir plotting to usurp power prematurely. The Ruler does not observe θ. The prior probability of loyalty is $Pr(\theta = L) = p \in (0, 1)$.

2. **The Intermediary (M)** perfectly observes θ and sends a signal $s \in \{L, A\}$ to the Ruler.

3. **The Ruler (R)** observes the signal s, updates his posterior belief $\mu(s) = Pr(\theta = A|s)$ using Bayes' rule, and chooses an action: Abide (A_R) or Purge (P_R).

4. **The Heir (H)**, anticipating or observing the Ruler's move, chooses to either Wait (W) or launch a preemptive Rebellion (B).

The institutional environment is defined by two key parameters: **Rule Independence ($\alpha \in [0, 1]$)**, measuring the probability that an independent third-party (e.g., a parliament or church) can accurately verify the signal and enforce rules; and **Information Transparency ($\beta \in [0, 1]$)**, representing the clarity of the signal reaching the Ruler without intermediary distortion. In an absolute autocracy, we analyze the limit case where $\alpha \to 0$.

2.2. Payoff Structure and the Dictator's Extreme Risk Aversion

The payoffs reflect the brutal reality of absolute power. The Ruler values maintaining the throne and a peaceful succession at V_R. However, if the Ruler chooses to Abide (A_R) while the Heir is truly Ambitious ($\theta = A$), the Ruler faces a catastrophic loss $-L_R$, representing

violent overthrow and death. If the Ruler preemptively Purges (P_R), he secures his immediate biological survival but incurs an institutional and political cost C_P.

Crucially, in the autocratic context, the cost of being deposed is infinitely greater than the cost of purging an heir. Thus, we assume $L_R \gg V_R > C_P$. This extreme asymmetry dictates the Ruler's threshold for action. The Ruler will purge the Heir if his posterior belief of a threat exceeds a critical threshold: $\mu(s) > \mu^* = \frac{C_P}{V_R + L_R}$. Because L_R approaches infinity, the threshold μ^* approaches zero. *The autocrat cannot afford even a fractional probability of betrayal.*

Boundary Condition and the Cost of Purging (C_P): A formal boundary condition to this extreme risk aversion exists if the Heir has amassed sufficient independent military or aristocratic power such that the institutional cost of purging them (C_P) approaches the catastrophic loss of a successful coup (L_R). If $C_P \to L_R$, the threshold μ^* rises significantly, forcing the Ruler to abandon the automatic purge and attempt to verify signals. This boundary condition perfectly illuminates the underlying institutional logic of absolute autocracies: to ensure $\mu^* \to 0$ and maintain absolute discretionary power over survival, the state must structurally enforce $C_P \ll L_R$. This explains why both the Han and Qing dynasties, despite their different succession systems, were obsessively committed to stripping princes of independent military commands.

2.3. Proposition 1: Endogenous Information Capture

The Intermediary M acts as a self-interested rent-seeker. If M successfully uncovers a "plot" and triggers a purge, M receives a bureaucratic reward and expropriates the purged faction's wealth, earning a rent $B > 0$. However, if M intentionally frames a loyal Heir ($s = A$ when $\theta = L$) and the false signal is discovered, M faces execution, a severe penalty F.

The probability of discovering this perjury relies entirely on the presence of an independent adjudicatory body (α). If M lies, his expected payoff is $(1 - \alpha)B - \alpha F$.

Proposition 1 (The Capture of Information): *When independent institutional con-*

straints are weak or absent ($\alpha < \frac{B}{B+F}$), the Intermediary's strictly dominant strategy is to always signal a threat ($s = A$), regardless of the Heir's true type. The signaling game collapses into a Pooling Equilibrium.

Intuition: In an absolute monarchy ($\alpha \to 0$), the Ruler acts as both the executive and the judiciary. Because the Ruler is physically or structurally isolated, he lacks the capacity to independently verify the Intermediary's claims. Consequently, the Intermediary faces virtually zero risk of being caught committing perjury ($\alpha F \to 0$), while the potential political rent for eliminating a future rival and confiscating their assets (B) remains massive. The information channel (β) is entirely captured and distorted by the Intermediary.

Because M always signals $s = A$, the signal becomes completely uninformative. The Ruler's posterior belief remains equal to the prior: $\mu(s = A) = 1 - p$. Since the Ruler's threshold for tolerance is near zero due to his extreme risk aversion ($\mu^* \to 0$), the uninformative signal invariably triggers the Ruler's strictly dominant response: Purge (P_R).

2.4. Proposition 2: The Security Dilemma and Preemptive Rebellion

We now examine the Heir's optimal response. If the Heir chooses to Wait (W) while the Ruler Purges (P_R), the Heir faces physical elimination and clan extermination, denoted by a catastrophic negative payoff $-V_C$. Alternatively, the Heir can choose to Rebel (B), which requires a high organizational cost K, but yields a probability π of successfully usurping the throne (worth V_H) and a probability $(1 - \pi)$ of failure (yielding $-V_C$).

Proposition 2 (The Structural Rebellion): *When $\alpha \to 0$, a structurally loyal Heir ($\theta = L$) is mathematically forced to launch a preemptive rebellion if $\pi(V_H + V_C) > K$.*

Intuition: This proposition captures the tragic essence of the autocratic security dilemma. The loyal Heir knows his own type ($\theta = L$), but he also rationally anticipates Proposition 1: the Intermediary will frame him ($s = A$), and the risk-averse Ruler will inevitably initiate a purge (P_R). Because the penalty for passively awaiting a purge is absolute destruction ($-V_C \to -\infty$), the expected utility of waiting drops far below the expected utility of a

costly, risky rebellion. The Heir does not rebel out of inherent ambition, but as a strict best response to the informational noise generated by the $\alpha \to 0$ environment.

2.5. Competing Intermediaries and Information Collusion

A critical objection to this framework is that a rational ruler, anticipating intermediary capture, would systematically deploy multiple, competing intelligence networks (e.g., the Ming Dynasty's overlapping secret police, or the Qing's secret memorial system) to maintain $\beta > 0$. However, adding N intermediaries does not resolve the equilibrium in an $\alpha \to 0$ environment; rather, it introduces the dynamics of bureaucratic collusion.

Assume the Ruler deploys two competing intermediaries, M_1 and M_2. In an absolutist system without independent adjudication, the penalty for sending conflicting signals is structurally asymmetrical. If M_1 reports the Heir is loyal ($s_1 = L$) while M_2 reports a threat ($s_2 = A$), the Ruler's extreme risk aversion ($L_R \to \infty$) dictates that he must act on the threat signal ($s_2 = A$) and purge the Heir. Consequently, the intermediary who signaled loyalty (M_1) is retroactively identified as a conspirator of the purged Heir and faces execution.

Anticipating this "winner-takes-all" dynamic, M_1 and M_2 face a classic Prisoner's Dilemma. The strictly dominant strategy for all competing agencies is to collude and universally signal a threat ($s_i = A, \forall i \in N$), confirming the Pooling Equilibrium. Thus, the information trap is robust: multiplying intermediaries under $\alpha \to 0$ merely generates systemic echo chambers rather than transparent signals.[1]

Having established the formal micro-mechanisms of the autocrat's security dilemma, the subsequent sections will map these equilibrium conditions into testable causal footprints across Imperial China and Western Europe.

[1] A game-theoretic paradox seemingly arises here: if the Ruler knows the intermediaries are in a pooling equilibrium where $s = A$ conveys no new information ($\mu = 1 - p$), why incur the bureaucratic costs to maintain the intelligence apparatus? The answer lies in the economies of scope of autocratic coercion. While the apparatus becomes endogenously useless for distinguishing a loyal heir from a rebellious one due to the asymmetrical penalties involved at the apex of power, it remains highly informative and effective for detecting non-elite threats, such as local peasant uprisings or provincial tax evasion, where intermediaries do not face the same catastrophic risk of retroactive punishment.

3. Institutional Background: The Mechanics of Absolute Autocracy

For Western scholars accustomed to the polycentric institutional development of early modern Europe (where monarchs negotiated with the Church, independent nobility, and parliaments), the structural realities of the Chinese imperial system require careful specification. Imperial China provides an unparalleled laboratory for testing theories of autocratic commitment precisely because it represents the historical maximum of Rule Independence approaching zero ($\alpha \to 0$).

3.1. The Stylized Fact: The Systemic Failure of Autocratic Succession

To appreciate the magnitude of the commitment problem in the Chinese imperial system, it is necessary to examine the macro-historical data. Throughout two millennia of dynastic cycles, the inability to institutionalize a credible, third-party enforced succession mechanism ($\alpha \to 0$) resulted in a staggeringly high rate of violent or irregular power transfers.

Table 1 summarizes the succession outcomes across major unified dynasties. The comprehensive list of all emperors, the exact nature of their succession, and the historical sources used for coding these historical events are cataloged in the Online Data Appendix. We define an "Abnormal/Violent Succession" as any power transfer involving armed rebellion, palace coups, the murder or forced abdication of the incumbent/heir, or the usurpation of the throne by regents and external warlords.

The data reveals a stark stylized fact: in major dynasties prior to the Qing, roughly one-third to one-half of all imperial successions broke down into violence or systemic irregularity. For example, the Tang Dynasty—often celebrated as the zenith of Chinese cosmopolitan power—suffered an abnormal succession rate exceeding 50%, plagued by continuous military coups at the Xuanwu Gate and assassinations orchestrated by inner-court eunuchs.

This statistical reality powerfully refutes the notion that imperial successions were gov-

Table 1: Disaggregated Rates of Abnormal Succession Across Major Dynasties

Dynasty	Total Emperors	Total Abnormal	Overall Abnormal	Inner-Court / Info Distortion	External / Warlord
Han	24	11	45.8%	**8 (72.7%)**	3 (27.3%)
Tang	21	11	52.4%	**9 (81.8%)**	2 (18.2%)
Ming	16	5	31.2%	**4 (80.0%)**	1 (20.0%)
Qing Era					
Open (1644–1722)	2	1	50.0%	**1 (100%)**	0 (0%)
Secret (1723–1911)	7	0	0.0%	**0 (0%)**	0 (0%)

Notes: "Inner-Court / Info Distortion Driven" refers to successions derailed by internal factional framing, eunuch/consort manipulation, or emperor-heir paranoia (precisely matching our $\beta \to 0$ information capture model). "External" refers to exogenous military conquests by provincial warlords.

erned by internalized Confucian moral codes or stable institutional norms. Instead, the data validates our baseline assumption: an absolutist setting without exogenous third-party enforcement is fundamentally trapped in a violent security dilemma.

Crucially, the bottom panel of Table 1 highlights the dramatic institutional break achieved by the Qing Dynasty's "Secret Reserve" system. By endogenously driving Information Transparency to zero ($\beta \to 0$), the Qing state completely eradicated violent succession (a 0% abnormal rate over nearly two centuries). However, as our formal model and subsequent empirical analysis will demonstrate, this unprecedented biological stability was purchased at the catastrophic cost of destroying the empire's executive political capital.

3.2. The Han Baseline: The Architecture of Open Succession

The Han Dynasty (202 BC – 220 AD) consolidated the world's first enduring, large-scale rationalized bureaucracy. The emperor sat at the apex of a vast civilian administration (the Outer Court), which managed taxation, conscription, and justice. In this baseline system, succession was managed through the 'Open Succession' mechanism. The Crown Prince was formally designated early in the emperor's reign and was granted his own miniature administrative apparatus, including a substantive tutor (Grand Tutor) and a personal military guard.

Crucially, this public designation was not merely symbolic; it was an economic signal to

the bureaucracy. It allowed the Crown Prince to engage in political contracting, building a future ruling coalition. However, because the Han system lacked any exogenous third-party enforcer ($\alpha \to 0$), the physical and informational proximity (β) between the Emperor and the Crown Prince was the only mechanism preventing the "Dictator's Dilemma." When physical proximity was disrupted—such as when the aging Emperor Wu relocated to the highly fortified and secluded Ganquan Palace, geographically isolating himself from the capital—the information channel became dangerously exposed to capture by inner-court intermediaries, setting the stage for the catastrophic Witchcraft Incident of 91 BC.

3.3. The Qing Institutional Technology: Bypassing the Outer Bureaucracy

When the Manchu Qing Dynasty established its rule over China in 1644, it faced the exact same $\alpha \to 0$ constraint. However, the Qing possessed a unique institutional technology inherited from their Inner Asian origins: the *Bao'yi* (bondservant) system. Unlike the Han or Ming dynasties, which had to rely on the formal "Outer Court" (composed of Han Chinese scholar-officials) or eunuchs for intelligence gathering, the Qing emperors could rely on a hereditary caste of personal slaves who managed the Imperial Household Department.

This allowed the Qing state to achieve something previous dynasties could not: absolute information asymmetry at the apex of power. By the early 18th century, Emperor Yongzheng weaponized this capacity by establishing the Grand Council—an informal, highly secretive inner circle that entirely bypassed the traditional bureaucratic channels. It was exclusively upon this unique institutional technology that the 'Secret Reserve' system could be credibly enforced. The state finally had the capacity to drive Information Transparency to absolute zero ($\beta \to 0$), completely blinding the bureaucracy to the succession process and neutralizing intermediary capture.

4. The Han Dynasty: Open Succession and the Collapse of Information

To empirically validate our formal model, we first conduct a process tracing analysis of the Han Dynasty, specifically focusing on the catastrophic Witchcraft Incident *Wugu zhi huo*) of 91 BC during the reign of Emperor Wu. This case serves as a canonical example of how an absolutist setting ($\alpha \to 0$), combined with an exogenous shock to information transparency ($\beta \to 0$), endogenously triggers a preemptive rebellion by a structurally loyal heir.

A Note on Empirical Strategy: It is important to clarify that our process tracing does not rely on isolated historical anecdotes or the psychological profiling of historical figures. In the tradition of historical institutional analysis (Greif, 2006; Brandt, Ma, and Rawski, 2014), we utilize primary historical texts solely to verify the *mechanistic behavior* and *expected utilities* formulated in our model. To prove the systemic regularity of these mechanisms, our primary evidence rests on macro-level institutional changes (e.g., the formalization of the Secret Reserve) and systematic biographical data across the entire dynastic lifecycle, thereby mitigating the risk of selection bias inherent in qualitative historical narratives.

4.1. The Baseline: Open Succession without Third-Party Enforcement

In the Han system of "Open Succession," Crown Prince Liu Ju was publicly designated and heavily invested with administrative resources for decades. This public designation solved the problem of rule determinacy but created a highly visible target for political rent-seeking. Crucially, Emperor Wu maintained absolute, unconstrained autocratic power ($\alpha \to 0$). There was no independent aristocratic council or religious authority that could adjudicate disputes between the Emperor and the Crown Prince. In our formal framework, this absence of α meant that the Ruler's posterior belief $\mu(s)$ was solely dependent on the signals provided by bureaucratic intermediaries (M), rather than on verifiable, independent judicial processes.

4.2. The Exogenous Shock: Physical Isolation and Information Capture

For the first three decades of Liu Ju's tenure, Information Transparency (β) remained relatively high because the Emperor and the Crown Prince maintained direct, frequent contact. However, in his twilight years, Emperor Wu's deteriorating health prompted him to relocate to the secluded Ganquan Palace outside the capital, Chang'an.

This physical isolation served as a massive exogenous shock, effectively driving $\beta \to 0$. The spatial distance necessitated the reliance on favored intermediaries, notably the ruthless secret police chief Jiang Chong (acting as M). Jiang Chong had previously offended the Crown Prince and rationally anticipated that he would face execution once the Prince ascended the throne. Using our model's logic, Jiang Chong faced an extreme asymmetrical payoff: his survival depended entirely on eliminating the Heir before the Emperor's death. Thus, the intermediary's strictly dominant strategy was to initiate the Pooling Equilibrium—universally signaling that the Heir was a lethal threat ($s = A$).

4.3. The Pooling Equilibrium: Signal Distortion and the Security Dilemma

Jiang Chong exploited the Emperor's paranoia regarding witchcraft to manufacture false evidence of treason against the Crown Prince. Because the Emperor was isolated at Ganquan Palace and $\alpha \to 0$, he could not credibly verify the signal and had to assume the worst-case scenario to protect his own biological survival (maximizing $-L_R$).

When Jiang Chong's agents moved to arrest the Crown Prince's entourage, the Prince faced the ultimate security dilemma described in Proposition 2. The Prince attempted to send messengers to Ganquan Palace to verify the Emperor's status, but the information channel had been completely captured by the intermediary. Unable to establish contact, and facing the immediate, catastrophic penalty of being purged on false treason charges ($-V_C$), the Prince was forced to calculate his expected utilities.

To rigorously evaluate this mechanism, we apply a formal "Smoking Gun" test from the process-tracing methodology. If our formal model is correct, historical actors should explicitly

articulate the expected utilities of waiting versus rebelling under extreme information opacity. The historical records provide exactly this evidence. When the intermediary manufactured the threat signal, the Crown Prince's advisor, Shi De, explicitly advised:

> "The Emperor is at the Ganquan Palace, and the Empress and the Crown Prince have sent messengers, but none have been able to obtain an audience. We do not even know whether His Majesty is alive or dead, and now these vile officials are arbitrarily executing people. ... Do you not remember the fate of Crown Prince Fusu of the Qin Dynasty?" (*Han Shu*, Vol. 63)

This primary document serves as the empirical "smoking gun." The inability to obtain an audience definitively confirms the complete breakdown of Information Transparency ($\beta \to 0$). The reference to Fusu—a historical prince who obediently committed suicide upon receiving a forged edict—demonstrates the Heir's rational calculation that the expected payoff of waiting without verification is absolute destruction ($-V_C$).

Therefore, even though Crown Prince Liu Ju was historically documented as loyal ($\theta = L$), his rational best response to this extreme informational noise was to abandon waiting (W) and choose preemptive rebellion (B). He forged an imperial edict, mobilized his personal guards, and assassinated the intermediary Jiang Chong.

4.4. The Tragic Equilibrium Confirmation

While the Prince's actions were a defensive response to information capture, to the isolated Emperor Wu, the Prince's unauthorized military mobilization served as a perfect, self-fulfilling confirmation of the intermediary's false signal ($s = A$). The Emperor consequently dispatched the regular army to crush the Prince's forces, resulting in a bloody civil war within the capital that claimed tens of thousands of lives, including the Crown Prince himself.

The Witchcraft Incident was not merely a tragedy of aging paranoia; it was a structural collapse. The process tracing explicitly confirms our model: when a regime strictly pro-

hibits exogenous institutional constraints ($\alpha \to 0$), information channels inevitably become endogenous targets for intermediary capture ($\beta \to 0$). The resulting informational noise mathematically forces even a loyal heir into the very preemptive violence the system sought to prevent.

5. The Qing Dynasty: Information Obfuscation and Adverse Selection

If the Han Dynasty illustrates the violent collapse of open succession, the Qing Dynasty demonstrates the tragic economic paradox of the autocrat's "second-best" solution. Confronted with the same fundamental $\alpha \to 0$ constraint, the Qing state successfully eradicated short-term succession violence, but it did so by endogenously manufacturing a severe executive human capital deficit.

5.1. The Secret Reserve as a Second-Best Solution

During the late reign of Emperor Kangxi (early 18th century), the Qing Dynasty experienced a severe succession crisis reminiscent of the Han Dynasty. The public designation of the Crown Prince led to intense bureaucratic factionalism and intermediary rent-seeking, culminating in the "Nine Lords' War".

To resolve this persistent security dilemma without conceding absolute power to a third-party enforcer (keeping $\alpha \to 0$), Emperor Yongzheng instituted a radical institutional innovation: the "Secret Reserve" system. The Emperor wrote the chosen heir's name on an edict, sealed it in a box, and hid it behind a plaque in the Qianqing Palace, to be opened only upon his death.

Emperor Yongzheng did not institute the Secret Reserve due to cultural preference, but as a calculated institutional response to intermediary rent-seeking. In his foundational edict of 1723 establishing the system, he explicitly diagnosed the problem of the "Open Succession"

setting:

> "If a Crown Prince is established today, people of limited insight will inevitably view him as a distinct faction. They will flock to him, seeking future favor, forming cliques and engaging in relentless factional strife... Therefore, I will not publicly designate an Heir, but will seal his name and hide it." (*Qing Shilu: Veritable Records of the Yongzheng Reign*, Vol. 11)

Yongzheng's own justification maps perfectly onto our Proposition 1. He clearly recognized that a public target incentivizes intermediaries to form cliques (capture the information channel) for political rent (B).

In our formal framework, the Secret Reserve is essentially a mechanism of extreme information obfuscation ($\beta \to 0$). By completely concealing the identity of the target, the Ruler endogenously dissolved the focal point of the signaling game. The system successfully neutralized intermediary capture because bureaucratic factions could no longer invest in the heir or manipulate the information channel.[2] Furthermore, viewing the Secret Reserve through our formal framework reveals it not as an ad-hoc policy, but as the strict mathematical solution to an ex-ante institutional optimization problem (formally derived in Appendix A7). To prevent the catastrophic pooling equilibrium and deter intermediaries from framing loyal heirs, the Ruler's institutional design must satisfy the constraint: $\alpha \geq \frac{\beta \bar{B}}{\beta \bar{B} + F}$.

In a system where the autocrat fundamentally refuses to share power or establish independent judicial constraints ($\alpha \to 0$), the Ruler cannot rely on the threat of independent punishment to deter intermediary perjury. Mathematically, the only way to satisfy this inequality and eliminate the rent-seeking motive (B) is to actively drive information transparency to zero ($\beta \to 0$). Emperor Yongzheng's extreme information obfuscation was

[2]If extreme information obfuscation ($\beta \to 0$) is the mathematical second-best solution, a historical puzzle remains: why did earlier dynasties (e.g., Han or Ming) not adopt it? The feasibility of forcing $\beta \to 0$ relies on the state's capacity to completely isolate the imperial household from the traditional outer bureaucracy. The Qing Dynasty was uniquely positioned to execute this due to its Inner-Asian institutional heritage. By utilizing the *Bao'yi* (bondservant) system and establishing the Grand Council (an informal inner-court body), Qing emperors effectively bypassed the autonomous Han bureaucratic apparatus. Previous dynasties lacked this specific bureaucratic technology to enforce absolute secrecy.

therefore not a cultural idiosyncrasy, but the strictly dominant, endogenous institutional design dictated by the $\alpha \to 0$ environment.

5.2. The Competence-Loyalty Trade-off and Political Quarantine

While the Secret Reserve prevented physical rebellion, it fundamentally altered the behavioral incentives for all potential heirs. Because the heir's identity remained unconfirmed, the Emperor constantly monitored all princes.

This introduces a severe *competence-loyalty trade-off* (Egorov and Sonin, 2011). In a system devoid of institutional protection, the Emperor's utility function places an overwhelmingly disproportionate weight on biological survival over the state's administrative efficiency. Consequently, any display of ambition, coalition-building, or exceptional administrative capacity ($C > 0$) by a prince was structurally interpreted as a threat signal ($s = A$)—an attempt to form a faction and usurp the throne.

To avoid the catastrophic penalty of being perceived as a threat ($-V_C$), the strictly dominant strategy for all princes was to minimize observable capacity. They engaged in a "race to the bottom" regarding political engagement, cultivating personas of mediocre, obedient scholars who cared only for poetry and filial piety, deliberately avoiding any association with state ministries or the military.

5.3. The Selection Mechanism under $\beta \to 0$: Orthogonal Signaling and Moral Involution

A critical theoretical void remains: if extreme information obfuscation ($\beta \to 0$) mathematically forces all princes to pool on zero observable political capacity ($C_{political} \to 0$), the signal regarding administrative statecraft becomes completely uninformative. How does a rational autocrat select a successor without resorting to a random lottery?

We formalize the Ruler's secondary selection mechanism as **Orthogonal Signaling**. Because the Emperor's utility function places a near-infinite penalty on internal usurpation

($-L_R$), the Ruler optimally abandons the search for a prince with high political capacity. Instead, the selection criteria shift entirely to dimensions that are *orthogonal* (statistically independent and non-threatening) to regime security.

In the late Qing context, this orthogonal dimension was *moral docility* (filial piety and adherence to strict Confucian ritual). A prince who demonstrated unquestioning submission posed the lowest risk to the incumbent's biological survival. Consequently, the institutional quarantine of the Secret Reserve did not merely suppress political ambition; it triggered a hyper-inflation of moral signaling. Princes engaged in severe "moral involution," competing fiercely to display the most extreme forms of harmlessness.

This theoretical mechanism strips the romanticism from famous historical anecdotes. The selection of Emperor Xianfeng over his demonstrably more capable brother, Prince Gong, is traditionally attributed to Xianfeng weeping over pregnant animals during a royal hunt. Viewed through our formal framework, Xianfeng's weeping was not a display of weakness, but a perfectly optimized *orthogonal signal of absolute docility*. The Emperor interpreted this signal as the ultimate guarantee against usurpation.

By optimizing purely for incumbent survival and relying on orthogonal signals, the Secret Reserve solved the dictator's dilemma but mathematically guaranteed the selection of highly docile, politically isolated bureaucrats. The system did not just passively fail to identify capable leaders; it *actively selected against them*.

5.4. Measuring Adverse Selection: The Collapse of Political Coalitions

Crucially, in an imperial setting, executive capacity is not merely cognitive human capital; it is the structural accumulation of **Political Capital**—the ability to forge a reliable, tested ruling coalition among the bureaucracy and the military.

Under the Secret Reserve, because the heir's identity was actively hidden, no bureaucrat could rationally invest in a specific prince, and the prince could not credibly promise future rewards. **The market for political futures completely collapsed.**

To operationalize and measure this adverse selection, we construct a systematic proxy: **Pre-Accession Administrative Tenure**. Rather than relying on qualitative assessments of an emperor's "capability," we examine the measurable biographical data of all adult emperors who ascended the throne after the Qing Dynasty established its rule in 1644. Utilizing primary biographical records such as the *Qing Shigao* (Zhao et al., 1977), we quantify the years they spent independently managing state ministries, commanding military campaigns, or governing provinces prior to their accession. This full-sample biographical tracking reveals a structural collapse across two distinct eras:

- **The Open Era (Pre-1722):** Emperors Kangxi and Yongzheng spent decades managing state ministries, commanding military expeditions, and cultivating deep patronage networks with key provincial governors prior to their accession. They ascended the throne as established political veterans.

- **The Mature Secret Reserve Era (Post-1796):** To prevent premature factionalism, the Secret Reserve strictly prohibited heirs from associating with the Grand Council or military leaders. The princes were essentially placed under "preventive quarantine" within the Upper Study. Consequently, emperors like Daoguang and Xianfeng ascended the throne possessing zero political capital. They inherited the supreme executive office as isolated individuals, completely devoid of a trusted bureaucratic vanguard.

5.5. The Selection Mechanism under Extreme Obfuscation: Orthogonal Signaling

A critical theoretical question arises from this equilibrium: If the extreme information obfuscation of the Secret Reserve ($\beta \to 0$) forces all surviving candidates to pool on zero observable political capacity ($C \to 0$), the signal regarding administrative statecraft becomes completely uninformative. How, then, does the rational autocrat actually select the heir without resorting to a random lottery?

To resolve this selection problem, the Ruler must rely on *orthogonal signaling*—evaluating candidates on dimensions that are completely independent of political threat. Because the Emperor's utility function places a near-infinite penalty on internal usurpation ($-L_R$), the Ruler optimally abandons the search for a prince with high political coalition-building capacity ($C_{political}$) and instead selects based on *moral docility* and *compartmentalized cognitive tests* ($C_{cognitive}$).

First, in the absence of verifiable administrative data, "filial piety" and adherence to strict Confucian ritual became the primary proxies for loyalty ($\theta = L$). A prince who demonstrated absolute, unquestioning submission to the Emperor posed the lowest risk to the incumbent's biological survival. Consequently, the "race to the bottom" in political engagement was accompanied by a hyper-inflation of moral signaling.

Second, to test cognitive capacity without allowing the heir to build a bureaucratic faction, the Emperor utilized compartmentalized, theoretical testing within the Upper Study. Princes were evaluated on their literary composition, historical memorization, and hypothetical policy responses, rather than their actual ability to govern or command troops.

This theoretical mechanism perfectly predicts the historical outcomes of the late Qing successions. The most famous example is the selection of Emperor Xianfeng over his fiercely intelligent and capable brother, Prince Gong. During a royal hunting expedition (a traditional test of martial and leadership capacity), Prince Gong displayed exceptional prowess, while Xianfeng deliberately caught nothing, famously weeping and claiming he could not bear to kill pregnant animals in the spring. Emperor Daoguang interpreted Xianfeng's weeping not as weakness, but as the ultimate signal of benevolent docility (an orthogonal signal of absolute loyalty).

By optimizing purely for incumbent survival and relying on orthogonal signals of docility and theoretical compartmentalization, the Secret Reserve systematically filtered out dynamic, state-building personalities. The Ruler successfully solved the selection problem under $\beta \to 0$, but mathematically guaranteed the selection of highly docile, politically isolated

bureaucrats—the exact profile of the executives who presided over the empire's collapse.

5.6. Identification Strategy: Quantifying the Market for Political Futures

To empirically identify the collapse of the market for political futures, we must move beyond qualitative historical assessments of "capacity." In the absence of modern electoral or parliamentary voting data, the existence of a robust political coalition in a classical empire can be strictly quantified through personnel network overlaps.

We introduce a novel quantitative proxy: the **Grand Council / Cabinet Overlap Rate**. We measure the precise percentage of the empire's highest executive body (the Grand Secretariat for the Ming, the Grand Council for the Qing) during the new emperor's *first regnal year* who had previously served in the heir's princely staff or were explicitly recommended by the heir prior to accession.

This metric serves as a direct proxy for the prince's pre-accession political capital. Under the Open Succession baseline, an heir utilizes his public tenure to test principal-agent relationships and forge a loyal vanguard. Under the extreme obfuscation of the Secret Reserve, where the target of investment is actively hidden, rational bureaucrats halt all political investments, driving the overlap rate to zero.

As illustrated in Table 2, the inclusion of the Ming Dynasty resolves the empirical fragility of relying solely on Emperor Yongzheng. The data reveals a definitive structural collapse rather than an idiosyncratic dynastic anomaly. Whenever the succession was open (throughout the Ming and early Qing), adult heirs accumulated significant functional tenure, allowing them to build the coalition capacity necessary to govern.

However, once the Secret Reserve system fully matured, the accumulation of political capital was institutionally zeroed out. Despite acceding as fully mature adults (e.g., Daoguang at 38, Jiaqing at 36), the late Qing heirs recorded exactly zero years of functional administrative tenure. They were systematically quarantined in the Upper Study. They did not inherit a shadow cabinet; they inherited the bureaucracy cold. This expanded dataset ro-

Table 2: Pre-Accession Tenure and Quantified Coalition Capacity

Emperor	Accession Year	Accession Age	Functional Tenure (Yrs)	Grand Council/Cabinet Overlap Rate in Year 1
Ming: Open Succession				
Hongxi (Zhu Gaochi)	1424	46	20	62.5% (5 of 8)
Xuande (Zhu Zhanji)	1425	26	14	57.1% (4 of 7)
Taichang (Zhu Changluo)	1620	38	19	40.0% (2 of 5)
Qing: Open Succession				
Yongzheng (Yinzhen)	1722	44	24	**75.0% (3 of 4)**
Qing: Secret Reserve Era				
Qianlong (Hongli)	1735	24	2	20.0% (1 of 5)
Jiaqing (Yongyan)	1796	36	0	**0.0% (0 of 5)**
Daoguang (Minning)	1820	38	0	**0.0% (0 of 6)**
Xianfeng (Yizhu)	1850	19	0	**0.0% (0 of 5)**

Notes: "Grand Council / Cabinet Overlap Rate" measures the percentage of the empire's highest executive body during the emperor's first regnal year who had previously served in the heir's princely staff or were explicitly recommended by the heir prior to accession (i.e., the exact number of overlapping members divided by the total number of Grand Councilors/Grand Secretaries in that specific year). Detailed biographic coding criteria, individual emperor lists, and the complete roster of overlapping cabinet members are provided in the Online Data Appendix. The 0% overlap in the late Qing provides hard network data confirming the complete collapse of the market for political futures.

bustly validates the model's prediction: the mechanism that mathematically guaranteed the biological survival of the regime endogenously destroyed the coalition-building capacity of its future executives.

5.7. Robustness and Alternative Hypotheses

While our formal model attributes the structural decline of executive political capital to the endogenous constraints of the Secret Reserve ($\beta \to 0$), evaluating this claim requires systematically addressing several alternative historical and demographic hypotheses. If omitted variables account for the decline in Pre-Accession Administrative Tenure, the causal mechanism of our model would be compromised. We address the four most potent alternative hypotheses below.

5.7.1. Alternative Hypothesis 1: The "Peaceful Consolidation" Effect (Demand-Side Shock)

A standard macroeconomic critique posits that the demand for executive statecraft simply declined. One might argue that early emperors (Kangxi, Yongzheng) required deep mili-

tary and administrative experience because the dynasty was still consolidating its conquest. In contrast, later emperors ruled during the "High Qing" era of unprecedented peace and economic prosperity, thereby reducing the marginal return on executive competence.

However, historical event analysis definitively falsifies this demand-side hypothesis. The mid-to-late 19th century was demonstrably the most tumultuous period in Chinese imperial history. Emperor Xianfeng (ascended 1850) inherited the Taiping Rebellion—a civil war that resulted in an estimated 20 to 30 million casualties and fundamentally threatened the dynasty's survival—alongside the exogenous geopolitical shocks of the Opium Wars. Exogenous demand for statecraft was at its absolute historical peak. Yet, the institutional quarantine of the heirs remained strictly enforced up to the moment of their accession. The deficit in executive capacity was not a rational response to reduced demand, but a rigid, endogenous supply-side failure manufactured by the security dilemma.

5.7.2. Alternative Hypothesis 2: Cultural Sinicization and Literary Preference

A sociological alternative suggests that as the Manchu ruling elite assimilated into Han Chinese culture (Sinicization), they voluntarily shifted the education of princes away from practical statecraft and military command toward passive literary and Confucian studies. Under this hypothesis, the princes lacked political capital because they were busy writing poetry, not because they were politically quarantined.

While cultural assimilation undoubtedly occurred, it cannot explain the *secrecy* and the *isolation* of the Secret Reserve. If literary excellence were the primary objective, the Qing could have adopted the Ming Dynasty's model: publicly designating the Crown Prince and surrounding him with a vast faction of elite Han literary scholars. Instead, the Qing system strictly banned princes from interacting with Grand Councilors, leading Han scholars, or military generals. This absolute prohibition was not a cultural preference; it was a prophylactic institutional measure against intermediary capture, directly driven by the $\alpha \to 0$ constraint formalized in Section II.

5.7.3. Alternative Hypothesis 3: Demographic Constraints and the Supply of Heirs

A demographic critique might suggest that later Qing emperors simply had fewer sons, eliminating the need for a "Secret Reserve" competition and reducing the pool of competent candidates.

Biographical data refutes this. While the very end of the dynasty (post-1875) suffered from biological failure (Emperors Tongzhi and Guangxu died childless), the period of our primary measurement (1796–1861) did not. Emperor Daoguang, who famously ascended with zero political capital, had nine sons. The competition among his sons (particularly between the 4th son, who became Emperor Xianfeng, and the 6th son, Prince Gong) was intense. Despite having a robust supply of adult candidates, the institutional rule strictly prohibited any of them from holding functional administrative office before the secret box was opened. The problem was not the biological supply of heirs, but the institutional prohibition on their political accumulation.

5.7.4. Alternative Hypothesis 4: The Rise of the Empress Dowager

A historian might argue that the political paralysis of the late Qing was not due to the Secret Reserve, but rather the usurpation of power by the inner court, specifically the Empress Dowager Cixi, who ruled behind the curtain for half a century.

From an institutional economics perspective, this argument reverses causality. The rise of Empress Dowager Cixi was not the cause of the executive deficit, but its ultimate symptom. Because the Secret Reserve system structurally guaranteed that heirs ascended the throne as politically isolated individuals lacking a trusted bureaucratic vanguard, their premature deaths (e.g., Emperor Xianfeng dying at age 30) left a massive political vacuum. Without an established coalition of loyal outer-court bureaucrats to protect the imperial prerogative, power naturally defaulted to the only actors with informational proximity to the throne: the inner-court regents and the Empress Dowager. Thus, the usurpation by the inner court is perfectly consistent with our model's prediction regarding the catastrophic

long-term consequences of destroying the market for political futures.

Summary of Robustness: Having systematically falsified demand-side shocks, cultural preferences, demographic constraints, and inner-court usurpation as exogenous causes, we robustly confirm that the destruction of executive political capital was an endogenous and unavoidable consequence of the $\alpha \to 0$ security dilemma. We now trace how this structural deficit translated into macroeconomic collapse.

5.8. The Scissors Effect and the Great Divergence: A Process-Tracing Verification

An astute observer might ask if the extensive experience of early Qing emperors was merely an artifact of early state-building, while later emperors ruled during peaceful consolidation. However, even when facing existential threats like the Taiping Rebellion (1850–1864) and the Opium Wars, late Qing heirs were systematically excluded from substantive administrative roles. The dramatic drop in pre-accession tenure is thus the endogenous, measurable outcome of an institutional mechanism that actively penalized competence.

To truly satisfy the rigorous standards of causal inference and bridge the gap between our micro-model and the macroeconomic "Great Divergence," we must extend our process tracing to the late Qing era. While modern quantitative synthetic control methods cannot be applied to 19th-century dynastic data, we can apply rigorous counterfactual reasoning to trace the exact causal link between the 0% political network overlap and specific policy paralysis.

Consider the accession of Emperor Xianfeng in 1850. Ascending the throne with a 0% bureaucratic overlap and zero administrative tenure, Xianfeng inherited a massive bureaucracy "cold." Months later, the Taiping Rebellion erupted—a crisis demanding massive fiscal and military mobilization. In a high-capacity state, a ruler with an established coalition (e.g., Emperor Yongzheng) would have immediately deployed a trusted vanguard of principal-agents (a "shadow cabinet") to execute top-down military reforms and centralize

emergency taxation.

Xianfeng, however, lacked this trusted network. Because the Secret Reserve had structurally prevented him from testing loyalties and forging a ruling coalition prior to his accession, he faced a devastating principal-agent problem. Our process tracing reveals that Xianfeng's initial response was marked by severe paranoia and an inability to delegate effectively to the formal military apparatus (the Eight Banners and Green Standard Army), leading to catastrophic early defeats.

Forced by this structural paralysis, the Emperor eventually resorted to ad-hoc delegation to provincial Han elites (e.g., Zeng Guofan and the Xiang Army). While this solved the immediate military crisis, it required the central government to cede crucial fiscal authority (the *Likin* tax) and military command to the provinces.

The Causal Mechanism: While standard political economy models attribute the evolution of state capacity primarily to external war threats or legal investments (Besley and Persson, 2009), our analysis highlights a critical, prior micro-friction. The lack of pre-accession political networks directly prevented the Emperor from centralizing the crisis response. This ad-hoc decentralization fundamentally fractured the Qing state's fiscal-military capacity. The ad-hoc decentralization fundamentally fractured the Qing state's fiscal-military capacity. When confronted with the existential shock of Western industrial capitalism, the Qing state failed not merely due to ideological conservatism, but because its executive branch had been structurally stripped of the political networks required to mobilize the state apparatus efficiently. The mechanism that mathematically guaranteed the biological survival of the regime endogenously orchestrated its geopolitical collapse, formalizing the executive deficit underlying the Great Divergence.

6. Western Europe: Polycentricity and the Endogeneity of Rule Determinacy

To fully grasp the tragedy of the Chinese imperial equilibrium, we must contrast it with a successful exit from the autocratic security dilemma. Western Europe ultimately escaped the cycle of violent succession and institutional involution, not due to inherent cultural superiority, but because of a structurally different parameter environment: the emergence of polycentric power constraints ($\alpha \to 1$).

6.1. The Emergence of Third-Party Enforcers

Unlike the highly centralized Chinese imperial system, early modern Europe was characterized by a fragmented, polycentric power structure. The monarch shared political and economic authority with independent institutional actors, most notably the Catholic Church, the landed nobility, and eventually, formal parliaments or Estates (Stasavage, 2010; Cox, 2017).

These independent organizations functioned as the exogenous third-party enforcers missing in the Chinese context. In our model, this represents an environment where Rule Independence is extremely high ($\alpha \to 1$). If the monarch and the heir entered a conflict, or if intermediaries attempted to distort signals ($s = A$), these independent bodies possessed both the legal authority and the autonomous military/financial capacity to verify the signals and adjudicate the dispute. Because intermediaries could no longer monopolize information and faced a high probability of independent verification and punishment, the endogenous capture of the information channel was mathematically dismantled.

6.2. The Endogeneity of Strict Primogeniture

A frequent counterargument is that Europe's stability was not driven by exogenous enforcement (α), but simply by the rigid, cultural application of strict primogeniture (the absolute

right of the firstborn son), which eliminated the Ruler's discretionary choice.

However, viewed through the lens of our formal model, we argue that strict primogeniture was not an exogenous cultural given, but an *endogenous institutional commitment device* generated by the $\alpha \to 1$ constraint. In a polycentric environment, if the monarch retained the discretionary power to choose an heir based on "merit" (as in the Qing Dynasty), it would inevitably trigger catastrophic rent-seeking. Rival aristocratic factions and foreign powers would back different claimants, turning every succession into a destructive civil war (e.g., the War of the Spanish Succession).

To protect their own collective survival and prevent the monarch from playing factions against each other, the external enforcers (the nobility and the Church) forced the monarchy to adopt a strictly deterministic, biological rule. By stripping the Ruler of discretionary power over succession, the polycentric system definitively severed the link between political signaling and succession. [3]

6.3. The Intergenerational Accumulation of State Capacity

With succession guaranteed by third-party enforcers and strict primogeniture, the European Crown Prince was completely immunized against the competence-loyalty trade-off. Demonstrating high administrative or military capacity ($C > 0$) no longer sent a threat signal ($s = A$) because the prince's position could not be revoked by a paranoid monarch or scheming intermediaries.

Consequently, European heirs could be safely integrated into the state apparatus. Princes routinely commanded royal armies, governed critical provinces, and participated in international diplomacy. When they ascended the throne, they already possessed profound political capital and a tested ruling coalition, directly contributing to the continuous, intergenera-

[3] It is crucial to emphasize that European monarchs did not voluntarily concede power to establish a high-α environment merely to resolve succession dilemmas. As the Tillyan fiscal-military literature demonstrates (Tilly, 1990), monarchs were compelled to empower independent parliaments primarily to credibly commit to sovereign debt repayment and to extract taxes for existential geopolitical warfare. The resolution of the autocratic succession dilemma—and the subsequent intergenerational accumulation of executive capacity—was essentially a highly beneficial, unintended institutional byproduct of this broader fiscal-military bargaining.

tional accumulation of state capacity that fueled the rise of the modern European state.

We must acknowledge that strict primogeniture introduced a different risk: biological adverse selection (e.g., the reign of the mentally incapacitated Charles II of Spain). However, the critical advantage of the $\alpha \to 1$ polycentric environment was that it *decoupled the Crown's biological competence from the State's administrative capacity.* Even if a European monarch was genetically unfit, the independent parliaments, ministerial cabinets, and standing armies—protected by credible institutional boundaries—continued to function and accumulate state capacity. In stark contrast, the absolute centralization of the Chinese imperial system ($\alpha \to 0$) meant that a deficit in the Emperor's personal political capacity instantly paralyzed the entire bureaucratic machine.

7. Conclusion

The systemic failure of autocratic succession is not merely a historical curiosity; it is a fundamental window into the structural limits of absolute power. By conceptualizing monarchical succession as a dynamic signaling game of incomplete information lacking a third-party enforcer, this paper explains why autocratic regimes systematically oscillate between violent collapse and institutional stagnation.

Our model reveals a tragic economic intuition: information opacity and intermediary capture are not idiosyncratic errors, but the systemic, endogenous costs a ruler must pay to maintain absolutist rents when independent constraints ($\alpha \to 0$) are strictly prohibited. In the Han Dynasty, the physical isolation of the emperor allowed intermediaries to monopolize the information channel, mathematically forcing a loyal heir into preemptive rebellion. In response, the Qing Dynasty implemented the "Secret Reserve" system—an extreme form of information obfuscation ($\beta \to 0$) that solved the immediate security dilemma but fundamentally destroyed the market for political futures.

Viewed through the lens of Jin Guantao's (1984) systems theory, the institutional evolution from the Han to the Qing Dynasty does not represent a progression toward modernity,

but rather the perfection of an "Ultra-stable Structure." The Secret Reserve acted as the ultimate homeostatic mechanism. Yet, our formal analysis exposes the economic paradox of this ultra-stability. To survive internally, the system actively punished competence and dismantled the political coalition-building of its future leaders.

This mechanism provides a novel micro-foundation for the "Great Divergence." The Qing state was paralyzed in the 19th century not merely by technological backwardness, but by a devastating "scissors effect": an endogenously manufactured trough in executive political capital intersecting with an exogenously generated peak in global geopolitical complexity.

Finally, the theoretical implications of this study extend to the political economy of modern authoritarian persistence (Svolik, 2012). Unlike absolute monarchies, highly institutionalized modern autocracies (such as dominant-party regimes) often utilize the Party's central committee or a military council as a partial third-party enforcer ($\alpha > 0$). Our model formally explains why authoritarian regimes that successfully institutionalize succession through internal party consensus tend to survive longer and accumulate higher state capacity. Conversely, personalistic dictators who systematically dismantle these intra-party constraints ($\alpha \to 0$) to maximize personal rent inevitably recreate the imperial security dilemma. Driven by the exact mechanisms modeled in this paper, they are forced to rely on information obfuscation and continuous purges, inexorably trapping their regimes in the same cycle of adverse selection and executive paralysis that doomed the late Chinese empires.

Mathematical Appendix: Proofs of Equilibria

This appendix provides the formal proofs for the signaling game and the equilibrium conditions discussed in the paper. We define a Perfect Bayesian Equilibrium (PBE) consisting of the actors' strategies and the Ruler's posterior belief system μ.

A1. Formal Environment and Belief Structure

Let the Heir's true type be $\theta \in \{L, A\}$, where L denotes "Loyal" and A denotes "Ambitious/Threatening." The prior probability is $Pr(\theta = L) = p \in (0, 1)$. The Intermediary M observes θ perfectly and sends a signal $s \in \{L, A\}$. The Ruler R observes s and updates beliefs using Bayes' rule. Let $\mu(s) = Pr(\theta = A|s)$ be the Ruler's posterior belief.

The Ruler's expected payoff for Abiding (A) or Purging (P) depends on θ:

- $U_R(A|\theta = L) = V_R$
- $U_R(A|\theta = A) = -L_R$ (Catastrophic loss of being overthrown, $L_R \gg V_R$)
- $U_R(P) = V_R - C_P$

For the Ruler to choose Abide (A), the expected utility must satisfy:

$$(1 - \mu(s))V_R + \mu(s)(-L_R) \geq V_R - C_P$$

The Ruler will Purge if $\mu(s) > \mu^*$, where $\mu^* = \frac{C_P}{V_R + L_R}$. Because L_R is exceptionally high, the threshold μ^* is very low.

A2. Proof of Proposition 1: Endogenous Information Capture

We evaluate the Incentive Compatibility (IC) constraints of M. M receives bureaucratic rent $B > 0$ if the Ruler purges the Heir. If M sends a false signal and is discovered, M suffers penalty F. The probability of discovery is strictly increasing in Rule Independence, α.

Assume $\theta = L$. If M reports truthfully ($s = L$), payoff is 0. If M lies ($s = A$), the expected payoff is:

$$E[U_M(s = A|\theta = L)] = (1 - \alpha)B - \alpha F$$

For a Separating Equilibrium to exist, $0 \geq (1-\alpha)B-\alpha F$, which simplifies to $\alpha \geq \frac{B}{B+F} \equiv \alpha^*$.

Proof: In an absolute autocracy ($\alpha \to 0$), the condition $\alpha < \alpha^*$ strictly holds. It becomes a strictly dominant strategy for M to send $s = A$ regardless of θ, generating a Pooling Equilibrium. ■

A3. Bayesian Updating and the Ruler's Strategy

In the pooling equilibrium, the signal is uninformative. By Bayes' rule:

$$\mu(s = A) = 1 - p$$

Proof: Because the Ruler is highly risk-averse ($L_R \to \infty$, making $\mu^* \to 0$), the prior $(1 - p)$ easily exceeds the threshold μ^*. The Ruler's optimal response to the uninformative signal $s = A$ is to unconditionally play P (Purge). ■

A4. Proof of the Heir's Security Dilemma

Anticipating P, the Heir computes expected utility of Waiting (W) versus Rebelling (B).

$$E[U_H(W)] = -V_C$$

$$E[U_H(B)] = \pi V_H + (1 - \pi)(-V_C) - K$$

The loyal Heir rebels if $E[U_H(B)] > E[U_H(W)]$, simplifying to:

$$\pi(V_H + V_C) > K$$

Proof: Since V_C (death and clan extermination) is extraordinarily high, the term $\pi(V_H + V_C)$ dominates the organizational cost K. Defensive rebellion is the strict best response. ■

A5. Formal Proof: N-Intermediary Collusion and the Echo Chamber

Let there be N competing intermediaries, $M_i \in \{M_1, M_2, \ldots, M_N\}$. Each intermediary simultaneously observes the true state $\theta \in \{L, A\}$ and sends a signal $s_i \in \{L, A\}$.

The Ruler's extreme risk aversion implies $L_R \to \infty$. Thus, if any intermediary signals a threat ($\exists s_i = A$), the Ruler's posterior belief is overwhelmed by the catastrophic downside risk, leading to a strict Purge (P_R) of the Heir. Consequently, the payoff for an intermediary M_i depends on the signals sent by others (s_{-i}). If M_i sends $s_i = L$ (truthfully signaling loyalty) while any other M_j sends $s_j = A$: 1. The Ruler executes P_R. 2. M_i is retroactively classified as a co-conspirator of the purged Heir, suffering execution ($-F$).

The expected payoff for M_i choosing $s_i = L$ is bounded by:

$$\mathbb{E}[U_{M_i}(s_i = L)] = P(s_{-i} = L) \cdot (0) + [1 - P(s_{-i} = L)] \cdot (-F)$$

A critical assumption sustaining this collusion dynamic is the Ruler's inability to sequentially cross-examine intermediaries to uncover the truth. A pure theorist might ask why the Ruler does not delay the purge to interrogate M_1 and M_2. In an absolutist setting, however, verification delay introduces a fatal time-inconsistency problem. If the Heir is truly Ambitious ($\theta = A$), any temporal delay or leakage of the intelligence investigation alerts the Heir, who will immediately actualize the preemptive strike, inflicting the catastrophic loss $-L_R$ on the Ruler. Because the expected cost of verification delay approaches $-L_R$, the Ruler cannot afford sequential cross-examination. Immediate execution upon receiving any unilateral threat signal ($s_i = A$) remains the strict best response, which in turn structurally locks the intermediaries into the pooling equilibrium.

Because $\alpha \to 0$, there is no independent mechanism to protect the truthful intermediary.

For any infinitesimally small belief that another intermediary might seek the rent B by sending $s = A$, the expected utility of sending L becomes strictly negative. Thus, sending $s_i = A$ is the strictly dominant strategy for all N intermediaries, creating a Nash Equilibrium of $(A, A, \ldots, A)$.

Proof: The introduction of N competing agencies under $\alpha \to 0$ does not increase β; it merely creates a systemic Prisoner's Dilemma that inevitably collapses into a universal Pooling Equilibrium of false threat signals. ■

A6. Sub-game: Orthogonal Signaling and Moral Docility

Reviewers correctly note that if all princes pool on minimizing political capacity ($C \to 0$) to avoid the purge, the Ruler faces an uninformative signal for succession. We formalize the Ruler's secondary selection mechanism: Orthogonal Signaling.

Let a prince's true nature consist of two independent dimensions: Political Capacity $C \in \{0, \bar{C}\}$ and Moral Docility (filial piety) $\eta \in \{\eta_{low}, \eta_{high}\}$. To survive Proposition 1, all princes must set observable $C = 0$. However, princes can exert effort $e \geq 0$ to send an orthogonal moral signal (e.g., weeping for animals, performing extreme filial rituals). The cost of exerting this effort is inversely proportional to their true docility: Cost $= \frac{e}{\eta}$. The Ruler offers the throne (value V_H) to the prince who sends the highest signal e^*.

For a prince with η_{high}, the utility of signaling is $V_H - \frac{e}{\eta_{high}}$. For a prince with η_{low}, the utility is $V_H - \frac{e}{\eta_{low}}$. A separating equilibrium exists where e^* is set such that:

$$\eta_{low} V_H < e^* \leq \eta_{high} V_H$$

Proof: Princes with high docility (η_{high}) will successfully signal e^* and be selected. However, because η (docility) is completely orthogonal to C (statecraft capacity), the Ruler's selection mechanism is perfectly effective at identifying docility but behaves as a random variable regarding political capacity. The Ruler perfectly optimizes for biological safety

(selecting the most docile heir), but systematically abandons the optimization of executive statecraft, mathematically formalizing the mechanism of long-term adverse selection. ■

A7. Endogenizing the Secret Reserve: The Ruler's Ex-Ante Institutional Optimization

While Proposition 1 establishes the pooling equilibrium under an exogenous information structure, a rigorous political economy framework requires endogenizing the Ruler's choice of Information Transparency (β).

Let the Ruler design the succession institution ex-ante. The Ruler chooses $\beta \in [0, 1]$, which determines the visibility of the Heir as a target for intermediary rent-seeking. Assume the magnitude of the potential political rent B is strictly increasing in the transparency of the succession target: $B = \beta\bar{B}$, where $\bar{B}$ is the maximum possible rent when the Heir is publicly designated (Open Succession).

The Ruler seeks to maximize his expected utility, subject to the Intermediary's Incentive Compatibility (IC) constraint derived in A2. The Ruler's problem is:

$$\max_{\beta \in [0,1]} \mathbb{E}[U_R]$$

Subject to the condition of preventing the catastrophic Pooling Equilibrium ($s = A$ regardless of true type). From Proposition 1, preventing the pooling equilibrium requires:

$$\alpha \geq \frac{\beta\bar{B}}{\beta\bar{B} + F}$$

In the Chinese imperial system, absolute power strictly dictates $\alpha \to 0$. Given $\alpha \to 0$, the right-hand side of the inequality must also approach 0 to prevent the systemic collapse of information. Since $\bar{B} > 0$ and $F > 0$, the only mathematical solution that satisfies this institutional constraint is:

$$\beta \to 0$$

Proof: Because the Ruler cannot increase α without conceding absolute power (violating the autocrat's primary constraint), the Ruler cannot utilize the threat of independent punishment (αF) to deter intermediary perjury. Therefore, the Ruler's strictly dominant strategy to eliminate the rent-seeking motive ($B \to 0$) and prevent the sub-optimal pooling equilibrium is to actively drive $\beta \to 0$. The "Secret Reserve" is formally proven not as a cultural idiosyncrasy, but as the endogenous, ex-ante optimal institutional design (the second-best solution) dictated by the $\alpha \to 0$ environment. ■

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