

# Noble No More: *Keju*, Institutional Commitment, and Political Purges

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## Abstract

The civil examination system (*Keju*) garnered a meritocratic bureaucracy in imperial China, but failed to modernize the nation. Utilizing hand-collected career path data of 5,353 bureaucrats over 1,400 years (265-1644CE) and a difference-in-differences approach, this paper reveals a hidden flaw of the system: while it increasingly recruited commoner-born elites into bureaucracy, the exam-era social elites became more vulnerable to extralegal political purges and featured shorter lifespans. When *Keju* erased the power checks from nobility, it cultivated and strengthened an absolutist rule where no social elites were safe. We thus highlight the necessity of institutional commitments in fostering pro-development social environments.

**Keywords:** *Keju*, commitment, purge, elite recruitment, check and balance

**JEL Codes:** P16, D74, N45, M50

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*A monarchy, where there is no nobility at all, is ever a pure and absolute tyranny.*

Francis Bacon, 1624

*Should the noble survive, an absolute imperial autocracy would not be possible.*

Liang Qichao, 1902

## **1. Introduction**

The civil examination system, which recruited social elites regardless of family backgrounds into the ruling bureaucracy through merit-based exams, was one of the most important institutional arrangements in pre-modern China (Chang, 1955; Elman, 2000; Chen et al., 2020). The exam system ensured effective elite capture (Bai and Jia, 2016), provided mobility across social classes (Jiang and Kung, 2021), and accumulated human capital (Chen et al., 2020). While all these features contributed to long-term economic development, the implementation of the system, however, failed to modernize the nation: China stagnated in a Malthusian trap with low per capita income, moderate urbanization rate, and minimal industry growth until the early 20<sup>th</sup> century (Chen and Kung, 2016; Broadberry and Guan, 2018). The stark contrast suggests that some hidden flaws of the exam system remained unrevealed.

This paper sheds light on a dark side of the civil exam system: it erased the checks and balances between the nobility and the emperors, thus creating an absolutist rule. In the pre-exam era, imperial power was contested by other parties for centuries (Johnson, 1970; Ebrey, 1978; Lewis, 2009). Much resembled Feudal Europe, nobility and clans had substantial influences on governance. Such influences were cemented by the elite recruitment system, where new entrants into the bureaucracy had to acquire recommendations from local gentries. Thus the nobility exercised *de facto* institutional commitment of checks and balances with imperial power.<sup>1</sup> The shock of the exams,

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<sup>1</sup> The institutional commitment of power is a theoretical foundation of accountability and effective governance (Myerson, 2008; Svobik, 2012), which cultivates inclusive economic development (Acemoglu and Robinson, 2012), safeguard social stability, and offers peaceful conflict resolution.

introduced in the Sui dynasty (581-618), changed the power dynamics fundamentally. In the exam era, the standardized tests regularly recruited commoner-born elites into the bureaucracy, making them highly homogenous and thus highly substitutable. Absent the checks and balances to safeguard personal security and stability, the imperial rule became absolutist (a la Svoblik, 2012), and the bureaucracy became a “*one-way flow of authority from superior to subordinate*” (Huntington, 1968).<sup>2</sup>

To analyze the interactions between the imperial rulers and the bureaucrats more precisely, we introduce a theoretical model, where a ruler and a continuum of bureaucrats split some social resources through peaceful negotiations or political purges. In political purges, the ruler initiates an attempt to replace a proportion of bureaucrats, while all or parts of the bureaucrats may resist, leading to conflicts. The costs of conflicts are determined by the intensity of resistance and the bureaucrats’ power bases. *Power bases* are defined as the relative bargaining power of social elites independent of *de jure* positions in the bureaucracy. We show that in equilibrium, the ruler chooses a bang-bang relegation strategy, that when social elites’ power base is above a threshold, no purges will be initiated; when the elites’ power base is below the threshold, the ruler unleashes full purge attempts on all bureaucrats, while only part of the bureaucrats survive. The realized relegation decreases with elites’ power bases. Furthermore, the fade-away of power bases strengthens the rule. In the context of China, the model points to more political purges in the exam era, and a prolonged imperial rule in the absence of powerful contestants from social elites.

To empirically test the predictions, we construct an individual career path dataset for social elites from the *Orthodox Histories* – the official written histories from dynasties to dynasties that kept records of major events and personnel. We recover the family

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<sup>2</sup> The deprivation of checks and balances was also present in pre-modern Europe: When Louis XIV (1638-1715) invited the nobles of the robe (*noblesse de robe*) to join his ruling inner circle, he not only meant to dilute the power of the old nobles of the sword (*noblesse d’épée*), but also made the newcomers – unlike the fief-and-castle-backed old nobles – fully aware that once their loyalty was in doubt, they could be easily replaced (de Mesquita et al., 2003, pp. 3-4).

backgrounds and positions served of social elites from *the Book of the Jin* to *the History of the Ming*, which includes 5,353 bureaucrats from 265 CE to 1644 CE, where 1,160 were from the pre-exam era, and 4,193 were from the exam era. The dataset thus allows us to systematically compare the career paths – mainly whether the elites ended their career in regular retirement or relegations and purges – of social elites in the two eras. To solve the endogeneity concerns, we employ a difference-in-differences approach. Our treatment groups are the local administrators who were more likely from a commoner’s background. We refer to these bureaucrats as *generalists*. Our control groups are the central-ministry officials less impacted by the exams, who we refer to as *functionalists*. We show that the generalists and functionalists featured comparable personal characteristics, and had similar purge probabilities in the pre-exam era, thus validating our difference-in-differences approach.

Our results show that generalists were 15.2% more likely to be purged than functionalists. The result remains significant after accounting for ranks, places of birth – thus social connections, dynasties fixed effects, and emperor fixed effects. Moreover, concerning position-specific influence accumulations, we show that civil servants had roughly 15% higher purge probability, consistent with their lack of power bases than their military colleagues. We show that the excess purge is not due to accountability for wrongdoings, thus highlighting the political concerns behind the relegations. Furthermore, the baseline remains robust when we re-classify generalists and functionalists according to their career experience instead of their last-served positions.

Next, we conduct three sets of robustness checks, to address omitted variables, overcome sample selection bias, and rule out alternative explanations, respectively. First, we include additional controls to show that the baseline results remain robust after considering bureaucrats’ age and the time trends. Second, we overcome the sample selection bias in the following ways: we re-classify samples to rule out purge heterogeneity across ranks and positions; we focus on a subsample of extreme

punishments to rule out punishment heterogeneity; and we exclude the data from the Tang dynasty, where exam-based and recommendation-based recruitment co-existed, for estimation consistency. The excess purge in the exam era remains robust across all the checks. Lastly, we rule out the alternative explanation that the excess purges are due to the intra-bureaucracy power scrambles by showing that the excess purge remains when considering only the purges that explicated direct involvements of the emperor.

Last but not least, we investigate the efficacy of the excess purge. For the social elites, the efficacy was directly reflected in their lifespan. We show that generalists in the exam era featured shorter lifespans and shorter tenure spans. For the imperial power, the fragility of elites' fates implied the high discretionary power of the emperor and thus a strengthened imperial rule. We employ two proxies to evaluate the imperial power consolidation in the exam era. First, we use the average reign of an emperor as a proxy for regime resilience, and show that higher elite recruitment through the exams prolonged the reign, echoing recent findings in the literature (e.g., Huang and Yang, 2022). Second, we use victories in external warfare as a proxy for regime strength (Chen and Fan, 2021), and find that the higher elite recruitment through the exams could increase victories on the battlefield. Thus, both tests point to the efficacy of the exams in strengthening the imperial rule.

This paper marks four contributions to the literature. First and foremost, we contribute to the literature on social order pioneered by North (North, 1990; 1993; North et al., 2013) and further theorized by Myerson (2008), Acemoglu and Robinson (2006), and de Mesquita et al. (2003). These seminal works highlight the endogenous formation of social order compared to exogenous institutions such as parliaments or courts (Doucette, 2022). During the formation process, the participants' power structure determines whether checks and balances are adequate (Svolik, 2012; Boix and Svolik, 2013; Paine, 2021). Our paper focuses on a representative power structure between the emperor and the bureaucrats, and contributes to this largely theoretical and case-based literature by

providing a first set of empirical evidence that when the monopolized connections between clans and elite recruitment faded away, the vanished checks and balances led to intensified political purges on the social elites.

Second, we add to the literature on personnel economics on two fronts, namely the entry and exit of the bureaucracy. On the entry of bureaucracy, i.e., political selection, we empirically validate the transformation from aristocratic to meritocratic elite recruitment, echoing Weber (1922), Dal Bó et al. (2017), Cavalcanti et al. (2018), and Artiles et al., (2021). The elite recruitment in historical China also shared traces of contemporary mechanisms, as shown in Bo (1996) and Maskin et al. (2000). On the exit of bureaucracy, we contribute to the literature on repression (Davenport, 2007; Besley and Persson, 2011; Hill and Jones, 2014; Tyson, 2018), retirement and term limit design (Besley and Case, 1995; Ginsburg et al., 2010; Corrales and Penfold, 2014; Labonne et al., 2021), and of political purges (Gibson, 1988; Earl, 2011; Esberg, 2021; Li et al., 2022), by pointing to an institutional design that systematically leads to destined bitter ends for social elites regardless of idiosyncratic personal features widely discussed in the case studies.

Third, we speak to the *institutional* origins of the great divergence between China and the West. Existing literature highlights that the Glorious Revolution of 1688 and the parliamentary checks formed during the 17<sup>th</sup> to the 19<sup>th</sup> century paved the way for economic growth in Europe (North and Weingast, 1989; Dincecco, 2009; Dincecco and Katz, 2016). However, as we show in this paper, establishing an open-access elite recruitment system *before* consolidating constitutional institutions may erase the power checks, strengthen an absolutist rule, threaten social elites' safety and security, and distort growth opportunities. Thus, we provide an institutional explanation of the great divergence. In this regard, we also add to the multifaceted literature that discusses the socio-economic origins of the great divergence, such as demography, natural resources, market integration, and technology (Broadberry and Gupta, 2006; Clark and Feenstra,

2003; Jones, 1981; Landes, 2006; Lucas, 2002; Ma, 2011; Mokyr and Nye, 2007; North et al., 2009; Pomeranz 2000; Pritchett 1997; Rosenthal and Wong 2011; Shiue and Kellor, 2007; Sng and Moriguchi, 2014; Voigtländer and Voth 2006, 2013; Wang, 2022; Huang and Yang, 2020; Jia et al., 2021).

Last but not least, the paper furthers our understanding of the civil exam system. The existing literature discusses the procedures (Chang, 1955; Elman, 2000; Bai, 2019), the human capital accumulation (Chen et al., 2020), its positive impacts on social stability (Bai and Jia, 2016; Jiang and Kung, 2021), and its distortions on innovation and resources (Lin, 1995; Clark and Feenstra, 2003; Huff, 2003; Chen et al., 2022). We add to the literature by empirically revealing the understudied power dynamics following the establishment of the exams between imperial power and social elites, which also echoes historians' narratives that the Tang and Song dynasties witnessed the transformation from aristocracy to absolutist monarchy in China (Naito, 1910; Tanigawa, 1976; Miyazaki, 1977; Qian, 2012). Moreover, the career paths of bureaucrats collected in the paper leave room for future research on governance in cross-national contexts, for instance, with European monarchs and rulers (Kokkonen and Sundell, 2020; Ottinger and Voigtländer, 2021).

The rest of the paper is organized as follows. We introduce the historical background in Section 2. A minimalist game-theoretic model is provided in Section 3 to develop our hypothesis. We introduce the data and our empirical strategy in Section 4 and present the results in Section 5. We conclude in Section 6.

## **2. Background**

### **2.1 Elite Recruitment before the Civil Exams**

In the past two millennia, elite recruitment in imperial China had undergone changes

from a recommendation system (*chaju*) to the civil examinations (*keju*). The Qin dynasty established the *chaju* system after unifying China in 221 BCE, in which local officials examined the conduct of the people within their jurisdiction, and then recommended the talents with outstanding virtues to their superiors. In 220 CE, the Wei emperor Cao Pi (187-226) adjusted the system, recentralizing the selection power from local officials to the central government, thus establishing the Nine-rank Rectification System. The Nine-rank system lasted for nearly 400 years until the Sui Dynasty (581-618) and served as the dominant channel of political selection in imperial China before the civil examinations.

Specifically, in the Nine-rank system, a central-appointed official (*Zhongzheng* Officer) subjectively assigned local elites into nine ranks (*xiangpin*, see the left panel of Figure 1) according to their family backgrounds and characters, where higher ranks translated to higher chances to enter the bureaucracy. The rank assignment played a decisive role in the elites' careers, whereas the evaluation process was highly discretionary (Qian, 1996). The grassroots were generally assigned ranks below five, whereas the nobility were assigned ranks five or above (Miyazaki, 2008). However, the system precisely specified the fifth rank as a qualification threshold for public offices.<sup>3</sup> In short, the institutional design of the Nine-rank system made it difficult for grassroots to enter the bureaucracy, and the nobility monopolized the upper social class (Miyazaki, 2008; Yan, 2009).<sup>4</sup> As the proverb states, “*No commoner was to be found in high positions, and no noble family would produce low-ranked officials*”.

[Insert Figure 1 here]

## 2.2 The Rise of Civil Exams

In 605, the Sui Dynasty (581-618) introduced the civil examinations to replace the

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<sup>3</sup> For instance, both Wang Dao (276-339) and Xie An (320-385) entered the bureaucracy purely based on their ranks, and later became the grand chancellors of the Eastern Jin dynasty.

<sup>4</sup> For a representative instance, Zuo Si (250-305), a renowned writer in the Western Jin dynasty, failed to enter higher-ranked positions despite his widely acknowledged talents.

Nine-rank system. The exams were intended to break the monopoly of the clan aristocracy on political resources so that the grassroots could join the ruling elites through examinations (Miyazaki, 1981; Amano, 1983). The civil examination system was the world's earliest elite recruitment system to select officials through merit-based exams and was also the longest one: it lasted for 1,300 years until its abolishment in the late Qing Dynasty in 1905.<sup>5</sup>

The civil examination system diluted the clan aristocracy both in qualifications and the content of examinations. First, unlike the Nine-rank system that required restrictions on family backgrounds, all male commoners were eligible for the exams (See Appendix Figure A2), thus allowing grassroots to enter the bureaucracy (Ho, 1962; Bai, 2019). Second, the exams offered standardized tests on the understanding of Confucian classics and contemporary affairs, which then selected competent examinees on a large scale, lowered the coordination costs once these elites entered public offices, and ultimately broke the nobility's monopoly in personnel control.<sup>6</sup>

The rise of the civil exams led to an increase in the proportion of commoners within the bureaucracy, reflected in key positions and overall distributions. First, the core ruling cycle featured more commoner representation: about one-third of the grand chancellors, the highest-ranked civil servants, were commoners in the early Song dynasty, whereas the proportion increased to more than three-quarters in the mid-Song, and to more than four-fifths in the late Song (Liang, 2015). Second, bureaucrats' diversified backgrounds were observed across positions and ranks. Figure 2 shows the distribution of the surnames of officials in each dynasty based on the *Twenty-Four Histories*, which record officials of the various dynasties in China. Figure 2a shows the changes in the number of officials with different surnames in the past dynasties, where the post-exam composition was more diverse. Figure 2b shows the proportion of officials with the top

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<sup>5</sup> See Appendix Figure A1 for a summary of the above discussions.

<sup>6</sup> According to Wang (1962), when Emperor Taizong of the Tang dynasty once saw the new recruits from the civil exams entering the government agencies, the emperor left a famous quote that “*All the talents are within my reach now*”.

20 surnames – an indicator of clan concentration – had decreased substantially post-exam.<sup>7</sup> As the Tang dynasty poet Liu Yuxi (772-842) wrote in his poem, “*Swallows that formerly built nests in the front halls of the noble people, are now flying into the houses of the common people.*” To summarize, the establishment of the civil examination system had achieved large-scaled elite recruitment from the commoners, and thus diluted the political power held by the noble clan in the Wei, Jin, Southern and Northern Dynasties.

[Insert Figure 2 here]

### 2.3 The Fates of Social Elites

The rise of the civil exams fundamentally changed the power dynamics between political elites and rulers. Before the exam, the nobility performed adequate checks and balances with the imperial court since the nobles held influential positions, resources, and personnel networks and thus could significantly restrain the imperial power (Ebrey, 1978). For instance, during the Northern Wei dynasty, the Li clan in Longxi was a regional warlord and thus had great prestige and influence in the local area. Consequently, such nobles had strong bargaining power facing the emperor, and could collectively resist imperial punishments (Johnson, 1970).<sup>8</sup> The power-sharing between the emperor and the nobility was widely acknowledged in society. For instance, during the Eastern Jin dynasty (317-420), when the Wang clan assisted Emperor Sima Rui in establishing the regime and daily governance, their relations were described as the “*Co-rule of Wang and Sima*”.

However, the political elites could no longer exert checks and balances on imperial power after the exam for two reasons. First, most of these exam-era political elites came

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<sup>7</sup> Since the number of bureaucrats could correlate with the contemporary population, a direct measure on surname diversity could be biased. Therefore, we further use a Herfindahl Index approach, a la Clark et al. (2015) to show that the surname diversity increased after the exams were established. For more details, see Appendix Figure A3.

<sup>8</sup> For instance, in Liu Song of the Southern dynasties, the Wang Clan was highly influential during Emperor Liu Yu’s reign (363-422), where the clan members could decline the emperor’s offers, and could escape from criminal charges when the prestigious clan leader, Wang Qiu, spoke for him in front of the emperor.

from the grassroots, thus having no access to local resources or military support to contend with the emperor. Second, the routine provision of talents through the civil exams made any incumbent political elites highly substitutable, weakening their bargaining power over the emperor. The substitutability was further strengthened by the standard tests in the exams that ensured public servants with highly homogenous values and capacity, where the emperor could easily find a quality replacement of appointments, even for important positions.

After the power-sharing commitment vanished, a direct consequence was the surge of political purges. Anecdotal evidence suggested increasing incidences of exam-era purges and more so for petty wrong-doings after the exam system was consolidated. For instance, earlier in the exam era, in the Song dynasty, the commoner-born grand chancellor Kou Zhun (961-1023) was relegated for backing the wrong prince. Centuries later, in the Ming dynasty, when the exams were fully established, Zhang Mao (1437-1522), another exam-recruited bureaucrat, was relegated for merely suggesting canceling the Lantern Festival. In comparison, Wang Meng, from the famous Wang clan in the Eastern Jin dynasty, refused the imperial request multiple times, but ended up with no punishment from the emperor. A simple count of the relegation cases for grand chancellors – the highest-ranked civil servants – echoes with the anecdotal evidence: in the pre-exam era, 19.7% of the grand chancellors were dismissed in their careers, and the same number rose to 45.4% in the exam era.

On the other hand, the vanished power-sharing commitment consolidated the imperial rule. In the pre-exam era, the bargaining between the nobility and the emperor was not always peaceful: the Southern dynasties witnessed nine emperors during the 60 years of Liu Song's regime, with an average reign of fewer than seven years. Similarly, the Southern Qi regime witnessed seven emperors in three decades, with an average reign of only four years. The short reign of emperors was mainly due to the clan intervention in state affairs which often ended up in usurpations and dethronement. Conversely, to

maintain good relations with the clan and thus the stability of the imperial power, the emperor had to be generous to the bureaucrats backed by the clan. In contrast, in the exam era, emperors were freed from such constraints and thus had a stabilized environment: the imperial reign from the Sui dynasty to the Qing dynasty averaged as long as 18 years per emperor. The following section provides a simple theoretical framework to illustrate the above discussion.

### 3. Theoretical Framework

The institutional background sets the tone for our analysis of bureaucrats' relegations. We highlight two elements: First, the relative negotiation power – instead of the *de jure* positions held by social elites – determines the outcome of the interactions; second, the rulers usually initiate the purge attempts, while the bureaucrats might resist afterward. Depending on the relative bargaining power, the resistance could be successful or in vain. Based on the two elements, we build a minimalist model to study the impacts of exit strategies on bureaucrats.

**Setup.** A ruler and a continuum of bureaucrats split a total pie of one. Since collective action problems are not the focus of our discussion, we assume away the coordination problems. We also abstract from effort provision to highlight the rent-sharing schemes between the ruler and the bureaucrats. The key concept in our analysis is the notion of *power bases*. We define the *power base* of a social elite as its relative bargaining power independent from its *de jure* position in the social hierarchy. For instance, a social elite from the leading clan who serves as a county head may have much more influence than his colleagues from a commoner's family. Power bases dictate two features in social elites' interactions: First, they generate position-free rents when the social elites are splitting resources; second, they determine the cost of conflicts, should the elites involve in such conflicts. To analyze the interactions more precisely, we define the key variables of the conflicts.

**Rents.** In the rent-sharing business, the default sharing scheme is  $(1 - r, r)$ , where the respective shares reflect the power bases between the ruler and the bureaucrat. Without considering effort provision, the bureaucrats – who, in the context of the historical background in Section 2, usually came from noble families prior to the exam era – naturally guaranteed  $0 \leq r \leq 1$  share of the pie. The reduced-form setup captures the key institutional background that with the existence of the nobility, there was *de facto* check and balance, and thus rent splitting, between the imperial power and the clan elites.

**Purges.** A political purge replaces or relegates a bureaucrat without proper causes or procedures. We model purges as a two-step process: in the first step, the ruler proposes a purge intensity that aims to relegate  $0 \leq y \leq 1$  of the (replaceable) bureaucrats (alternatively, share  $y$  of a bureaucrat's power). Upon the purge attempts, the bureaucrats respond by fighting back with intensity  $0 \leq x \leq y$ . Power struggles are highly costly, and the costs differ in power distributions. In particular, we model the costs of the ruler as  $g(r)c(x)$ , where  $c'(x) > 0$  and  $c''(x) > 0$  reflect the positive correlation between resistance and the cost of purges, and  $g'(r) > 0$  reflects that larger power bases render stronger checks and balances, thus higher costs of breaking such balances. In the meantime, purge attempts are also costly to bureaucrats: we model such costs as  $h(r)c(x)$ , where  $g'(r) < 0$  reflects that purges are less likely to succeed when bureaucrats possess established power bases.

**New Replacements.** The realized purge follows  $\Delta \equiv y - x \geq 0$ . After purges are realized, new replacements enter into the bureaucracy. The new recruits have potentially diverged impacts on the old players. On the one hand, the fresh hands – especially when selected through meritocracy – may enlarge the total rents for the split. On the other hand, the new recruits alter the existing power landscape. In particular, the ruler likely receives extra loyalty from the new recruits, while the bureaucrats lose old

patronage. To accommodate full flexibility, we model the impacts on the two players as  $\gamma\Delta$  for the ruler and  $(-\rho)\Delta$  for the bureaucrat in the rent split. Consequently, a *social welfare-improving* replacement occurs if and only if  $\gamma > \rho$ . In the following discussion, we assume  $\gamma > \rho$  unless otherwise emphasized.

The timing of the game is as follows.

1. Given power base distribution  $(1 - r, r)$ , the ruler proposes an intended purge  $y$ ;
2. The bureaucrat responds by choosing costly resistance intensity  $x$ ;
3. The actual purge  $\Delta$  realizes, and the new replacement enters the bureaucracy.
4. The payoffs are collected, with the overall size of the pie  $1 + (\gamma - \rho)\Delta$ .

Based on the setup of the model, the ruler solves:

$$\max_y (1 - r + \gamma\Delta) - g(r)c(x)$$

The bureaucrat solves:

$$\max_x (r - \rho\Delta) - h(r)c(x)$$

where  $\Delta = y - x \geq 0$ .

Our first theoretical result establishes the equilibrium relegation strategy of the ruler. Intuitively, when purge attempts are moderate, the bureaucrat fights back; when purge attempts are heavy, the bureaucrat only selects a fixed resistance rate due to the costs of conflicts. This means that low-purge-attempts are never optimal for the ruler, facing the resistance. High-purge-attempts, however, should be fully leveraged since the bureaucrat only responds with a fixed intensity. Consequently, the ruler selects a bang-bang strategy in equilibrium, where when the bureaucrat's power base is above a threshold level  $\bar{r}$ , the ruler does not purge at all;<sup>9</sup> when below the threshold, the ruler exercises the maximal purge possible:

**Proposition 1.** *The ruler selects a bang-bang relegation strategy in equilibrium. That*

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<sup>9</sup> However, there can still be political turnovers due to other legitimate reasons, which are beyond the scope of our discussion. In this paper, we focus on political purges, that is, relocations without proper courses or procedures.

is, there exists a cut-off power base threshold  $\bar{r} \in [0,1]$  such that when initial power base  $r < \bar{r}$ , the ruler chooses full-scale purges,  $y^* = 1$ ; when  $r \geq \bar{r}$ , the ruler chooses no purges,  $y^* = 0$ .

**Proof.** See appendix.

Proposition 1 shows that equilibrium strategy may change radically when power bases tremble. This is important since the establishment of the exam did not topple the power bases of bureaucrats overnight. However, the relative shift could trigger drastic changes in the bureaucrats' fates. Though a static model, we can observe some simple dynamics: With a smaller initial power base  $r$  for the bureaucrats, the system converges to a non-base stationary state. While with a large initial power base for the non-ruling elites, the system remains stationary, consistent with the experience in China. We leave the dynamic model and the discussions for future research. Next, we provide comparative statics. In particular, we focus on the power bases of rulers and bureaucrats.

**Proposition 2.** *The realized relegations, should the ruler initiates a purge, decrease with the bureaucrat's power base,  $r$ ; The ruler's utility decreases with the bureaucrat's power base  $r$ .*

**Proof.** See appendix.

The first part is intuitive, as a stronger power base from the bureaucrats forms proper checks and balances of imperial power. The second part, in the meantime, provides two important implications. First, it implies the substantial incentives from imperial power to weaken or eradicate bureaucrats' power base for its self-interests. Second, should the ruler hold on to a stronger power base, Proposition 2 indicates a strengthened imperial rule. This is also consistent with the anecdotal observations in the historical background. Meanwhile, the benefits towards the ruler might not coincide with social optimality. The following proposition addresses the mismatch between purges and social efficiency.

**Proposition 3.** *In terms of social welfare:*

1. *For  $\rho \geq \gamma > 0$ , there are too many purges when the bureaucrat has a small power base, i.e.,  $r < \bar{r}$ .*
2. *For  $\gamma > \rho > 0$ , there are too few purges when the bureaucrat has a large power base, i.e.,  $r \geq \bar{r}$ .*
3. *For  $\rho \leq 0$ , bureaucrats willingly concede to potential purges.*

**Proof.** See appendix.

As shown in Proposition 3, social inefficiency in the era of high elites' bargaining power comes from the reluctance of vested interests to embrace progress. Meanwhile, in the era of low elites' bargaining power, social inefficiency comes from the aggression of the ruler to grasp a larger share of the existing pie, despite the distortion in social production. However, the conflict of interests between the ruler and bureaucrats can be resolved when bureaucrats receive higher overall rent from political turnovers. The last observation echoes the logic of constitutional reforms, à la Myerson (2008).

To summarize, eradicating power bases intensifies purges, leading to more realized relegations and strengthened rule. Given the context of China, and based on Proposition 2, we introduce the following corollaries for empirical tests.

**Corollary 1.** *More bureaucrats were purged in the exam era, compared to the pre-exam era. Moreover, bureaucrats with weaker power bases were purged more heavily than functionalists.*

**Corollary 2.** *The emperor's reign was more stable in the exam era.*

## **4. Data and Empirical Strategy**

### **4.1 Data**

We collect data on bureaucrats' career paths in imperial China and other determinants of political purges. Specifically, we compile the individual career path dataset from historical records in the *Orthodox Histories*, from the *Book of the Jin* to the *History of the Ming*,<sup>10</sup> published by the imperial courts of each dynasty. The history of the current dynasty was usually written by its immediate successor, which covers the whole dynasty's economy, politics, culture, and technologies. The dynastical records also limited the short-term bias and interference compared to inter-emperor evaluations, because the authors usually had longer time horizons to evaluate the policies and performances of the previous dynasties. In particular, the history of a dynasty consisted of four parts, *Benji* (records of emperors), *Liezhuan* (records of notable individuals), *Zhishu* (demographics), and *Biao* (index). We recover the career paths of bureaucrats from *Liezhuan*. For each bureaucrat, we collect personal information such as the place and date of birth, the date of entering public offices, the date of retirement, and the date of death. Our data includes 5,353 bureaucrats from 265 CE to 1644.<sup>11</sup> Figure 3 depicts the distribution of bureaucrats across dynasties in our dataset.

[Insert Figure 3 here]

**Dependent Variable.** Our main dependent variable is whether the bureaucrats get purged during their careers. The information about purges comes from the *Twenty-Four Histories*. We define the dependent variable, *purge*, as a dummy variable that takes the value of 1 if a bureaucrat was demoted or dismissed from office during his career, and 0 otherwise. The detailed coding procedure and the confounding complications are discussed in Appendix B.2. In our sample, 2,067 bureaucrats suffered from political purges, and the mean of purge experience is 0.387. The distribution of bureaucrats who experienced the purge of each dynasty is presented in Figure 4. As shown, the average

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<sup>10</sup> The *Orthodox Histories* exclude the *Book of the Qing*. The exclusion exhibits an extra advantage, where in the Qing dynasty, there was an additional channel of elite recruitment apart from the Keju exam, *Juanna*, that is, to buy one's way into the bureaucracy. Lee et al. (1975) estimates that nearly 30% of the positions were obtained through *Juanna* in the Qing dynasty. Meanwhile, the positions bought were usually designed for generalists, which may confound our results should there be systematic purge patterns against the *Juanna* entrants to the bureaucracy. The *Juanna* system was only prevalent in the Qing dynasty, which had limited impacts on our data from previous dynasties.

<sup>11</sup> Our database only includes bureaucrats who had complete biographies (*liezhuan*) in the *Orthodox Histories*, since we aim to recover the career paths of these social elites. The data collection process is introduced in Appendix B.1.

percentage of bureaucrats purged was 16% in the pre-exam era, and surged to 42% in the exam era.

[Insert Figure 4 here]

**Independent Variables.** We collect the information on the last active office that a bureaucrat held, according to the *Orthodox Histories*.<sup>12</sup> Within the bureaucracy in the exam era, the proportion of recruited commoners varied systematically across positions. In particular, the exam-recruited commoners were often assigned to local positions in charge of comprehensive administrative tasks. Meanwhile, more connected individuals were often granted positions in the central bureaucracy, in charge of specific functions in different ministries (see Appendix Figure A4).<sup>13</sup> We refer to the former social elites as *generalists*, and the latter as *functionalists*, and use whether the bureaucrat held a functionalist position as a proxy for power base. In particular, a bureaucrat is a generalist if he was in charge of the administration of a region. A generalist position includes *Taishou*, *Xunfu*, *Zhifu*, and *Zhixian*. Correspondingly, a functionalist was in charge of a division in a ministry, such as in *Dali Si*, *Taichang Si*, *Taipu Si*, and *Honglu Si*.<sup>14</sup> We further differentiate the bureaucrats by their ranks within the hierarchy. In the dataset, we recorded 1,374 generalists and 1,263 functionalists, among whom 1,017 held senior positions.

**Control Variables.** We collect the following three sets of data as control variables.

*Ranks.* Higher-ranked bureaucrats were closer to the ruler, thus may feature systematic differences in purging probabilities (Yan, 2010). The ranks in Chinese imperial bureaucracy were typically divided into nine classes (e.g., first class vs. second class), with two tiers within each class (e.g., upper second class vs. lower second class).

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<sup>12</sup> The records in the *Orthodox Histories* are subject to selection bias, especially those with political concerns. For instance, rebellious figures of the previous dynasty might be overstated, while loyalists might be understated, to advocate the righteousness of the current dynasty. In Appendix B.3, we explain why the selection problem has limited impacts on our data.

<sup>13</sup> For instance, the famous Ming philosopher, Wang Yangming, was the son of Wang Hua, who served as the Minister of Personnel in the central bureaucracy. When Wang Yangming passed the Keju exam in 1499, he served in the Ministry of Works and the Ministry of Justice, both in the central bureaucracy.

<sup>14</sup> The detailed definitions are included in Appendix B.2.

Based on the ranks of positions specified in Lv (2015), we construct a categorical variable coded from 1 (Upper First Class) to 18 (Lower Ninth Class). The mean value of ranks in the sample is 6.2, which corresponds to a lower third class – which confirms that our sample covers the major positions in the bureaucracy.

*Civil Servants.* A civil servant usually had limited influence in arms, while a military officer was more likely to be the purge target for his command of force. On the other hand, an actual relegation could be highly costly because of the power bases that a military officer might accumulate. We construct the variable by checking the last office held by a bureaucrat, and compare it with Lv (2015), which classifies civil positions from military ones. We also cross-reference the classification with the information in the CBDB dataset. In the total sample, 58.6% of the bureaucrats were civil servants, while the number increased to 64.1% for the exam-era sub-sample. This confirms the general trend in historical China that the rulers increasingly relied on civil servants in governance (Yu, 1980; Toynbee, 1987; Chen, 1997; Qian, 2012).

*Places of Birth.* A crucial determinant of bureaucrats' fate is their social network (Xu, 2018). In China, shared hometowns often imply deep social connections. Therefore, we include the places of birth as a measure of connection. Specifically, we extract the birth information from the *Orthodox Histories* and recode it into corresponding provinces in contemporary China.

Table 1 summarizes the sources and the descriptive statistics for all the variables used in our analysis.

[Insert Table 1 here]

## **4.2 Empirical Strategy**

Our empirical strategy follows the standard DID approach, in which we compare the

relative changes in purge probabilities for functionalist and generalist elites before and after the exam's inception. The model specification takes the following form:

$$Y_{it} = \beta \text{Generalists}_i \times \text{Post}_t + \delta_d + \sigma_t + X + \varepsilon_{it} \quad (1)$$

In the specification,  $i$  represents individual bureaucrats,  $t$  represents dynasties, and  $d$  represents the book of records. The binary variable *Generalists* is assigned the value of 1 if the corresponding official served as the administrative head of a local region, and 0 otherwise. *Post* is a dummy variable with a value of 1 for post-Sui dynasties where the civil exam system was established, and 0 for pre-Sui dynasties.<sup>15</sup>  $X$  denotes a series of control variables, such as ranks, places of birth, and office attributes. Moreover, we control the historical-record fixed effect  $\delta_d$  and dynasty fixed effect  $\sigma_t$ . Our primary dependent variable is whether a bureaucrat gets purged or relegated. Our coefficient of interest is  $\beta$ , which captures the impacts of purges on bureaucrats in the post-exam era.

### 4.3 Suggestive Evidence

Before proceeding to the results, we provide some descriptive evidence. Figure 5 presents the distribution of purged bureaucrats before and after the exam. The left panel of Figure 5 shows the distribution of purged functionalist bureaucrats, while the right panel shows the distribution of purged generalists. As shown, the post-exam purge intensified, and more so for the generalists. In terms of magnitudes, the proportion of purged bureaucrats increased from 16.4% in the pre-exam era to 44.8% in the exam era.

[Insert Figure 5 here]

Table 2 performs a standard  $t$ -test between the two groups of bureaucrats. Consistent with previous observations, generalists were more likely to be purged in the exam era: the purge probability increases from 0.141 to 0.588, with a relative change of 0.219 at a 1% significance level.

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<sup>15</sup> The Keju exams were first established in 605 CE, which we use as the cut-off time. The inception of Keju was clearly identified, which better satisfies the assumptions in the parallel trend test.

[Insert Table 2 here]

## 5. Results

### 5.1 Baseline Results

We present our baseline results in Table 3. Column 1 shows generalists were 15.2% more likely to be purged than functionalists, and the result remains significant after accounting for the impacts of civil servants, ranks, and places of birth – thus social connections (Column 2). Furthermore, the excess purge risks remained robust when controlling for dynasty, record, and emperor fixed effects. Therefore, our baseline results provide consistent evidence to our theoretical framework that checks and balances were weakened in the exam era when bureaucrats lost their power bases and became highly substitutable. Thus the emperors had high discretionary power in determining the fate of bureaucrats. Moreover, as shown in Columns 2-4, civil servants had roughly 15% higher purge probability, consistent with their lack of power bases than their military colleagues. To further differentiate purges from regular accountabilities for wrongdoings, we exclude regular demotions and relegations from the sample of purges and re-estimate the results. As shown in Column 5 in Table 3, our main results are robust to this alternative definition.<sup>16</sup>

[Insert Table 3 here]

The validity of our DID specification hinges on the assumption that generalists and functionalists shared similar fates in the pre-exam era (Heckman et al., 1998; Abadie, 2005). We address this concern in two steps. First, we conduct a balance test in Table 4 to show that the personal characteristics between generalists and functionalist bureaucrats were comparable in the pre-exam era.

[Insert Table 4 here]

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<sup>16</sup> See Appendix Table A1 for a replicate of baseline regressions on the subsample.

Furthermore, we conduct a parallel trend test to validate that generalists and functionalists had similar purge probabilities in the pre-exam era. The econometric specification is as follows:

$$Y_{it} = \sum_{\tau=-200}^{700} \beta_{\tau} Generalists_i \times Decade_{\tau} + \delta_d + \sigma_t + \chi + \varepsilon_{it} \quad (2)$$

In particular, we use an interval of 50 years to conduct the test, centering around 605 CE, when the exam system was established. Figure 6 depicts the results, confirming that the difference between the treated and control groups was constant over time and small in magnitude in the pre-exam era. The gap began to widen after the Sui dynasty and stayed positive. This pattern was consistent with the historical background, which justifies our cut-off selection.

[Insert Figure 6 here]

**Treatment Intensities.** In the baseline results, we classify bureaucrats by the last positions they served, which may capture their career paths biasedly. To address the concern, we construct an intensity measure that exploits the career focus, where we re-classify a generalist as a bureaucrat during whose career had served as a generalist longer than a functionalist; otherwise, the bureaucrat is identified as a functionalist. Then, we re-estimate the following equation:

$$Y_{it} = \beta Generalists_i \{proportion\ as\ Generalists \geq\ mean\ of\ his\ dynasty\} \times Post_t + \delta_d + \sigma_t + X + \varepsilon_{it} \quad (3)$$

Based on our theoretical framework, we expect bureaucrats who served extensively in generalist positions during their careers more likely to be purge targets in the exam era. Table 5 presents the results, which confirm our prediction that the generalists suffered significantly more purges than functionalists. Therefore, our baseline estimations remain robust.

[Insert Table 5 here]

## 5.2 Robustness Checks

Next, we conduct three sets of robustness checks to address omitted variables, overcome sample selection bias, and rule out alternative explanations, respectively. First, we include additional controls to show that the baseline results remain robust after considering bureaucrats' age and the time trends. Second, we overcome the sample selection bias by considering reclassifications of key variables, selective sampling of ranks and positions, and exclusion of specific dynasties. Lastly, we rule out the alternative explanation that the excess purges are due to the intra-bureaucracy power scrambles.

**Additional Controls.** We consider several additional controls. First, exam-recruited bureaucrats entered the bureaucracy at an older age and thus may feature different threats to imperial power (Goldring and Matthews, 2021).<sup>17</sup> Therefore, we control bureaucrats' age when entering the bureaucracy in Column 1 of Table 6. Moreover, to control other unobserved time-varying factors that may contaminate our analysis, we include a time trend, *trend<sub>t</sub>*. We report the results in Column 2 of Table 6, where our baseline result remains robust.

[Insert Table 6 here]

**Sample Selection.** We address the potential sample selection bias in four ways. First, functionalists can be higher-ranked than peer generalists. To alleviate the concerns that higher-ranked officials are systematically more likely to be purged (Bokobza et al., 2022), we exclude the high-ranked functionalists from the control group and re-estimate the results. As shown in Column 3 of Table 6, the results remain robust. Second, rulers

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<sup>17</sup> An average entrant of bureaucracy in the pre-exam era was 21.8 years old, and was 28.6 years old in the exam era.

often target military attaches as purge targets to mitigate the risk of coups d'état (Sudduth, 2017). Therefore, we replicate the baseline using a sub-sample that includes only the civil servants. As shown in Column 4 of Table 6, the results remain robust. Third, we replace the dependent variable from purges to the extreme form – unnatural deaths to rule out punishment heterogeneity. Specifically, a bureaucrat executed by the emperor was coded 1, and otherwise 0. We present the result in Column 5 of Table 6. The result is consistent with our baseline that more generalists were executed in the exam era. Fourth, some may worry that data from the Tang dynasty – the period with co-existing exam-based and recommendation-based recruitment – may threaten the consistency of our estimation. We, therefore, exclude the Tang data and replicate the analysis. Column 6 of Table 6 shows that our results remain robust.

**Alternative Explanation.** A key alternative explanation of our baseline story is that the excess purge may result from intra-bureaucracy scrambles, echoing existing studies on political purges (e.g., Goodman, 1989; Shirk, 1993).<sup>18</sup> To alleviate the concerns, we refine the sample of purges to include only the crackdowns directly from the emperor onto the bureaucrats. The results remain robust, as shown in Column 7 of Table 6.

## 6. Power Consolidation in the Exam Era

This section investigates the efficacy of the political purges on power consolidation. To start with, the efficacy of the excess purge was directly reflected in bureaucrats' lifespan. Thus, we replace the dependent variable with the lifespan of bureaucrats, and show, in Columns 1-2 of Table 7, that, consistent with our framework, generalists in the pre-exam era enjoyed a longer lifespan. To correct the different entry ages into the bureaucracy, we also replace the lifespan with the tenure span and the tenure span over the lifespan. As shown in Columns 3-6 of Table 7, the results remain robust.

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<sup>18</sup> Meanwhile, we are less concerned by intra-bureaucracy scrambles, since the existing literature has established that intra-bureaucracy scrambles were more severe in the central governments (Wang, 1981), which indicates that the personnel turmoil should be more substantial in the central bureaucracy. This, in turn, adds to the robustness of our baseline.

[Insert Table 7 here]

Meanwhile, the question remains whether the fragility of elites' fates implied strengthened imperial rule. Historians have pointed to better executions of imperial policies under the civil-service system (e.g., Min, 1989). To empirically evaluate the imperial power consolidation in the exam era, we employ two proxies. First, echoing the existing literature (Waguespack et al., 2005; Blaydes and Chaney, 2013; Kokkonen and Sundell, 2014; Huang and Yang, 2022), we use the (logged) reign duration of an emperor as a proxy for regime resilience, Second, literature has validated victories in external warfare increased ruling legitimacy (Chen and Fan, 2021). Therefore, we use the (logged) external military victories as a proxy for regime strength. The econometric specification is as follows:

$$\ln Y_i = \alpha + \beta \ln Keju_i + X' + \varepsilon_i \quad (4)$$

$X'$  includes a set of controls. First, we include a dummy variable, *Direct Offspring*, which equals 1 when the emperor is a direct offspring of his predecessor and 0 otherwise, to control the impact of lineage in power consolidation (Easton and Siverson, 2018; Chen and Fan, 2021). The covariates include two additional variables, *Precipitation*, and *Last Emperor*. *Precipitation* is a proxy for extreme weather, i.e., the droughts and floods in central China, which profoundly influenced agrarian regime stability (Bai and Kung, 2011), with an index from 1 to 9, where 1 indicates extreme droughts, and 9 indicates severe floods. Both data are retrieved from Wang (1992). *Last Emperor* is a dummy variable, which equals 1 when the emperor is the last emperor of his dynasty and 0 otherwise, to control the declining-period turmoil in regime survival (Olson, 1986; Fu, 1993).

We report the results in Table 8. We show that higher exam-based elite recruitment indeed prolonged the reign (Column 1). Regarding magnitudes, the point estimator

reported in Column 1 is 0.963, representing a 0.963% increase in reign with one percent higher exam-based elite recruitment. This effect corresponds to a 0.151-year increase from the reign sample mean (15.769) and is significant at the 5% level. The estimated coefficients reported in Column 2 exhibit similar magnitudes. Furthermore, to the extent of data availability, we find that higher exam-based elite recruitment increased victories on the battlefield, which enhanced rulers' legitimacy and thus consolidated the rule. Both results are robust after controlling for a series of other determinants, such as birth order.

[Insert Table 8 here]

## 7. Discussion and Conclusion

This paper utilizes the comprehensive career records of social elites in historical China to investigate the impacts of the changes in the power-sharing commitment of the imperial rulers. Building on a theoretical model of purge contest between the ruler and the elites, we empirically show that when a meritocratic elite recruitment shock arrived, grass-root elites entered the bureaucracy, served in high-ranked positions, but failed to exercise checks and balances with the ruler. Furthermore, when the elite recruitment system persistently selected new commoners to enter the governing bureaucracy, any social elite became substitutable, thus dispensable. As a result, they were more likely to suffer from political purges. With no challenges from the elite class, the imperial rulers thus prolonged their rule. More broadly, the paper sheds light on the dark side of establishing an open-access elite recruitment system *before* consolidating constitutional institutions, which may erase the power checks and strengthen an absolutist rule.

There are two final remarks. First, we highlight our dataset's potential to study important personnel economics questions from a novel perspective of power dynamics in the imperial context. Second, the benefits of stability induced by the elite recruitment system do not come without costs, that innovation incentives are distorted when no one

is under either property rights or personal safety protection. We leave the empirical investigation of such distortion, particularly the connections with the great divergence in economic development between the East and the West, for future research.

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## Figures and Tables

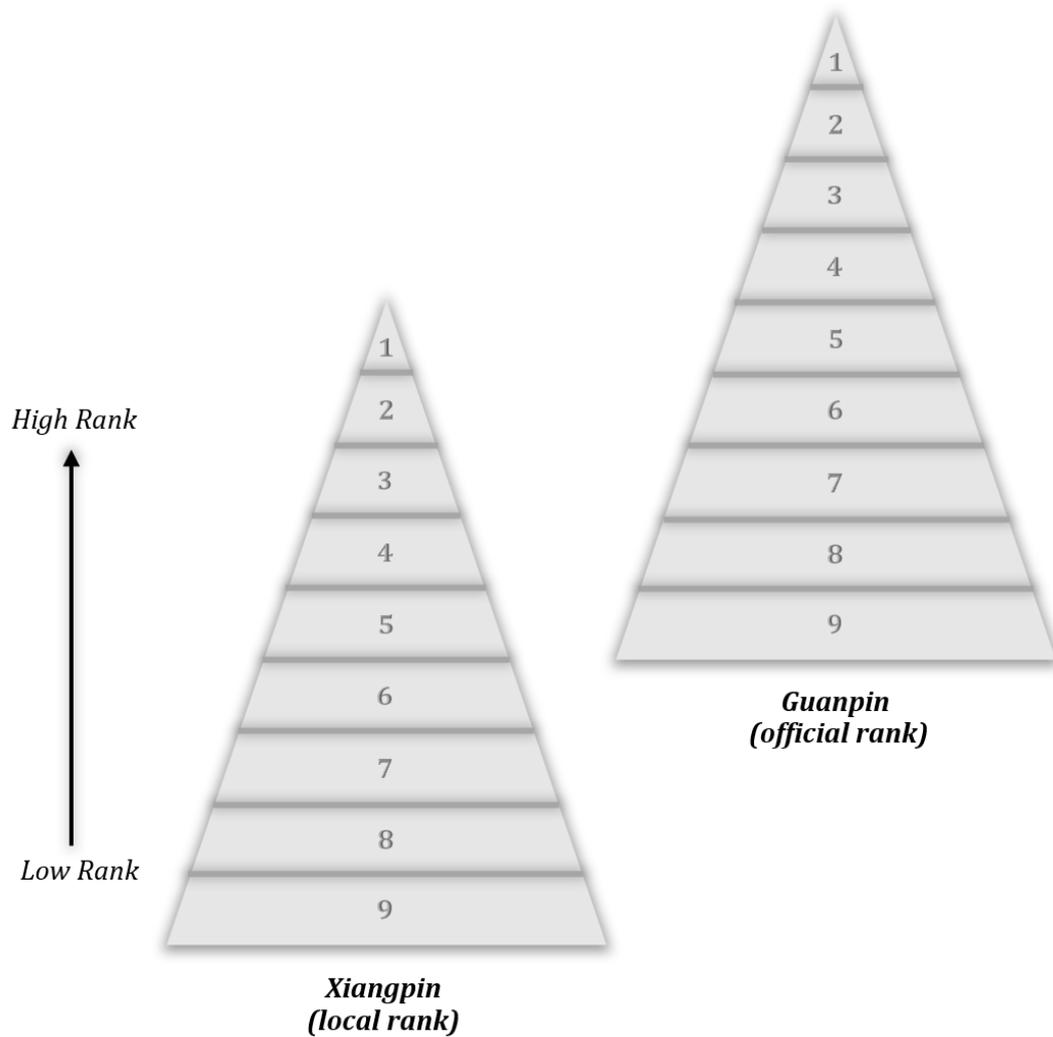


Figure 1. Selection procedure of nine-rank rectification system

*Notes: The figure depicts the selection procedure of the Nine-Rank System before the Sui dynasty, based on information from Miyazaki (2008). The Xiangpin was graded by the justice officer mainly according to the elites' family status. Then the central government recruited elites based on Xiangpin and distributed the Guanpin.*

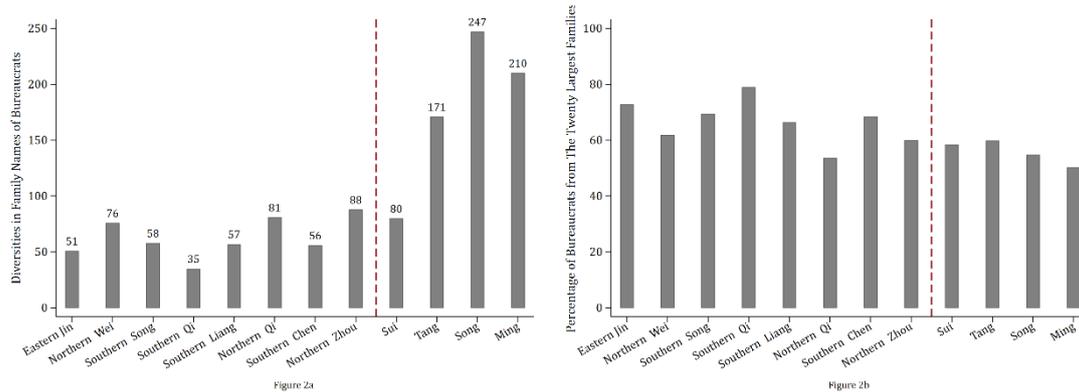


Figure 2. Distribution of bureaucrats by family names

Notes: The figure depicts the distribution of bureaucrats by family names from the Eastern Jin to the Ming dynasty. The left panel depicts the diversities in family names of bureaucrats, and the right panel depicts the percentage of bureaucrats from the twenty largest families. The vertical dash line represents the time when the exams started.

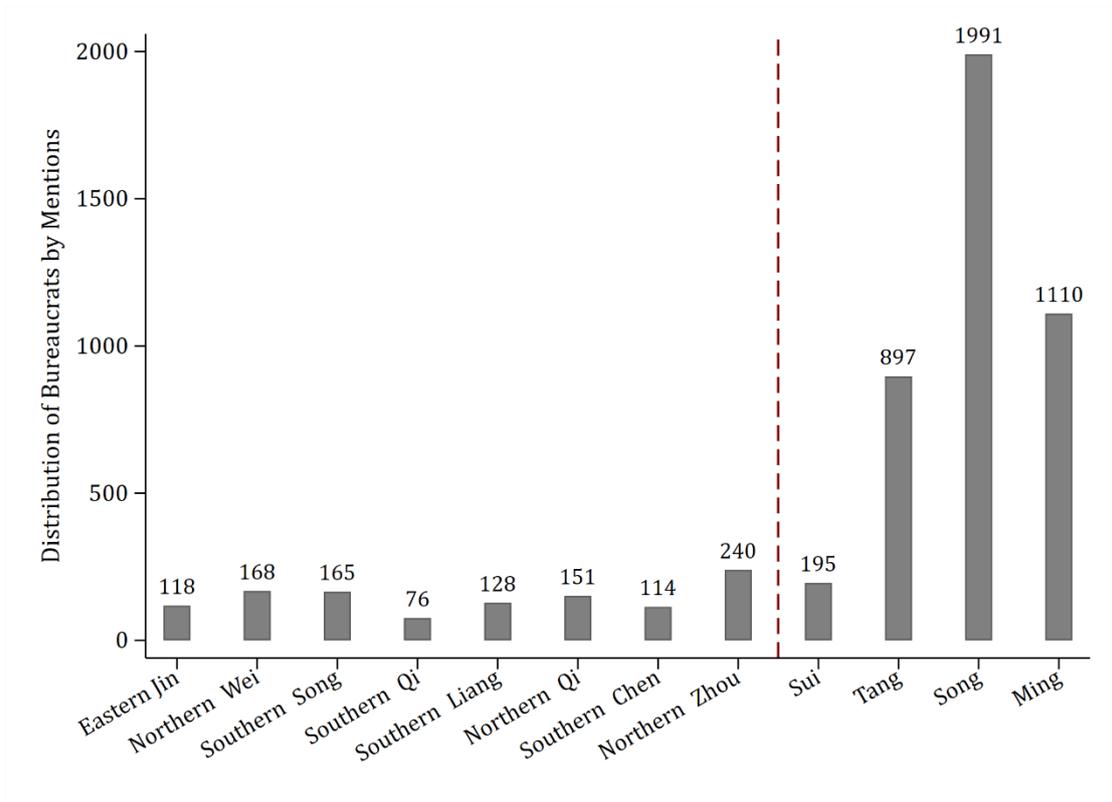


Figure 3. Distribution of bureaucrats by mentions

*Notes: The figure depicts the distribution of bureaucrats from the Eastern Jin to the Ming dynasty. The figure above the bar is the number of bureaucrats in our sample. The vertical dash line represents the time when the exams started.*

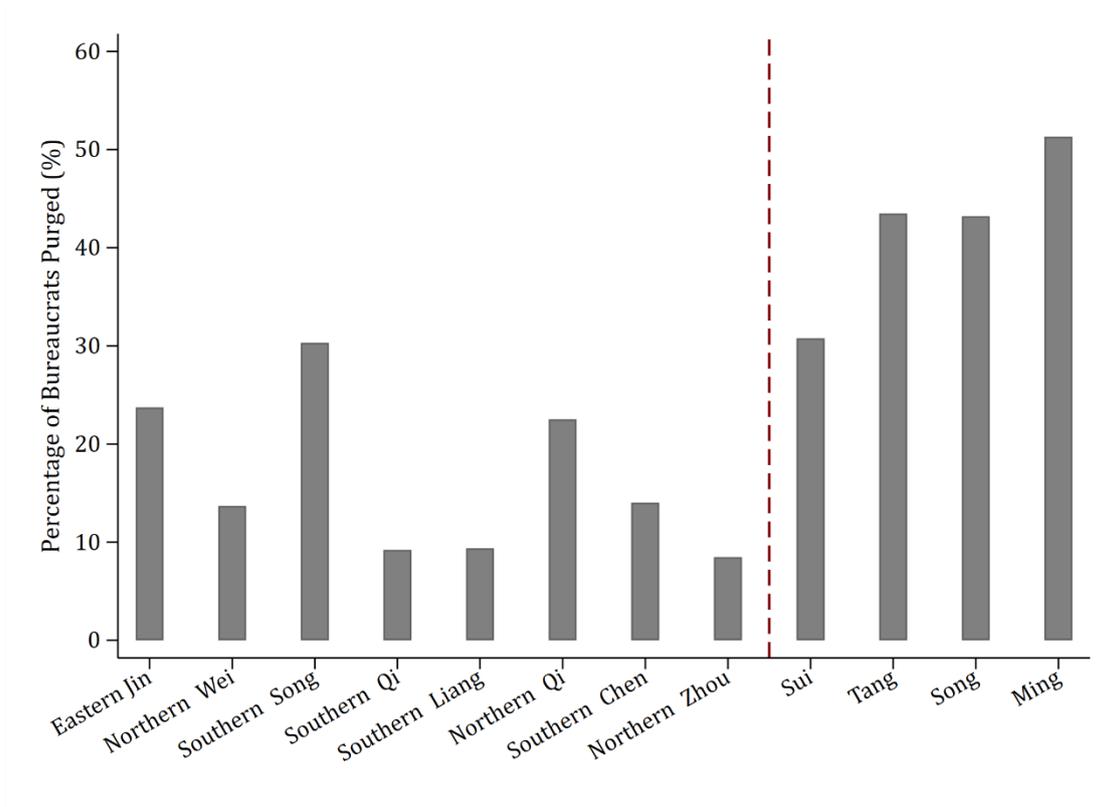


Figure 4. Distribution of purged bureaucrats

*Notes: The figure depicts the distribution of purged bureaucrats from the Eastern Jin to the Ming dynasty. The vertical dash line represents the time when the exams started.*

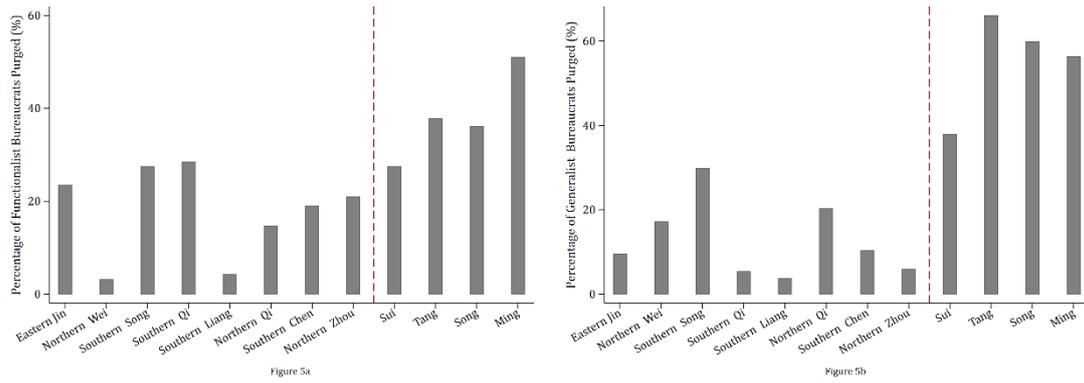


Figure 5. Distribution of purged bureaucrats by functionality

*Notes: The figure depicts the distribution of purged bureaucrats from the Eastern Jin to the Ming dynasty. The left panel depicts the percentage of functionalist bureaucrats purged, and the right panel depicts the percentage of generalist bureaucrats purged. The vertical dash line represents the time when the exams started.*

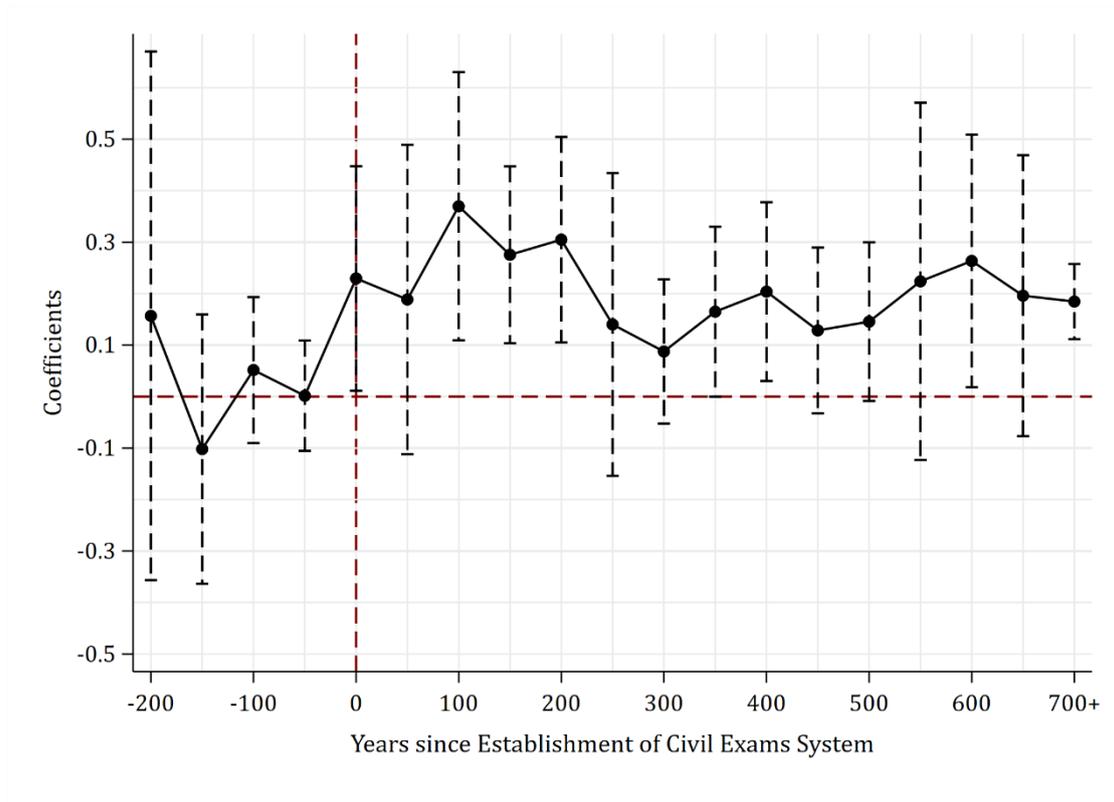


Figure 6. The effects of *Keju* on the purge probabilities: parallel trends test  
*Notes: The figure depicts the differences in purge probability between generalists versus functionalists before and after the exams. The markers and capped spikes represent the OLS estimators and 95% confidence intervals based on robust errors. The dashed vertical line represents the treatment date, and the periods are grouped every 50 years relative to 605. The dependent variable is the dummy that equals one if bureaucrats experienced a purge. The reference groups are the years more than 300 years before the treatment date. The regression considers record, emperor, and year of death fixed effects.*

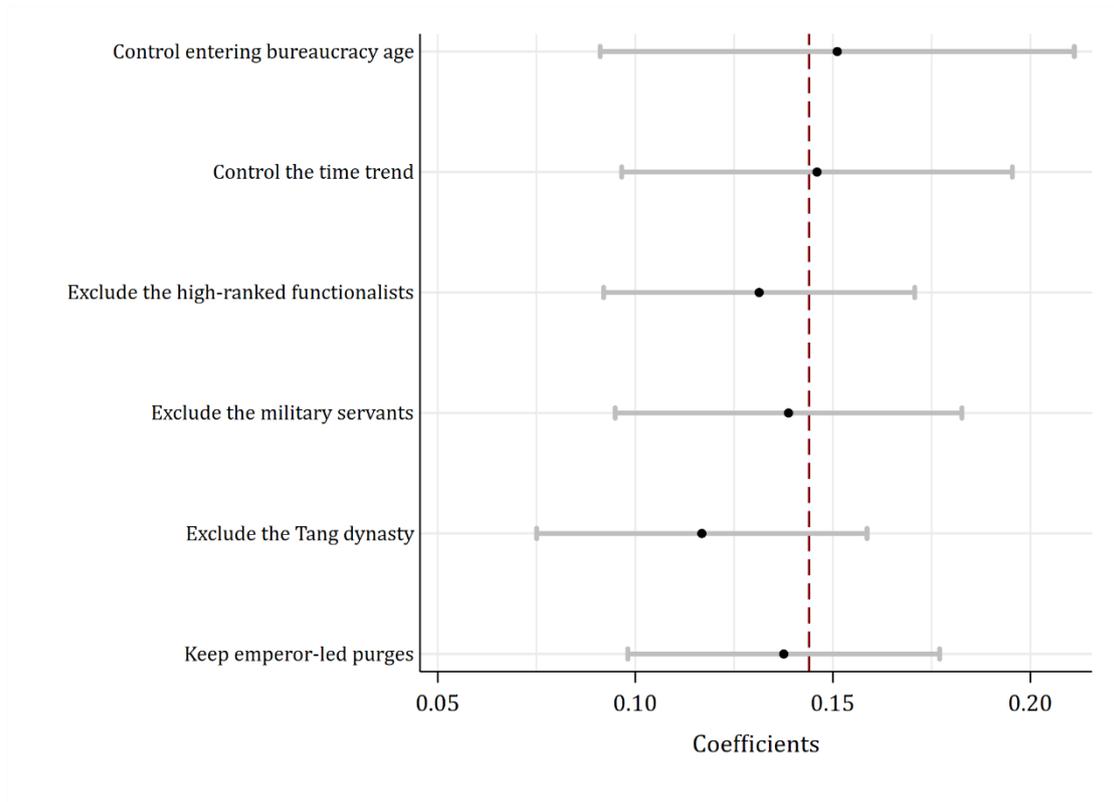


Figure 7. The effects of *Keju* on the purge probabilities: robustness

*Notes: The figure depicts the differences in purge probability between generalists versus functionalists before and after the exams across different robustness checks. The dependent variable is the dummy that equals one if bureaucrats experienced a purge. The markers and capped spikes represent the OLS estimators and 95% confidence intervals. The regression considers record and dynasty fixed effects. Standard errors are robust to heteroskedasticity.*

Table 1. Summary statistics

Variable	Source	No. of Obs.	Mean	Std. Dev
<b>Dependent Variables</b>				
<b>Official:</b>				
Purge	A	5343	0.387	0.487
Unnatural Death	A	5341	0.206	0.404
Life-span	A, B, C	3121	62.330	12.700
<b>Emperor:</b>				
Duration (ln)	A, B	145	2.508	0.817
No. of Victories (ln)	D	145	0.945	0.935
<b>Control Variables</b>				
Rank	A	4590	6.239	3.513
Civil Official	A, C	5344	0.586	0.493
Direct Offspring	A	123	0.512	0.502
Last Emperor	A	145	0.166	0.373
Avg. Precipitation	E	145	6.239	2.059

**Sources:**

- A. Orthodox Histories (Twenty-Four Histories);
- B. Wikipedia; (<https://zh.wikipedia.org/>);
- C. CBDB database (<https://projects.iq.harvard.edu/cbdb>);
- D. Military History of China Writing Group (2003);
- E. Wang (1992).

Table 2. Differences in purge probabilities

	Pre-Sui	Post-Sui	Difference
Generalist	0.141 (0.019)	0.588 (0.015)	
Functionalist	0.174 (0.013)	0.402 (0.009)	
Difference	-0.033 (0.024)	0.186*** (0.018)	0.219*** (0.034)

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities by simply comparing the means of differences. Standard errors in parentheses. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 3. The effects of *Keju* on the purge probabilities: baseline results

	(1)	(2)	(3)	(4)	(5)
	Purge	Purge	Purge	Purge	Regular Demotion Excluded
Generalists*Post	0.152*** (0.017)	0.138*** (0.019)	0.144*** (0.019)	0.199*** (0.026)	0.141*** (0.020)
Rank		0.001 (0.002)	0.000 (0.002)	-0.000 (0.003)	0.000 (0.002)
Civil Servants		0.131*** (0.015)	0.122*** (0.017)	0.115*** (0.023)	0.124*** (0.017)
Place of Birth		-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	0.000 (0.000)
Dynasty FE	Yes	Yes	Yes	No	Yes
Record FE	Yes	Yes	Yes	Yes	Yes
Emperor FE	No	No	Yes	Yes	Yes
Year of Death FE	No	No	No	Yes	No
Observations	5343	4486	4133	3423	3897
R <sup>2</sup>	0.135	0.137	0.218	0.503	0.224

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities of equation (1). The dependent variable is the dummy that equals one if bureaucrats experienced a purge in Columns 1-4, and equals one if bureaucrats experienced a purge excluding regular demotions and relocations. Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 4. Balance tests between Generalists and Functionalists

	Generalists (1)	Functionalists (2)	Difference (3)
Observation	335	825	
Purge	0.141	0.174	-0.033 (0.024)
Natural Death	0.180	0.213	-0.033 (0.026)
Life-span	56.295	58.510	-2.215* (1.750)
Rank	6.910	5.375	1.535*** (0.192)
Civil Official	0.317	0.487	-0.170*** (0.032)

*Notes: This table reports balance tests between generalists and functionalists before the Keju. Standard errors in parentheses. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 5. The effects of *Keju* on the purge probabilities: treatment intensities

	(1)	(2)	(3)	(4)
	Purge	Purge	Purge	Purge
Generalists*Post	0.055*** (0.015)	0.048*** (0.017)	0.055*** (0.017)	0.074*** (0.023)
Rank		0.005** (0.002)	0.004* (0.002)	0.004 (0.003)
Civil Servants		0.136*** (0.015)	0.127*** (0.017)	0.123*** (0.023)
Place of Birth		-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.001)
Dynasty FE	Yes	Yes	Yes	No
Record FE	Yes	Yes	Yes	Yes
Emperor FE	No	No	Yes	Yes
Year of Death FE	No	No	No	Yes
Observations	5343	4486	4133	3423
R <sup>2</sup>	0.123	0.127	0.209	0.492

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities of equation (3). The dependent variable is the dummy that equals one if bureaucrats experienced a purge. Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 6. The effects of *Keju* on the purge probabilities: robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Purge	Purge	Purge	Purge	Unnatural Death	Purge	Emperor- led Purges
Generalists*Post	0.151*** (0.031)	0.147*** (0.025)	0.131*** (0.020)	0.139*** (0.022)	0.041*** (0.015)	0.117*** (0.021)	0.138*** (0.020)
Rank	0.001 (0.004)	0.003 (0.003)	0.002 (0.002)	0.005** (0.003)	0.008*** (0.002)	-0.000 (0.002)	0.002 (0.002)
Civil Official	0.040 (0.030)	0.108*** (0.020)	0.170*** (0.017)		-0.167*** (0.013)	0.105*** (0.017)	0.122*** (0.015)
Place of Birth	0.001 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.000 (0.001)	0.001** (0.000)	-0.001 (0.001)	-0.001 (0.000)
Work Age	-0.002 (0.002)						
Trend	No	Yes	No	No	No	No	No
Dynasty FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Record FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1525	2698	3535	2806	4483	3689	3689
R <sup>2</sup>	0.142	0.139	0.165	0.119	0.076	0.149	0.149

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities of equation (1). Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 7. Power consolidation in the exam era: bureaucrats' career

	(1)	(2)	(3)	(4)	(5)	(6)
			Work	Work	Work	Work
	Lifespan	Lifespan	Duration	Duration	Duration/ Avg. Lifespan	Duration/ Avg. Lifespan
Generalists*Post	-3.217***	-1.297**	-4.663***	-1.913**	-0.073***	-0.030**
	(0.605)	(0.638)	(0.783)	(0.800)	(0.012)	(0.013)
Control	No	Yes	No	Yes	No	Yes
Dynasty FE	Yes	Yes	Yes	Yes	Yes	Yes
Record FE	Yes	Yes	Yes	Yes	Yes	Yes
Emperor FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2983	2684	1466	1375	1466	1375
R <sup>2</sup>	0.184	0.227	0.261	0.321	0.275	0.332

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the power consolidation of equation (1). The control variables include ranks, civil servants, and places of birth. Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table 8. Power consolidation of imperial rule

	(1)	(2)	(3)	(4)
	Duration (ln)	Duration (ln)	Victory (ln)	Victory (ln)
Keju(ln)	0.963** (0.468)	1.377** (0.537)	0.997* (0.564)	1.278* (0.676)
Direct Offspring		0.152 (0.155)		0.127 (0.154)
Precipitation		0.039 (0.043)		0.016 (0.043)
Last Emperor		0.120 (0.239)		0.102 (0.176)
Dynasty FE	Yes	Yes	Yes	Yes
Observations	145	123	145	123
R <sup>2</sup>	0.245	0.306	0.511	0.510

*Notes: This table reports estimates of the effects of power consolidation of the imperial rule of equation (4). Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

## Appendix: Omitted Proofs.

### Proof of Proposition 1.

**Proof.** For bureaucrats, the first order condition gives;

$$x = (c')^{-1} \left[ \frac{\rho}{h(r)} \right]$$

Therefore, the bureaucrat's optimal response is:

$$x^* = \min \left\{ y, (c')^{-1} \left[ \frac{\rho}{h(r)} \right] \right\}$$

This means that the response from the bureaucrat towards the ruler follows a debt-like structure: under small purge intensity, the bureaucrats fully fight back. While under high purge intensity, the bureaucrats select a fixed rebounding intensity, because of the sizeable costs of resistance.

Furthermore, since  $h'(r) < 0$ ,  $x^*$  is increasing in  $r$ . That is, a larger power base enables the bureaucrat to resist a wider range of purges. Meanwhile,  $x^*$  is increasing in  $\rho$ . This is intuitive, as greater loss of rent induces higher resistance towards purges.

Next, we turn our attention to the ruler.

Having solved for the bureaucrat's response, the ruler faces the following problem: when the bureaucrat has a full response ( $x^* = y$ ), the ruler should stay put and attempt to purge no one. And the ruler's utility is  $U_0 = 1 - r$ .

When the bureaucrat responds with a fixed rate, the ruler's utility,  $U_p = (1 - r + \gamma y - \gamma \bar{x}) - g(r)c(\bar{x})$  is increasing in  $y$ . Therefore the ruler unleashes full purge attempts. Therefore, the ruler chooses full purge over non-purge if and only if:

$$U_p|_{y=1} - U_0 = \gamma(1 - \bar{x}) - g(r)c(\bar{x}) > 0$$

Since  $\bar{x} = (c')^{-1} \left[ \frac{\rho}{h(r)} \right]$ ,  $c'(x) > 0$  and  $c''(x) > 0$ ,  $\bar{x}$  increases in  $r$ . Consequently,  $U_p|_{y=1} - U_0$  decreases in  $r$ . Given mild assumptions of boundary conditions, there exists a cut-off bureaucratic power base  $\bar{r}$  such that above such threshold,  $U_p|_{y=1} \geq U_0$ , and the ruler selects full-scale purges; below such threshold,  $U_p|_{y=1} < U_0$ , all purge efforts will be countered by the bureaucrat, thus, the ruler selects not to purge. **Q.E.D.**

### **Proof of Proposition 2.**

**Proof.** When  $r \geq \bar{r}$ , there is no realized purges. When  $r < \bar{r}$ , the realized purge follows:  $\Delta^* = y^* - x^* = 1 - (c')^{-1} \left[ \frac{\rho}{h(r)} \right]$ . As shown in the proof of Proposition 1,  $x^*$  is increasing in  $r$ . Therefore  $\Delta^*$  is decreasing in  $r$ .

When  $r \geq \bar{r}$ , the ruler's utility stays at  $U_0 = 1 - r$ . When  $r < \bar{r}$ , the ruler's utility follows:  $U_p = (1 - r + \gamma - \gamma x^*) - g(r)c(x^*)$ , since  $g'(r) > 0$ ,  $c'(x) > 0$  and that  $x^*$  increases with  $r$ , we have  $U_p$  decreases with  $r$ . **Q.E.D.**

### **Proof of Proposition 3.**

**Proof.** Without considering the purges and the resistance, from a social perspective, bureaucrats should be fully replaced if and only if  $\rho > \gamma$ . However, the first two parts of the proposition naturally follow by comparing the social optimality with equilibrium conditions.

For the third part, when  $\rho \leq 0$ , there is no conflict of interests between the bureaucrat and the ruler, thus the bureaucrat willingly concedes power. **Q.E.D.**

# Additional Appendix

## A Supplementary Figures and Tables

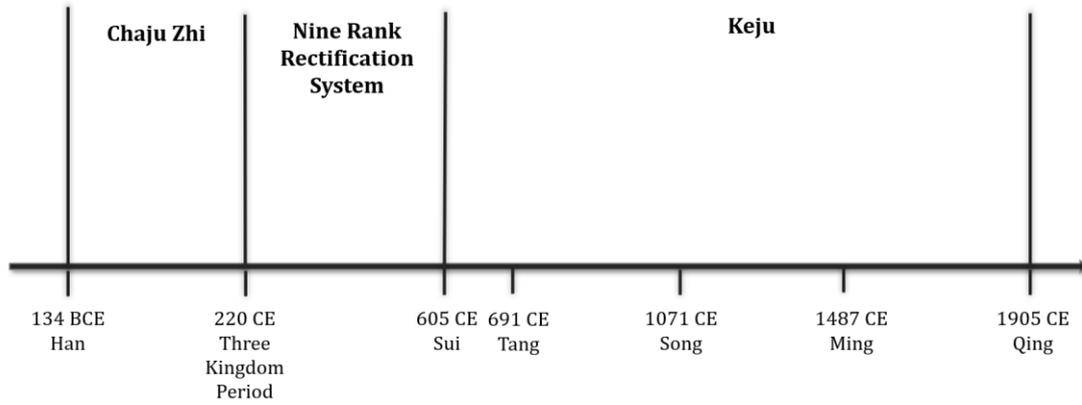


Figure A1. Elite recruitment timeline

Notes: The figure depicts the elite recruitment timeline.

乾隆三十四年覆准嗣後凡遇鄉試之年各直  
省學政造送錄科錄遺等冊均照順天鄉試之  
例將年貌籍貫註明移送布政使衙門交該收  
卷官於投卷時詳加覈對儻有不符不在收卷  
仍將底冊移送提調等官查覈。

嘉慶十年咨准嗣後凡遇舉人在部呈報聞訃  
丁憂者本部飭令回籍守制知照該省督撫仍  
即將回籍日期咨部備查其舉人在籍呈報丁  
憂者該督撫照例取結即行咨部註冊如有因

Figure A2. Excerpt of the *Exam Regulations*, the Qing dynasty  
Notes: The excerpt describes the procedures of the exam. In particular, the highlighted box specifies the eligibility of examinees, which includes age and place of birth, but not family backgrounds.

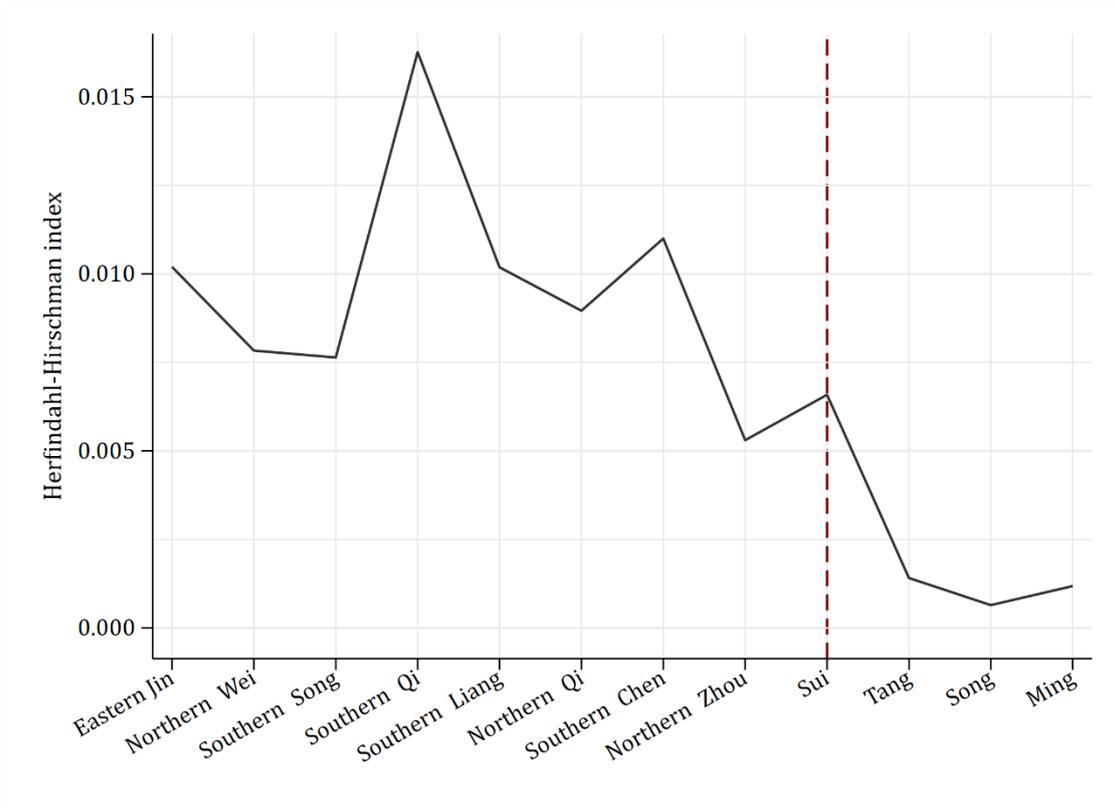


Figure A3. Distribution of bureaucrats by family names: surname concentration  
*Notes: The figure depicts the distribution of bureaucrats' surname concentration by calculating the Herfindahl-Hirschman index from the Eastern Jin to the Ming dynasty. The vertical dash line represents the time when the exams started.*

官廷試用翰林及朝臣文學之優者為讀卷官共閱對策擬定名次候臨軒或如所擬或有所更定傳制唱第狀元授修撰榜眼探花授編修二三甲考選庶吉士者皆為翰林官其他或授給事御史主事書行人評事太常國子博士或授府推官知州知縣等官舉人貢生不第入監而選者或授小京職或授府佐及州縣正官或授教職此明一代取士之大略也終明之世右文左武然亦嘗設武科以收之可得而附列也初太祖起事首羅賢才吳元年設文武二科取士之令使有司勸諭民間秀士及智勇之人以時勉學俟開舉之歲克貢京

Figure A4. On Selections, from *The Histories of the Ming*

Notes: The excerpt specifies the exam results and the corresponding bureaucratic positions. Better results in the exams were mapped to higher-ranked positions.

Table A1. The effects of *Keju* on the purge probabilities: excluding regular accountability

	(1)	(2)	(3)	(4)
	Purge	Purge	Purge	Purge
Generalists*Post	0.152*** (0.017)	0.134*** (0.020)	0.141*** (0.020)	0.200*** (0.028)
Rank		0.002 (0.002)	0.000 (0.002)	-0.002 (0.003)
Civil Servants		0.128*** (0.015)	0.124*** (0.017)	0.115*** (0.023)
Place of Birth		-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)
Dynasty FE	Yes	Yes	Yes	Yes
Record FE	Yes	Yes	Yes	Yes
Emperor FE	No	No	Yes	Yes
Year of Death FE	No	No	No	Yes
Observations	5343	4242	3897	3245
R <sup>2</sup>	0.135	0.133	0.224	0.518

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities of equation (1). The dependent variable is the dummy that equals one if bureaucrats experienced a purge excluding regular demotions and relegations. Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

Table A2. Robustness: Career Duration

	(1)	(2)	(3)	(4)
	Work Duration	Work Duration	Work Duration/ Avg. Lifespan	Work Duration/ Avg. Lifespan
Generalists*Post	-4.252*** (0.777)	-1.913** (0.800)	-0.067*** (0.012)	-0.030** (0.013)
Control	No	Yes	No	Yes
Dynasty FE	Yes	Yes	Yes	No
Record FE	Yes	Yes	Yes	Yes
Emperor FE	No	Yes	No	Yes
Observations	1470	1375	1470	1375
R <sup>2</sup>	0.112	0.321	0.128	0.332

*Notes: This table reports difference-in-differences estimates of the effects of Keju on the purge probabilities of equation (1). The control variables include ranks, civil servants, and places of birth. Standard errors in parentheses are robust to heteroskedasticity. \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.*

## B Additional Data Description

### B.1 Coding Method

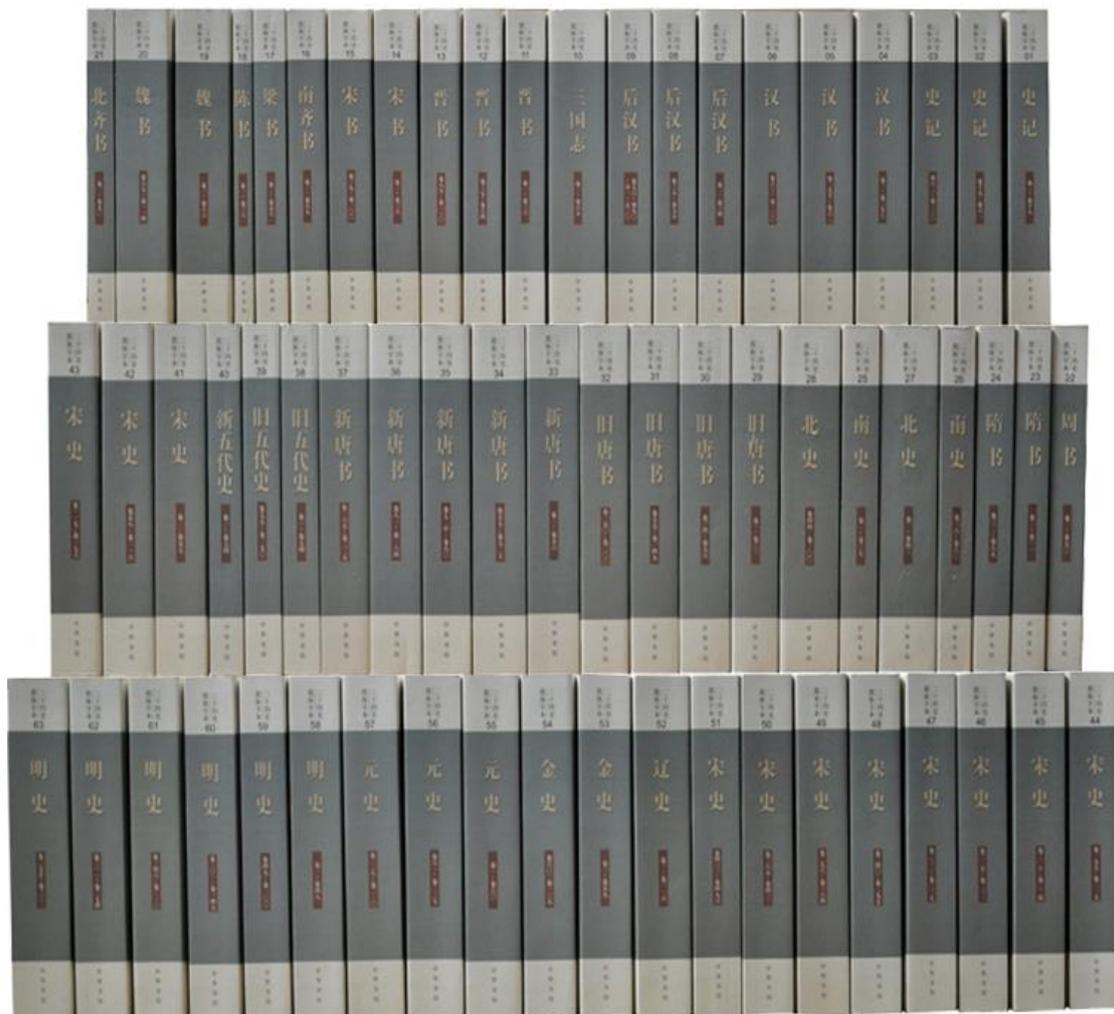


Figure B1. The Orthodox Histories

This section details the data used in the paper and the collection procedure. First, we briefly describe the data structure, followed by the procedure to construct the database. In the *Liezhuan* (records of notable individuals) section of the Orthodox Histories, notable bureaucrats' life and careers are usually recorded chronically. There were roughly 6,000 bureaucrats recorded in the books, where the names, birthplaces, time of

entry into the bureaucracy, and their career paths are all available.

To be specific, we employ the digitalized version of the *Orthodox Histories*,<sup>19</sup> and proceed in the following steps:

1. We track the bureaucrats' names and cross-reference them with the time, dynasty, and volume of the books on the first pages of each *Liezhuan*. For instance, the red box below highlights the names.

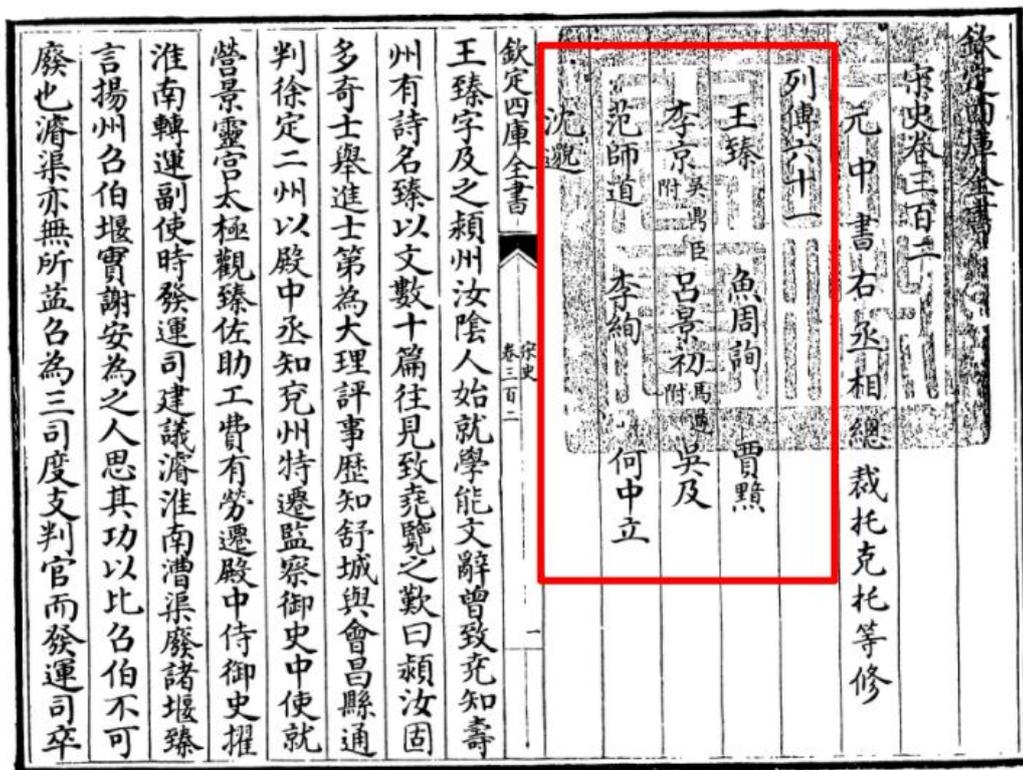


Figure B2. The names of the bureaucrats

2. For each bureaucrat, we extract the following information from the records:

A: Hometowns;

B: Ways of entering the bureaucracy. Before the Sui dynasty, one may enter the bureaucracy through recommendations, inheritance, military accomplishments, and civil accomplishments. We identify items in the books that relate to the keyword. Take

<sup>19</sup> Available at: <https://www.allhistory.com/>

the Keju exams as an example, we do so by searching for the keyword “*jinshi*”, “*zhongju*”, and “*xiucai*”. We choose these keywords because it is the most common term to refer to the entering the bureaucracy by Keju.

C: Office held by a bureaucrat. We collect the whole office held by a bureaucrat and the last office held by a bureaucrat from the *Liezhuan*.

D: Purge. We identify items in the books with related keywords. We do so by searching for the keyword “*bian*”, “*zhe*”, “*qian*”, “*jiang*”, “*mian*”, “*zuozui*”. For each record identified through keyword-searching, we thoroughly read the raw text to refine the results.

E: Death. We conduct a reading of each bureaucrat and record the death of each bureaucrat.

According to the definitions above, we offer an example from *History of the Ming* Volume 186. For instance, the red box below highlights the bureaucrat’s name, hometown, the way he entered the bureaucracy, the last office he held, and whether he experienced a purge.

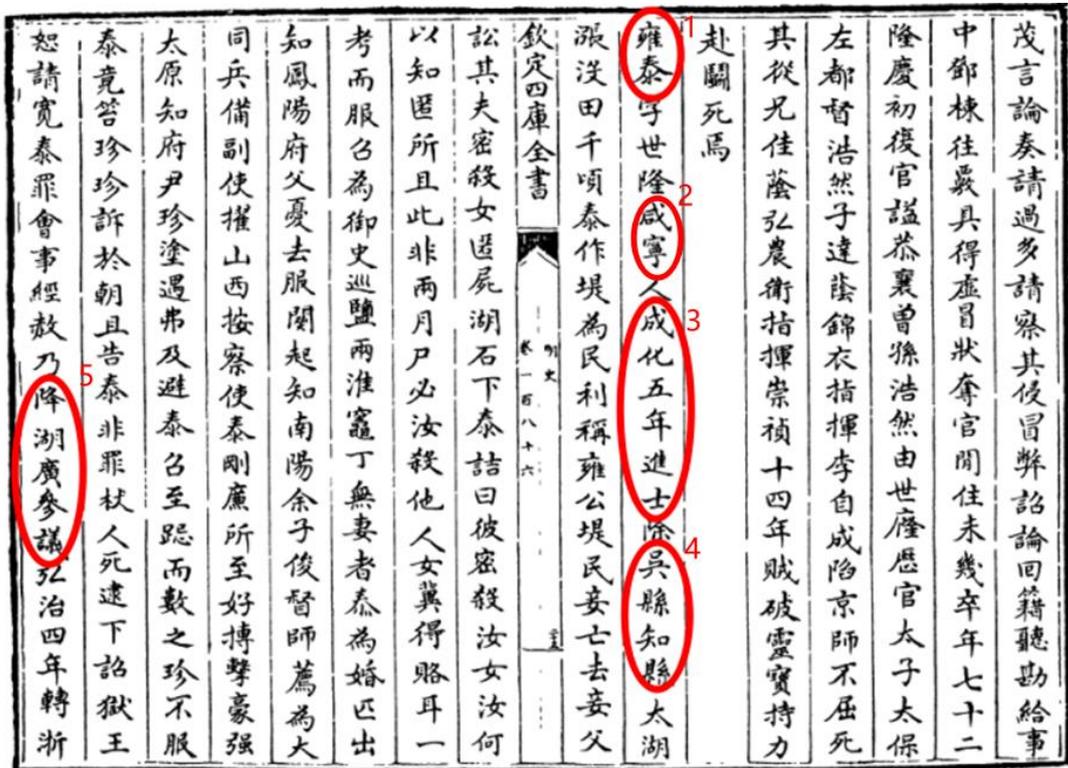


Figure B3. Coding method

3. We pinpoint the hometowns of the bureaucrats by matching the location of current boundaries. We rely on online searches of local history to link the past and now. Then we classify the type of bureaucrats into two categories: generalists or functionalists according to the last office they held. Based on this transformation, we report the way of entering the bureaucracy in our sample.

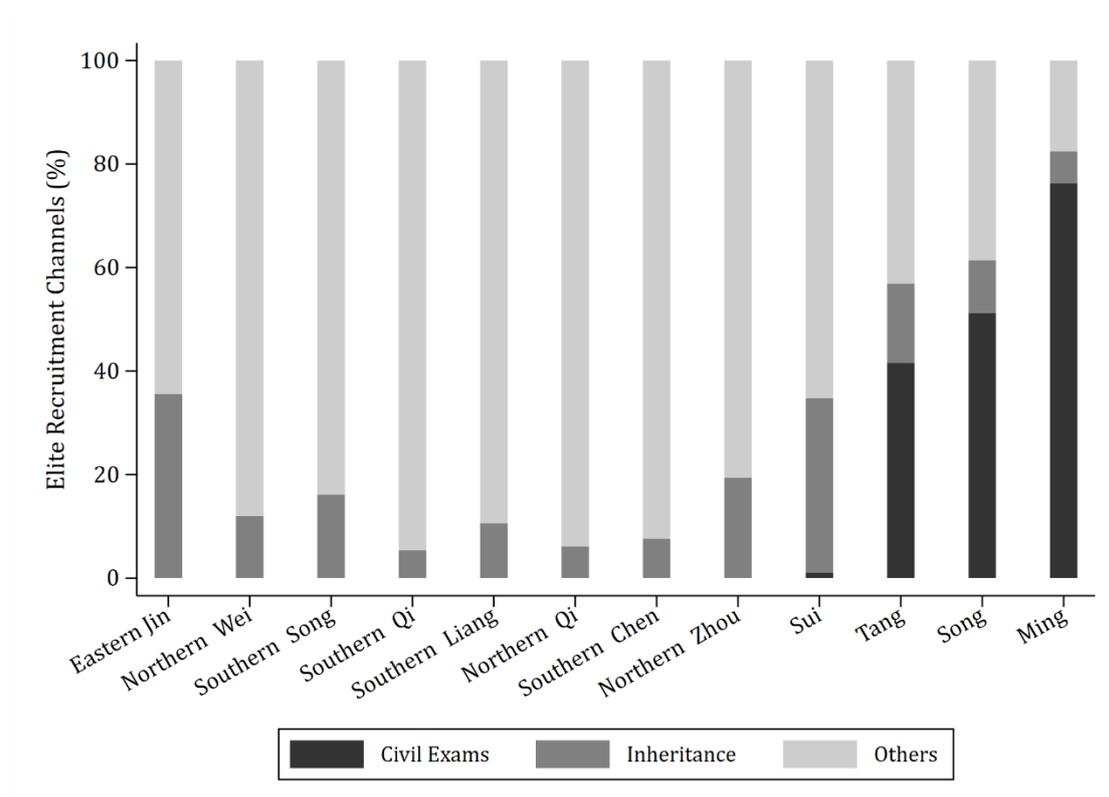


Figure B4. Distribution of elite recruitment channels

4. We pinpoint the hometowns of the bureaucrats by matching the location of current boundaries. We rely on online searches of local history to link the past and now.

We rely on online searches to collect the year of birth and death of bureaucrats by querying Baidu and the China Biographical Database (CBDB). Then we can calculate the other variable like the life expectancy variable.

5. We exclude duplicated records of the same bureaucrat. There are some bureaucrats

in different records, so we keep one of the more detailed documents.

## B.2 Additional Details on Variable Construction

This section offers additional Details on Variable Construction. We divide bureaucrats into functionalists and generalists based on official positions. It is worth noting that official positions with the same name may have different functions between dynasties, which leads to the possibility that officials with the same position may be purged differently due to their different roles and powers. And more importantly, it may confound our main results. To test this issue, we analyzed the official positions of the dynasties according to Lv (2015). The results show that the functions of official positions with the same name, and the classifications of functionalists or generalists, did not change significantly in the successive dynasties.

Figure B5. Additional details on variable construction

Variable	Definition	Official Position
Generalists	Generalists were local administrators that handled comprehensive governing tasks for the empire	Zhizhou, Zhifu, Cishi, Taishou, Xunfu, Canzheng, Buzhengshi, Zhixian, Xiancheng, Zhubu
Functionalists	Functionalists were officials in the central ministries who were more likely descendants from established families.	Senior: Shangshu, Shizhong, Shilang, Langzhong, Langzhong, Jishizhong in six ministries and Qing of Nine Ministers Junior: Yuanwailang in six ministries and Shaoqing of Nine



### **B.3 More Discussion on the Data Selection Problem**

This paper's main data source is the *Orthodox Histories*, from the *Book of the Jin* to the *History of the Ming*. Although these books are published by the royal courts and the history of the current dynasty is usually written by its immediate successor, there may have been some political considerations in its compilation process, such as data selection. If this issue is directly related to our treated and control groups, it will confound our findings, so it should be clarified whether it is directly related. While lacking clear criteria for what kind of bureaucrats will be documented in the history book, there are sampling criteria behind it. If the sampling criteria are random for two types of bureaucrats, this problem will not affect our main findings.

This section offers two additional checks on the data selection problem in this paper. We start by comparing with the CBDB database (Constructed by Fairbank Center for Chinese Studies at Harvard University)<sup>20</sup>. We then utilized the machine learning method by analyzing the text of *Orthodox Histories* to examine this problem.

First, we compare our data with China Biographical Database (CBDB) database. To our knowledge, the China Biographical Database is the largest database of officials in ancient China, which could be made available for use upon completion. Considering that CBDB mainly contains officials born after the Sui dynasty, we select all officials in CBDB and the same period in our sample for comparison. We plot the comparison result in Figure B6 and find no systematic difference in age, way of entering the bureaucracy, and other statistical indicators, which validates the credibility of our source.

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<sup>20</sup> For more details on CBDB, see <https://projects.iq.harvard.edu/chinesecbdb/home>.

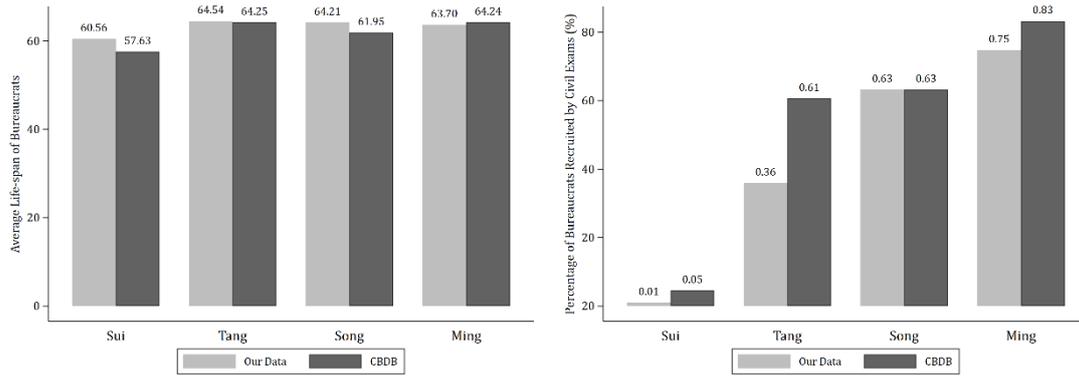


Figure B6. Our data vs. CBDB

Second, we compared the sentiment scores of the bureaucrats between the two groups. By comparing the word counts of the two groups in the texts that contain bureaucrats and using machine learning methods to view the ratings of the two groups in the texts, we found no significant differences between the treated and control groups, which means that the Selection Problem does not affect the results of this paper. Therefore, when we use this data, there is little chance that the selection problem could directly confound our results.

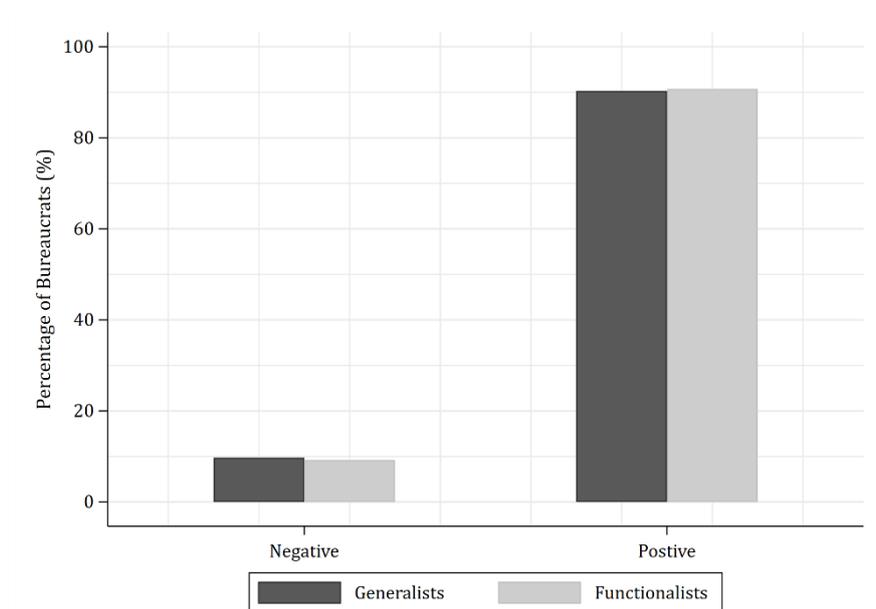


Figure B7. Comparing the sentiment scores of two types of bureaucrats

## C Brief Summary of Civil Exams in Southeast Asia

Table C1. A brief summary of civil exams in Southeast Asia

Country	Established Time	Cause of the Established	Abolition Time	Cause of the Abolition
Japan	late 7th century	Imitation of the Tang Dynasty.	late 9th century	The aristocracy interfered with the government, the hereditary government, and the civil exam system became formalized and then died out.
Korea	958 CE	Imitation of the Tang Dynasty.	1894 CE	The Japanese occupied Korea in 1894. After “Kofu Shoshu”, they abolished the exam system.
Vietnam	1075 CE	It was a vassal state of the Tang dynasty, and as a dependency, the imperial examination system was implemented.	1919 CE	After becoming a French colony, the civil exam system declined and died out.