# Leviathan's Offer: State-Building with Elite Compensation in Early Medieval China*

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This Version: September 1, 2021.

**Abstract**

How to soften resistance to state-building efforts by reform losers? This paper highlights a strategy of compensation via the bureaucracy, in which the ruler offers meaningful government offices in exchange for elites' acceptance of state-building reforms. We empirically explore this strategy in the context of the Northern Wei Dynasty (386 - 534 AD), which terminated an era of state weakness in early medieval China that initially resulted from entrenched landowning interests and fragile barbarian kingdoms. Our unique dataset combines geocoded family background and career histories of around 2,600 elites with information on medieval Chinese strongholds, which we use to infer state weakness. Leveraging a comprehensive state-building reform in the late $5^{\text{th}}$ century, difference-in-differences estimates document that the reform led to a sustained, substantial increase in the total number of powerful aristocrats from localities with strongholds recruited into the imperial bureaucracy. Subsequent estimates provide evidence for two mechanisms by which compensation facilitates state-building: 1) the offices taken by these elites came with direct benefits of prestige and power, and 2) by transforming these aristocrats from local powerfuls into national stakeholders, these offices potentially induced the realignment of their interests toward those of the dynasty. Further analysis suggests that the bureaucracy provided the regime with institutional tools of power-sharing to mitigate credible commitment problems. Findings in this paper shed light on the causes of the "First Great Divergence," where similar barbarian invasions at similar times led to political fragmentation in Europe but further state consolidation in China.

**Keywords**: Political economy, Institutions, State-building, Bureaucracy, China.
**JEL codes**: D73, H70, N45, O1.

*We thank Ying Bai, Shuo Chen, Yu Hao, Wenkai He, Jean Hong, Shaowei Ke, Ming Ma, Mohamed Saleh, Paul Seabright, Jan Stuckatz, Yang Xie, Shoufu Yin, and seminar and conference participants at the China Political Science Speaker Series, Institute for Advanced Study in Toulouse, Monash University, Hong Kong University of Science and Technology, Peking University (PKU) School of Government, PKU School of Economics, the 2021 Midwest Political Science Association Annual Meeting, and the 8th International Symposium for Quantitative History for helpful comments and suggestions. We are grateful to Yuying Jiang, Lulu Li, Kexin Lin, Yunjie Liu, Tianhao Wang, Junfan Yang and Yaoyao Yang for outstanding assistance in data collection. Erik H. Wang acknowledges funding from the French National Research Agency (ANR) under the Investments for the Future program (Investissements d'Avenir, grant ANR-17-EURE-0010). Authors contributed equally to this research. All errors are our own.

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# 1 Introduction

State capacity is pivotal for economic development, but enhancing state capacity is a difficult task. This difficulty is intuitive in the various established findings that state weakness tends to persist over time (e.g., Migdal 1988, Bockstette, Chanda and Putterman 2002, Besley and Persson 2011, Dell, Lane and Querubin 2018). Across space and time, state-building efforts often fail because they provoke resistance from potential reform "losers" with vested interests in the status quo. Local elites, in particular, can block or undermine such efforts using the considerable powers available to them (e.g., Soifer 2005, Dincecco 2015, Garfias and Sellars 2021*a*). How can state-builders weaken elite resistance? We answer this critical question by highlighting an important yet often overlooked strategy: directly *compensating* the losers through prestigious and powerful positions in the bureaucracy that facilitate interest realignment and credible commitment. By exploiting a major state-building episode in Early Medieval China (ca. 220-589 AD), this study finds that powerholders in regions previously lacking state penetration saw their political careers substantially improved during and after the reform as part of a deal to relinquish local autonomy to the state.

The theoretical inquiry addressed here is also related to a historical puzzle. Barbarian invasions in Late Antiquity brought down the West Roman Empire and sowed the seeds of the so-called "Feudal Revolution." An emerging consensus in political economy argues that this process created the conditions of state weakness and political fragmentation that underlied the great political and economic divergence between Europe and the rest of the world (e.g., Blaydes and Chaney 2013, Ko, Koyama and Sng 2018, Leon 2020).[1] Often referred to as the "Age of Disunion," early medieval China almost witnessed an identical phenomenon. As the Inner Asian equivalents of the Visigoths and Vandals destroyed the Chinese empire in the 4$^{\text{th}}$ century, political order collapsed into warring kingdoms and fragile dynasties that held "nominal sway over families who could rival the government in their own territory" (de Crespigny 2019: 49). Two centuries later, however, a remarkably different outcome emerged as the Chinese state re-consolidated. A key step in this "First Great Divergence" of global history[2] is the Reform of 485-486 AD,[3] the empirical focus of this paper.

The Reform, carried out under the Northern Wei Dynasty (386-534 AD), revived the mobilization capacity of the Chinese state for centuries to come (Huang 1996). The consensus among historians is that, by deploying state-appointed agents at the grassroots for population registration and establishing a state-controlled land redistribution program, the Reform substantially deepened state penetration and enhanced its capacity in regions previously dominated by local powerholders.

[1] As summarized in Stasavage (2016:146): "no barbarian invasions, no democracy."

[2] This term is used by Scheidel (2019) to describe the divergence in patterns of state formation between China and Europe that took place between 500 and 1000 AD.

[3] It should be clarified that this state-building reform is *not* the "sinicization reform" undertaken by Emperor Xiaowen in 493 AD.

We analyze a compensatory strategy adopted by the Northern Wei regime to placate the aristocracy in regions lacking prior state penetration. The respective aristocratic clans had enjoyed centuries of local autonomy without state presence, but now saw their vested interests in the status quo severely challenged and thus had incentives to block or undermine the Reform.

We hand-collect datasets on geo-coded career histories of 2,590 elites active from the $4^{\text{th}}$ to $6^{\text{th}}$ centuries as well as their family background, choronym, and ethnicity, using official histories compiled in the $6^{\text{th}}$ century complemented with excavated tomb epitaphs. We also geocode the mentions of $4^{\text{th}}$ century fortified castles (hereafter "strongholds") from a variety of historical records. With the collapse of political order and prolonged warfare among fragile barbarian kingdoms, peasants had to flee in massive numbers and become dependents of local aristocrats in exchange for subsistence and personal safety. Strongholds enabled aristocrats to shelter a large number of dislocated people as their private clients and serfs from the state which desperately needed manpower for military conscription and revenue collection. We therefore use the existence of strongholds to measure the lack of prior state penetration.

Two findings from our data motivate the need to study loser compensation in state-building: 1) the Reform enabled the Northern Wei regime to substantially deepen its penetration in localities with strongholds, and 2) it did not lead to more rebellions in localities with strongholds by antagonizing the local aristocrats.[4] Section 2 theorizes the mechanisms of bureaucratic compensation and its links with state-building. The main prediction is that, as the rulers implemented the state-building policies of direct population control and land redistribution, they would directly compensate the aristocratic clans in regions with strongholds as potential losers and blockers of the Reform.

Using a difference-in-differences (DD) strategy, we find that the treatment group—commanderies[5] with strongholds—experienced a substantial, sustained surge in the number of aristocrats recruited into the imperial bureaucracy compared with the control group, commanderies without strongholds, during and after the Reform. It reflects a proactive compensation scheme for powerholders in regions that would experience vast expansion of the state apparatus due to the Reform.

We conduct an extensive set of robustness tests. The increase in aristocratic recruitment from regions with strongholds as a result of the Reform was not driven by a rising demand for elites with specific characteristics. There were no statistically significant differences between aristocrats in the treated and control groups across a wide range of personal characteristics, such as military prowess, governance capacity, experience in institutions building, literature, intelligence, and integrity.

[4]These results are in Appendix Section A. In contrast, reforms in Bourbon Mexico (Garfias and Sellars 2021*b*) and Tsarist Russia (Finkel, Gehlbach and Olsen 2015) incited large-scale social unrest.

[5]Commanderies are the second lowest level of the imperial administrative hierarchy, only above counties. The closest equivalent of a commandery in contemporary China is a prefecture, albeit the former is smaller in size: commanderies have an average of 4.14 counties in our data.

Our result is also robust to a rich gamut of additional checks, including but not limited to: a restrictive definition of aristocracy, using adjacent commanderies as the control group, removing elites with disputed identity or migration history, using non-aristocratic recruitment as a placebo test, controlling for the time-varying effects of earlier warfare, distance to the capital, and the pattern of earlier aristocratic settlement, and an instrumental variable strategy.

Having established that the regime adopted a bureaucratic compensation strategy to mute loser resistance, we proceed with individual-level data analyses to unpack the mechanisms of compensation. For a deal to be reached between the state-builders and local powerholders, two conditions must be met: (1) compensation should carry substantial and tangible direct benefits so as to offset the losses of vested interests; and (2) the deal should be *credible* in that reneging on it would incur a huge political cost to the ruler. In addition, we argue that a key feature of compensation through the bureaucracy is that it can realign the interests of the local elites with those of the regime, by having the former serve in offices designated to further the interests of the regime as a whole.

We provide evidence for all three components with a triple-differences (DDD) strategy examining the characteristics of office-holding. Our estimates reveal that aristocrats from commanderies with strongholds were more likely to hold higher-ranked and more prestigious offices after the Reform. This reflects the lucrative direct benefit in the compensation deal. We then show that aristocrats in the treated group were more likely to take senior posts in the *national* government but no more likely to take senior posts at the *regional* level. This finding indicates that state-builders took the compensation opportunity to realign the aristocrats' interests with those of the regime by trying to transform them into national stakeholders through service in the central government. Moreover, we find that even though aristocrats in the treated group were more likely to be regional governors, they were more likely to serve in jurisdictions *away* from their hometown. This result further suggests that the reformers deliberately adopted a rotation strategy to reduce aristocrats' localist orientation.

To explore the credible commitment mechanism underpinning the compensation deal, we exploit a unique institution in the bureaucracy: offices in charge of the recruitment, evaluation and promotion of bureaucratic personnel. As such offices determine political selection, they enable the officeholders to develop patronage networks of allies owing careers to them. Our DDD estimates indeed show that aristocrats from stronghold commanderies were more likely to take offices in charge of personnel affairs during and after the Reform. By doing so, the rulers increase their own cost of reneging on the compensation promises. As expected, the Reform did not lead to more purges against aristocrats in the treated group. Rather, they were more likely to receive promotions after the Reform. These results further substantiate the success of credible commitment through bureaucratic compensation.

### Theoretical contributions

Our findings contribute to research on state capacity. Existing studies recognize the importance of elite incentives, but emphasize *ex ante* conditions for incentive alignment in support of state-building. A prominent research tradition focuses on the central role of external conflict in compelling powerholders to accept reform (e.g., Tilly 1990, Besley and Persson 2011, Gennaioli and Voth 2015). It's joined by a new literature on internal conflict and state capacity (Slater 2010, Blattman and Miguel 2010, Dincecco 2011, Dincecco and Wang 2018). Other contributing factors include demographic shock (Garfias and Sellars 2021*a*), economic crisis (Garfias 2018), and politicians' time horizon (Geddes 1994, Grzymala-Busse 2007).

We recognize state-building as a difficult and uncertain process that not only could be prevented from initiation, but also stopped or undermined after initiation (e.g., Soifer 2005, Wang 2021). Relatedly, state-building is risky because it may reduce local elites' willingness to repress rebellions against the ruler (Garfias and Sellars 2021*b*).[6] The reform in our setting is successful in that it led to deeper state penetration *without* inciting more rebellions. How the ruler could proactively mute elite resistance to state-building reforms therefore deserves more scholarly attention (Berman 2021). Our paper fills this lacuna with the empirical demonstration of a specific strategy: compensating the losers. In doing so, we also revise an existing paradigm based on the analytical dichotomy of the regime/ruler versus the local elites. Through elite compensation with offices in a centralized bureaucracy, our results show that state-builders may in fact try to align the preferences of local elites with that of the state by turning them into national stakeholders. These findings on interest realignment via bureaucratic compensation are related to Jha (2015), where developing stakes in a different framework mobilizes the individual to support reforms facilitating that framework.

Though relatively underexplored in the state capacity scholarship, the idea of compensating the losers figures prominently in the broader literature on political and economic reforms. Most works in this tradition emphasize avenues of new economic gains for groups who would otherwise lose from economic or political transitions. Important examples include the welfare state that helps compensate losers of free trade agreements (e.g., Rodrik 1998, Adsera and Boix 2002) and financial integration and asset mobility that reduce elites' willingness to resist democratization (Boix et al. 2003, Freeman and Quinn 2012, Jha 2015). These tools and conditions were absent in most of human history prior to the ascent of modern economy and likely remain so in many severely underdeveloped regions today. This paper underscores *political* compensation via the bureaucracy as a new mechanism through which reformers soften resistance to their project. By documenting efforts to turn potential economic losers into political winners, our findings are related to Acemoglu and

[6] For rebellions induced by other kinds of reforms, see Finkel, Gehlbach and Olsen (2015).

Robinson (2000*a*) and Acemoglu and Robinson (2006) that formulate the direct relations between political power, economic benefit, and the fate of reform. We also speak to a vast literature on authoritarian power-sharing by empirically highlighting that a key to political compensation is indeed credible commitment facilitated by the bureaucracy (e.g., Boix and Svolik 2013, Myerson 2015, Meng 2020).

This paper is organized as follows. Section 2 presents our argument. Section 3 describes the historical context of our empirical setting. Section 4 discusses data sources and identification strategy. Section 5 provides evidence on compensation. Section 6 examines mechanisms of compensation. Section 7 provides a discussion of other cases involving state-building with bureaucratic compensation, such as the Late Roman Empire and premodern Korea. Section 8 concludes.

## 2 Compensation, Bureaucracy, and Interest Realignment

We now describe the argument formalized by a simple model in Appendix D, which centers on a ruler and an aristocrat. The aristocrat is a local powerholder: he controls the productive assets and population of a locality that generate income for him. The ruler decides to *engage in state-building* by taking away the aristocrat's control of local resources, and deploying state-appointed staff to manage local population directly. This move benefits her in many ways, one of which is gaining access to more spoils (Garfias and Sellars 2021*a*).[7]

This move is often difficult, however, due to resistance by the aristocrat who would lose out in the process (Boone 2003, Ali et al. 2018). Local powerholders across various contexts of the developing world are endowed with the wherewithal to undermine or obstruct state-building efforts. They could deploy patron-client ties sustained through massive landed wealth (Faguet, Sánchez and Villaveces 2020). Their popularity with the local population as traditional leaders further enhances the power to prevent control (Logan 2009, Acemoglu, Moscona and Robinson 2016). Attempting to subdue resistance to state-building, the ruler thus has two options: she could build the state with force, or with an offer.

The option of state-building by force is obviously costly. Civil conflicts incur both economic and political costs, and can paralyze a regime's defense against foreign enemies.[8] When the ruler is sufficiently strong, she may still prefer force as she can easily take over localities without having to make any concessions.[9] Furthermore, when she is too weak, the aristocrat could reject any offer she

[7] Other benefits include improving her chances of political survival (Slater 2010), and completing a crucial prerequisite for a functional modern state (Acemoglu et al. 2014).

[8] Economically, the immediately dire consequence is also accompanied with various longer-term governance problems, such as increases in violent theft operations (e.g., Henn et al. 2021) and decreases in peasants' time horizons in economic activities (e.g., Lin 2020).

[9] The "by force" option can be exercised without force *per se* actually carried out but only implied in the background.

makes in exchange for peaceful transfer of control and count on his relative strength against the ruler to defend local autonomy. This lower-bound on ruler strength coincides with the observation in Berman (2010) that a compensation-based state-building strategy requires enough military power to increase the cost of resistance by local strongpersons. Making an offer thus emerges as an attractive strategy when the ruler is neither too strong nor too weak.

A deal between a ruler and powerful social groups often has to be as credible as it is valuable (Acemoglu 2003).[10] Offering posts in the bureaucracy mitigates commitment problems in two ways. First, the institution of bureaucracy implies delegation of power in the form of a principal-agent relationship. By construction, it consists of various formal rules that are common knowledge to both the ruler and members of her ruling coalition. This feature facilitates credible power-sharing because further expansion of personal power by the ruler at the expense of the ruling coalition entails the violation of one or more of such rules, the process of which could send a signal for all members of the ruling coalition to resist the ruler's power-grab (Svolik 2009). Second, certain offices in the bureaucracy can help their holders build personal power in the organization, thereby forming a *de facto* check on ruler's powers. Prominent ones include those that select, appoint and manage personnel in the bureaucracy. Holders of such offices could use this public power to build networks of personal loyalists and put them into important positions.[11]

Valuable bureaucratic offices generate positive payoffs from monetary remuneration, power, and prestige to offset the economic losses by the aristocrat. That money generates payoff is self-evident. The power attached to an office enables its holder to extract political rents (e.g., Xu 2018). Prestige brings social and political recognition, which help accumulate political capital. Differences in the values of posts allow the ruler to compensate losers in accordance with their varied abilities to resist state-building, with more powerful ones receiving more valuable positions. All of the above presume the existence of a functioning national bureaucracy, in which offices have well-defined spheres of authority and are organized in a stable hierarchy (Alkadry 2002). Only then can the aristocrat form reliable expectations on the payoffs he can derive from office-holding.[12]

Another advantage of bureaucratic compensation to state-building is through interest realignment, which induces the holders of government offices to develop a stake in the system (Berman 2021). In

See Garfias and Sellars (2021*a*) for how exogenous increase in the ruler's relative strength enables her to centralize political authority and enhance state capacity dictatorially against the wish of local powerholders.

[10]The Glorious Revolution in seventeenth-century England provides a classic example, where the Crown established its commitment to uphold property rights by introducing the parliament as an institutional constraint on its arbitrary powers (North and Weingast 1989). The extension of voting rights in nineteenth century Europe, which acted as a commitment device for future redistribution, was adopted by the ruling elites facing social unrest and revolution (Acemoglu and Robinson 2000*b*).

[11]Joseph Stalin offers a textbook example of how this particular type of officeholders could become real contenders to the throne (Rigby 1981).

[12]Section 7 discusses Gaul in the wake of barbarian invasions where this condition was likely absent.

other words, it invites holders to share the gains of a strong state, thereby incentivizing them to participate in activities that benefit the regime as a whole (Jha 2012). Our model predicts that the ruler would optimally give out offices that are conducive to interest realignment: ones that facilitate the transformation of the holders' once localist interests into nationalized ones as well as political ventures that help expand the interests of the state. Senior posts in the central government, as opposed to regional ones in the aristocrat's hometown, are examples of such offices.[13]

Two testable implications from the foregoing discussion guide our empirical analyses. In state-building reforms, a ruler who enjoys a medium level of strength implements bureaucratic compensation in the following ways:

1. Local powerholders receive meaningful positions in the bureaucracy as compensation for accepting state penetration. In particular, the more powerful among them receive even higher compensation.

2. Powerholders receive compensation in the form of offices that: (a) realign his interest with that of the ruler and (b) mitigate the credible commitment problems.

# 3 Historical Background

This section begins by describing the trend towards local autonomy and state weakness, and the rise of the medieval Chinese aristocracy in $2^{nd}$-$4^{th}$ centuries AD. It then discusses the state-building Reform of 485-486 AD under the Northern Wei regime (hereafter "NW") that paved the way for the revival of unified Chinese dynasties from the late $6^{th}$ century onwards. Note that this state-building reform is *not* to be confused with a cultural reform of ethnic integration beginning in 493 AD under Emperor Xiaowen.[14] See Figure 1 for a timeline of dynasties and important developments.

## 3.1 State Weakness, Aristocratic Families, and the Barbarian Regimes

Well noted by scholars of Chinese history were two long-term developments already underway during the unified rule of the Later Han Dynasty (25-220 AD): the decline in the power of the imperial government, and the growth of large estates owned by prominent local aristocrats obsessed with family pedigree and capable of transmitting wealth and power through generations (e.g., Ebrey

[13]Our model also predicts that interest realignment is beneficial to the ruler when the national "pie" is sufficiently large - national offices would thus become more prestigious and lucrative. It explains why efforts of centralization usually happen after conquest in various historical and contemporary contexts. The completion of military conquest over a large territory, among other things, means that the "pie" of spoils that holders of high central government office could access is now large. Next section describes a regime that implemented compensatory state-building long after having completed the conquest of northern China.

[14]We describe this cultural reform as well as the collapse of NW in Sections F.1 and F.2 of the Appendix.

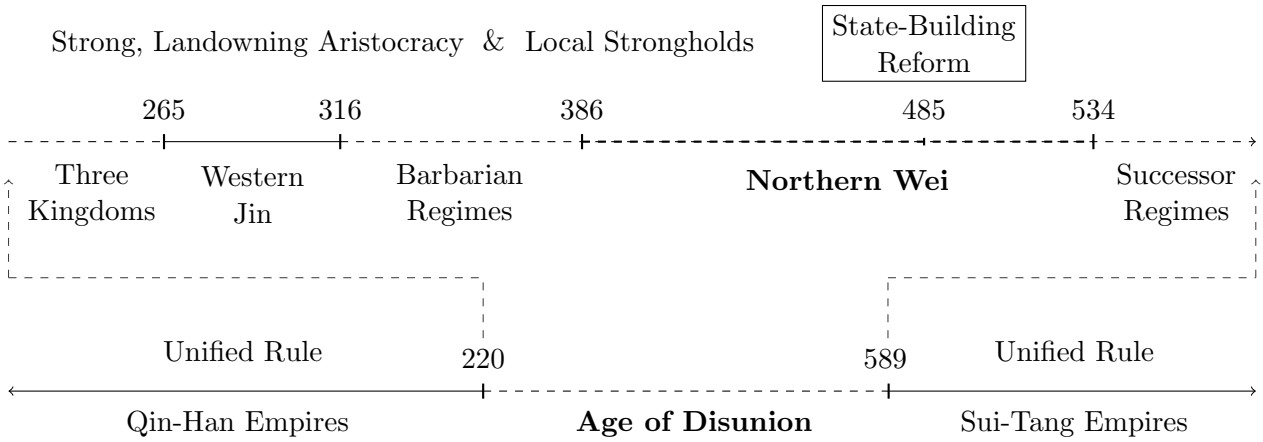



Figure 1. Historical Timeline of Early Medieval China

*Notes*: this figure illustrates the historical timeline of Early Medieval China, with a focus on the Age of Disunion (220-589 AD). This era is characterized by political fragmentation and intense warfare, except for a brief period of unification under the Western Jin (265-316 AD). Dashed timeline indicates political division, and solid timeline indicates unified rule.

1978, Wang 2003). These aristocrats grew more powerful amid the political division after 220 AD, as aspiring rulers had to offer them immense institutionalized privileges in exchange for their political support (Lewis 2011: 37-44). State concessions to the landed aristocrats culminated in two mutually-reinforcing policies during the Western Jin Dynasty (265-316 AD): politically, members of the most prestigious clans in each locality now dominated the pool of candidates from their area for government positions (Lewis 2011: 42); economically, holders of government positions (as well as the offspring of prominent prior holders) were offered serfs and vast amounts of new land for their families (Wang 2003: 171-172). While state capture by local interests had become increasingly prevalent in the 2nd century,[15] the imperially-sanctioned privileges in the 3rd century further enhanced the position of the elite landowners at the expense of the state, making them "a danger to the dynasty through their possession of both financial and administrative power" (Chaussende 2019: 90).[16]

The true nadir of imperial authority came in the 4th century (Lewis 2011: 42). Via a similar process to the end of Roman rule in Europe, the Chinese empire, briefly reunified under Western Jin, completely collapsed and disintegrated into various successive "barbarian" regimes in the early 300's. These regimes were led by nomadic or semi-nomadic peoples previously living within or just beyond the imperial border.[17] Some aristocrats migrated and formed another Chinese dynasty in the south.[18] Many powerful, prominent aristocrats, however, remained in the north and exercised

[15] Brown and Xie (2015).

[16] Von Glahn (2016) noted the further erosion of state capacity from these developments (serfdom and private clientage in particular), as evidenced by the decline of state-registered population under Western Jin (p.268).

[17] For the gradual movements of these peoples into the Chinese sphere of influence over centuries, see Holcombe (2019: 119-124) for an introduction.

[18] The capital of this new dynasty is *Jiankang*, the modern day Nanjing, south of the Yangtze River.

local influence with the political, economic, and cultural capital accumulated through their roles in the prior dynasties (Ebrey 1978: 19-20).

It was during this century of "endemic warfare, widespread misery, and political and economic collapse"[19] that mentions of "strongholds" (*wubao* or *wubi*) became prevalent in the historical records.[20] In massive numbers, dislocated people in the north took refuge in regions with strongholds for protection and subsistence, and subsequently became serfs in the estates of aristocratic families (Lewis 2011: 131, von Glahn 2016: 265-266).[21] With strongholds dotted across northern China in the absence of state, governance in many regions fell to the hands of local aristocrats with self-sufficient estates managed by the refugee population now dependent on them as clients in arms (Graff 2003: 55-56; von Glahn 2016: 265-266).

This locally fragmented landscape fell under the rule of warring barbarian regimes only nominally, and none of the regimes was able to establish a stable government (Ebrey 1978: 24). Self-perpetuating state weakness thus manifested itself in the barbarian rulers' struggle to extract manpower (let alone revenue) from the regions, as well as their failure to conquer one another.[22] Due to their "inability to register population and politically mobilize the elites," the northern regimes' administration in the 4$^{th}$ century "seem to have extended little beyond the immediate hinterland of the capital" (Lewis 2011: 125).

### 3.2 Northern Wei, Local Autonomy, and the Reform of 485-486 AD

Founded by the Tuoba branch of the inner Asian Xianbei people, the Northern Wei Dynasty would effectively reverse the process of feudalization of medieval China (Scheidel 2019: 227-247). In the several decades spanning from late 4$^{th}$ to early 5$^{th}$ centuries, the NW first secured Xianbei hegemony in the modern-day Inner Mongolia and then launched attacks southward, conquering the barbarian kingdoms located in the Chinese hinterland.[23] Their governance of northern China for most of the 5$^{th}$ century also involved the service by a small number of Chinese aristocrats in the imperial court, who helped establish basic sinicized institutions and rituals.

[19] Holcombe (2019: 144).

[20] English translations of the same Chinese phrase are "strongholds," "forts," "fortified villages," "fortified communities," etc. We adopt "strongholds" as used in Pearce (2019). Strongholds were the Chinese equivalents to the "castles of Japan or medieval Europe" (de Crespigny 1995: 6). We believe that direct parallels to the Chinese aristocrats in stronghold regions were the Roman aristocratic "potentates" in the 5$^{th}$ century AD Gaul during barbarian invasions (Mathisen 2011).

[21] The same process through which disastrous wars led aristocrats to build fortifications, absorb dislocated people as their clients seeking protection, and expand their possessions of land and serfs was already in full display during Han Dynasty's collapse and the resulting Three Kingdoms period in the 3$^{rd}$ century (Wang 2003: 136-137). The phenomenon took on an even larger scale in the 4$^{th}$ century.

[22] For a detailed military history of the barbarian kingdoms and their fragile, indirect rule of the regions through local elites of fortified estates, see Chapter 3 of Graff (2003).

[23] See Graff (2003: 69-72) for a short introduction to Northern Wei's military conquest of northern China.

To sustain nominal unification, the regime abandoned its efforts to register population in regions with strongholds by formally recognizing their local autonomy in exchange for a small amount of financial contribution and corvée labor delivered by locally powerful families (Pearce 2019: 174, Li 1986). Such legitimization further deepened aristocrats' control over the local society in these regions, and as the small number of independent farmers found the burden of corvée labor increasingly heavier, they fled to the private clientage of local aristocrats, further reducing the size of the registered populace for NW (von Glahn 2016: 299-300).

Under the reign of Empress Dowager Feng, NW implemented a reform package in 485-486 AD (hereafter, "the Reform") that broke the vicious cycle of state weakness. The Reform comprised of two interlocking procedures. The "equal-field system" (*juntian-zhi*) claimed state ownership of all land on earth and redistributed land to commoners.[24] The goal was to undermine the economic dominance of local aristocrats, whose dependents lived in strongholds that spread across the North and were sheltered from taxation to the state (Xiong 2019: 313). To better achieve this objective, the state accompanied the equal-field system with the "three-elder system" (*sanzhang-zhi*). This system saw the deployment of state-appointed villagers to detect and re-register population outside of state accounts (Hou 2002), and resulted in the creation of new county government offices to administer the newly registered people. The Reform thus "not only weakened the dominance of local magnates but also created a network of grassroots organizations that kept local residents under surveillance" (Xiong 2019: 313). Altogether, the Reform created a stable fiscal basis for the empire, allowing NW rulers to fully exploit the manpower and wealth in the Chinese hinterland (Pearce 2019: 174, Li 2018: 369). Consensus among scholars of Chinese history credits the NW regime with laying the foundation for China's eventual unification in 589 AD under the Sui.

Having so thoroughly shifted the status quo, the Reform saw potential losers and blockers in the locally powerful aristocrats of regions with strongholds. With clients re-registered by the state and offered new land of their own, the aristocrats suffered a political blow to their local influence and now foresaw the coming financial strain on their offspring for generations to come.[25] As in elsewhere, reforms to improve state capacity were met with strong resistance in medieval China. An attempt of much lesser extent in the 3$^{rd}$ century resulted in the execution of state-builders by the antagonized landed aristocrats (de Crespigny 2019: 47). Prior to the Reform, tentative efforts to remove some population from aristocrats' control were met with resistance at the grassroots and had to be aborted (see volume 24 of *Book of Wei*). When the Empress Dowager discussed the Reform's promulgation at court, opposition was voiced by two elites, both of whom came from

[24] Land was classified into two types. After reaching an advanced age, land recipients (male and female) would return one type of land ("open fields") to the state , but their offspring would inherit the other type ("mulberry fields") (Xiong 2019: 313).

[25] See Ebrey (1978: 82-83) for a discussion of how the equal-field system hurt the aristocrats' landed interests.

prominent aristocratic families in stronghold regions.[26] As the Reform went on, however, no records indicate further resistance by aristocrats in the imperial court.

The discussion thus far reveals two aspects of the Reform: a) the Reform had astonishing success in enhancing state capacity, and b) despite clear potential and initial action, resistance to the Reform by local powerholders became muted later on. Appendix A brings forward key findings from the consensus by historians of China that are further supportive of a). Importantly, it also reports quantitative evidence using our data on state penetration and local rebellions that is consistent with both a) and b). The Reform is thus puzzling from a political economy perspective. In making sense of NW's success in re-establishing centralized direct rule over the Chinese population, Ebrey (1978) speculates that the regime might have reached a deal with the landed aristocrats, in which the former would offer powerful and prestigious government positions in exchange for the latter's local autonomy (p.25).[27] This compensation strategy will receive systematic evidence in the ensuing sections.

# 4 Data and Empirical Strategy

This section presents the data used for our empirical analysis and their sources, discusses the construction of key variables, and describes the main empirical strategy.

## 4.1 Data Sources

**Political Elites.** We hand-collect data on elites in NW. The main source we use is the *Book of Wei (Weishu)* that describes the dynastic history of NW and that forms a part of the official "Twenty-Four Dynastic Histories" collection. It was compiled in 544 AD, under NW's immediate successor regime, with exclusive access to NW archives and the wide availability of oral histories of elite families. The *Book* is also the only historical text exclusively devoted to describing NW that survives to this day. In a format consistent with other dynastic histories, the *Book of Wei* includes the biographies of statesmen and notable individuals. Example of a translated biographical excerpt can be found in Appendix F.3.

[26] The two families in opposition were the Zheng clan of Xingyang and the Gao clan of Bohai. In addition to the Empress herself (whose family had completely relocated to the capital one generation ago), the two supporters of the Reform, Li Chong and Tuoba Pi, were both centralized elites. Li Chong was Empress Dowager's lover, and his family had completely relocated to the capital one generation ago, and his niece was married into the royal household. Tuoba Pi was a royal prince. See *Book of Wei*, volume 53.

[27] Note that historians used to speculate that perhaps NW compromised at the implementation stage by letting clan members of landed aristocrats be the state-appointed villagers in charge of population registration and surveillance in the *three-elders* system. This view is systematically rejected by more recent research by Hou (2002), which points out that these villagers were petty clerks of immense responsibility and career risks who were also in a different track than other government officials, so aristocratic families would not condescend themselves to such service. Our data lends further support to Hou (2002): 0% of the individuals ever served such a role.

We complement the *Book of Wei* with excavated tomb epitaphs of NW individuals, assembled by Zhao (1992), Luo and Ye (2005), and the China Stone Inscription Database.[28] These tomb epitaphs are slabs of stones on which biographies of the deceased are inscribed, and are widely used by historians as primary sources for studying relevant historical periods.[29]

These two sources cover *every* political elite of the Northern Wei regime that is currently known.[30] For each of the 2,590 elites in our sample, we digitize and geocode his biographical and bureaucratic career information. The biographical data contains the elite's name, ethnicity, choronym, place of birth, and family pedigree; and the career data contains the offices and noble titles he held, where he was stationed and the reigning emperor during the tenure of each office.[31]

**Offices in the Bureaucracy.** We construct a dataset on the characteristics of several hundred bureaucratic offices in Northern Wei, from a number of historical and modern scholarly sources.[32] For each office, we have information on its rank, functions (whether it is civil or military, central or regional), and quality (whether it is "pure" or "sullied", substantive or insignificant)).[33]

To facilitate empirical analysis, we convert office rank to a numerical scale. Ranks in the Chinese imperial bureaucracy follow a nine-rank system, with one being the highest rank, and nine the lowest. Our conversion method rearranges ranks into an ascending order, where an increase in numerical value of 2 corresponds to a rise of one rank (see Appendix G.1 for details).

**Strongholds.** We collect data on 4$^{\text{th}}$ century strongholds, which predate the NW regime, from records in three historical sources: *Book of Jin (Jinshu)*, *Comprehensive Mirror in Aid of Governance (Zizhi Tongjian)*, and *Commentary to the River Classic (Shuijing Zhu)*.[34] We search for mentions of strongholds using a list of six keywords: stronghold, castle, (erected) walls, (erected) barriers, defend (oneself) at natural obstacles, and self-fortify.[35] We are able to find 105 strongholds with precise geographical information, excluding ones that were constructed by government armies for

[28] See China Stone Inscription Database.

[29] For example, Tackett (2014) used tomb inscriptions to study the great clans of the Tang dynasty. See Figure A1 for an epitaph used to construct our data, where the blue, red, yellow, and green rectangles contain, respectively, the person's choronym, career history with office title description, the age and date of death, and the offices held by the person's father and grandfather.

[30] When describing the data and empirical analyses hereafter, we use the word "elite" to mean an individual in our data, and vice versa.

[31] To be more specific, the data contain the era names of the reigning emperor during each office. Era names were titles used by Chinese emperors for the purpose of numbering years.

[32] The main source is the *Treatise on State Offices (guanshi-zhi)* in the *Book of Wei*. We use Zhang (2017) for information on pure and sullied offices, and Zhang (2004) for information on military generals and offices.

[33] In short, a "pure office" (*qingguan*) is deemed suitable for men of high birth, and a substantive office entails real responsibilities (Lewis 2011). For more details, see discussion in Section 6.1.

[34] The *Book of Jin*, compiled in mid-7$^{th}$ century, describes the history of Western and Eastern Jin, and is also part of the "Twenty-Four Dynastic Histories" collection. The *Comprehensive Mirror in Aid of Governance* is a chronological narrative of Chinese history compiled by Sima Guang in the 11$^{th}$ century, and is extensively used by historians. The *Commentary to the River Classic* is an early 6$^{th}$ century work on Chinese geography, and is widely cited by scholars of historical geography.

[35] The corresponding Chinese terms are *wu*, *bao*, *bi*, *lei*, *juxian* and *zigu*.

military purposes. These strongholds map to 41 commanderies, which is 16.5% of all commanderies in our dataset.

**Other Data.** We hand-collect data on counties in each commandery from Mu, Wu and Wei (2016), a study of historical administrative divisions in China. For each county on record, we know its name, present-day location, and years of creation and abolition.

We also compile a dataset on conflicts in Northern Wei.[36] We are able to identify 157 conflicts with precise geographical information. Conflicts are of three types: external war between NW and other regimes, peasant uprisings led by civilians, and rebellions led by NW elites.

We collect a host of geographic characteristics for each commandery as our baseline controls: terrain ruggedness,[37] river density,[38] and the suitability index of two staple foods in China, rice and wheat.[39] Since a map of NW commanderies with clear boundaries does not exist, we compute the average values of each of those four variables across a 50-kilometer radius of the capital cities of each commandery.

Summary statistics and definitions for the main variables used in our empirical analysis can be found in Tables A3 and A16 respectively.

## 4.2 Defining Aristocracy

The centerpiece of our paper is the powerful aristocratic families, some of whom exercised control over local population and economy through local strongholds and therefore stood to lose from NW's state-building reforms. We operationalize the concept of aristocracy—one that captures the enormous political, economic and cultural capital possessed by the aristocratic families—by tracing the activity of affiliated individuals in earlier empires.

We employ the following definition of aristocracy throughout our analysis: an elite is an *aristocrat* if an individual with the same choronym-surname has a biography in the dynastic histories of earlier empires between 25 AD and 300 AD. These records are *Book of the Later Han*, *Records of the Three Kingdoms* and *Book of Jin*.[40] They form a part of the official "Twenty-Four Dynastic Histories"

[36] Data on conflicts are extracted from two sources: the *Book of Wei*, and the *Catalogue of Historical Wars*: *Zhongguo Lidai Zhanzheng Nianbiao*, compiled by China's Military History Editorial Committee.

[37] The metric we use to compute this index is the amount of elevation difference between adjacent cells of a digital elevation grid using data provided by United States Geographic Services (USGS).

[38] Source: CHGIS database.

[39] Source: Food and Agriculture Organization (FAO). The index ranges between 0 and 10,000, and a larger number indicates higher suitability.

[40] *Book of the Later Han* is an early $5^{th}$ century text covering the history from 6 to 189 AD. *Records of the Three Kingdoms* is a late $3^{rd}$ century text covering the history from 180 to 280 AD, approximately. We choose 25 AD as the starting point because it was the founding year of the Later Han Empire. As explained in Section 3, it was during Later Han that the seeds of the medieval Chinese aristocracy were sown. We choose 300 AD as the ending point because it was the last year of political stability in northern China: a brief but excessively catastrophic civil war erupted in 301 AD and was followed immediately by barbarian invasions.

collection. We use choronym-surname to identify family affiliations because it was common practice for prominent families in imperial China to distinguish themselves by associating the family surname with their place of origin. Famous examples of the medieval period include the Clan Cui of Qinghe and Clan Du of Jingzhao, whose members held prestigious offices in various regimes and wielded significant social and political influence.

We choose the Later Han Dynasty as the earliest dynasty from which to draw on historical biographies because the first century was commonly understood as the era during which many prominent medieval Chinese families began to emerge (see Section 3.1). Inclusion in historical biographies suggests that ancestors of the family were politically active and highly likely to have made accomplishments in administration, military, literature or moral integrity. Thus, they were at a particularly advantageous position to further accumulate and transmit political, economic and cultural capital to their descendants.[41] Importantly, regime transitions in the 3$^{rd}$ century, which were elite-led coups or usurpation, forced aspiring rulers of the new dynasty to offer other politically active elites many privileges in order to enlist their support.[42] Ancestors featured in prior historical biographies were therefore more likely to take advantage of these developments, and the individuals in our dataset with ancestors featured were therefore more likely to have stronger local power bases.

We further devise a more restrictive definition of aristocracy, which is used in our heterogeneity analysis and robustness checks. This definition states that an elite is an *aristocrat* if an individual with the same choronym-surname held top bureaucratic offices in earlier empires.[43] In other words, only elites with the most prestigious family pedigree qualify as aristocrats.

Under the main and restrictive definitions, 29.24% and 20.09% of all elites, and 46.66% and 32.27% of all ethnic Han elites in our sample are aristocrats. Given that elites who appear in our data sources are already in the top echelon of the imperial bureaucracy, these percentages suggest that the socio-political status of medieval Chinese aristocrats demonstrated remarkable persistence over centuries.

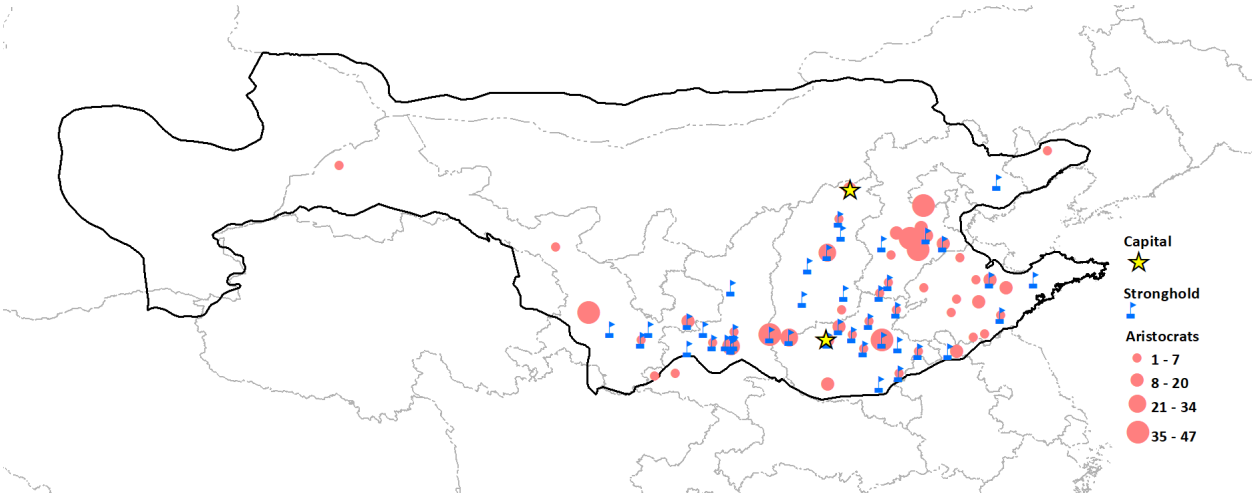
Figure 2 presents a map of Northern Wei, with blue castles denoting commanderies with strongholds. Most strongholds are located in present-day central China. It also displays the spatial distribution of all aristocrats in our sample.

[41] For studies on the semi-hereditary nature of political power in medieval China, see Johnson (1970) and Mao (1988).

[42] A prominent example is the land enclosure policies under Western Jin, where officials of the dynasty and offsprings of prominent officials in the former dynasties were given a green light to expand their landholdings and take on serfs (see Section 3.1).

[43] These are Chancellors (*zaixiang*); Minister of Works, Minister of Education and Defender-in-Chief (*sikong*, *situ* and *taiwei*, collectively called the Three Excellencies (*sangong*)); Grand Perceptor, Grand Mentor, Grand Guardian, Great Steward, General-in-Chief and Great Manager of Mounts (*taishi*, *taifu*, *taibao*, *taizai*, *da-jiangjun* and *da-sima* collectively called *shangshi*). Translations are from Hucker (1985).

Figure 2. Geographical Distribution of Strongholds and Aristocrats




*Notes*: this figure displays the geographical distribution of strongholds and aristocrats (main definition) recruited into the NW regime. The black line depicts the territory of NW in approximately 504 AD. We construct this map based on the historical map of China in 448 AD, which is taken from ChinaXmap 3.0 Three Kingdoms and the Period of Division, Harvard WorldMap database.

### 4.3 Empirical Strategy

In the most ideal world, our theory would be tested with data on more direct measures of elite wealth such as land and the number of private serfs and armed clients, but such information do not exist for a context as far back as 1,600 years ago. Thus, we focus on *aristocrats in stronghold commanderies* as an estimate of the powerful landed elites willing to and capable of resisting the Reform.[44] By restricting our attention to the most politically prominent group, our method of measuring locally powerful extractive elites is similar to the one in Acemoglu, Reed and Robinson (2014) that identifies a list of local chiefs in modern-day Sierra Leone. Although our argument is based on economic vested interests and power, this method is well suited to our research because, as described in Section 3, a family's local economic dominance largely dovetailed with its socio-political capital that is reflected in the enduring clan pedigree and the strongholds that helped prevent state penetration.[45]

We employ a standard difference-in-differences (DD) strategy to test Prediction 1 of Section 2. We assess the effect of the Reform by estimating Equation 1 below at the level of commandery-period.[46] Commanderies were the second lowest level of the imperial administrative hierarchy in

[44] As in Acemoglu, Reed and Robinson (2014) and Garfias and Sellars (2021*a*), we do not further distinguish between willingness and capacity to resist state-building reforms because the amount of economic vested interests, which reflect willingness, also underpin the ability to hire self-defense and engage in practices of subversion.

[45] Of course, strongholds can also be viewed as a *direct*, though imperfect, indicator of additional economic dominance.

[46] Each period corresponds to approximately 10 to 14 years of reign under a specific ruler. For details, see Table A2 in the Appendix.

medieval China, with the lowest level being counties. The treatment group consists of commanderies with pre-existing strongholds, which reflects a high degree of aristocratic control of of the local economy and population, and the control group consists of commanderies without strongholds. Aristocrats in commanderies with strongholds are the local powerholders, and therefore economic losers of the Reform that the regime seeks to compensate.

$$Y_{ct} = \beta \text{Stronghold}_c \times \text{Reform}_t + \phi_c + \gamma_t + \epsilon_{ct} \tag{1}$$

Here, $Y_{ct}$ is the outcome of interest for commandery $c$ during period $t$, which, in our main analyses, is the number of aristocrats recruited. $\text{Stronghold}_c$ is an indicator variable that is equal to 1 if commandery $c$ has $4^{\text{th}}$ century strongholds. $\text{Reform}_t$ is equal to 1 if period $t$ is during or after the reign of Empress Dowager Feng, which is from 477 to 490 AD. Commandery fixed effects $\phi_c$ control for time-invariant unit-specific differences, and emperor fixed effects $\gamma_t$ control for variations over time that are common to all commanderies. To allow for serial correlation of the error terms, we cluster standard errors at the commandery level.

The identifying assumption for our DD strategy is that, non-stronghold commanderies provide an appropriate counterfactual for what would have happened in stronghold commanderies, in the absence of the Reform. The coefficient $\beta$ therefore estimates the causal effect of the Reform on the outcomes of interest.

# 5 Main Results

As described in Section 3, the Reform was remarkable both for its success in reviving the Chinese state and for the relative lack of documented resistance. We provide further evidence, in Section A of the Appendix, that the Reform enhanced state capacity but did not lead to local resistance, the facts of which motivate us to investigate how a state-building regime could soften resistance by powerful vested interests. This section and the one that ensues report a diverse array of evidence to document the bureaucratic compensation strategy theorized in Section 2.

## 5.1 Reform and Recruitment

We now establish the main result of the paper: the NW massively recruited aristocrats from stronghold areas as a result of the Reform. We estimate Equation 1, using as dependent variable the number of aristocrats who first held state offices in period $t$, divided by the number of years.[47]

[47] Since each time period in our panel data is a particular ruler reign, the dependent variable is weighted by the number of years in that reign.

Table 1. Effects of Reform on Aristocratic Recruitment

| | Number of Aristocrats Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold × Reform | 0.081*** | 0.077** | 0.072** | 0.048** |
| | (0.031) | (0.030) | (0.029) | (0.019) |
| Mean of D.V. | 0.020 | 0.020 | 0.020 | 0.020 |
| Period FE | Yes | Yes | Yes | Yes |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes |
| Province-Period FE | No | No | Yes | No |
| Commandery linear trend | No | No | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.474 | 0.482 | 0.493 | 0.803 |

*Notes*: This table presents the effect of reform on the aristocratic recruitment. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table 1 reports the results. Column (1) indicates that 0.081 additional aristocrats from stronghold commanderies are recruited into the regime per year, compared to non-stronghold commanderies. This magnitude represents a 4.05 fold increase relative to the mean of 0.02, which is statistically significant at the 1% level. This estimate remains practically unchanged with the addition of geographical characteristics (interacted with the post-Reform dummy) and commandery-level lagged conflicts as controls (column 2), or with province-time fixed effects, and is robust to commandery-specific linear trends. These estimates show that the Reform caused a large number of aristocrats to be recruited from the strongholds commanderies.

**Checking Pre-Trends.** The DD design relies on the parallel trend assumption. To provide stronger support that this assumption holds, we perform an event study analysis by estimating a dynamic version of Equation 1:

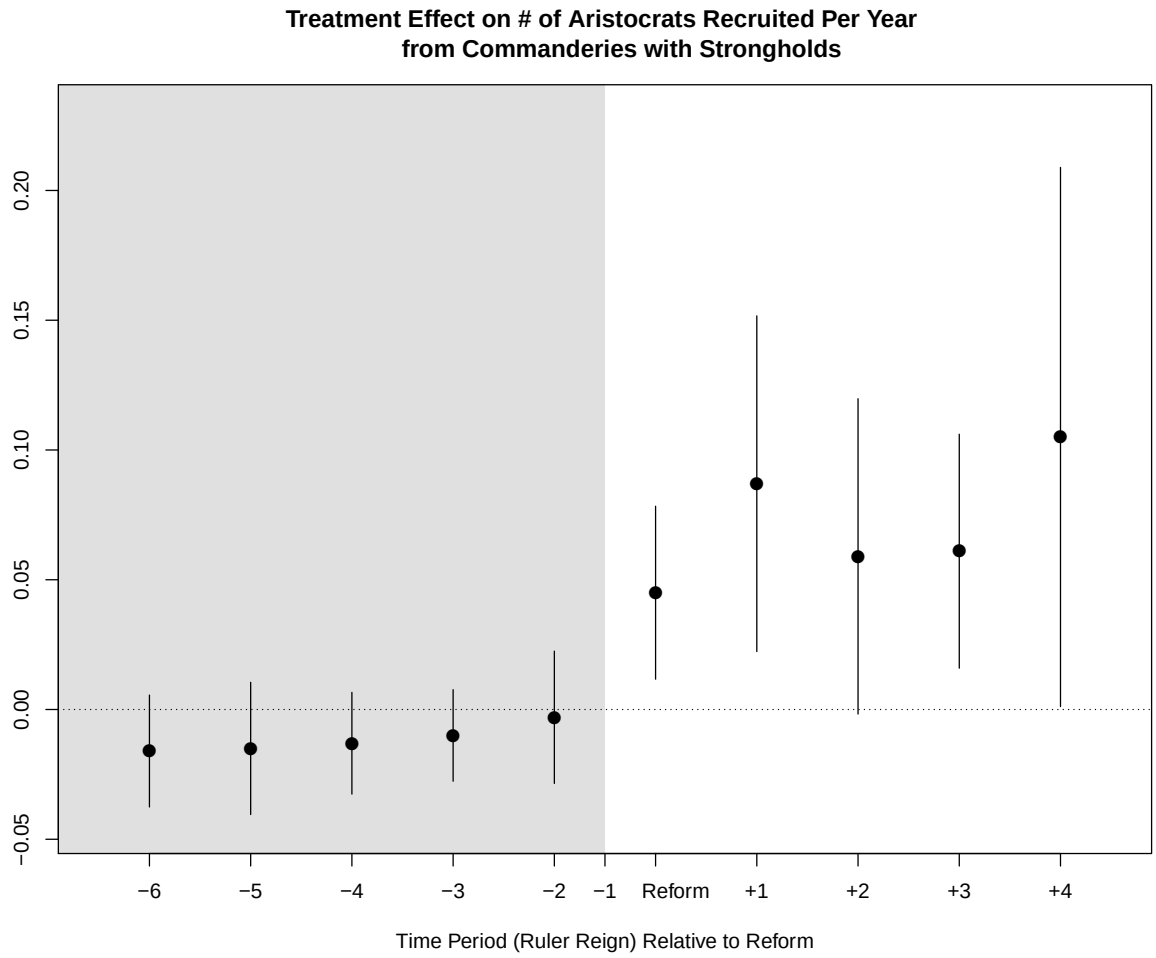
$$\text{NumAristocrats}_{ct} = \sum_{j=1}^{N} \beta_j \text{Stronghold}_c \times \text{Period}_j + \phi_c + \gamma_t + \epsilon_{ct}, \tag{2}$$

where Period denotes dummy variables indexed by $j$ for each period.

Figure 3 presents the coefficient plot for each emperor reign.[48] The omitted category serving as the benchmark is the period right before the reign of Empress Dowager Feng. Coefficients for pre-reform periods are not statistically or substantively different from zero, and estimates for

[48] Regression results are reported in Appendix Table A5.

Figure 3. Test for Parallel Pre-trend




Notes: This figure plots event study estimates for equation (2). Vertical bands represent 95% Confidence Interval

post-reform periods are positive and statistically significant. This exercise shows that there are no differential pre-trends in aristocratic recruitment for stronghold and non-stronghold commanderies. Equally importantly, the substantial spike of the treatment effect sustains in the long run and becomes even larger.

### 5.1.1 Robustness Checks

This subsection reports a large battery of robustness checks for our result on aristocratic recruitment.

**Alternative Definition of Aristocracy.** We employ the more restrictive definition stated in Section 4.2, that an elite is an aristocrat if individuals with the same choronym-surname took top government offices in earlier empires. Our main results are robust to this alternative definition (Table A6).

**Adjacent Commanderies Only.** In our baseline results, we control for pre-existing differences between commanderies by interacting a set of geographical characteristics with the post-Reform dummy. To further exclude the effects of any pre-existing differences not picked up by the control variables, we restrict our sample to commanderies that either have strongholds themselves (treatment group) or do not have strongholds but are adjacent to a commandery with strongholds (control group). This exercise using spatially similar commanderies does not affect our results (columns (1) and (2) of Table A7).

**Territorial Changes.** Our baseline results use the territory of NW in 504 AD. Even though most of NW's territorial expansion took place during the late 4$^{\text{th}}$ and the early 5$^{\text{th}}$ centuries, which is more than 50 years before the Reform, we nevertheless remove commandery-period observations that are unoccupied from our sample to eliminate the effects of territorial changes.[49] Our results remain robust (columns (3) and (4) of Table A7).

**Measurement.** In medieval China, individuals of humble origins occasionally tried to fabricate their aristocratic identity by claiming that their families belonged to a prestigious choronym-surname. Even though historians do not believe that this was a problem for dynasties before Sui and Tang (Fan 2014), we nevertheless exclude aristocrats with disputed origins from our sample.[50] Our results are robust to this exercise (columns (1) and (2) of Table A8).

Warfare and political turmoil in the 4$^{\text{th}}$ century caused migration. We re-estimate our baseline regression on the sample of elites who never migrated, and show that results remain robust in columns (3) and (4) of Table A8.

**Alternative Outcomes.** Recall that our main dependent variable is the number of aristocrats who entered the bureaucracy for the first time in each period. To verify that aristocrats from stronghold commanderies also enjoyed continued presence in the bureaucracy, we re-estimate our baseline results, using as dependent variable the total number of aristocrats serving in each period. Results in columns (1) and (2) of Table A9 show that the Reform produced a persistent, positive effect the on presence of aristocrats from stronghold commanderies. For an additional test, we also use the log number of aristocrats as the dependent variable to diminish the impact of outliers (columns (3) and (4) Table A9).

**Placebo Tests.** Non-aristocrats did not have the socio-political capital required to maintain local economic dominance and were therefore not the losers the regime had to compensate. We further use the number of non-aristocrats and the number of non-aristocratic ethnic Han elites as placebo

[49] The year of occupation for each commander is compiled from Mu, Wu and Wei (2016).

[50] An elite has disputed origin if the *Book of Wei* recounts that he "self-reported" or "asserted" his family to be some choronym-surname.

outcomes, and our results in Table A10 provide verification that increased recruitment in stronghold commanderies was not driven by unobserved shocks.

**Other Political Factors.** We use two methods to account for any potential impact that capital regions might have on aristocratic recruitment. First, we include interaction terms between the distance from commanderies to the two capital cities and the post-Reform dummy (columns (1) and (2) of Table A11).[51] Second, we exclude capital commanderies from our sample (columns (3) and (4) of Table A11). Our results remain robust.

Warfare in the fourth century may also affect aristocratic recruitment. To flexibly control for the time effect of initial differences in war on the outcome variable, we include the interaction term between the presence of $4^{\text{th}}$ century warfare in each commandery and the post-reform dummy (columns (1) and (2) of Table A12).

The surge in aristocratic recruitment in stronghold commanderies may reflect pre-existing differences in patterns of aristocratic settlement. We thus include the interaction term between the number of historical aristocratic clans in each commandery and the post-reform dummy (columns (3) and (4) of Table A12).[52] In addition, we interact a dummy indicating whether a commandery served as a provincial or national capital prior to NW with the post-reform dummy to account for that commandery's historical political development (see columns (5) and (6) of Table A12).

**Instrumental Variable.** Appendix Section E describes an instrumental variable strategy that leverages commandery-level variation in exposure to an excessively catastrophic historical episode between 301 and 307 AD that paralyzed the local state and socio-political order of northern China. Our results are robust to all of the tests outlined above.

## 5.2 Recruitment as Compensation

Having established the causal relationship between Reform and aristocratic recruitment in stronghold areas, we now discuss richer evidence for the theory of bureaucratic compensation and against alternative interpretations.

### Broad Recruitment Strategy

The host of geographic controls in Equation 1 should go a long way towards addressing the concern that our results could potentially be driven by natural expansion of the aristocratic population. Furthermore, the DD design and the likely parallel trends in Figure 3 further help

[51] The capital of NW had been Pingcheng until 494 AD, when Emperor Xiaowen moved the central government to Luoyang. See Sections F.1 and F.2 of the Appendix.

[52] This variable is defined in a consistent manner with our main definition of the aristocracy. We compute this variable as the number of distinct surname-choronym pairs at a commandery, where each surname-choronym pair is associated with at least one biographee in the three books of earlier empires (*Book of the Later Han*, *Records of the Three Kingdoms* and *Book of Jin*) came from this commandery.

rule out secular growth as an alternative explanation. Here we present further evidence against any interpretation based on potentially different demographic growth between stronghold and non-stronghold aristocratic families.

We re-estimate Equation 1 with an alternative dependent variable. In each commandery $i$ at time $t$, rather than the total number of aristocrats recruited, we now use the total number of aristocratic *clans* that had one or more member recruited.[53] If our main result is driven by the alternative explanation based on secular population expansion within aristocratic clans in stronghold areas, then we would not find any effect using this alternative coding that shifts the focus away from the number of recruits within clan to the total number of clans that saw recruitment. Consistent with our argument and inconsistent the alternative interpretation, corresponding results in Panel A of Table 2 indicate that the NW state recruited from a *greater number* of aristocratic *clans* in the stronghold commanderies as a result of the Reform, compared with non-stronghold commanderies.[54]

**Heterogeneity**

Even though a wider range of the aristocracy in stronghold commanderies were recruited into the regime in the post-Reform period, the theoretical framework in Section 2 suggests that the extent of recruitment should not have been shared equally across all clans. More specifically, clans with higher socio-political capital were likely to be the ones that controlled more local resources, and were therefore likely to pose a stronger threat of resistance to the Reform. In order to weaken such resistance, the NW regime may need to recruit greater numbers of them as concessions.

To examine this implication, we restrict our sample to aristocrats only, and conduct further analysis at the clan level. We use two proxies to measure the socio-political capital of aristocratic clans. The first proxy, TopOffice, derives from the more restrictive definition of the aristocracy. It is a dummy variable that equals to 1 if a clan's ancestors held top bureaucratic offices in earlier empires, which captures the fact that more prominent statesmen could amass greater political and economic privileges. The second proxy, Longevity, is a dummy equal to 1 if a clan's ancestors have biographies in at least two of the three dynastic histories of earlier empires, which reflects the clan's degree of local entrenchment.

We then interact this proxy with the post-treatment indicator $\text{Reform}_t$, and examine the heterogeneous effect of socio-political capital on recruitment for aristocratic clans in stronghold and non-stronghold commanderies separately. We estimate the following regression model:

[53] For example, if a commandery $i$ produced **3** recruits from Family A and **0** recruit from Family B at $t = 1$ but **1** recruit from Family A and **1** recruit from Family B at $t = 2$, our original variable (before weighting by the total number of years in each time period) would be **3** $(3 + 0)$ for $t = 1$ and **2** $(1 + 1)$ for $t = 2$ in this commandery. On the other hand, this alternative variable would record **1** for $t = 1$ and **2** for $t = 2$, because only **1** clan produced recruits at $t = 1$ but **2** clans did so at $t = 2$.

[54] Interestingly, this result also connects with the "selectorate theory" in de Mesquita et al. (2005), where the ruler benefits from efforts to expand the eligibility of membership in the ruling coalition.

$$\text{NumAristocrats}_{ckt} = \beta \text{Prominence}_{ck} \times \text{Post}_t + \phi_{ck} + \gamma_t + \epsilon_{ckt}. \quad (3)$$

Here, $\text{Prominence}_{ck}$ is the dummy equal to 1 if clan $k$ from commandery $c$ has higher levels of socio-political capital. $\phi_{ck}$ is the clan-commandery fixed effect.

Results for clans in stronghold commanderies are reported in Panel B of Table 2. The first two columns use TopOffice, and the last two columns use Longevity as relevant proxies. In line with our prediction, clans with higher socio-political capital had a significantly greater number of members recruited into the regime, compared to clans with lower socio-political capital. In contrast, we do not find a statistically significant effect for commanderies without strongholds (see Table A4).

**Demand for Talent**

As an alternative interpretation to compensation, the observed pattern of aristocratic recruitment may be driven by an increase in demand for: (1) officials at the front-line bureaucracy, or (2) more capable officials, following the state-building reform. Our own empirical evidence and the consensus in historical research rule out these interpretations.

The first interpretation has no bearing on our quantitative results because 0% of the individuals in our data (aristocrat or non-aristocrat) had ever assumed the office of "three-elder," a front-line post in the bureaucracy created by the Reform to register and monitor local population under state control. This empirical pattern is not surprising at all because the NW elites were indeed unwilling to serve positions in the new "Three-Elders" system. It is important to note that the "Three-Elders" system was a grassroots state organ that created a network of village-level petty clerks (von Glahn 2016:175). Positions as such were at the bottom level of imperial officialdom, and had low social status (Hou 2002). Moreover, "three-elders" officials were tasked with gruelling work, and enjoyed few privileges: they were required to meet stringent targets in tax collections, and even had to make up for the deficiency themselves. Taken together, existing evidence shows that our results on aristocratic recruitment could not have been driven by a surge in demand for officials in the front-line bureaucracy.

To rule out the second interpretation, we systematically demonstrate that aristocrats from stronghold commanderies, the treated group, did not possess more superior administrative ability than aristocrats from non-stronghold commanderies, the control group. To do so, we manually extract descriptions of six types of personal merits from elites' biographies in the *Book of Wei*.[55] We classify those merits into two categories, administrative ability and personal character. The administrative ability category consists of military prowess, good governance, and institutions and

[55] We leave out elites from the tomb epitaphs because epitaph passages are intended to describe the accomplishments of the deceased, and therefore lack objectivity. *Book of Wei*, on the other hand, was solo-authored and therefore lends much more consistency in its evaluations of elites.

Table 2. Number of Aristocratic Clans Producing New Recruits

*Panel A: Recruitment of Aristocratic Clans*

| | Number of Aristocratic Clans Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold × Reform | 0.301*** | 0.293*** | 0.283*** | 0.186* |
| | (0.104) | (0.108) | (0.108) | (0.099) |
| Mean of D.V. | 0.116 | 0.116 | 0.116 | 0.116 |
| Period FE | Yes | Yes | No | Yes |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes |
| Province-Period FE | No | No | Yes | No |
| Commandery linear trend | No | No | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.537 | 0.539 | 0.549 | 0.720 |

*Panel B: Clan-Level Heterogeneity in Recruitment*

| | Number of Clan Members Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Top office×Reform | 0.154** | 0.178** | | |
| | (0.062) | (0.074) | | |
| Longevity×Reform | | | 0.148** | 0.171** |
| | | | (0.057) | (0.066) |
| Mean of D.V. | 0.051 | 0.051 | 0.051 | 0.051 |
| Clan FE | Yes | Yes | Yes | Yes |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 528 | 528 | 528 | 528 |
| R-squared | 0.498 | 0.544 | 0.497 | 0.542 |

*Notes*: Panel A presents estimates of the Northern Wei's reform on the number of clan recruited. Panel B represents estimates of the heterogeneous effect of reform. We restrict the sample to the aristocratic clans commanderies with strongholds. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at the commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

policy; and the personal character category comprises of literature, intelligence, and integrity.[56]

To illustrate how merits were recorded, we select a short excerpt from the biography of Cui Hao, a member of the prestigious Clan Cui of Qinghe. Volume 35 of *Book of Wei* recounts:

> "Since youth, [Hao] was fond of literature, and was well-versed in classics and history... Court rituals, statements of commendation and imperial edicts, military and administrative orders, were all authored by Hao."

Thus, Cui Hao has merits in institutions and policy, as well as literature.

Table 3 displays comparisons of personal merits. We exclude from our sample members of the imperial household and eunuchs, as they were not recruited into the bureaucracy in the same way as other elites. We first establish the validity of those merits records by comparing the merits of aristocrats and non-aristocrats. Results in Panel A suggest that aristocrats demonstrate higher ability in institutions and policy and literature, and lower ability in military prowess, in comparison to non-aristocrats. This finding is consistent with historical research showing that medieval Chinese aristocratic families were characterized by a rich tradition of literature, classics, and institutional and policy knowledge (Yan 2021, Chen 1998).

To examine pre-treatment "balance," we now restrict our sample of to *aristocrats only*, and compare the merits of aristocrats from stronghold commanderies with ones from non-stronghold commanderies. Results in Panel B of Table 3 indicate that there exist no statistically meaningful differences between those two groups of aristocrats along all dimensions of merit in the *pre*-Reform period. This suggests that aristocrats who came from stronghold commanderies and held offices in the regime did not exhibit superior ability compared to their counterparts from non-stronghold commanderies *prior* to the Reform. Taken together, these findings reject the interpretation that the increase in the number of aristocrats from the stronghold commanderies was due to superior ability.

However, as implied by our theory and by the substantial recruitment result established previously, one would expect that aristocrats from commanderies with strongholds serving in the NW bureaucracy *after* the Reform were of less quality. Since the compensation strategy entailed massively recruiting aristocrats from one particular group to serve in government offices as political concessions, the selection process may not have been highly meritocratic.[57] Panel C of Table 3 shows that aristocrats from stronghold commanderies indeed became less capable in governance and institutions and policy, and the difference is statistically significant at the 5% and 1% levels

[56] Military prowess: if an elite is good at personal combat, masters weapons, or has success in the battlefield. Governance: if an elite demonstrates good or effective governance, is praised by the local people, or is good at conciliating civilians. Institutions and policy: if an elite has accomplishments in making laws, ritual codes, or policy recommendations for the state. Literature: if an elite is well-read, well-trained in literature, or is a scholar or instructor. Intelligence: if an elite is bright, gifted, or good at strategy. Integrity: if an elite takes bribes.

[57] Proposition 3 in Appendix D formalizes this idea.

Table 3. Merits Comparison for Northern Wei Elites

*Panel A: Aristocrats vs. Non-Aristocrats, Pre-Reform*

| Merits | Aristocracy | Non-Aristocracy | Difference |
|---|---|---|---|
| Military Prowess | 0.117 | 0.260 | -0.143*** |
| | (0.323) | (0.439) | (0.000) |
| Governance | 0.207 | 0.202 | 0.005 |
| | (0.407) | (0.402) | (0.909) |
| Institutions & Policy | 0.144 | 0.057 | 0.087*** |
| | (0.353) | (0.233) | (0.014) |
| Literature | 0.261 | 0.108 | 0.153*** |
| | (0.441) | (0.311) | (0.001) |
| Intelligence | 0.171 | 0.129 | 0.042 |
| | (0.378) | (0.335) | (0.280) |
| Integrity | 0.063 | 0.032 | 0.031 |
| | (0.244) | (0.177) | (0.210) |
| Observations | 111 | 435 | 546 |

*Panel B: Aristocrats from Commanderies with and without Strongholds, Pre-Reform*

| Merits | Stronghold | Non-Stronghold | Difference |
|---|---|---|---|
| Military Prowess | 0.159 | 0.090 | 0.070 |
| | (0.370) | (0.288) | (0.293) |
| Governance | 0.205 | 0.209 | -0.004 |
| | (0.408) | (0.410) | (0.956) |
| Institutions & Policy | 0.182 | 0.119 | 0.062 |
| | (0.390) | (0.327) | (0.381) |
| Literature | 0.205 | 0.299 | -0.094 |
| | (0.408) | (0.461) | (0.262) |
| Intelligence | 0.227 | 0.134 | 0.093 |
| | (0.424) | (0.344) | (0.226) |
| Integrity | 0.045 | 0.075 | -0.029 |
| | (0.211) | (0.265) | (0.521) |
| Observations | 44 | 67 | 111 |

*Panel C: Aristocrats from Commanderies with and without Strongholds, Post-Reform*

| Merits | Stronghold | Non-Stronghold | Difference |
|---|---|---|---|
| Military Prowess | 0.124 | 0.145 | -0.021 |
| | (0.331) | (0.353) | (0.502) |
| Governance | 0.145 | 0.220 | -0.074** |
| | (0.353) | (0.415) | (0.032) |
| Institutions & Policy | 0.017 | 0.063 | -0.046*** |
| | (0.128) | (0.243) | (0.008) |
| Literature | 0.203 | 0.278 | -0.075* |
| | (0.403) | (0.449) | (0.050) |
| Intelligence | 0.050 | 0.090 | -0.040* |
| | (0.218) | (0.287) | (0.077) |
| Integrity | 0.037 | 0.043 | -0.006 |
| | (0.190) | (0.204) | (0.743) |
| Observations | 241 | 255 | 496 |

*Notes*: T-tests are used for comparing differences in the mean value. ***, **, * denote significance at 1%, 5%, 10% level. Military prowess: if an elite is good at personal combat, masters weapons, or has success in the battlefield. Governance: if an elite demonstrates good or effective governance, is praised by the local people, or is good at conciliating civilians. Institutions and policy: if an elite has accomplishments in making laws, ritual codes, or policy recommendations for the state. Literature: if an elite is well-read, well-trained in literature, or is a scholar or instructor. Intelligence: if an elite is bright, gifted, or good at strategy. Integrity: if an elite takes bribes. All metrics are dummy variables taking the value of 1 if a merit description is recorded in the *Book of Wei*. Members of the imperial household and eunuchs are excluded from the sample.

respectively. They were also less likely to be intelligent and to be good at literature, with statistical significance at the 10% level. These results suggest that the rise in aristocratic recruitment from the treatment commanderies had led to a decrease in the average ability of the recruits.

# 6 Mechanisms of Compensation

Our empirical findings thus far demonstrate that, in order to ensure the success of state-building policies, the regime compensated potential losers—aristocrats from the stronghold commanderies—by offering them offices in the imperial bureaucracy. In this section, we present evidence on three types of mechanisms through which aristocrats were compensated: Direct benefit, interest realignment, and credible commitment.

## 6.1 Direct Benefits and Interest Realignment

We explore the mechanisms of compensation by examining the offices held by elites. Since office-holding entails power, prestige, and remuneration, offices can accurately reflect the relative importance of their holders in the imperial bureaucracy.

We use the rank of an office to proxy for its value in terms of power and wealth. The fact that rank reflects power should be self-evident. In medieval China, rank was also tied to a range of hidden benefits such as tax exemptions, legal privileges, and inheritable official titles (Yan 2010:169).[58]

To measure prestige, we exploit a unique institutional feature of medieval Chinese bureaucracy: the existence of "pure offices," which were deemed to be suitable for men of high birth (see Lewis 2011, Zhang 2017). Examples of pure offices include posts close to the emperor or crown prince and appointments to the Ministry of Personnel, which carry enormous prestige and recognition. Offices as such were highly sought after by the aristocracy (Yan 2009: 373).

We employ a triple-differences (DDD) strategy to examine the effect of the Reform on office-holding outcomes for aristocrats from stronghold commanderies. We introduce a third dimension of differences—the group of non-aristocrats—to control for any unobserved changes in the structure of the imperial bureaucracy that may differentially affect office-holding for individuals from stronghold commanderies. We estimate the following regression model:

$$\begin{aligned} Y_{ict} = {} & \beta \text{Stronghold}_c \times \text{Reform}_t \times \text{Aristocracy}_i \\ & + \text{Stronghold}_c \times \text{Reform}_t + \text{Aristocracy}_i \times \text{Reform}_t + \text{Stronghold}_c \times \text{Aristocracy}_i \\ & + X_i + \phi_c + \gamma_t + \epsilon_{ict} \end{aligned} \tag{3}$$

[58] We only include substantive offices—ones that entail real responsibilities—in our analysis.

Table 4. Mechanism of Compensation: Direct Benefit and Interest Realignment

| | | | Senior Offices | | Junior Offices |
|---|---|---|---|---|---|
| | Max Rank | Pure Offices | Central | Regional | Central |
| | (1) | (2) | (3) | (4) | (5) |
| Reform×Stronghold×Arist | 3.381*** | 0.188** | 0.163** | 0.043 | 0.013 |
| | (1.117) | (0.079) | (0.067) | (0.071) | (0.090) |
| Stronghold×Arist | -2.435** | -0.267*** | -0.128* | -0.033 | -0.068 |
| | (1.015) | (0.081) | (0.073) | (0.077) | (0.088) |
| Reform×Stronghold | -1.932*** | -0.155*** | -0.070* | -0.038 | -0.036 |
| | (0.640) | (0.054) | (0.038) | (0.034) | (0.049) |
| Reform×Arist | -0.934 | -0.128*** | 0.021 | -0.044 | -0.127** |
| | (0.659) | (0.037) | (0.042) | (0.042) | (0.056) |
| Mean of D.V. | 11.171 | 0.435 | 0.175 | 0.096 | 0.668 |
| Period FE | Yes | Yes | Yes | Yes | Yes |
| Commandery FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,509 | 3,672 | 3,672 | 3,672 | 3,672 |
| R-squared | 0.088 | 0.111 | 0.098 | 0.061 | 0.099 |

*Notes*: This table provides the results of direct benefits of compensation. The unit of observation is the individual-period. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level. Controls include aristocracy, royal membership, ethnic Han dummy and father's rank.

where $i$, $c$, and $t$ denote individual, commandery and emperor reign respectively. $Y_{ict}$ is the outcome of interest for individual $i$ from commandery $c$ during period $t$. Aristocracy$_i$ is a dummy that is equal to 1 if individual $i$ is an aristocrat. $X_i$ is a set of individual-level controls that include indicator variables for aristocracy status, membership to imperial household, ethnic Han status, and whether the individual's father has ever held offices above Rank Five.[59] Reform$_t$, $\phi_c$ are $\gamma_t$ are defined as in Equation 1. To allow for serial correlation of the error terms, we cluster standard errors at the commandery level. The coefficient of interest, $\beta$, captures the treatment effect of the Reform on office-holding outcomes for aristocrats from stronghold commanderies.

Results are reported in Table 4. Column (1) uses the maximum rank achieved by an elite during each period as the dependent variable, and shows that aristocrats from stronghold commanderies on average held higher-ranked offices in the post-Reform period. Recall that an increase in numerical value of 2 corresponds to a rise of one rank (see Sections 4.1 and Appendix G.1), the coefficient of 3.381 therefore indicates a rise of 1.69 in actual rank. This is a substantial change, given that offices only have nine ranks. From column (2), it is evident that aristocrats from stronghold commanderies were also more likely to hold pure offices. Taken together, these results suggest that the NW regime compensated aristocrats by giving them higher-ranked and more prestigious offices.

We now give closer scrutiny to high-ranked offices, as they entail substantial power and respon-

[59] Rank Five is the middle rank of all state offices, which are ranked from nine (lowest) to one (highest).

sibilities. We define senior offices to be ones that are above Rank Three Junior, and divide them based on whether they are in the central or in the regional bureaucracy.[60] For instance, Head of the Imperial Library is an office in the central bureaucracy, whereas Commandery Governor is an office in the regional bureaucracy.

Columns (3) and (4) display regression results using central and regional senior offices respectively, and show that compensation to aristocrats came through powerful offices in the central, but not the regional, bureaucracy. This result provides evidence for the interest realignment mechanism, where NW rulers aligned the incentives of the aristocrats with those of the state by tying their careers to the health and longevity of the state, thereby enabling them to "share the future" as national stakeholders (Jha 2012). Our findings are also consistent with the macro-history of medieval China, which witnessed an extended period of nationalization for local aristocrats that continued well into the Tang dynasty (618 - 905 AD) (Mao 1988: 242, Tackett).[61]

Without prior knowledge of medieval Chinese history, one may interpret this result to imply that the regime actively recruited aristocrats from stronghold commanderies into the central bureaucracy in order to hold them hostage. Such interpretation already runs counter to the fact that they were given powerful offices, as is obvious from historians' works on this era (e.g., Ebrey 1978; Mao 1988) and further verified by our findings in the previous paragraphs. The next subsection will also provide evidence on the particular phenomenon where the ruler deliberately reduced her own power by letting these stronghold aristocrats take offices in charge of personnel appointment and management.

Nevertheless, we empirically examine whether these aristocrats were also more likely to hold less powerful central offices, which could make them vulnerable to potential purges by the emperor. Column (5) uses as dependent variable an indicator equal to 1 if an elite held a junior central office (ones that are below Rank Three Junior). The estimate is small in magnitude relative to the mean, and not statistically different from zero. This non-result further rules out the hostage interpretation.

We further explore the interest realignment mechanism by examining elites' appointments to important regional offices. We focus on the civil and military chiefs of regional government. Civil regional chiefs include the governors of counties, commanderies and prefectures; and military regional chiefs are commanders of regional armies.[62] Many of those offices are not senior in rank, but entail substantive local power as they are the highest offices at different levels of regional government.

We find strong evidence, again, for the interest realignment mechanism. Column (1) of Table 5

[60] Offices above Rank Three Junior are in the top echelon of the bureaucratic hierarchy and consist of positions heading different central departments and regional governments (Liu 2019).

[61] Starting in the 11$^{th}$ century AD, however, there began an interesting trend of elite *de*-nationalization, commonly referred to as the "localist turn" in Chinese history. Wang (2021) shows that the corresponding decrease in interest alignment caused obstacles to further state-building.

[62] Corresponding Chinese terms are: *xianling*, *taishou*, *cishi*; *dudu* and *zhenjiang*.

Table 5. Mechanism of Compensation: Interest Realignment

| | Civil Regional Chiefs | | | Military Regional Chiefs | | |
|---|---|---|---|---|---|---|
| | All | Other Jdx | Home Jdx | All | Other Jdx | Home Jdx |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Reform×Stronghold×Arist | 0.296*** | 0.297*** | 0.030 | 0.053 | 0.047 | 0.010 |
| | (0.107) | (0.110) | (0.061) | (0.069) | (0.068) | (0.006) |
| Stronghold×Arist | -0.208* | -0.217* | -0.015 | 0.013 | 0.013 | -0.003 |
| | (0.114) | (0.111) | (0.052) | (0.064) | (0.064) | (0.003) |
| Reform×Stronghold | -0.100 | -0.078 | -0.041* | 0.030 | 0.035 | -0.008** |
| | (0.066) | (0.064) | (0.023) | (0.033) | (0.032) | (0.004) |
| Reform×Arist | -0.118 | -0.112 | -0.001 | -0.021 | -0.022 | -0.003 |
| | (0.073) | (0.070) | (0.024) | (0.037) | (0.037) | (0.003) |
| Mean of D.V. | 0.318 | 0.290 | 0.039 | 0.154 | 0.152 | 0.003 |
| Period FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Commandery FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,672 | 3,672 | 3,672 | 3,672 | 3,672 | 3,672 |
| R-squared | 0.060 | 0.063 | 0.055 | 0.069 | 0.070 | 0.042 |

*Notes*: This table provides the results of credible commitment of Northern Wei's reform. The unit of observation is the individual-period. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level. Controls include aristocracy, royal membership, ethnic Han dummy and father's rank.

reports estimate for civil chiefs, and columns (2) and (3) break down this result for civil chiefs at home and non-home jurisdictions respectively. While aristocrats from stronghold commanderies are more likely to be civil regional chiefs, this result is almost exclusively driven by appointments to jurisdictions *away* from their hometown. Estimates are statistically significant at the 1% level. Columns (4)-(6) repeat the same analysis for military chiefs, and find that aristocrats from stronghold commanderies are neither more nor less likely to be appointed military chiefs, both for home and non-home jurisdictions. While supporting the interest realignment mechanism, these results also suggest that the regime did not distrust those aristocrats by deliberately barring them from military power.

To sum up, our findings reveal that NW rulers compensated aristocrats from stronghold commanderies—who were losers of the Reform—by appointing them to offices with tangible benefits, and took meaningful measures to transform them into national stakeholders.

## 6.2 Credible Commitment

So far, our empirical findings provide evidence for a compensation strategy adopted by the NW regime, which improved state capacity by compensating the losers with offices in the imperial bureaucracy. For the compensation deal to proceed, however, the ruler must credibly commit to upholding her promise (see Section 2). That is, she cannot remove compensation recipients from

office after they have given up local control. This subsection empirically highlights the Ministry of Personnel (*libu*) in the central state bureaucracy, responsible for recruiting, assigning offices to, evaluating and promoting bureaucrats, as an pivotal device for credible commitment.

The nature of the Ministry of Personnel would enable its officials to form alliances by appointing their friends and relatives to important positions. This advantage at building patronage network not only helps transform aristocrats' local influence into *de facto* political power at the national level, but also substantially increases the cost for the emperor to renege on the political deal. The emperor would face costly consequences for punishing aristocrats, and even if he could punish individual aristocrats, he would not be able to eliminate the entire alliance of aristocrats as their interests are interlocked and reinforced by their control over bureaucratic personnel.

We first establish the fact that our proposed mechanism of credible commitment was utilized by the NW regime as part of its compensation strategy. Column (1) of Table 6 shows that aristocrats from stronghold commanderies indeed were more likely to hold offices in the Ministry of Personnel. Since the Ministry of Personnel is part of the Department of State Affairs, the core of the executive branch of the central government, we verify that our Personnel-specific result was not driven by the regime's overall attempts to recruit stronghold aristocrats into this Department. To do so, we use offices in other ministries in the Department of State Affairs as a placebo.[63] Column (2) shows that the estimate is small and statistically indistinguishable from zero.

In column (3), we examine a regional position which entails significant power over the evaluation of candidates for bureaucratic offices, the rectifier (*zhong-zheng*).[64] The estimate, which is rather small in magnitude compared to the mean, suggests that aristocrats of stronghold commanderies were not significantly more likely to be appointed as rectifiers. This suggests that, while control over bureaucratic personnel was employed as a credible commitment device, the interest realignment mechanism is still at work: the regime did not want to increase aristocrats' local power by granting them more positions that could affect selection of candidates to join the imperial bureaucracy from their hometowns.

We perform a series of tests to show that the credible commitment device is indeed functional. Column (4) of Table 6 shows that aristocrats from stronghold commanderies were more likely to receive a promotion. Meanwhile, the estimate in Column (5) shows that they were not more likely to be punished.[65] These results demonstrate that the regime committed itself to the compensation

[63] They include the Ministry of War, Ministry of Provisions, Ministry of Revenue, Census Section, Land Tax Section and Justice Section. Corresponding Chinese terms are *jiabu*, *kubu*, *duzhi*, *zuo-mincao*, *you-mincao* and *duguan*.

[64] Rectifiers are responsible for assessing the meritoriousness of and assigning grades to local candidates who aspire to enter civil service. A given local grade led to a given level of appointment at court (Lewis 2011). For more details, see Yan (2021), Miyazaki (2007).

[65] An elite is punished if he is removed from office, killed by the emperor, or received death sentence for committing crimes.

Table 6. Mechanism of Compensation: Credible Commitment

| | Central: State Affairs Department | | Regional | | |
|---|---|---|---|---|---|
| | Personnel | Other | Rectifier | Promoted | Punished |
| | (1) | (2) | (3) | (4) | (5) |
| Reform×Stronghold×Arist | 0.040** | -0.016 | 0.002 | 0.288*** | 0.113 |
| | (0.017) | (0.066) | (0.030) | (0.096) | (0.087) |
| Stronghold×Arist | -0.029 | 0.007 | -0.029 | -0.240** | -0.107 |
| | (0.019) | (0.069) | (0.026) | (0.092) | (0.101) |
| Reform×Stronghold | -0.024 | 0.011 | -0.000 | -0.135*** | 0.001 |
| | (0.016) | (0.050) | (0.017) | (0.034) | (0.048) |
| Reform×Arist | 0.004 | 0.021 | 0.027 | -0.050 | -0.074 |
| | (0.004) | (0.024) | (0.024) | (0.069) | (0.060) |
| Mean of D.V. | 0.021 | 0.151 | 0.041 | 0.497 | 0.087 |
| Period FE | Yes | Yes | Yes | Yes | Yes |
| Commandery FE | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,672 | 3,672 | 3,672 | 3,054 | 3,672 |
| R-squared | 0.034 | 0.047 | 0.050 | 0.103 | 0.097 |

*Notes*: This table presents results on credible commitment. The unit of observation is the individual-period. The indicator variable Stronghold equals to one for commanderies with strongholds; the indicator Reform equals to one for periods after reform; the indicator Arist equals to one for elites if clan members with the same choronym-surname have biographies in chronicles of earlier empires. We control for commandery and emperor fixed effects in all specifications. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level. Controls include aristocracy, royal membership, ethnic Han dummy and father's rank.

deal as it continued to promote those aristocrats to higher ranked positions, and did not purge them from the bureaucracy.

We then provide empirical evidence to substantiate our argument that offices in the Ministry of Personnel can help elites build their patronage network, and therefore can serve as a credible commitment device. In Table 7, we examine whether having clan members hold personnel offices would affect career outcomes for fellow clansmen. Estimates show that an elite whose clan members had experiences in personnel offices would be more likely to hold senior offices in both central and regional bureaucracies as well as pure offices, compared to an elite whose clan members had never held such office. One may be concerned that the regime could strategically weaken the credible commitment mechanism by undermining the function and importance of the Ministry of Personnel in the post-Reform period. To verify that this was not the case, we compare the effects of holding personnel office on clan members' career outcomes before and after the Reform. Findings in Table A13 suggest that the Ministry of Personnel was not weakened in the post-Reform era.

Table 7. Importance of Offices in the Ministry of Personnel

| | Senior Offices | | |
|---|---|---|---|
| | Central | Regional | Pure Office |
| | (1) | (2) | (3) |
| Clan Member in Personnel Ministry in Periods $\leq t$ | 0.088*** | 0.052*** | 0.087*** |
| | (0.026) | (0.016) | (0.033) |
| Mean of D.V. | 0.176 | 0.096 | 0.434 |
| Clan FE | Y | Y | Y |
| Period FE | Y | Y | Y |
| Commandery FE | Y | Y | Y |
| Observations | 3,715 | 3,715 | 3,715 |
| R-squared | 0.164 | 0.112 | 0.184 |

*Notes*: This table presents the effect of personnel office-holding on the career development. The unit of analysis is individual-period. Patronage network in personnel office denotes whether other clan members of a elites had served in the personnel office before the current position. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

# 7 Case Illustrations beyond China

This section discusses the application of our bureaucratic compensation theory to two cases beyond China: the Late Roman Empire and premodern Korea.

### Late Roman Empire, 4th-6th centuries AD

In response to the so-called "Crisis of the Third Century," emperors from Diocletian to Constantine I took major steps to enhance the Roman state, strengthening its fiscal capacity and extractive power. The resulting "Late Roman Empire" was a much more centralized bureaucratic machinery capable of exploiting and deploying material resources and manpower efficiently.[66] Critical to the state-building project was the shift from indirect to direct rule over grassroots population that "confiscated the annual flow of funds" to the local city councils, which in turn lost its administrative power before eventual disappearance, in ways that "all the work and none of the play were left for local elites" (Heather 2018: 63).

As concessions to the local aristocrats who saw their vested interests in the pre-reform status quo severely undermined, the Empire massively recruited them into the new imperial bureaucracy and even designed institutionalized routes for their advancement (Heather 2018: 63 - 67). Extensive

[66]For a a general introduction to the Late Roman imperial bureaucracy, see Eich (2015). Also see Chapter 2 of Heather (2018) for the transformation from early to late Roman imperial bureaucracy.

historical evidence in the 4th century now reveals that "the vast majority of the new imperial bureaucrats were actually recruited from the old city-level gentry and above, the same class that had previously run the city councils" (Heather 2018: 63). The Roman case also provides evidence for the interest realignment component of our theory, where state-building through elite compensation "was massively to increase the extent to which local landowning elites had a direct stake in the imperial administrative system" (Heather 2018: 64).

Why, then, didn't the European state re-consolidate like its Chinese counterpart did following similar barbarian invasions? A question of such a scale would render any monocausal explanation futile.[67] Here we only provide a bureaucracy-centered *mechanism* to shed new light. It is noteworthy that the strategy of bureaucratic compensation, while successful in bolstering the Roman fiscal state, was only employed in regions of the East, such as Greece, the Balkans, Egypt, and Antioch, but not Western regions such as Gaul, Spain, and Britain. In fact, much of the Roman West experienced *de-bureaucratization* starting in the 5th century.[68] Some ostensible Roman legacy notwithstanding, the Germanic rulers might have found themselves with fewer precedents and protocols of the Roman bureaucracy from which to develop a central state and compensate the local aristocrat-turned castle magnates than the Xianbei leaders had with the Chinese bureaucracy in Northeast Asia.[69] Another obstacle to employing a bureaucratic compensation strategy to deepen local state penetration lies in the presence of "competing offers" from opportunities to become leaders of Christian churches. Mathisen (2011) provides a detailed discussion of how local Roman potentates, in an attempt to sustain their aristocratic prestige despite the lack of office-holding opportunities in the de-bureaucratized 5th century, became bishops in large numbers. For example, the highly prestigious Gallo-Roman aristocratic family of Sidonius Apollinaris, whose status, careers, and interactions with the barbarian rulers shared fascinating parallels to the clan of Cui Hao used for illustrating Table 3, eventually chose the paths of local bishops despite their strong preference for continuing the office-holding tradition in the bureaucracy.

Overall, the comparative perspective suggests that the lack of a strong imperial bureaucratic legacy and the competing institution in the Christian Church could explain why the bureaucratic compensation strategy, while successful in enhancing state capacity early on, was not fully employed to re-consolidate the state in the Roman West by barbarian rulers.[70] The fiscal-military skeleton

[67] See Scheidel (2019) for discussions of various existing explanations.

[68] The withdrawal of Roman presence from Britain completed between 383 and 410 AD. For de-administration in Gaul, see Mathisen (2011): x-xii and Matthews (1975): 347.

[69] In very much the same way with the Chinese aristocrats in the 3rd and 4th centuries, the Gallo-Roman aristocrats became castle lords providing refuge to dislocated people and expanding landholdings in the context of local state withdrawal and barbarian invasions in the 5th century. For details, see Mathisen (2011): 50-57. For the heavy influence of the imperial legacies from the Han and Jin dynasties over early state-building by NW rulers, see Lou (2017).

[70] Offices in a weakly institutionalized bureaucracy cannot generate sufficient benefits for their holders. This understanding is formalized when $w_{Ai}$ becomes too small in the model in Appendix D.

built with this strategy in the 4th century continued to benefit the Eastern Empire, however. Just as the Sui-Tang emperors re-unified the whole of China using NW's highly extractive state built one hundred years prior, the Roman leviathan born in the 4th century enabled Justinian's reconquest of the Mediterranean world two centuries later (Heather 2018: 363).

### Korea from Koryo to Choson, 10th-15th centuries AD

The argument in this paper could also inform our understanding about the *longue durée* of state-building struggles in pre-modern Korea. The nominal unification of the Later Three Kingdoms in 935 AD under the Koryo Dynasty (918-1392 AD) belied the significant *de facto* independence of local aristocrats, known as the *hyangni*, around the peninsula who had governed their territories for generations with bureaucracies and private armies of their own (Duncan 2000: 31). The several decades since the unification saw steady progress made by the Koryo regime in establishing control over the localities, with policies that freed up the armed retainers previously enslaved by the local aristocrats and asserted the authority of central government with a rationalized salary system for officials recruited by and loyal to the throne (Seth 2012: 86, Kim 2012: 124-125). The regime also confiscated arms from local lords and dispatched centrally-appointed officials to head the newly created local administrative units starting in 983 AD, further undermining *hyangni* power bases (Duncan 2000: 38, Kim 2012: 125-126).

The Koryo court took pains to incorporate the *hyangni* elites into the central bureaucracy as compensation for their acceptance of greater state presence in the countryside. An analysis of biographic data for officials in the central bureaucracy of early Koryo reveals striking similarities between the strategy adopted by the Korean rulers and the one documented in Table 2 by the Xianbei-Chinese counterparts: recruitment benefited a wide spectrum of aristocratic clans while the more powerful ones gained even further (Duncan 2000: 55). Institutionalized compensatory methods included the civil service examination system, introduced in 958 AD to recruit and solidify the loyalty of the *hyangni* in the countryside, as well as honorary office titles, which formed another route by which the *hyangni* strongpersons could join the central bureaucracy (Duncan 2000: 192-194). In short, the "concessions that the tenth-century kings made to the local elites ... in effect incorporated the *hyangni* into the dynasty's ruling class" (Duncan 2000: 199).

As suggested by our theory, the compensatory strategy effectively realigned the interests of the local powerholders to those of the Korean central state. The descendants of the *hyangni* elites, having relocated as centralized aristocrats in the capital for generations, "had begun to see themselves as deriving their status primarily from family traditions of office holding in the central bureaucracy, rather than from their more remote forebears' positions as autonomous local strongmen" (Duncan 2000: 87). As the Korean state emerged from the Mongol conquest chronically incapacitated, the

already centralized aristocratic clans, now known as the *yangban*, "whose primary source of status and prestige was the offices they and their forebears held in the dynastic government," took on an ideology oriented towards a "strong, activist central regime" and championed state-building reforms to crush particularistic local interests once and for all (Duncan 2000: 264). They saw in the military strongman Yi Seong-gye the ideal candidate to provide monarchical leadership for reform, and thus supported the latter's bid for power in the palace coup that replaced the Koryo with Choson Dynasty (1392 - 1897 AD) (Duncan 2000: 274-275). The renewed centralization drive, proposed by the *yangban* and approved by early Choson rulers, significantly tightened the state's grip over human resources and radically deepened the degree of direct central control over localities.[71]

# 8 Conclusion

State-building involves many challenges. Enhancing the state's extractive capacity usually comes at the expense of local powerholders, and unquestionably triggers resistance. This paper provides evidence for a compensatory strategy used by rulers of medieval China, in which economic losers from a nationwide state-building reform were given powerful, prestigious offices in the state bureaucracy in exchange for their acceptance of the reform, and commitment problems were mitigated by granting offices that controlled bureaucratic personnel.

Origins of the Great Divergence, in which Western Europe surpassed the rest of the world in achieving sustained economic growth, can be traced back to an institutional divergence that took place in the early Middle Ages (Scheidel 2019). While the collapse of the Roman Empire gave rise to over a millennium of political fragmentation and polycentricity in Europe, China was able to restore imperial rule under a centralized bureaucracy. Autocracy equipped with a state bureaucracy is believed to be a very robust form of political development that tends to persist over time (Stasavage 2020). This paper provides a theory for and micro-level evidence on how bureaucratic legacies facilitated state consolidation at this critical juncture in history, and by doing so, sheds light on the causes of institutional divergence between China and Europe.

[71] The state-building package created the first system of provincial civilian governorship in Korean history along with systematic administrative reorganization at the lower level and substantially expanded the new dynasty's tax base by freeing the peasants from dependence on local elites with a series of land reforms. For details, see Duncan (2000: 204-213).

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# A Empirical Motivation

The long-term impact of the Reform is overwhelmingly acknowledged by scholars of Chinese and world history. From a comparative perspective, NW's state-building efforts contributed to the "First Great Divergence" between China and Europe that had faced similar barbarian invasions but saw the contrasting outcomes of state consolidation versus political fragmentation (Scheidel 2019). From the perspective of Chinese economic history, recent scholarship identifies the year 485 AD as a key watershed of the first millennium (von Glahn 2016). The "Northern Dynasty Thesis" in recent historiography argues that the Reform provided a necessary condition for the revival of state capacity and imperial power that ultimately enabled China to climb from the "trough" to the "crest" of history (Yan 2017:224-225). This view echoes an earlier observation in Huang (1996) that credited the Tuoba rulers of NW for having built "the infrastructure of a regenerated empire" through "the creation of a new, homogeneous peasantry base, which had proven indispensable to any working imperial order" (pp. 93-94).

Historians have also assessed the impact of the Reform on state capacity at a more micro level. By comparing changes in registered population in the few commanderies that were once controlled by the southern dynasties and then became part of NW, Zhou (1997) finds compelling evidence that the Reform increased the regime's tax base and improved its ability to detect and re-register peasants sheltered by local aristocrats. Population data only exist in a small number of cross-sections over the course of medieval China, but Hou (2002) confirms this finding using another metric: the number of county government agencies. Indeed, Hou (2002) provides a variety of examples showing that the regime greatly enhanced its state capacity as evidenced in the increase in the number of county government agencies established after the Reform.

In a similar spirit, we present systematic evidence to show that the Reform led to an increase in state capacity in stronghold commanderies. Since there are no comprehensive data on taxation and population—conventional measures of state capacity—for NW commanderies before and after the Reform, we use the number of county governments as an alternative measure. Our measurement choice is consistent with the more recent political economy literature. According to Acemoglu, García-Jimeno and Robinson (2015), Acemoglu, Moscona and Robinson (2016) and Jensen and Ramey (2020), the number of local state functionaries and agencies measures state capacity as it embodies the "infrastructural power" of the state (Mann 1986, 1993). In imperial China, counties are precisely the lowest level of the administrative hierarchy that is responsible for population registration, tax collection and military recruitment. An increase in the number of county governments in stronghold commanderies following the Reform would therefore suggest that the regime managed to establish a stronger presence in the localities it had otherwise only ruled indirectly, as these newly built state

apparatuses would help manage populations that it had not possessed previously.[72]

We estimate Equation 1 using the number of counties during each ruler reign as the dependent variable. Results are reported in columns (1) and (2) of Table A1. Column (1) is the baseline specification with two-way fixed effects, column (2) adds interaction between geographic controls and post-reform dummy and commandery-level controls, and province-period fixed effects to eliminate any time-varying confounding at the province level.[73] Findings show that the Reform led to an expansion of county government offices in stronghold commanderies. Coefficient sizes are between 0.944 and 1.05, which represent a rise between 22.78% and 25.34% compared with the mean of 4.144. Both estimates are statistically significant.

In columns (3), (4), (5), and (6) of Table A1, we re-estimate Equation 1 using the number of elite-led rebellions and peasant uprisings as the dependent variables. The coefficient of interest is statistically insignificant and small in magnitude across all specifications, suggesting that NW's state-building efforts did not incite rebellions led by either local elites or commoners in stronghold commanderies. These quantitative non-results are in line with the narrative in Section 3 that the Reform saw initial but by and large muted resistance. They are surprising from a political economy point of view - a reform with such a success should have antagonized the local powerholders.[74] We argue in Section 2 and demonstrate in Sections 5 and 6 that this was because the NW regime implemented a compensation strategy that successfully re-aligned the interests of the aristocrats with the state and therefore resolved their resistance.

[72] This result is direct evidence for the regime's success in taking over the localities previously under the *de facto* rule by the aristocrats and thus the most relevant to the distributional conflict conceptualized in this paper. In addition, the historical discussions in this section and Section 3 suggest that the Chinese state also strengthened in manifold dimensions across all localities under NW as a result of the Reform.

[73] Geographic controls include terrain ruggedness index, river density, and suitability index of rice and wheat. Commandery-level controls are the number of civil conflicts and foreign invasions at the commandery-level, lagged one period. We follow Yan (2007) to determine which commanderies fall under which provinces

[74] A reform that undermines the interests of the local powerholders may induce their rebellions directly, but also indirectly induce more rebellions by the commoners as it could reduce the local elites' willingness to repress rebellions against the ruler (Garfias and Sellars 2021*b*).

Table A1. Effects of Reform on State Capacity and Elite Rebellions.

| | County Government Offices | | Elite Rebellions$_{t+1}$ | | Peasant Uprisings$_{t+1}$ | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Stronghold × Reform | 1.050*** | 0.944*** | 0.006 | 0.041 | -0.079 | -0.052 |
| | (0.337) | (0.339) | (0.049) | (0.044) | (0.096) | (0.091) |
| Mean of D.V. | 4.144 | 4.144 | 0.087 | 0.087 | 0.207 | 0.207 |
| Period FE | Yes | No | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | Yes | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes | No | Yes |
| Observations | 1,478 | 1,478 | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.892 | 0.902 | 0.302 | 0.431 | 0.326 | 0.444 |

*Notes*: This table shows the effect of reform on the state capacity building, measured by the number of counties, elite rebellions and uprisings. The unit of observation is commandery-period. The data of county is not available for each commandery so we only have 1478 observations. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

# B Additional Tables

Table A2. Definition of Time Period

| **Years** | **Period Name** | **Reigning Emperor** |
|---|---|---|
| 398–409 | Later Daowu | Emperor Daowu |
| 410–423 | Mingyuan | Emperor Mingyuan |
| 424–438 | Earlier Taiwu | Emperor Taiwu |
| 439–452 | Later Taiwu | Emperor Taiwu |
| 453–465 | Wencheng | Emperor Wencheng |
| 466–476 | Xianwen | Xianwen, first as Emperor, then as Emperor Emeritus |
| 477–490 | Empress Dowager Feng | Xiaowen as Emperor, Empress Dowager Feng as Regent |
| 491–499 | Xiaowen | Emperor Xiaowen |
| 500–514 | Xuanwu | Emperor Xuanwu |
| 515–527 | Xiaoming | Emperor Xiaoming |
| 528–534 | Last Years | Emperors Xiaozhuang, Jiemin and Xiaowu |

*Notes*: This table shows our coding of emperor reign.

Table A3. Summary Statistics of Main Variables

| **Variables** | **N** | **Mean** | **SD** | **Min** | **Max** |
|---|---|---|---|---|---|
| *Panel A: Commandery-Period Level* | | | | | |
| Aristocrats recruited per year (main) | 2,739 | 0.020 | 0.100 | 0.000 | 1.500 |
| Aristocrats recruited per year (restrictive) | 2,739 | 0.010 | 0.090 | 0.000 | 1.330 |
| Aristocratic clans recruited | 2,739 | 0.100 | 0.400 | 0.000 | 4.000 |
| Number of county government offices | 2,739 | 4.1441 | 2.484 | 1 | 23 |
| Civil conflicts | 2,739 | 0.050 | 0.270 | 0.000 | 5.000 |
| Foreign invasions | 2,739 | 0.010 | 0.120 | 0.000 | 2.000 |
| *Panel B: Commandery Level* | | | | | |
| Has stronghold(s) | 249 | 0.165 | 0.372 | 0 | 1 |
| Number of great clans in $4^{\text{th}}$ century | 249 | 2.117 | 3.592 | 0 | 27 |
| Presence of $4^{\text{th}}$ century warfare | 249 | 0.458 | 0.500 | 0 | 1 |
| Provincial capital dummy | 249 | 0.245 | 0.431 | 0 | 1 |
| Terrain ruggedness index | 249 | 466.816 | 362.069 | 7.106 | 1,388.678 |
| River density | 249 | 447.986 | 185.522 | 0 | 1,247.706 |
| Rice suitability index | 249 | 669.794 | 1,011.557 | 0 | 5,749.424 |
| Wheat suitability index | 249 | 3,300.505 | 1,965.893 | 0 | 8,277.250 |
| *Panel C: Individual-Period Level* | | | | | |
| Max rank | 3,509 | 11.172 | 4.651 | 0 | 18.25 |
| Pure office | 3,672 | 0.435 | 0.496 | 0 | 1 |
| Regional senior office | 3,672 | 0.096 | 0.295 | 0 | 1 |
| Central senior office | 3,672 | 0.175 | 0.380 | 0 | 1 |
| Central junior office | 3,672 | 0.668 | 0.471 | 0 | 1 |
| Regional civil chief | 3,672 | 0.318 | 0.466 | 0 | 1 |
| Regional civil chief: other jurisdictions | 3,672 | 0.290 | 0.454 | 0 | 1 |
| Regional civil chief: home jurisdiction | 3,672 | 0.040 | 0.195 | 0 | 1 |
| Regional military chief | 3,672 | 0.154 | 0.361 | 0 | 1 |
| Regional military chief: other jurisdictions | 3,672 | 0.154 | 0.361 | 0 | 1 |
| Regional military chief: home jurisdiction | 3,672 | 0.003 | 0.057 | 0 | 1 |
| Personnel office | 3,672 | 0.021 | 0.144 | 0 | 1 |
| Rectifier | 3,672 | 0.041 | 0.199 | 0 | 1 |
| Promotion | 3,054 | 0.597 | 0.491 | 0 | 1 |
| Punishment | 3,672 | 0.087 | 0.283 | 0 | 1 |
| *Panel D: Individual Level* | | | | | |
| Father above rank five | 2,524 | 0.601 | 0.490 | 0 | 1 |
| Member of imperial household | 2,524 | 0.175 | 0.380 | 0 | 1 |
| Ethnic Han | 2,524 | 0.622 | 0.485 | 0 | 1 |

*Notes*: This table presents summary statistics of main variables used in the analysis. For definitions of main variables, see Table A16.

Table A4. Placebo Test Using Non-Stronghold Commanderies

| | Number of Clan Members Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| TopPosts×Reform | 0.109 | 0.124 | | |
| | (0.071) | (0.107) | | |
| Longevity×Reform | | | 0.119 | 0.127 |
| | | | (0.070) | (0.083) |
| Mean of D.V. | 0.058 | 0.058 | 0.058 | 0.058 |
| Clan FE | Yes | Yes | Yes | Yes |
| Period FE | No | Yes | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | Yes | Yes | Yes | Yes |
| Province-Period FE | Yes | No | No | Yes |
| Observations | 495 | 495 | 495 | 495 |
| R-squared | 0.568 | 0.527 | 0.528 | 0.572 |

*Notes*: This table presents placebo results of the heterogeneous effect of the reform. We restrict our sample to aristocratic clans and commanderies without strongholds. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A5. Pre-trend Test

| | Number of Aristocrats Recruited |
|---|---|
| | (1) |
| Stronghold×Reform$_{t-6}$ | -0.016 |
| | (0.011) |
| Stronghold×Reform$_{t-5}$ | -0.015 |
| | (0.013) |
| Stronghold×Reform$_{t-4}$ | -0.13 |
| | (0.010) |
| Stronghold×Reform$_{t-3}$ | -0.010 |
| | (0.009) |
| Stronghold×Reform$_{t-2}$ | -0.003 |
| | (0.013) |
| Stronghold×Reform | 0.045*** |
| | (0.017) |
| Stronghold×Reform$_{t+1}$ | 0.087*** |
| | (0.033) |
| Stronghold×Reform$_{t+2}$ | 0.059* |
| | (0.031) |
| Stronghold×Reform$_{t+3}$ | 0.061*** |
| | (0.023) |
| Stronghold×Reform$_{t+4}$ | 0.105** |
| | (0.053) |
| Controls | Y |
| Period FE | Y |
| Commandery FE | Y |
| Observations | 2,739 |
| R-squared | 0.478 |

*Notes*: This table presents the event study results. The unit of observation is commandery-period. Controls include the number of disasters, civil conflicts and foreign invasions in the previous period. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A6. Alternative Definition of Aristocracy

| | Number of Aristocrats Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.063** | 0.058** | 0.055** | 0.031* |
| | (0.027) | (0.027) | (0.026) | (0.016) |
| Mean of D.V. | 0.014 | 0.014 | 0.014 | 0.014 |
| Period FE | Yes | Yes | No | Yes |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | Yes | Yes |
| Province-Period FE | No | No | Yes | No |
| Commandery linear trend | No | No | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.462 | 0.471 | 0.482 | 0.801 |

*Notes*: This table presents the robustness of definition of aristocracy. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A7. Robustness Checks with Sub-samples

| | Number of Aristocrats Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.068** | 0.054** | 0.083** | 0.063** |
| | (0.033) | (0.027) | (0.037) | (0.030) |
| Mean of D.V. | 0.033 | 0.033 | 0.028 | 0.028 |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Adjacent commanderies only | Yes | Yes | No | No |
| Dropping unoccupied commanderies | No | No | Yes | Yes |
| Controls | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 1,309 | 1,309 | 1,938 | 1,938 |
| R-squared | 0.458 | 0.496 | 0.509 | 0.538 |

*Notes*: This table presents the robustness checks using adjacent commanderies that didn't have strongholds as the control group. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A8. Alternative Measurement

| | Number of Aristocrats Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.062** | 0.053** | 0.068** | 0.058** |
| | (0.027) | (0.024) | (0.029) | (0.027) |
| Mean of D.V. | 0.014 | 0.014 | 0.014 | 0.014 |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Excluding aristocrats with disputed origins | Yes | Yes | No | No |
| Excluding migrated aristocrats | No | No | Yes | Yes |
| Controls | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.479 | 0.505 | 0.479 | 0.502 |

*Notes*: This table presents the robustness of the measurement of aristocracy. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A9. Alternative Outcomes

| | Total Aristocrats Serving | | Aristocrats Recruited (logged) | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.156*** | 0.141*** | 0.063*** | 0.057*** |
| | (0.055) | (0.054) | (0.022) | (0.022) |
| Mean of D.V. | 0.036 | 0.036 | 0.016 | 0.016 |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.474 | 0.494 | 0.514 | 0.532 |

*Notes*: This table presents the robustness of results using alternative outcomes. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A10. Placebo Test Using Non-Aristocrats

| | Non-Aristocrats | | Non-Aristocratic Han | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.033 | 0.020 | 0.034 | 0.029 |
| | (0.023) | (0.024) | (0.022) | (0.020) |
| Mean of D.V. | 0.031 | 0.031 | 0.018 | 0.018 |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Controls | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.823 | 0.834 | 0.577 | 0.611 |

*Notes*: This table presents the results of placebo test. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A11. Addressing the Effect of Capitals

| | Number of Aristocrats Recruited | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Stronghold×Reform | 0.065** | 0.054** | 0.077** | 0.070** |
| | (0.028) | (0.027) | (0.031) | (0.029) |
| Mean of D.V. | 0.020 | 0.020 | 0.019 | 0.019 |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Distance to capitals×Reform | Yes | Yes | No | No |
| Drop capitals | No | No | Yes | Yes |
| Controls | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,739 | 2,739 | 2,717 | 2,717 |
| R-squared | 0.488 | 0.515 | 0.475 | 0.494 |

*Notes*: This table presents the robustness results mitigating the effect of capitals. The unit of observation is commandery-period. Capitals of the NW are Ping Cheng and Luo Yang. Distance to capitals is the commandery's shortest great-circle distance to the nearest capitals of the NW. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

Table A12. More Controls Added

| | Number of Aristocrats Recruited | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Stronghold×Reform | 0.071** | 0.065** | 0.055** | 0.048* | 0.078** | 0.069** |
| | (0.035) | (0.032) | (0.027) | (0.026) | (0.032) | (0.030) |
| Mean of D.V. | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 | 0.020 |
| Period FE | Yes | No | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Wars (4th century)×Reform | Yes | Yes | No | No | No | No |
| Historical aristocrats×Reform | No | No | Yes | Yes | No | No |
| Provincial capital×Reform | No | No | No | N | Yes | Yes |
| Controls | No | Yes | No | Yes | No | Yes |
| Province-Period FE | No | Yes | No | Yes | No | Yes |
| Observations | 2,739 | 2,739 | 2,739 | 2,739 | 2,739 | 2,739 |
| R-squared | 0.477 | 0.495 | 0.491 | 0.512 | 0.474 | 0.494 |

*Notes*: This table presents the robustness of main effect by adding more controls. The unit of observation is commandery-period. Controls include the number of civil conflicts and foreign invasions (lagged), and the interaction between post-reform dummy and terrain ruggedness index, river density, and suitability index of rice and wheat. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

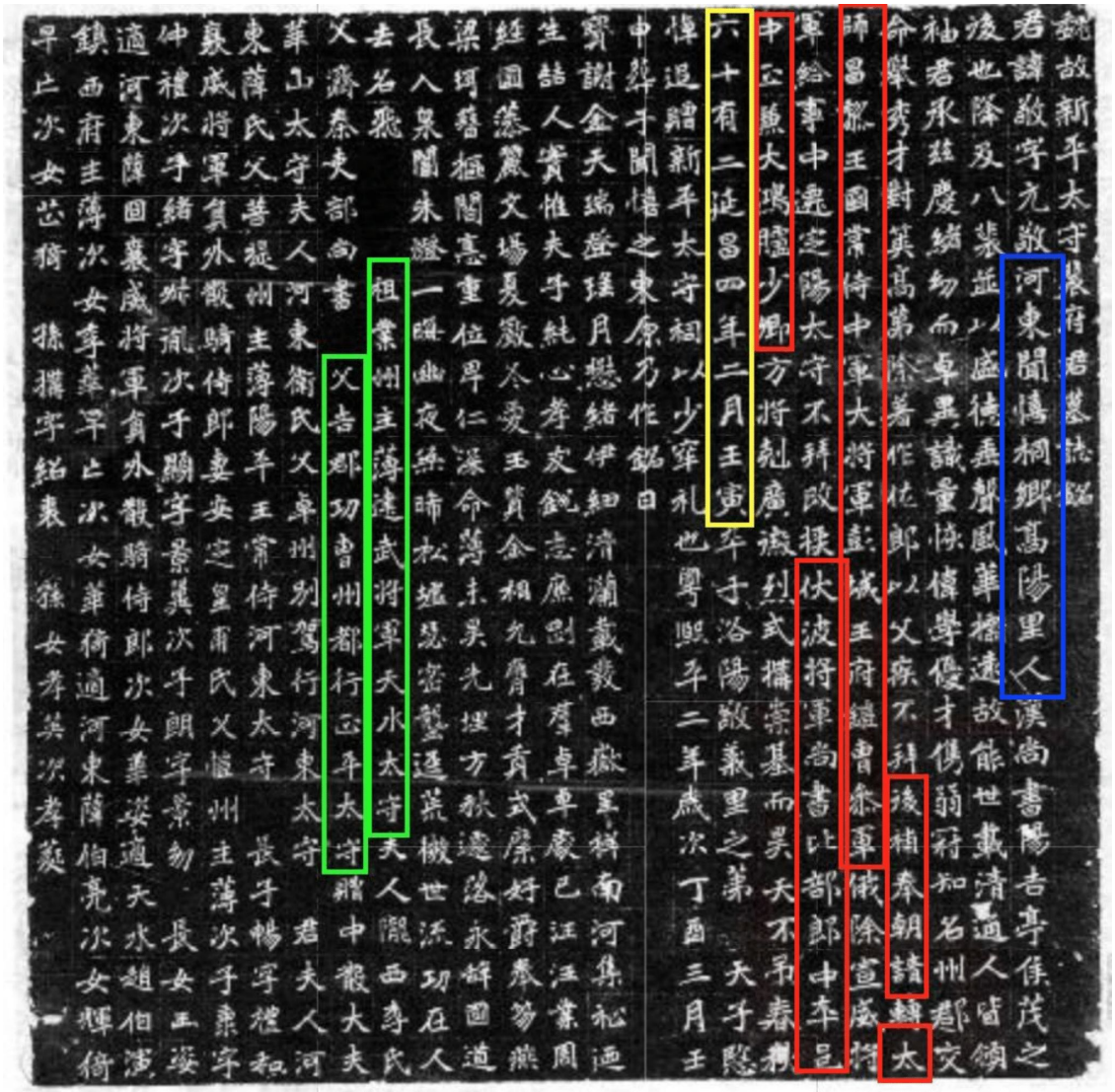
Table A13. Importance of Offices in the Ministry of Personnel

| | Senior Offices | | |
|---|---|---|---|
| | Central | Regional | Pure Office |
| | (1) | (2) | (3) |
| Clan Member in Personnel Ministry in Periods $\leq t \times$ Reform | 0.018 | 0.105*** | 0.004 |
| | (0.038) | (0.038) | (0.039) |
| Clan Member in Personnel Ministry in Periods $\leq t$ | 0.074** | -0.032 | 0.084** |
| | (0.030) | (0.032) | (0.037) |
| Mean of D.V. | 0.176 | 0.096 | 0.433 |
| Clan FE | Yes | Yes | Yes |
| Period FE | Yes | Yes | Yes |
| Commandery FE | Yes | Yes | Yes |
| Observations | 3,715 | 3,715 | 3,715 |
| R-squared | 0.164 | 0.114 | 0.184 |

*Notes*: This table presents the effect of personnel office-holding on the career development. The unit of analysis is individual-period. Patronage network in personnel office denotes whether other clan members of a elites had served in the personnel office before the current position. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

# C Additional Figures

Figure A1. Example of a Tomb Inscription from Northern Wei



Epitaph of Pei Jing (454-515). The blue rectangle shows that Pei Jing comes from Wenxi county of Hedong commandery. The red rectangle shows his career history with office title description. The yellow rectangle shows his age and date of death. The green rectangle shows offices held by his father and grandfather.

# D An Illustrative Model

**Setup.** In the model, there is one autocratic ruler, $R$, and one aristocrat, $A$. The ruler has total political rents $s$. The aristocrat controls the productive assets and population of a locality $L$. He is able to tax the productive output of $L$, and receive an income of $\tau_L$.

The self-interested ruler wants to build state capacity. That is, she decides to take over the aristocrat's taxation income from locality $L$. In our historical context, this corresponds to taking over $A$'s control of the population of $L$. The ruler can choose to seize $A$'s control by force, or by offering him an office $i$ in the bureaucracy as compensation for his economic loss. If the ruler gives an offer, then it becomes the aristocrat's turn to decide whether to accept the offer, or to reject the offer and rebel. The sequence of events is illustrated in Figure A2.

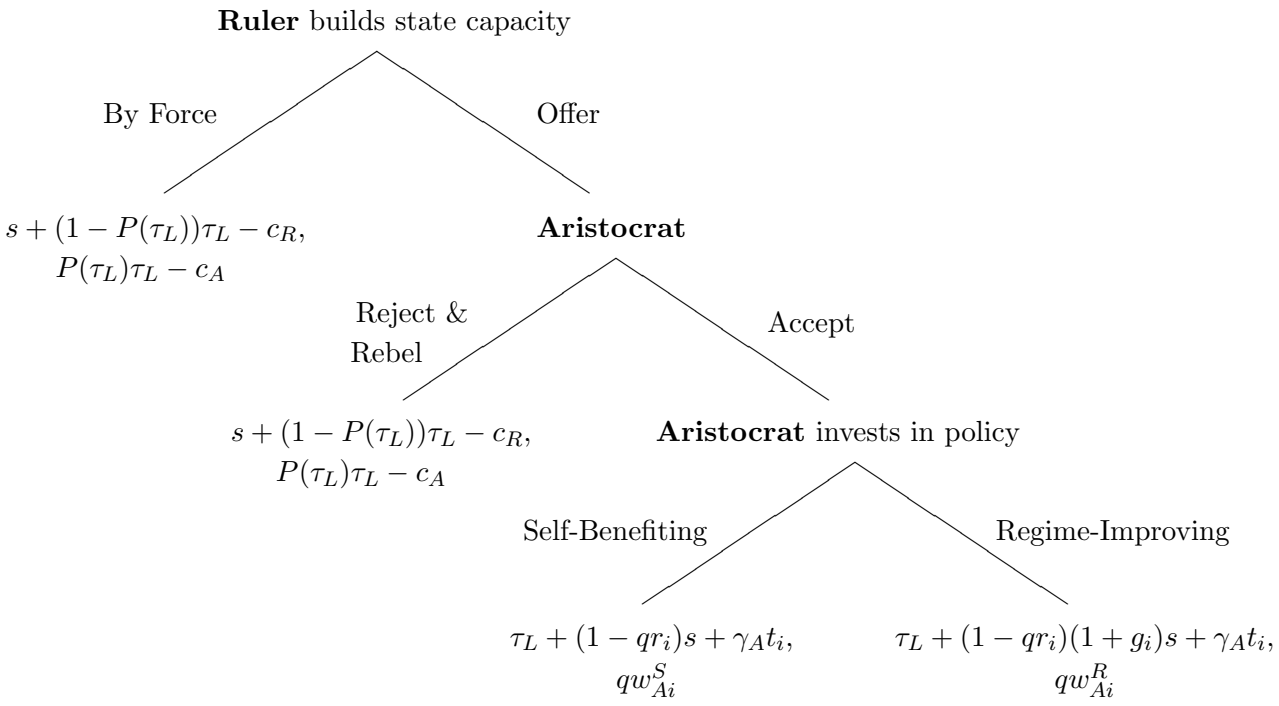



Figure A2. Game Tree

If $R$ chooses to seize $A$'s income by force, or if $A$ rejects $R$'s offer and rebels, a violent conflict breaks out. This conflict incurs a fixed cost $c_R$ to the ruler, and $c_A$ to the aristocrat. The winner receives $\tau_L$, the aristocrat's taxation income from locality $L$. The probability that $A$ wins the conflict follows a function $P(\tau_L)$, which takes a value between 0 and 1 and is increasing in $\tau_L$. That is, higher income can translate to greater military strength and therefore a higher probability of

success, and therefore the aristocrat's expected gain $P(\tau_L)\tau_L$ is increasing in $\tau_L$.[75]

Now, we turn to describe the compensation outcome. If $R$ gives $A$ an office $i$, and $A$ accepts the offer, the payoffs to both sides are modeled as follows. The ruler seizes the economic output of locality $L$, $\tau_L$, as part of the deal; the aristocrat assumes office $i$, and makes a policy investment.

To the ruler, office $i$ generates a payoff $\gamma_A t_i$. Here, $t_i$ embodies the administrative or military services performed by the holder of office $i$ that help stabilize, protect or enhance the interests of the regime. The value of these services is increasing in $\gamma_A$, which is the aristocrat's administrative competence.

To the aristocrat, office $i$ generates two types of payoffs: an *appropriable* payoff $u_{Ai}$, and shared rents $r_i s$. $u_{Ai}$ reflects what the aristocrat can appropriate from the office as his own. Recall from Section 3.1 that aristocratic families in medieval China accumulated political and economic capital from their involvement in prior dynasties. $u_{Ai}$ thus embodies the prestige and political capital attached to office $i$ that can be used by the aristocrat to enhance his family's socio-political status and power. $r_i \in (0,1)$ entails the fraction of total political rents that is paid to the holder of office $i$. This can include, for instance, wages, economic privileges and career advancement prospects as an official of the imperial bureaucracy.

After assuming office, the aristocrat chooses to invest in a policy that increases either $u_{Ai}$ or $s$ by a positive rate $g_i \in (0,1)$. That is, he can choose a policy that only increases his own political capital (for example, a tax exemption that only applies to his hometown); or a policy that enhances the interests of the entire regime, in which he owns a share (for example, laws and regulations that reduce nationwide corruption). In the former case, his payoff becomes $w_{Ai}^S = (1+g_i)u_{Ai} + r_i s$, and in the latter case, his payoff becomes $w_{Ai}^R = u_{Ai} + r_i(1+g_i)s$.

Lastly, ruler's credible commitment is captured by $q$. That is, with probability $q \in [0,1]$, $R$ commits to her compensation promise. With probability $1-q$, she will remove $A$ from office after she seizes control of the population and economy of locality $L$ and after the policy investment, in which case $A$ will receive zero payoff. Thus, the aristocrat's expected payoffs from holding office $i$ are $qw_{Ai}^S$ and $qw_{Ai}^R$ respectively.

**Compensation Equilibrium.** We know that $A$ will invest in the policy that gives him a higher payoff. Comparing $w_{Ai}^S, w_{Ai}^R$ reveals that $A$ will choose the self-benefiting policy if $u_{Ai} > r_i s$, and the regime-improving policy otherwise. Thus, in order for $R$ and $A$ to reach a compensation outcome,

[75] This functional property can be formally derived from the following maximization problem: $\max_{m_A}[\rho(m_A, m_R)\tau_L - m_A]$. Here, $m_R$ denotes the ruler's military strength, and $\rho(m_A, m_R) = \frac{m_A}{m_A+m_R}$ is the contest success function commonly used in the literature on conflict (see Dixit 1987, Skaperdas 1996). The aristocrat chooses the amount of military investment to maximize his expected payoff from a conflict against the ruler. By the Envelope Theorem, the value function of this problem is increasing in $\tau_L$. $m_R$ is treated as a constant and is abstracted away.

the following two conditions must be met:

$$\begin{aligned}\text{Aristocrat: } & q\big[\mathbb{1}(u_{Ai} > r_i s)w^S_{Ai} + \mathbb{1}(u_{Ai} \le r_i s)w^R_{Ai}\big] \ge P(\tau_L)\tau_L - c_A \\ & \Rightarrow q\big(u_{Ai} + r_i s + g_i \max\{u_{Ai}, r_i s\}\big) \ge P(\tau_L)\tau_L - c_A \qquad (4)\end{aligned}$$

$$\begin{aligned}\text{Ruler: } & \tau_L + \gamma_A t_i + (1 - qr_i)s + \mathbb{1}(u_{Ai} \le r_i s)g_i(1 - qr_i)s \ge s + (1 - P(\tau_L))\tau_L - c_R \\ & \Rightarrow qr_i s - \gamma_A t_i - \mathbb{1}(u_{Ai} \le r_i s)g_i(1 - qr_i)s \le P(\tau_L)\tau_L + c_R. \qquad (5)\end{aligned}$$

Combining the two conditions yields:

$$\begin{aligned}P(\tau_L)\tau_L \in \big[& qr_i s - \gamma_A t_i - \mathbb{1}(u_{Ai} \le r_i s)g_i(1 - qr_i)s - c_R, \\ & qr_i s + qu_{Ai} + c_A + g_i q \max\{u_{Ai}, r_i s\}\big].\end{aligned}$$

This model delivers the following predictions.

**Proposition 1** (Scope Condition)**.** *The compensation equilibrium prevails if and only if $\tau_L$ is neither too large nor too small.*

- Since $P(\tau_L)$ increases in $\tau_L$, it follows that $P(\tau_L)\tau_L$ is increasing in $\tau_L$. Thus, for $P(\tau_L)\tau_L$ to lie in an intermediate range, $\tau_L$ cannot be too large or too small. This means that, compared to the ruler, the aristocrat is neither too strong (has a high level of economic sources), nor too weak (has a low level of economic resources).
- The intuition is straightforward. If $A$ is weak, then $R$ can easily seize $A$'s control over $\tau_L$ by force, and does not need to resort to compensation. In contrast, if $A$ is strong, then $A$ can resist the ruler's state-building efforts by force with a relatively high probability of success, and does not need to accept the compensation offer.

We now focus on the compensation equilibrium.

**Proposition 2** (Bureaucratic Compensation)**.** *In the compensation equilibrium, an aristocrat receives a higher level of compensation* $\max\{w^S_{Ai}, w^R_{Ai}\}$ *if he controls more taxation income $\tau_L$.*

- A compensation offer that is optimal for the ruler and will be accepted by the aristocrat should satisfy Expression 4 with equality. From this expression, it is clear that if $A$ has higher $\tau_L$, then a higher $w^S_{Ai}$ or $w^R_{Ai}$ is required for Expression 4 to hold with equality.
- The intuition is simple. If $A$ controls more economic resources, $\tau_L$, he will have more to lose from $R$'s attempt to build state capacity, and thus will have greater incentives to resist $R$'s efforts. He will also have a higher ability to resist $R$, as he can invest more resources into

building his own military strength. Thus, this aristocrat will accept the compensation deal only if the deal gives him a sufficiently high payoff.

**Proposition 3** (Aristocratic Ability)**.** *Let A,A′ be two aristocrats, with claims to taxation income $\tau_L$, $\tau'_L$, and administrative ability $\gamma_A$, $\gamma'_A$ respectively. Suppose $\tau_L > \tau'_L$. All else being equal, there exists $\gamma^* < \gamma'_A$ such that the ruler prefers A over A′ when $\gamma_A \in [\gamma^*, \gamma'_A]$. In other words, the ruler is willing to trade off lesser ability for more taxation income.*

- The part of $R$'s payoff in the compensation equilibrium that depend on $\tau_L$ and $\gamma_A$ are, respectively, $\tau_L$ and $\gamma_A t_i$. From this expression, it is clear that $R$ will prefer $A$ over $A'$ as long as her extra payoff from $A$'s taxation income can fully or more than offset her loss from $A$'s lesser ability.

**Proposition 4** (Credible Commitment)**.** *An aristocrat accepts the compensation offer only if q is sufficiently high.*

- Inequality 4 is more likely to hold when $q$ is larger. A bigger $q$ reflects a higher likelihood that the ruler will keep her promise (e.g., if it is costly for $R$ to renege on her promise), and an increase in $q$ raises $A$'s expected payoff from the compensation offer.

**Proposition 5** (Interest Realignment)**.** *Consider only the set of offices that satisfy Expression 4 with equality. The ruler will prefer to give the aristocrat offices with $r_i s = u_{Ai}$ if $s$ or $g_i$ is sufficiently large.*

- Proof: the ruler compares two corner solutions.
  - The first corner solution is where the ruler chooses $r_i s = 0$, so that $u_{Ai}$ constitutes $A$'s only payoff. In this case, the ruler's payoff is equal to $\pi_1 := s + \tau_L + \gamma_A t_i$.
  - The second corner solution is where the ruler chooses an office with $r_i s = u_{Ai}$, which is the minimum level of $r_i s$ required to induce $A$ to invest in the regime-improving policy. Since $r_i s, u_{Ai}$ solve Expression 4 with equality, letting $V := P(\tau_L)\tau_L$, we know that $u_{Ai} = r_i s = \frac{V - c_A}{q(2+g_i)}$. Now, the ruler's payoff is equal to $\pi_2 := s + g_i s - (1+g_i)\frac{V-c_A}{q(2+g_i)} + \tau_L + \gamma_A t_i$.
  - The ruler prefers the second corner solution if $\pi_2 > \pi_1$, that is, if $s \geq (1+g_i)\frac{V-c_A}{g_i q(2+g_i)}$. The LHS of this inequality increases in $s$, and the RHS decreases in $g_i$.
- The intuition is as follows. $A$ invests in the regime-improving policy if and only if $r_i s \geq u_{Ai}$. That is, if and only if his own interests are sufficiently aligned to the regime to allow him to adequately benefit from the regime-improving policy. For $R$, the benefit and cost of the

regime-improving policy are as follows: growth on the stock of $s$; and rents shared with $A$ in order to align his interests. Since the latter is bounded by $A$'s payoff from the conflict outcome (his "outside option"), the ruler will prefer the regime-improving policy if growth on the stock of $s$ can more than offset the cost of this policy. In other words, she will prefer to realign $A$'s interests to the regime if gains from policy investments are sufficiently high.

# E Instrumental Variable (IV)

This section reports results obtained by instrumenting for stronghold commanderies with the shortest possible geographic distance between each commandery and the routes taken by armies in the "War of the Eight Princes" (301 - 307 AD),[76] a series of intense military conflicts between members of the imperial household of the Western Jin dynasty. The scale of this war was so massive that it completely depleted the dynasty's material and human resources and brought local institutions to ruins, rendering it defenseless against "the later barbarian rebellions that resulted in a divided China for the next three centuries" (Dreyer 2009: 112).[77] Luoyang, the imperial capital, fell to the barbarians in 311 AD, only four years after the civil war's conclusion.[78] The dynasty would exist in name only for another five years.

This historical episode was chiefly responsible for the rise of 4$^{\text{th}}$ century strongholds. The six years of chaos left the social and political order "irreparably damaged," led internal migration to increase "from a trickle to a flood as refugees fled the violence in Northern China, and bandits [to arise] everywhere" (Graff 2003: 47). Further compromising the safety of northern peasants was the armed conflicts between the migrant and native populations (Graff 2003: 47-48). With the agrarian economy already in ruin, disastrous consequences as such only further compelled peasants to take refuge under the protection of powerful aristocrats with strongholds and submit their freedom as serfs and armed retainers (Section 3). The IV measures the commandery-level exposure to the impact of this episode. As princely armies desperately scrambled for food and materials on their way to and from the capital (and to and from the bases of hostile princes), the residents near their routes were the most unfortunate and had to seek protection. Historical records abound for the humanitarian crises ensued. For example, Prince Sima Yong of Hejian twice led his troops raid the residents in the Henan commandery (a commandery with later mentions of stronghold in our data), the first time killing more than a hundred thousand civilians and the second time committing cannibalism.[79]

[76] The number "eight" in this phrase is a misnomer. Two of the eight princes, Sima Wei and Sima Liang, did not participate in any civil war *per se*, but in palace coups only. In addition, three royal princes who fought civil wars commanding their own troops were not included in the list of "eight." They were: Sima Xiao, Sima Teng and Sima Shi. See *Book of Jin*, volumes 37, 38 & 59. We compute the distance from the centroid of each commandery to the closest point along the routes taken by armies in the "War of the Eight Princes"

[77] Regarding the legacy of this brief but immensely catastrophic episode, the evaluation in Dreyer (2009) reflects the consensus in historical research. See (Graff 2003: 50-51) for a similar view.

[78] The first so-called "barbarian kingdom" was established in 304 AD, while the princes were still fighting each other for the throne.

[79] *Comprehensive Mirror in Aid of Governance*, volume 85. Another source of disaster for residents living near these routes is that warring princes often forcefully conscript civilians to either replenish their troops or provide logistical supplies. See Prince Sima Teng of Xincai as an example in *Book of Jin*, volumes 59 & 101.

## E.1 Validity

The plausible exogeneity of the IV follows the logic that regional leaders' relations with the capital unexpectedly changed due to the rise and fall of political leaders in the central government.[80]

The change of fortune in the central government came at a particular time. The founding Western Jin emperor died in 290 AD, leaving, by primogeniture, Sima Zhong on the throne. The young emperor had known intellectual disabilities and his reign was thus under the *de facto* regency of Empress Jia.[81] With the emperor in control, Empress Jia and her clansmen were able to maintain political authority despite challenges from the Western Jin princes and a few other elites.[82] Her fortune dramatically fell after she imprisoned and murdered the crown prince in 300 AD, a miscalculation that provided the pretext for ambitious Western Jin princes to immediately rebel laying claim to the throne one after another.[83]

For an elite of Western Jin to participate in this war as a military leader, two conditions seemed to be necessary. First, he would need to be a royal prince so as to have dynastic claim to the throne. Second, it would need to be that he, when the political opportunity at the center presented itself, happened to be located in a region outside the capital as a military commander or located in his own regional fiefdom. Importantly, the Western Jin princes, just like all other high-ranked officials throughout most of Chinese history, were on constant rotation between service in the central bureaucracy and service in a region or between service in one region and in another region. As princes, their career rotation also included relocating to their own fiefdoms from time to time, as in the cases of Sima Yi and Sima Yue, both of whom marched on Luoyang from their kingdoms in Hejian and Donghai, respectively.[84]

At any point in time, due to the rotation of governors in China and the fact that only some governors were royal princes, some regions would be governed by the princes but not others. Therefore, the regions where leaders would raise armies and take them all the way to the capital would have been different had Empress Jia's premature move come a few years before or after 300 AD. In other words, the distribution of commandery-level exposure to the disasters of war and its resulting banditry and conflicts between the migrants and native population, measured by the IV, would have been different. And the variation in the presence of strongholds across commanderies was largely a reaction to such a distribution.

[80] For applications of this logic in modern context, see Jia, Kudamatsu and Seim (2015) and Jia (2017).
[81] *Book of Jin*, volumes 31 & 59.
[82] Ibid.
[83] Ibid & Wang (2003): 199. There is a *Game of Thrones* analogy to the situation where the controversial Empress Jia and the intellectually-disabled emperor Sima Zhong ruled the empire with a crown prince in line: while the Targaryen "Mad King" was judged unfit to rule, a lot of elites still respected the political authority of the regime because the crown prince, Rhaegar, was a proper one and expected to take the throne later.
[84] *Book of Jin*, volume 59

Table A14. Exclusion Restriction

| | Elite Rebellions | | Uprisings | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Distance × Reform | -0.008 | -0.017 | 0.038 | 0.024 |
| | (0.022) | (0.021) | (0.031) | (0.030) |
| Mean of D.V. | 0.020 | 0.020 | 0.020 | 0.020 |
| Geographic conditions × Reform | Yes | Yes | Yes | Yes |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,442 | 2,442 | 2,442 | 2,442 |
| R-squared | 0.273 | 0.454 | 0.309 | 0.460 |

*Notes*: This table presents exclusion restrictions test. The unit of observation is commandery-period. Geographic conditions include terrain ruggedness, agriculture potential and river density. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

The validity of the IV also requires that it only affects aristocratic recruitment through the presence of strongholds. One may concern that this civil war in the very beginning of the 4$^{th}$ century could affect future conflicts, which would in turn affect recruitment. It's reassuring to us, however, that the instrument actually has no effect on either type of conflict, elites rebellions or peasants uprisings, as evident in Table A14. In addition, there exist no differences in military merits between aristocrats in the treatment and control groups (Table 3), making it further unlikely that the legacy of the conflict itself had any direct bearing on the minds of the NW rulers when the compensatory strategy was devised.

## E.2 Results

We now report the 2SLS estimates in Table A15. As shown in columns (1) and (2), the first-stage IV-estimates are substantial and statistically significant. The high F-statistics indicate that our instrumental variable is quite strong. Columns (3) and (4) in the second stage show that, using the shortest geographic distance between each commandery and the routes taken by armies in the "War of the Eight Princes" as instrument, the commanderies with stronghold saw a significant surge in the number of aristocrats recruited into the bureaucracy. The instrumented coefficients are almost two times larger than the baseline estimates in Table 1, suggesting that the endogenous stronghold measure likely under-estimates the real effect of the compensation strategy.

Table A15. IV Results

| | Reform×Stronghold | | Number of Aristocrats Recruited | |
|---|---|---|---|---|
| | First stage | | Second stage | |
| | (1) | (2) | (3) | (4) |
| Distance × Reform | -0.133*** | -0.142*** | | |
| | (0.023) | (0.023) | | |
| Stronghold × Reform | | | 0.221*** | 0.233*** |
| | | | (0.078) | (0.082) |
| Mean of D.V. | 0.088 | 0.088 | 0.375 | 0.375 |
| Geographic conditions × Reform | Yes | Yes | Yes | Yes |
| Period FE | Yes | No | Yes | No |
| Commandery FE | Yes | Yes | Yes | Yes |
| Province-Period FE | No | Yes | No | Yes |
| Observations | 2,442 | 2,442 | 2,442 | 2,442 |
| Kleibergen-Paap F-statistic | | | 32.544 | 36.752 |

*Notes*: This table presents instrumented results. The unit of observation is commandery-period. Geographic conditions include terrain ruggedness, agriculture potential and river density. Robust standard errors in parentheses are clustered at commandery level. ***, **, * denote significance at 1%, 5%, 10% level.

# F Additional Historical Context

## F.1 Emperor Xiaowen's Sinicization Reforms

Contemporary Chinese state propaganda tends to highlight a cultural reform of ethnic integration beginning in 493 AD under Emperor Xiaowen.[85] This so-called "sinicization" narrative focuses on the Tuoba rulers adopting Han Chinese clothing, language, and surnames, as well as relocating the central government to Luoyang, the capital of former Chinese dynasties such as the Later Han and Western Jin empires.[86] Historical research both in and outside China, alongside historical records themselves, however, accords a much greater importance to two other components of the sinicization movement: "aristocratization" (e.g., Pearce 2019, Ebrey 1978) and the (renewal of) military invasions of the south (e.g., Pearce 2019, Zhang 2008, Li 2018).

The former refers to state-sponsored reclassification of status hierarchy for supposedly all clans under NW, a process that further elevated several dozens of Chinese aristocratic families and merged the royal household as well as other Xianbei nobles with those families into a unified Chinese aristocracy (Pearce 2019; Ebrey 1978). From a political economy perspective, our empirical findings reveal that this part of the sinicization movement was probably to provide a cultural pretext for the continuation of the compensation strategy that would continue to benefit the aristocrats from the stronghold regions (and benefit them mainly) into and well after Emperor Xiaowen's reign.[87] In the latter component, Emperor Xiaowen and his successors now saw themselves as fully Chinese rulers who would have to bring *all of China* under heaven into the rule of their dynasty through conquest (Li 2018). It was previously the southern Chinese dynasties that were on the offensive to reunify all of China. NW's Xianbei horsemen could defeat these advances, but they, in the attempt to revenge and extract concessions, often foundered in the region between the Huai and the Yangtze Rivers. Sustained conquest campaigns were impossible without a strong state, as they entailed recruiting massive numbers of Chinese *footmen* who could fight in the waterways and lay cities under siege, as well as constructing a full set of infrastructure on land and water for reliable supply lines (Li 2018: 350-420). The Reform thus under-girded the renewal of military invasions in NW's sinicization drive (Li 2018: 396).

[85] A recent example is the short documentary produced by the Chinese Central State Television, "Reform under Emperor Xiaowen of Northern Wei," https://www.youtube.com/watch?v=CsiNs7LVgMA, access date: May 28, 2021

[86] ibid

[87] The sinicization movement is chronologically post-treatment. The cultural channel as an explanation is also automatically excluded: as both our treated and control groups consist of Han Chinese aristocrats only, the DD and DDD analyses essentially investigate the differential career privleges *within* the Han Chinese aristocracy.

## F.2 The End of NW in 534 AD

NW collapsed in 534 AD due to rebellions that were initiated by the Six Garrison populations settled in the regime's northern frontier (Pearce 2019: 181). Such uprisings led to a destructive chain of events culminating in the general Erzhu Rong marching to the capital and massacring the ruling elites attending his arrival ceremony with a large army consisting of co-opted rebels. Although traditional accounts attributed the rebellions to Emperor Xiaowen's sinicization drive that alienated the left-behind northerners with the relocation of capital southward to Luoyang and the aristocratization policy, more recent research rejects this interpretation. Analyzing detailed data for the profiles of elites involved in this episode, Xue (2020) shows that the so-called "Six Garrison Rebellion" had little to do with the northerners' resentment of the elevated, integrated Chinese-Xianbei aristocracy based in Luoyang, because it was essentially a class conflict *within* the northern frontier settlement seeded in the inequality between upper-class officers and the lower-class settlers exacerbated by severe weather conditions (Chapters 1-2).

In fact, NW's successor states, founded by the Six Garrison elites, both continued the aristocratization policy in their own ways (Zhang 2015). It's well-established in empirical political economy research that individual leaders do matter in altering a country's political fate, particularly in authoritarian regimes like NW (e.g., Jones and Olken 2005, 2009). A closer attention to basic biographic data of NW emperors is largely in line with this well-known finding. Emperor Xiaowen naturally died of a young age at 33, his successor (Xuanwu) even younger at 25. Successive unexpected departures of emperor left the regime inherently unstable and unable to cope with the severe natural disasters hitting the northern frontier. In any case, the state-building Reform of 485 - 486 AD and the compensation strategy were unlikely the cause of regime collapse. Recent research in military history even suggests that the renewed conquest of the south, enabled ultimately by the Reform, would have succeeded in re-unifying China under NW (an accomplishment that would have very much enhanced the regime's imperial authority and thus survival odds) had Emperor Xiaowen not died too prematurely and left his young son to misjudge and miss the strategic opportunity offered by a Southern dynasty civil war in 500 AD (Zhang 2016: 499-500).[88] The *three-elder* system lasted for a century (Hou 2002), and the *equal field* land policy continued well into the 700s (Huang 1996). The immediate geopolitical legacy of the Reform is China's eventual re-unification in 589 AD under Yang Jian, the son of a NW official, who subdued the southern dynasty with a formidable army raised and supplied with the immense extractive capacity of the northern Chinese state (Huang 1996: 94-97).

[88]The incompetence of Emperor Xiaowen's successor, Emperor Xuanwu, would lead to another missed strategic opportunity that would have further enhanced regime legitimacy through successful southern campaigns (*Book of Wei*, vol. 65).

### F.3 Excerpt from Book of Wei

To provide more context on the nature of our data sources, below we translate an excerpt from the biography of Wei Lang, a member of the prominent Clan Wei of Jingzhao, from Volume 45 of the *Book of Wei*.

> Wei Lang, courtesy name You-Guan, is from Duling, Jingzhao. His family had been one of the most prestigious in the Capital region for generations. His grandfather Kai was a Mighty General of Jin, and Governor of the Changle and Qinghe commanderies. His father Kui was a Director of Personnel and Court Attendant for Murong Chui. At a young age, Lang had both talent and fame, he fled to Jicheng during the civil unrest in the Murong regime. He was appointed by Emperor Taiwu as the Governor of Xianyang commandery, and then transferred to the Governor of Wudu Commandery. The rebellion of Hao Wen, the Town General of Xingcheng, and Gai Wu, caused disruptions in the Guanzhong Region, and Lang dedicated himself to appease the people, and many in his jurisdiction survived the turmoil. He served in the commanderies for sixteen years. He died.

From this excerpt, it is clear that Lang's choronym is Jingzhao. He was an official during the reign of Emperor Taiwu. According to Mu, Wu and Wei (2016), Xianyang commandery came under NW's rule in 430 AD, and Wudu commandery was created in 436 AD. Moreover, the famous Gai Wu rebellion took place in 445-446. Since Lang served a total of sixteen years, it was most likely that he was appointed the two Governor offices during Earlier Taiwu, and the second office lasted into Later Taiwu.

# G Additional Details on Variable Construction

## G.1 Rank of Offices

The main source of information on office ranks is the *Treatise on State Offices* in the *Book of Wei*. The *Treatise* records two decrees released by Emperor Xiaowen that tabulated office titles against ranks, one in 493 and the other in 499 AD. The two decrees differ in two respects: first, they cover different offices, though some overlaps do exist; second, they follow different rank classifications, which we discuss below.[89]

We use the tabulation in the 499 decree as the basis of our rank-number conversion, the objective of which to assign each rank to a numerical value that represents its position in the bureaucratic hierarchy. If an office appears in the 499 decree or in both decrees, we use its rank in the 499 decree. If it only appears in the 493 decree, we use its rank in this decree. Since the two decrees have different rank classifications, we design our conversion algorithm in such a way that ranks in the two decrees are assigned to numbers that reflect their relative positions within their respective classifications.

We first convert Chinese ranks in the 499 decree into numerical values. Our conversion algorithm derives from the decree's rank classifications, which work as follows. All state offices falls under nine ranks, with Rank 9 being the lowest and Rank 1 being the highest. Each rank is divided into the principal class (*zheng*, denoted by A) and the junior class (*cong*, denoted by B). From Rank 4 downwards, each class is further subdivided into the upper grade (*shang*, denoted by number 1) and the lower grade (xia, denoted by number 2). In other words, each rank above Rank 4 has two half-ranks, and each rank below Rank 4 has four quarter-ranks.

Our conversion method is as follows.

1. The lowest rank, which is Rank 9B2 (Rank Nine Junior Lower, *cong-jiupin-xia*), is assigned number 1.

2. Then, each quarter-rank corresponds to a difference of 0.5 in numerical value. Thus, Rank 9B1 would be 1.5, and Rank 4A1 would be 12.5.

3. Since ranks above Rank Four do not have quarter-ranks, the rank that is immediately above Rank 4A1 is Rank 3B. It would be assigned a value of 13.25 for the following reason: if Rank 3B2 and 3B1 had existed, they would have been converted to 13 and 13.5 respectively. Therefore, Rank 3B, which lies in between 3B2 and 3B1, should receive an intermediate value between 13 and 13.5.

[89] As pointed out in Liu (2016), the two decrees actually differ very little in how they reflect the relative status and importance that the NW regime accords with each office. The two tabulations differ mainly in format. And the NW elites referred to the two decrees jointly in court discussions on offices.

4. Each half-rank then corresponds to a difference of 1 in numerical value. Thus, Rank 3A would be 14.25, and Rank 1A would be 18.25.

We then return to the 493 decree. Its rank classification works as follows. All offices fall under nine ranks, but *every rank* is divided into two classes, and *every class* is subdivided into three grades. That is, the 493 decree creates 54 uniform "levels" within nine ranks. To ensure that numerical ranks in the two decrees are comparable, we assign number 1 to Rank 9B3 (the lowest rank), and number 18.25 to Rank 1A1 (the highest rank) in the 493 decree. We then divide the difference between the highest and lowest numerical values ($18.25 - 1 = 17.25$) by 53, as there are 53 "steps" among the 54 distinct levels. Each level therefore corresponds to a difference of 0.3255 in numerical value.

## G.2 Variable Definitions

The following table summarizes the definitions of main variables used in the analysis.

Table A16. Definitions of Main Variables

| **Variables** | **Sources** | **Definition** |
|---|---|---|
| Aristocrat, main | 1-4,7 | If individual with the same choronym-surname as elite has biographies in *Book of the Later Han*, *Records of the Three Kingdoms* and *Book of Jin* between 25 AD and 300 AD. |
| Aristocrat, restricted | 1-4,7 | If individuals with the same choronym-surname as elite held the following offices in Later Han, Three Kingdoms or Jin between 25 AD and 300 AD: prime ministers (*zaixiang*); minister of works, minister of education and defender-in-chief (*sikong*, *situ* and *taiwei*, collectively called *sangong*); grand perceptor, grand mentor, grand guardian, great steward, general-in-chief and great manager of mounts (*taishi*, *taifu*, *taibao*, *taizai*, *da-jiangjun* and *da-sima* collectively called *shangshi*). |
| Aristocratic clans (4th century), number of | 2-4 | Number of distinct choronym-surname pairs at a commandery, where each pair is associated with at least one biographee in the historical books of earlier empires. |
| Central offices | 1 | Offices in the central bureaucracy. |
| Civil conflicts, number of | 1,11 | Peasant uprisings and rebellions led by NW elites. |

| | | |
|---|---|---|
| County government offices, number of | 9 | Number of active county government offices under the jurisdiction of each commandery. |
| Elite, disputed origin | 1 | If the *Book of Wei* recounts that an elite "self-reported" or "asserted" his family to be some choronym-surname. |
| Elite, ethnic Han | 1,7 | If elite is recorded to be Han Chinese. |
| Elite, migrant | 1,7 | If elite or his ancestors were recorded to have moved home. |
| Elite, royal member | 1,7 | If elite is a member of the imperial Tuoba household. |
| Foreign invasions, number of | 11 | Invasions led by nomads or foreign states. |
| Historical provincial capital, dummy | 9-10 | Equal to 1 if a commandery has a county that had served as provincial capital (*zhouzhi*) or national capital prior to NW. |
| Historical wars, dummy | 11 | Equal to 1 if a commandery experienced warfare in the 4th century. |
| Junior offices | 1 | Offices below Rank Three Junior (*cong sanpin*) and are substantive. |
| Personnel offices | 1,7 | Offices in the ministry of personnel (*libu*) at the state affairs department (*shangshu-sheng*), with the following keywords: chief of personnel, director of personnel, evaluations, ministry of personnel, personnel section. Chinese terms are *libu-shangshu*, *libu-lang*, *kaogong*, *xuanbu* and *libu-cao*. |
| Promotion | 1,7 | If elite sees a rise in office rank. |
| Punishment | 1,7 | If elite is removed from office, killed by the emperor, or received death sentence for committing crimes. |
| Pure offices | 1,7,8 | Suitable for men of high birth (Lewis 2011). Chinese term is *qingguan*. |
| Rank | 1 | See Appendix G.1. |
| Rectifiers | 1,7 | Local dignitaries who register and classify all males in their jurisdictions who were considered eligible for government office on the basis of their hereditary social status, assigning them to 9 ranks, theoretically reflecting their meritoriousness (Hucker 1985: 189). Chinese terms are *zhongzheng* and *zhoudu*. |
| Regional civil chiefs | 1,7 | Governors of counties/commanderies/prefectures. Chinese terms are *xianling*, *taishou* and *cishi*. |
| Regional military chiefs | 1,7 | Commanders of regional armies. Chinese terms are *dudu* and *zhenjiang*. |

| | | |
|---|---|---|
| Regional offices | 1 | Offices in the regional bureaucracy. |
| Rice suitability | 12 | Index ranges between 0-10,000; a larger number indicates higher suitability. |
| River density | 14 | Total kilometers of rivers within a 50-kilometer radius of a commandery's capital, divided by the area of a circle with 50-kilometer radius. |
| Senior offices | 1 | Offices that are above Rank Three Junior (*cong sanpin*) and are substantive. |
| Strongholds | 2-5 | A commandery has a stronghold if it is associated with any mentioning of the following keywords: stronghold, castle, (erected) walls, (erected) barriers, defend (oneself) at natural obstacles, and self-fortify. Chinese terms are *wu*, *bao*, *bi*, *lei*, *juxian* and *zigu*. |
| Terrain ruggedness | 13 | Amount of elevation difference between adjacent cells of a digital elevation grid. |
| Wheat suitability | 12 | Index ranges between 0-10,000; a larger number indicates higher suitability. |

Data sources:

1. *Book of Wei (Weishu)*.
2. *Book of Later Han (Hou Hanshu)*.
3. *Records of Three Kingdoms (Sanguo Zhi)*.
4. *Book of Jin (Jinshu)*.
5. *Comprehensive Mirror in Aid of Governance (Zizhi Tongjian)*.
6. *Commentary to the River Classic (Shuijing Zhu)*.
7. Zhao (1992), Luo and Ye (2005), and the China Stone Inscription Database.
8. Zhang (2017).
9. Mu, Wu and Wei (2016).
10. Zhou, Li and Zhang (2016), Hu, Kong and Xu (2016).
11. *Catalogue of Historical Wars (Zhongguo Lidai Zhanzheng Nianbiao)*.
12. Food and Agriculture Organization (FAO).
13. United States Geographic Services (USGS).
14. CHGIS Database.