

Political Elites and Human Capital Formation in Pre-Imperial China

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Abstract

I examine the activity of political elites during a period of intensive state-building in pre-imperial China. Using a novel hand-collected dataset on 1,075 political elites, I find that civil unrest was responsible for a majority of the deaths of elites, that there was substitution away from incumbent nobles towards commoners in administrative roles, and rising competition over administrative office-holding among clans. I argue that such substitution was made possible by the rise of a class of literate commoners as a new source of administrative human capital, and propose a model to explain their emergence. I postulate that civil unrest improves commoners' access to learning by displacing a fraction of literati and learned nobles and forcing them to make a living out of teaching, and enhanced productivity enables more commoners to acquire literacy to enter state services. I discuss mechanisms through which human capital can facilitate state-building.

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1 Introduction

The creation of centralized states¹ has long attracted scholarly attention. While leading theories of how states form emphasizes the role of warfare, what happens during the process of state-building remains a black box. [Becker et al. \(2019\)](#) shows that greater exposure to war induces cities to develop larger councils, and [Tilly \(1992\)](#) postulates that the process of state-building entails the “elimination, neutralization and cooptation” of the ruler’s local rivals. But which elites join the new administration, and which elites are eliminated? How is this related to the development of state capacity?

Chinese history provides a suitable opportunity to examine this question, as court historians have the tendency to record the activity of the ruling elites in great detail. State-building in China occurred in the seventh century B.C., when China was composed of over one hundred autonomous regional states (*zhuhou guo*) ruled by warlords and their vassals. The next five centuries saw rapid centralization in the leading regional states, and in 221 B.C., the unification of those states by the first empire under a centralized bureaucratic government ([Creel 1964:155](#)). Many of the institutional innovations developed then became the skeleton of the empire over the next two millennia.

In this paper, I hand-collect data on political elites, iron artifacts and bronze money excavations from historical and scholarly sources. I first examine the exits and causes of exits of political elites in the Spring and Autumn Period (770-481 B.C.).² I show that external military conflicts were only responsible for 3.40% of 294 recorded elite exits,³ and around 93.88% of elite exits were attributable to coups and civil conflicts. Moreover, elite exits were not entirely the consequence of rulers eliminating their local rivals. While rulers of regional states were responsible for only 23.43% of 192 elite deaths in coups and civil conflicts, nobles themselves were responsible for 67.70% of those deaths, suggesting that the aristocracy actively participated in many of the political struggles at the time.⁴

Then, I document changes in the composition of administrators in the regional states. I demonstrate an overall increase in the share of individuals of non-noble origins in admin-

¹[Weber \(1946\)](#) defines a state to be a monopoly on the legitimate use of physical force within a given territory.

²An elite exits politics if he dies of an unnatural cause or flees his home state and never returns. An individual is responsible for an elite’s death if he directly committed the murder of that elite, or if that elite died in a civil conflict that he initiated. If multiple individuals were responsible, then I record the person with the highest political status.

³This is consistent with the claims of [Hsu \(1965:63-4\)](#), [Lewis \(1990:243\)](#) and [Yang \(1998:309-11\)](#), that military conflicts in the Spring and Autumn Period lasted for at most a day or two, and likely produced limited destructive effects.

⁴This is in contrast to [Tilly \(1992\)](#), who claims that the process of state-building entailed the “elimination, neutralization and cooptation” of the ruler’s local rivals for the case of Western Europe.

istrative roles, and stronger downward mobility of incumbent noble administrators in the second half of the Spring and Autumn Period. Using information on administrators' clan affiliations, I show that competition among noble clans over administrative office-holding had also been rising. These findings point towards a general trend of substitution towards commoners in administrative roles.

But what facilitated this substitution? I establish that literacy was a prerequisite skill for administrative office-holding since the Spring and Autumn Period, and substantiate this claim by referencing appropriate historical accounts and scholarly works.⁵ Moreover, I argue that the expansion in trade and commerce during this era reflects a more widespread distribution of literacy and numeracy across the population, since arithmetic and account-keeping are necessary skills for traders. I use the dataset on bronze money to illustrate this commercial expansion.

Going one step forward, I propose and formulate a simple model that explains the emergence of literate commoners as a new source of administrative human capital. I identify civil unrest and improvement in productivity as two key drivers: civil unrest displaces a fraction of literati and learned nobles and forces them to make a living out of teaching, and increased productivity enables more commoners to live off the land, and to acquire literacy to enter state services. While the pervasiveness of civil unrest can be observed in the data on elite exits, I use the dataset on iron artifacts to provide supportive evidence for productivity improvement. More specifically, I illustrate that the types of iron production tools had been steadily increasing over the Spring and Autumn and Warring States Periods.

Lastly, I discuss the relationship between the emergence of new administrative talent and state capacity in pre-imperial China. I argue that a rise in the supply of eligible candidates for administrative appointment facilitates political centralization by eroding the bargaining position of incumbent officials; and that appointing officials with literacy and numeracy skills improves state capacity by enhancing the administration's ability to record and utilize information.

This paper contributes to the literature that studies political institutions in pre-imperial China. Most works focus on the effects of military conflicts on centralization in the regional states (Hui 2005; Zhao 2006; Chen 2019), with Kiser and Cai (2003) postulating that warfare facilitated bureaucratization in pre-imperial China by decimating the aristocracy and killing "the main barrier to administrative reform". My findings stand in contrast with this view, and show that coups and civil conflicts account for a majority of elite deaths.

⁵According to Lewis (1999b), teaching was one way for a textually trained person to earn a living in the late Spring and Autumn Period and the Warring States Period. He mentions the existence of tutors in wealthy families and perhaps even village school masters.

This paper is most closely related to [Hsu \(1965\)](#), which examines social mobility in pre-imperial China using a random sample of individuals. He finds that the social status of *shi* has been gradually rising, while the status of high-officials and ministers experiences a steady increase at first but declines towards the end of the Spring and Autumn Period. While those results are consistent with this paper, my results derive from a comprehensive dataset of every known elite, and therefore speak to mobility in politics and state administration. I also present novel findings on the activity of commoners, nobles, and clans, and the hereditariness of and inter-clan competition over administrative office-holding.

This paper also contributes to the literature that explores the determinants of state-building. [Gennaioli and Voth \(2015\)](#) emphasizes on the effect of fiscal resources on military strength and states' internal cohesion, [Ko et al. \(2018\)](#) and [Koyama et al. \(2018\)](#) examine the impact of the number and direction of external threats and the size of the affected state, and [Centeno \(1997\)](#) discusses the availability of alternative taxable resources. I highlight the importance of human capital and how it affects the nature and the extent of extraction that rulers are able to implement. My findings are consistent with [Ertman \(1997\)](#), who theorizes that an increase in the supply of experts in post-1450 Europe enabled rulers to bureaucratize.⁶ I demonstrate that this channel has broader historical relevance, substantiate this theory using empirical evidence on state service, and propose and formulate a mechanism that explains the formation of new administrative human capital.

In addition, human capital is often linked to innovation and economic growth, and much less to institutions. [Cantoni and Yuchtman \(2014\)](#) postulate that law graduates in medieval Germany became administrators and codified laws and regulations, which then led to the proliferation of markets and subsequently economic development. In a similar spirit, I propose that the absorption of new human capital into the state administration can produce important effects on political institutions and state capacity.

This paper is structured as follows. Section 2 outlines the relevant historical and institutional background. Section 3 describes the data and presents empirical patterns on elite activity. Section 4 develops a simple model to explain the emergence of new administrative human capital. Section 5 concludes.

⁶More specifically, [Ertman \(1997\)](#) claims that the increase in the supply of experts is “a result of the proliferation of medieval universities, the growth and commercial and financial markets, and changes in military technology”.

2 Historical and Institutional Background

In this section, I provide a brief overview of the history of Western Zhou, the Spring and Autumn Period and the Warring States Period, with a focus on the characteristics and activities of political elites.

2.1 Western Zhou: 1041-771 B.C.

The Western Zhou was established in 1041 B.C. after King Wu overthrew the Shang dynasty. Kinsmen and nobles of non-Zhou tribes who fought alongside the king were rewarded fiefs to help consolidate Zhou rule. Enfeoffed lands were called regional states, and their rulers became dukes (*gong*). In a similar fashion, dukes appointed their kinsmen to be high-officials and ministers in the regional states (*qing* and *dafu*), and assigned fiefs to them.

Dukes and their *qing-dafu* established lineage clans in their respective fiefs, and collected taxes and maintained private armies. The noble clans constructed cities, temples and dwellings, organized local agricultural production, and hired artisans and craftsmen to produce goods for their members' consumption. Since population growth would reduce land per capita, when an existing clan acquired new land, smaller branches of the clan would usually relocate to the new territory (Zhu 1990). Ties of kinship and solidarity among different branches of the same clan were reinforced through ceremonial and festive activities and the worship of common ancestors.

Male members of the nobility received proper education and military training, and were the elite warriors of the Western Zhou regime and its regional states (Huang 1998). Fighting in wars was an honorable and strictly upper-class business, though auxiliary functionalities such as infantrymen and laborers were performed by commoners and slaves. Similarly, participation in politics was generally restricted to members of the nobility, and was hereditary to the degree that the heir of a *qing-dafu* was usually able to serve in the administration, but may not necessarily hold the same office as his father (Li 2008; Zhu 1990).

The duke and his *qing-dafu* are interdependent to a large degree. The *qing-dafu* helped the duke rule by providing services such as policy-making and counseling, and supported the duke with private armies when needed (Yang 2003). In turn, office-holding in the duke's administration was an important avenue through which noble clans maintained their political status and associated material wealth. However, there exists an inherent conflict of interest between the two—the expansion of the political and economic powers of the nobility posed threats to the duke's power and authority (Li 2006). In addition, giving out landed fiefs to elites meant a direct deduction from the duke's land stock. Hence, the duke always

had an incentive to constrain the power of the noble clans, even though their military and educational training were requisite for the administration of the regional state.⁷

2.2 Spring and Autumn Period: 770-481 B.C.

A disastrous defeat in 771 B.C. forced the King of Zhou to relocate to the east. The court's authority declined dramatically, and the system that had held the Zhou together, in which the King was a supreme lord of the nobility, disappeared (Hsu 1999:550). A multi-state system gradually emerged, and the Spring and Autumn Period that ensued was characterized by frequent, albeit small-scale, warfare among the regional states.

During the Spring and Autumn Period, the rise of prominent noble clans was seen across many regional states, and clans grew to control an increasing range of state affairs. Initially, sons of dukes held important positions in the administration, served as military commanders in the battlefields, and represented their home state in inter-state meetings. As high-officials and ministers gradually took over those responsibilities, the center of political activity shifted away from sons of dukes towards the *qing-dafu* (Hsu 1965).

The expansion of the political power of noble clans led to political centralization in the sense that power was becoming concentrated in the hands of a few. In 562 B.C., three largest clans in the state of Lu divided the duke's army into three divisions, and each claimed command of one division; in 514 B.C., six leading clans in Jin exterminated the largest branches of the duke's clan and formed a ruling coalition where the leader of each clan would take turns to rule as the head of state; in Song and Zheng, political power was monopolized by a coalition of *qing-dafu*; and in Qi, the clan of Tian became so powerful that its leader eventually overthrew the duke of the state in 379 B.C.

Meanwhile, a new unit of administration—the county (*xian*)—emerged. Contrary to fiefs, counties' fiscal resources and troops were directly controlled by the duke (Yang 1981; Tan 2005). By 532 B.C., there had been forty-nine counties established in Jin, and at least eighteen in Chu (Zhao 1990; Gu and Zhu 2001; Zhou and Li 2009). To a certain extent, magistrates of counties were bureaucrats.⁸ Dukes can appoint and remove county magistrates, office-holding was not hereditary, and magistrates neither owned private armies, nor laid claims to tax revenue.

⁷Due to the scarcity of historical records of the regional states in the Western Zhou period, it remains unclear whether conflicts between the duke and the elites ever transpired, and if so, the form in which they transpired. What we do know is that contention among the nobility over land and economic resources in the royal domain—that is, the domain directly controlled by the King of Zhou—intensified visibly during mid Western Zhou (Li 2006, 2008).

⁸It should be noted that some counties in the Spring and Autumn Period still retained features of noble fiefs.

2.3 Warring States Period: 480-221 B.C.

Many regional states became conquered by the militarily dominant powers, and only around twenty survived to the Warring States Period. Social mobility markedly increased, power became concentrated in the court of the ruler, and office became an extension of royal power (Lewis 1999a:597,604).

As the number of offices rose, officers across all regional states were selected from a much wider geographical and social range, and individual merit became an important consideration. For example, Qin created a “system of merit based on service to the state that would supersede the privileges of the old nobility” (von Glahn 2016:56). Zhao, Han and Qi all promoted meritocratic selection and developed a set of rules to evaluate the performance of state officials. This gave rise to a new class of men, namely the *shi*, who served and counseled the ruler. The *shi* class comprised of peoples of mixed origins—declined nobles, professional warriors, and peasants and artisans who made an effort to climb up the ranks. They were bright, knowledgeable individuals who served social and political elites, and their success was a result of personal talent rather than familial connections (Zhu 1990).

The old nobility, meanwhile, slowly lost their power and status. Fiefs ceased to be hereditary; the owners of fiefs possessed no administrative or judicial powers, and were only allowed to collect tax revenue from fiefs (Lewis 1999a:607). Some states even implemented policies aimed at curbing noble privileges. For example, Wu Qi of Chu eliminated royal payments to distant nobles, and forced them to migrate to remote areas that were sparsely populated. The military and administrative roles of the nobility also noticeably diminished. Mass infantry in the Warring States era were recruited from peasants, and a man of humble origins could rise to high office if he demonstrated sufficient talent.

Many of the surviving regional states widely adopted counties, and developed large bureaucracies and ways to govern them. The selection, promotion, and advancement of officials, their ranks, salaries and performance strictly followed a set of written rules and criteria (Yates 1995). Officials were rewarded for meritorious service, demoted for bad performance, and punished for violating rules (Pines et al. 2014).

3 Data Description and Patterns

In this section, I document the activity of political elites during the Spring and Autumn Period, and the evolution of commerce and productivity over the Spring and Autumn and Warring States Periods (see Appendix A.1 and A.2). I begin by describing the construction of the main datasets used in the analysis.

3.1 Data Sources

Notables. I assemble a dataset of 1,306 notables who were politically active during 722-468 B.C. in the seven major regional states of Qi, Jin, Chu, Lu, Zheng, Song and Wei. The notables include dukes, sons and grandsons of dukes, high-officials, ministers, *shi*, court scribes and priests. Information on the names of the notables, their clans and surnames are digitized from genealogies of the Spring and Autumn clans.⁹ All notables have made appearance(s) in the chronicle of *Zuo's Commentary*,¹⁰ from which I extract information on their first and last years of activity, title and office, and if applicable, the years in which they were involved in coups or civil wars, the cause of their death, and the year of their expulsion.

Zuo's Commentary is one of the two primary textual sources used by historians to study the Spring and Autumn Period (Gu and Zhu 2001:27).¹¹ For each year between 722 and 468 B.C., it provides an overview of important political, diplomatic and military events that took place in that year. Thus, it is appropriate to think of individuals who appear in the *Commentary* as having an adequate level of political activity and importance. The *Commentary* assumes the following format: each chapter recounts events from a specific year; a chapter begins with an entry from the *Spring and Autumn Annals* for that year, and presents a follow-up narrative which elaborates on this entry. Below is an excerpt from Year 1 of Duke Yin (722 B.C.), translated by Durrant et al. (2016:7):

Annals In the third month, our lord and Zhu Yifu swore a covenant at Mie.

Zuo In the third month, our lord and Zhu Yifu swore a covenant at Mie: Yifu was Ke, the Master of Zhu. But he did not yet have the king's appointment. For this reason, it does not record his rank. That the text says "Yifu" is to honor him. Being in the position of regent, our lord wanted to seek good relations with Zhu. He therefore swore the covenant of Mie.

Recall that the notables came from the regional states of Qi, Jin, Wey, Lu, Zheng, Song and Chu. These states are representative of the Spring and Autumn Period, as they were politically important and active, maintained a continued presence throughout this period, and constitute a majority of our understanding of this period. Moreover, all of them survived into the Warring States Period, and Qi, Chu and the three descendants of Jin constitute five

⁹Sources: Chang (2002). Yao, Yanqu. *Chunqiu Huiyao (Institutional History of the Spring and Autumn Period)*.

¹⁰*Chunqiu Zuozhuan Zhu (Zuo's Commentary)*. Annotated by Yang Bojun. Beijing: Zhonghua Shuju. 1990.

¹¹The other source is the *Spring and Autumn Annals*, which was the official chronicle of the State of Lu compiled by Confucius. It is among the Five Classics of Chinese literature.

of the seven leading states in this era.¹² Table 1 contains summary statistics of notables for each regional state.

Bronze Money. I compile a dataset of excavations of bronze money using Huang (2001), a study of money and coins in the major states of the Spring and Autumn and Warring States Periods. It contains a summary of archaeological excavation records of shell money and bronze coins prior to 221 B.C. Each record has information on the location and year of excavation, the number and types of coins discovered, and the character engravings on the bronze coins. Using the information on coin types, I derive an estimate of the time of mintage of the coins.

Iron Artifacts. I collect a dataset of iron artifacts from Western Zhou to the Warring States Period using Bai (2005:23-29, 54-111). This is a comprehensive survey of iron technology prior to and during the Han Dynasty that draws extensively from archaeological excavations. Chapter 2 (pp.23-29) contains a complete listing of iron artifacts that date back to the Western Zhou and the Spring and Autumn Period. Chapter 3 contains a complete listing of all types of iron artifacts that date back to the Warring States Period—it is impossible to compile a list of all excavated iron artifacts for this period because they are too numerous. For each artifact or type of artifact, the dataset contains information on its place(s) of excavation and the approximate time(s) of forgery. To date, a total of 91 artifacts that were forged prior to the end of the Spring and Autumn Period had been found in 8 different states.

3.2 Composition of Administrators

In this subsection, I examine the composition of state administrators in the Spring and Autumn Period, and provide evidence of an increase over time in the political activity of commoners, especially in the latter part of the Spring and Autumn Period.

The state administrators comprise of the high-officials, ministers and the *shi*. As previously mentioned in Section 2, important administrative offices in the Zhou regional states were held by the *qing-dafu*, and were to a large degree hereditary.

Noble and commoner status can be distinguished in two ways. The first way is by examining clan names. In the Spring and Autumn Period, every noble clan had a clan name, and a noble man would be formally addressed by the name of his clan. Clan names were distinct from clan members' patrilineal surnames, and were often derived from the names of

¹²It should be noted that textual information on Qin, the state that eventually unified China, is very limited during the Spring and Autumn Period as it was situated on the periphery of the Central Plain and was distant from the center stage of political activity. I will complement the discussion by referencing relevant archaeological works.

the places where clan domains were located (Du 1990). A noble man would always inherit his father’s surname; in some cases, he would also inherit the name of his father’s clan, and in other cases, he may establish his own clan and adopt a different clan name. Therefore, an individual without a clan name on record is very likely to be a commoner. On the other hand, having a clan name does not necessarily mean having superior socio-economic status, as declined nobles also kept their clan names.

The second way is by examining the *shi*. In the Spring and Autumn Period, the *shi* served as warriors or performed various functional roles such as stewards and advisors to dukes and the *qing-dafu*. At first, the pool of talent from which they were chosen “was swelled by former noblemen who had lost their status” (Hsu 1999:583). Over time, the *shi* class expanded to include the most capable commoners (Gu and Zhu 2001), and towards the end of the Spring and Autumn Period, no distinction could be made between men of noble and commoner origins in the *shi* class (Yu 2003). In the Warring States Period, the *shi* provided services to political elites.

3.2.1 Upward Mobility of Commoners

Figure 3 displays the share of *shi* in all administrators, and the share of administrators who did not have a clan. The share of non-noble state administrators has been increasing over the entire Spring and Autumn Period. The share of *shi* is also rising over time, and since the origin of the *shi* became increasingly mixed, this is also evidence that individuals from the lower social strata became increasingly active in administrative roles.

Restricting the sample to the high-officials and ministers (*qing-dafu*), this pattern still holds true for the second half of the Spring and Autumn Period. Figure 4 displays the share of non-noble ministers, high-officials and both in all *qing-dafu*. The share of non-noble ministers decreases over the first half of the Spring and Autumn Period,¹³ and visibly increases over the latter half. This indicates that the origins of ministers were becoming increasingly mixed towards late Spring and Autumn Period.

Meanwhile, the offices of high-officials were clearly monopolized by the nobles throughout the entire Spring and Autumn Period. Into the Warring States Period, however, 48 out of 79 prime ministers across all regional states were not known to have ties to the nobility, demonstrating that non-nobles became eligible for and capable of holding the highest office in a state (see Table 2).¹⁴ Together with the evidence on *shi* and ministers, this suggests

¹³This is consistent with Hsu (1965), who undertook a systematic study of social stratification and mobility during the Spring and Autumn Period. He found an increase in the activity and importance of the *qing-dafu* until 602-573 B.C., followed by a gradual decline; and an increase in the concentration of *qing-dafu* in prominent clans.

¹⁴Data source is Chapter 2 of Hsu (1965).

that there had been a gradual substitution towards non-nobles in administrative roles, and that this substitution began from the lowest level of government and slowly penetrated to the top of the political hierarchy.

The claim that there was increasing upward mobility for persons with little political connections over the latter half of the Spring and Autumn Period also finds support in historical materials. Based on historical accounts, Yu (2003:15-17) argues that channels for commoners to move up the social ladder (one of which was by becoming a scholar) already existed by the end of the Spring and Autumn Period, and that it was not uncommon for peasants to become *shi*. In the Warring States Period, as discussed in Section 2.3, the *shi* class comprised of peoples of very different backgrounds, and some served as retainers to powerful ministers and provided counseling and administrative services. It was possible for retainers to be recommended by their hosts to receive official appointments from the king (Yang 1998:465).

3.2.2 Downward Mobility of Nobles

While upward mobility for non-nobles had been increasing, I provide evidence that the downward mobility of incumbent nobles was also on the rise over the latter half of the Spring and Autumn Period. Taken together with previous results, this suggests that the incumbent nobles were being substituted out of office-holding.

Figure 5 illustrates how the hereditariness of office-holding changes over time. The black line represents the share of *qing-dafu* who had at least one son of equal or higher status in all *qing-dafu*; and the blue line is the share of *qing-dafu* who had at least one son of equal or higher status in the subsample of *qing-dafu* who were recorded to have sons.

From this graph, it is clear that the share of *qing-dafu* who were able to pass on their offices rises to reach a peak in 602-573 B.C., and then declines. The same trends hold for the subset of *qing-dafu* who were recorded to have sons. This pattern is consistent with the historical reality portrayed in Section 2—the initial increase in the probability of passing offices to sons reflects the overall rise in the power of *qing-dafu*, and the subsequent decrease in this probability may be the result of the attrition of noble clans in coups and power struggles.

Historical accounts also lend support to this observation. Elites who were defeated in civil strife and therefore exited politics were forced to give up their wealth and land to expropriation. For ones who were recorded to have fled to foreign regional states, only a very small fraction were able to receive official appointments, and those who did not would then have to find some other means to make a living.¹⁵

¹⁵Du (1990) also argues that the overgrowth of the ruling class population led to a decline in social status

While this data does not cover the state of Qin, some archaeological findings can shed light on the social mobility in Qin in the Warring States Period. For the nobles, the disappearance of ritual bronze vessels and their ceramic counterparts from Qin mortuary indicates that the nobility was fatally hit by Shang Yang’s reforms in 350 B.C. (Shelach and Pines 2005:210-212). Regulations regarding unranked descendants of the ruling clans also helped accelerate downward mobility of the nobles (Hulsewé 1985:174). For the commoners, writings discovered from Qin tombs of the late Warring States Period show that newborns had a wide range of prospects from becoming a high-ranked minister, to becoming a state official, to becoming relegated to a bondservant (Wu 2000:291-311). This suggests that there existed channels of upward mobility for individuals of humble origins.

3.3 Clans and Administrators

As seen in Section 2, clans were the predominant form of socio-political organizations of the Spring and Autumn Period. In this subsection, I examine the activity of clans and the relationship between clans and office-holding.

Clan Activity. Figure 6 displays the total number of active clans, the number of new clans, and the share of new clans in all active clans over time. A clan is active in a given period if a member held an administrative position in this period. A clan is new if it is the first period in which a clan member ever held an administrative position.

It is clear from Figure 6 that the number of active clans consistently rises, and the share of new clans consistently declines. This suggests that the entry barrier for new clans had become higher over time, which was likely a result of increased competition among incumbent clans over administrative office-holding. Figure 7 provides supporting evidence.

Administrators’ Clan Membership. The Herfindahl-Hirschman Index (HHI) is a commonly used measure of market concentration, and serves as an indicator for the degree of competition in that market. Here, I compute an analogous HHI for the concentration of state administrators across clans in period t :

$$HHI_t = \sum_c \left(\frac{N_{c,t}}{N_t} \right)^2 \quad (1)$$

where $N_{c,t}$ is the number of administrators who are members of clan c in period t , and N_t is

for most nobles. An anecdotal example of this would be Yan Hui, who was a student of Confucius and was active in 521-481 B.C. Even though Yan was recorded to have come from a lowly background, his ancestors had served as a high-official for the state of Lu for fourteen generations while his grand-father was a mere city steward (Zhao 1976:157-158).

the total number of state administrators in period t . For administrators without clan names, I count each of them as a stand-alone “clan”.

Figure 7 displays the evolution of the HHI for all state administrators, ministers only and high-officials only. The HHI for the first two groups had been declining over time, whereas the HHI for high-officials saw a small increase towards the end of the period. This suggests that competition for administrative offices in general had been rising, which is also consistent with the finding of an increase in the share of non-noble administrators in Section 3.2.1.

3.4 Attrition of Administrators

Finally, I examine the activity of political elites. I demonstrate that coups and civil conflicts accounted for the majority of elite deaths and expulsion, and that a considerable share of those deaths were attributable to other elites rather than the ruler.

I define an individual to be a political elite if he is one of the following: a duke, a son of a duke, a high-official or a minister. An elite *exits* politics if he dies of an unnatural cause or leaves his home state and never returns. Columns 1 and 2 in Panel A of Table 3 display the number of different types of elites and their exits. Columns 3 and 4 show the number of exits caused by coups and civil conflicts, which is when an elite is murdered or expelled by his civil rivals, and the number of exits due to death in external military conflicts. It is clear that throughout the course of the Spring and Autumn Period, coups and civil conflicts consistently accounted for a great majority of the displacements of political elites, while external military conflicts played a negligible role. This holds for elites of all political statuses.

Now I decompose elite deaths in coups and civil conflicts by the political status of the individuals who were responsible. An individual is responsible for an elite’s death if he directly committed the murder of that elite, or if that elite died in a civil conflict that he initiated. If multiple individuals were responsible, then I record the person with the highest political status. Columns 2 to 4 in Panel B of Table 3 display the number of deaths for which individuals of different political status were responsible. High-ranked nobles are *qing-dafu* or sons of dukes, and low-ranked nobles are members of noble clans who held no offices or titles. These results suggest that dukes were not the only ones responsible for eliminating the nobles—in fact, the general aristocracy were actively involved in killing each other.

4 Administrative Human Capital

The previous section presents a few important empirical patterns. In particular, we observe an increase in the share of administrators of commoner origins, coupled with a decrease in the hereditariness of office-holding. Moreover, competition over administrative office-holding has also been rising over time. Meanwhile, a majority of elite deaths and displacements were attributable to civil coups and conflicts.

These results adopt the following interpretation: the Spring and Autumn Period saw a gradual substitution towards commoners in administrative roles. That this trend continued into the Warring States Period can be corroborated by various historical sources, as discussed in Sections 3.2.1 and 2.3. This suggests that, during the Spring and Autumn Period, there emerged a functional mechanism which enabled commoners to acquire administrative skills, and therefore to be eligible for administrative appointment.

In this section, I propose a framework to explain the formation of this pool of administrative human capital. I begin by discussing the nature of literary instruction in the Spring and Autumn Period, possible channels for commoners to acquire literacy, and the relationship between literacy and office-holding.

4.1 Literary Instruction

Since Western Zhou, education had been an exclusive privilege of the noble class (Chen and Zhang 2009). Private instructors who taught in public began to appear on historical records since the late Spring and Autumn Period. A famous example is Confucius (551-479 B.C.), who began to teach publicly at the age of 23, and traveled across at least seven other regional states to spread his teachings and philosophy.¹⁶

The origin of private instruction remains obscure, but a glimpse into the classical texts may provide some insights, suggesting that civil unrest could force literate individuals to experience a decline in status and to possibly seek others means to support themselves.¹⁷

¹⁶Other notable private instructors of the late Spring and Autumn Period include Deng Xi (545-501 B.C.), a minister of Zheng; Guqiu Zilin, the master of Zichan, who then went on to become the prime minister of Zheng; Shaozheng Mao (?-500 B.C.), a minister of Lu; Mozi, who was born in an artisan family; Zixia and Ziyu, who were students of Confucius.

¹⁷Civil unrests were likely a result of the erosion of kinship solidarity over time and intensifying competition over resources. In the Western Zhou and the Spring and Autumn Period, dukes and *qing-dafu* of wealthy clans apportioned settlements and lands among various family branches, leading to fragmentation of resources (von Glahn 2016:49). Moreover, nobles of the time practiced polygamy—strictly speaking, they had one wife and a number of concubines—thereby giving rise to larger clans and families. Both would have an effect of exacerbating resource contests. The *Commentary* contains a number of records of noble competition over land and wealth. Examples can be found in the following chapters: Year 2 of Duke Min; Years 7, 16 of Duke Cheng; Years 19, 29 of Duke Xiang; Years 3, 7, 8, 10, 13, 14 of Duke Zhao and so on. Note that this does not imply that the precise causes of all civil unrest had to be about resources—the resource problem can

An excerpt from the *Commentary* reads “when the officers of the son of Heaven are not properly arranged, we may learn from the wild tribes all round about”; a Prince of Zhou who was defeated in a civil conflict brought along court classics with him as he fled to Chu.¹⁸ A paragraph from the *Analects* describes an instance of court musicians leaving for foreign states as the political condition in their home state deteriorated.¹⁹

Teaching was indeed one way for a textually trained person to make a living since the late Spring and Autumn Period (Lewis 1999b:75). Records from the *Analects*, *Xunzi*, *Han Feizi* and *Zhuangzi* all show that instructors at a high level received tuition and gifts from students, and some were even able to make a fortune. Lower level instructors could have taught at or founded village schools, as mentioned in *Mencius*.²⁰ That literary instruction was to some degree accessible to non-nobles can be seen in excerpts from *Zhuangzi* and *Han Feizi*. The *shi* of the states of Lu and Zou were commended for being well-educated in literature, poetry and music. Moreover, by the time of Duke Ping (reign 558-532 B.C.), one-quarter of the citizens in the capital city of Jin abandoned business and took up literature.²¹

An advanced level of literacy could lead to a career in state service in the Warring States Period (Lewis 1999b:79). This channel probably already existed by the late Spring and Autumn Period, if we examine the famous disciples of Confucius. Out of the 24 disciples for whom biographical information exists, one served as the prime minister of Lu and Wey, six served as city stewards, and four served as retainers for the most powerful clans in the state of Lu; two were invited to hold administrative offices but declined, and one was studying with an eye to an official career (Lau 1979). Confucius himself was appointed as the Minister of Crime in 500 B.C. Moreover, six of his disciples were known to be commoners or have come from poor families, suggesting that education had been somewhat accessible to ordinary people, as they needed to have studied basic literacy before they became disciples of Confucius.²²

also indirectly increase the incidence of civil unrest by increasing the range of situations in which conflicts of interest between noble clans transpired, thereby increasing the range of situations in which conflicts of interest escalate to physical conflict. This can be illustrated by an example from Year 10 of Duke Xiang in *Zuo's Commentary*: Zisi, the Prime Minister of Zheng, ordered the construction of irrigation ditches in farm fields; he and some fellow clan members were then murdered by nobles who suffered land losses from the construction.

¹⁸Years 17 and 26, Duke Zhao of Lu.

¹⁹Book 18, no.7.

²⁰Teng Wen Gong Shang, Paragraph 3; Liang Hui Wang Shang, Paragraph 3.

²¹*Zhuangzi*, Chapter Tian Xia; *Han Feizi*, Chapter Wai Chu Shuo Zuo Xia.

²²Prime minister: Zigong. City stewards: Ziqi and Zijian for Shanfu, Zigao for Hou, Ran Boniu for Zhongdu, Ziyou for Wucheng, Zixia for Jufu. Retainers: Yuan Xian for Confucius when he was Minister of Crime; Zichi, Ran Yong, Ran You, Zilu for the Ji clan. Declined: Min Ziqian and Qidiao Kai. Poor: Zisi, Zeng Xi, Zengzi, Yan Hui, Ran Yong and Zixia. Zichi once asked Confucius about farming techniques, so he might also have come from a peasant family (Book 13 of the *Analects*).

One may wonder why literacy was preferable, or perhaps requisite, for office-holding. This can be explained by the fact that many forms of administrative documents were being widely used and circulated. Records from *Zuo's Commentary* indicate that ministers of Spring and Autumn regional states engaged in letter correspondence with each other, that states signed covenants (*zai shu*) to settle war disputes, that diplomatic papers (*guo shu*) were used to deal with inter-state relations, and that states began to use population registers by as early as the eighth century B.C. Into the Warring States Period, written laws and regulations, written transmission of orders between superiors and subordinates, and household and population registers were widely used in the local administration;²³ statistical and written reports were submitted to the central administration to regulate the behavior and assess the performance of lower level officials (Yang 1998).²⁴

4.2 A Simple Model

In this subsection, I combine findings on elite activity in Section 3, and evidence on trade growth and improved iron technology in Appendix A.1 and A.2, to motivate a framework to explain the rise of literate commoners who are eligible for administrative appointment.

I first argue that the increase in the use of iron tools in production reflects an increase in manufacturing and agricultural productivity. While the growth in trade and commerce reflects this rise in productivity, it is also associated with a more widespread distribution of literacy and numeracy across the population. This is because basic arithmetic and book-keeping skills are necessary for individuals to participate in trade.

The key idea behind the model is straightforward. Discussion in Section 4.1 suggests that coups and civil conflicts created a channel for non-nobles to access education, by displacing the literati and other learned men and forcing them to find alternative means to make a living, one of which was by teaching. That is, civil unrest led to an increase in the supply of high-quality private instructors. Meanwhile, increased productivity and specialization (see Appendix A.1) can enable a greater share of the population to live off the land and participate in non-productive activities, one of which would be learning. In other words, civil unrest and higher productivity both led to an increase in the supply of learned commoners. That some

²³Documents excavated from Yunmeng and Baoshan tombs contained “rules for official conduct, guidelines for keeping accounts, procedures for the inspection of officials... maintenance of official stores and hords... [and instructions] for officials in the proper conduct of investigations and interrogations so as to secure accurate results and transmit them to the court.” (Lewis 1999b:22)

²⁴“Baoshan texts record large numbers of cases transmitted from local officials to the central court for adjudication. These include instances of failure to register population, denunciations by one official of the high handed behavior of another, and remarks by higher officials on a variety of criminal cases. The documents record the plaintiffs and defendants, the officials who first examined the case, and those to whom reports were sent” (Lewis 1999b:28-29).

commoners did engage in learning and that learning did lead to state services is evident from Section 4.1.

Correspondingly, in the model, I assume that there are two markets in the economy: a market for goods, and a market for services. Each individual has one unit of labor. Displaced nobles supply labor in the services market, whereas commoners can either be producers in the good market, or work in the services market.

Nobles. There are total of N_n nobles in the economy. I assume that a fraction ρ of nobles are displaced in coups and civil conflicts. Those nobles lose their land and status, and seek employment in the market for services for a living. The remaining fraction belong to the landowning class, and consume output from their landholdings.

Commoners. There are a total of N_c commoners in the economy. Commoners either become a producer in the market for goods, or seek employment in the market for services. The latter requires some degree of literacy. I assume that a fraction λ of commoners have access to literary instruction, and are qualified to be employed in the market for services. The remaining fraction can only supply products in the goods market. Since literary instruction was in part provided by literati and learned men who were displaced in civil conflicts, I assume that $\lambda = \mu\rho$, where $\mu \in (0, 1)$.

Market for Services. This is the labor market for service professionals such as administrators, private instructors and tutors, ritual specialists, scribes and so on. A total of N_D entities hire service professionals, and each entity has production function:

$$F(L) = \theta L^\psi$$

where L is labor input and θ denotes literacy. Letting w denote wages, each entity's labor demand can be derived by equating marginal product with marginal cost:

$$\psi\theta L^{\psi-1} = w \Rightarrow L = \left(\frac{\theta\psi}{w}\right)^{1/(1-\psi)}.$$

And total labor demand is:

$$L_D = \left(\frac{\theta\psi}{w}\right)^{1/(1-\psi)} N_D.$$

Recall that labor is supplied by literate commoners and displaced nobles. Letting L_C denote the number of literate commoners who seek employment in the market for services,

total supply can be written as:

$$N_S = L_C + \rho N_n.$$

And equilibrium wage can be solved as:

$$w^* = \psi \theta \left(\frac{N_D}{N_S} \right)^{1-\psi}$$

Market for Goods. For the demand side, I assume that total consumption in the economy depends only on population. That is, demand for goods is equal to

$$y^* = \gamma(N_c + N_n).$$

For the supply side, I treat every commoner as a producer with productivity η . Since a fraction $1 - \lambda$ of commoners are illiterate, they will always be producers in the goods market. The remaining fraction λ will choose between producing in the goods market or working in the services market. The former gives them a payoff of w , and the latter gives them a payoff of $p\eta$, where p is the prevailing price level.

The supply of goods is given by:

$$y_S = \begin{cases} \eta(1 - \lambda)N_c, & \text{if } p \in \left[0, \frac{w}{\eta}\right) \\ \eta N_c, & \text{if } p \geq \frac{w}{\eta} \end{cases}$$

Given this piece-wise supply function, there are two possible outcomes for the equilibrium price level p : when $y^* < \eta(1 - \lambda)N_c$, $p = 0$ and no literate commoner produces goods; when $\eta(1 - \lambda)N_c \leq y^* < \eta N_c$, $p = w/\eta$ and some fraction of literate commoners produce goods. Therefore, in the first case, all λN_c literate commoners work in the services market; and in the second case, $N_c - y^*/\eta$ commoners work in the services market.

Letting $N_c^* = \gamma/(\eta(1 - \lambda) - \gamma)N_n$, the solution for L_C , the supply of commoners in service market, can be expressed as:

$$L_C = \begin{cases} \lambda N_c, & \text{if } N_c > N_c^* \\ \left(1 - \frac{\gamma}{\eta}\right)N_c - \frac{\gamma}{\eta}N_n, & \text{if } N_c \leq N_c^*. \end{cases}$$

Intuitively, it is clear that $\left(1 - \frac{\gamma}{\eta}\right)N_c - \frac{\gamma}{\eta}N_n < \lambda N_c$ when $N_c \leq N_c^*$, because not every commoner works in the services market in this case. Moreover, simple algebra reveals that $\lambda N_c < \left(1 - \frac{\gamma}{\eta}\right)N_c - \frac{\gamma}{\eta}N_n$ when $N_c > N_c^*$.

Previous discussion postulates civil unrest and improved productivity as two factors that

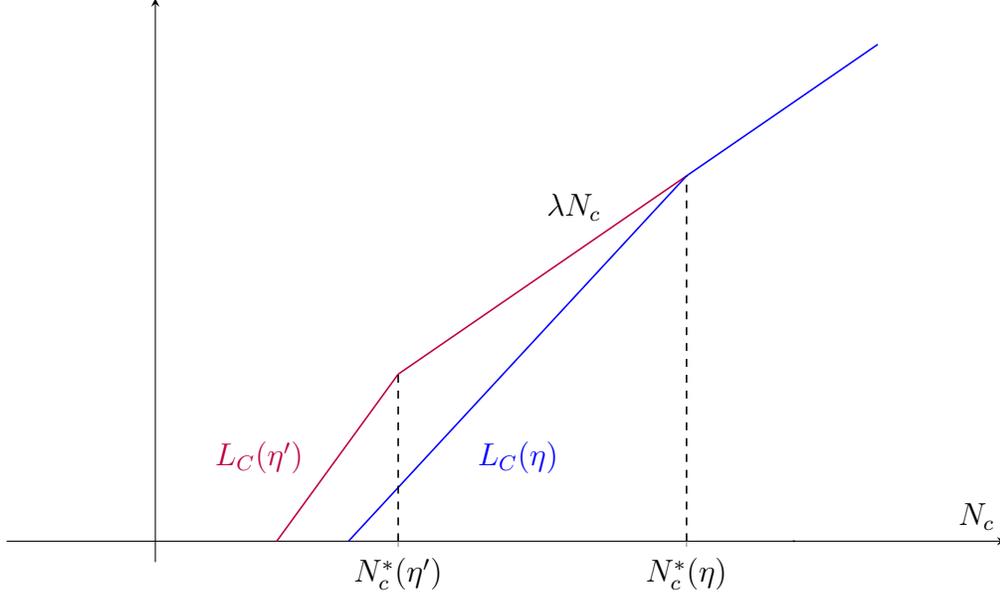


Figure 1: Effect of an Increase in η on L_C

increase the supply of literate commoners. In the model, a higher incidence of civil unrest is represented by a rise in ρ , and higher productivity is represented by a rise in η . Below, I show that increases in ρ and η both lead to a rise in L_C .

Increase in η . A change in the productivity parameter η affects the L_C schedule when $N_c \leq N_c^*$, as well as the cut-off N_c^* . Figure 1 shows that L_C increases when η rises.

More specifically, let $\eta' > \eta$. First, it is clear that $N_c^*(\eta') < N_c^*(\eta)$, since fewer producers are required to satisfy total output demand when productivity rises. Now fix N_c :

- If $N_c \leq N_c^*(\eta')$, then $L_C(\eta') > L_C(\eta)$, since fewer literate commoners are needed for output production when η is high.
- If $N_c \in (N_c^*(\eta'), N_c^*(\eta)]$, then $L_C(\eta') = \lambda N_c > (1 - \frac{\gamma}{\eta})N_c - \frac{\gamma}{\eta}N_n = L_C(\eta)$.
- If $N_c > N_c^*(\eta)$, then $L_C(\eta') = L_C(\eta)$. This is when all literate commoners work in the services market.

Increase in ρ . An increase in ρ leads to an increase in λ , since $\lambda = \mu\rho$, so that there is a higher fraction of commoners who are literate. This in turn affects the L_C schedule when $N_c > N_c^*$, as well as the cut-off N_c^* . Figure 2 shows that L_C increases when ρ , and therefore λ , rises.

More specifically, let $\rho' > \rho$, so $\lambda' > \lambda$. First, it is clear that $N_c^*(\lambda') > N_c^*(\lambda)$, since having a smaller share of illiterate commoners means that a greater number of literate commoners are needed to fill in for output production. Now fix N_c :

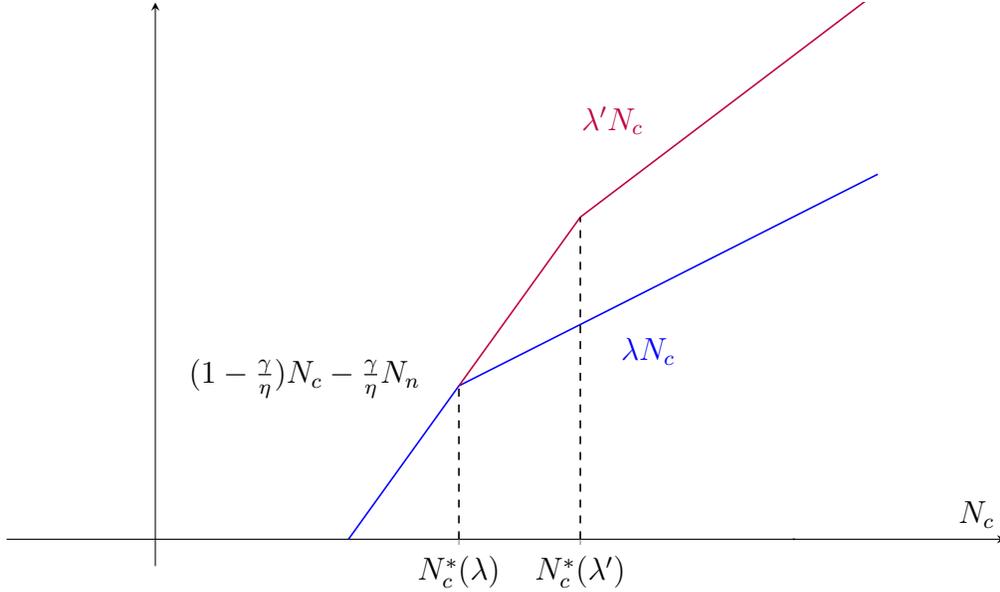


Figure 2: Effect of an Increase in ρ on L_C

- If $N_c \leq N_c^*(\lambda)$, then $L_C(\lambda') = L_C(\lambda)$. This is when a fixed share of literate commoners produce in the goods market.
- If $N_c \in (N_c^*(\lambda), N_c^*(\lambda')]$, then $L_C(\lambda') = (1 - \frac{\gamma}{\eta})N_c - \frac{\gamma}{\eta}N_n > \lambda N_c = L_C(\lambda)$.
- If $N_c > N_c^*(\lambda')$, then $L_C(\lambda') = \lambda' N_c > \lambda N_c = L_C(\lambda)$. This is when a higher fraction of commoners are literate, and all of them work in the services market.

This shows that increases in both η and ρ lead to a rise in the supply of literate commoners in the market for services.

4.3 Relationship to State Capacity

Analysis and historical evidence presented in the previous sections establishes that the human capital pool for administrative appointment has steadily expanded to incorporate commoners, and that literacy was a skill required for daily administrative work. These facts speak to the trend of increasing centralization and enhanced state capacity throughout the Spring and Autumn and Warring States Periods.

First, a rise in the supply of eligible candidates for administrative positions reduces the cost of administrative appointments. Moreover, from a ruler's perspective, commoner administrators are more desirable than noble administrators since the former have little political power and outside support, and therefore pose no threat to the crown and can be easily replaced. Thus, commoner administrators demand fewer privileges, and are also

more likely to faithfully execute the ruler’s orders and commands. This in turn increases the range and complexity of tasks that the administration is capable of handling. [Chen \(2019\)](#) demonstrates that administrators with little or no political connections are more likely to be appointed as bureaucrats, who do not have hereditary claim over their offices.

Second, having more administrators with literacy and numeracy skills enhances the administration’s ability to make use of data. Household and population registration and statistical reports, which were widely used in the Warring States Era for taxation, military recruitment and performance assessment purposes, are only possible if officials are capable of collecting and recording such information. This information provides a basis for more efficient resource extraction, communication and decision-making, and facilitates bureaucratization to the extent that it enables officials to be monitored and evaluated based on written regulations and technical qualifications ([Kiser and Cai 2003](#); [Swedberg and Agevall 2005](#)).

The relationship between administrative human capital and state capacity extends beyond pre-imperial China. In the imperial era, the link between human capital and state administration became further consolidated as Emperor Wu of Han introduced the Civil Examination to select officials. Over the next few centuries, it eventually developed into the primary means of bureaucratic recruitment for the imperial state. Moreover, [Ertman \(1997\)](#) claims that the increase in the supply of experts facilitated bureaucratization in medieval Europe, by enabling rulers to resist against efforts by incumbent administrators to patrimonialize their offices. Using German princes as an example, he writes: “... between 1348 and 1498, 16 universities had been founded within central Europe, and between 1502 and 1648 another 18 would open, thus producing a steady stream of graduates trained in Roman and canon law suitable for positions in government service” (p.244).

5 Conclusion

In this paper, I hand-collect novel datasets to examine the activity of political elites in Spring and Autumn China, which was a crucial period for the development of the imperial state. I demonstrate an overall increase in the activity of commoners in administrative roles, downward mobility of incumbent noble officials, and rising competition for administrative offices. I propose a mechanism for explaining the rise of literate commoners as new administrative human capital, identifying civil unrest and improvement in productivity as two important factors. Lastly, I argue that human capital is closely associated with the trend of increasing centralization and state capacity.

Political institutions are equilibrium outcomes supported rulers, elites and individuals. My analysis sheds light on how the composition of elites evolves during a period of institu-

tional transformation, and how those changes can potentially affect the development of new institutional arrangements. This mechanism exhibits historical relevance much broader than pre-imperial China, and deserves closer scrutiny from scholars.

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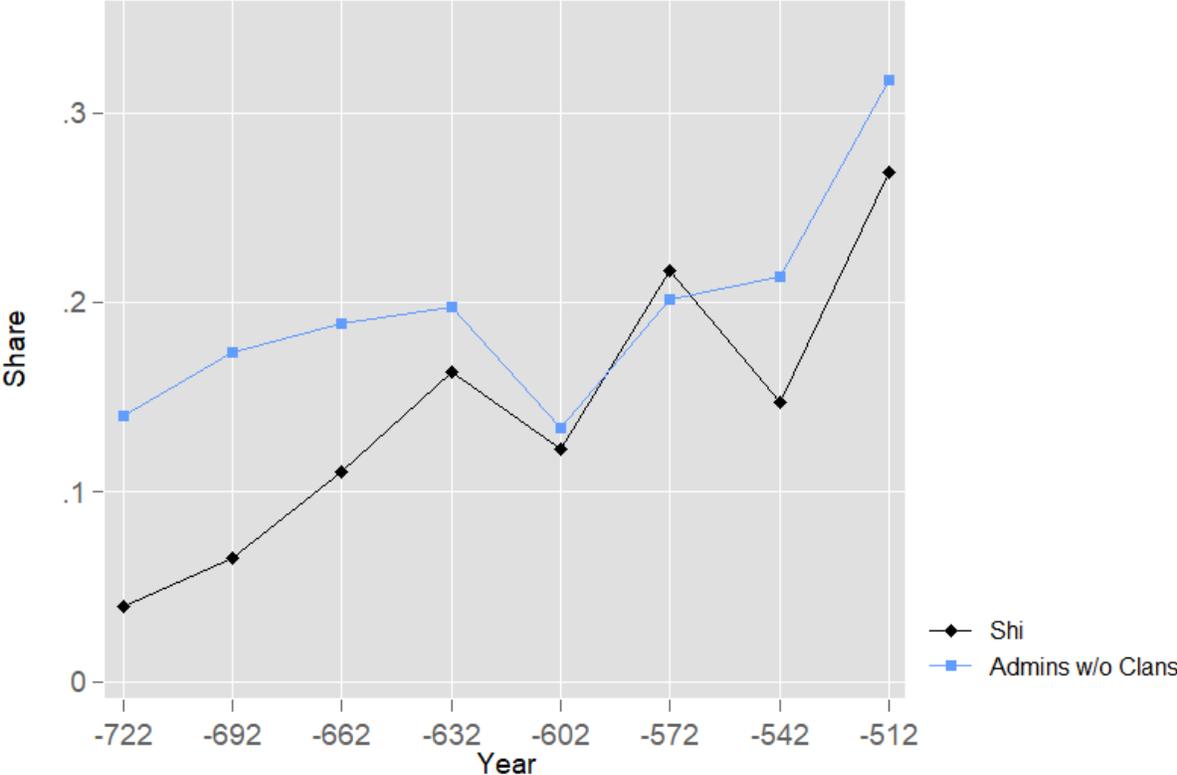
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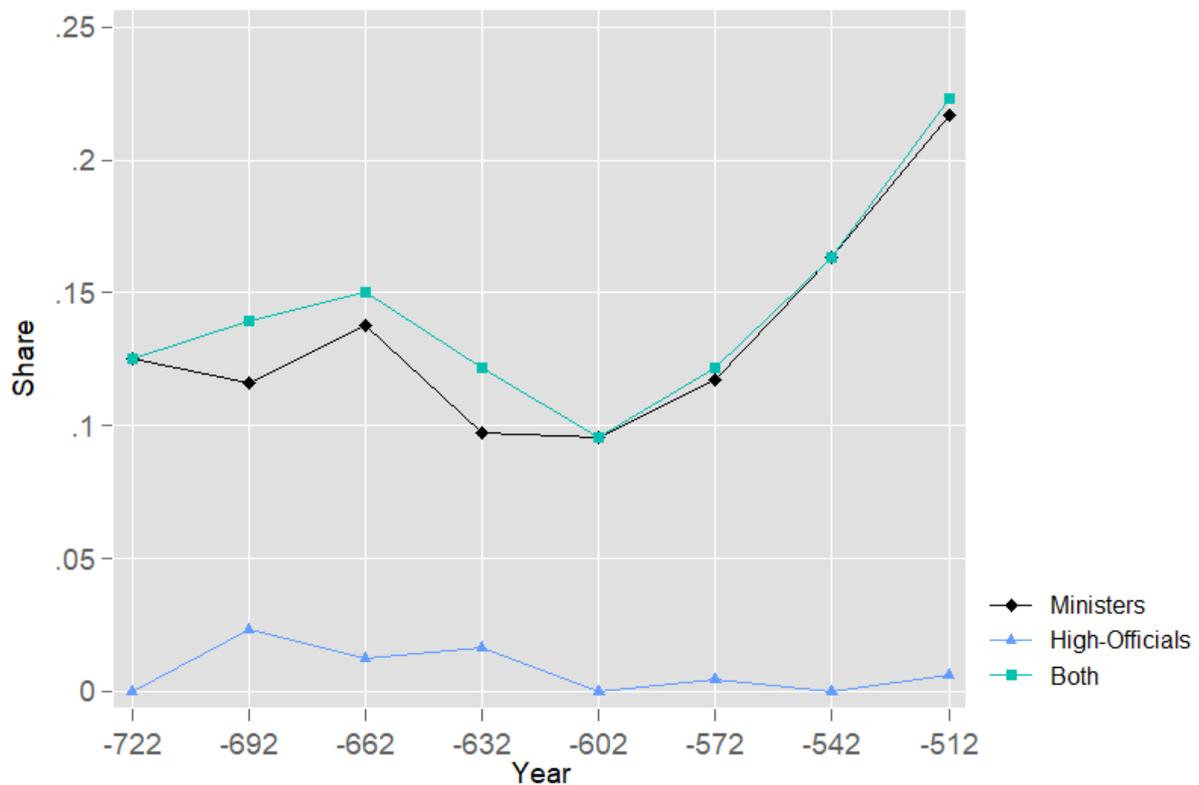
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Figure 3: Share of *Shi* in All Administrators and Share of Administrators without Clans, 722-468 B.C.



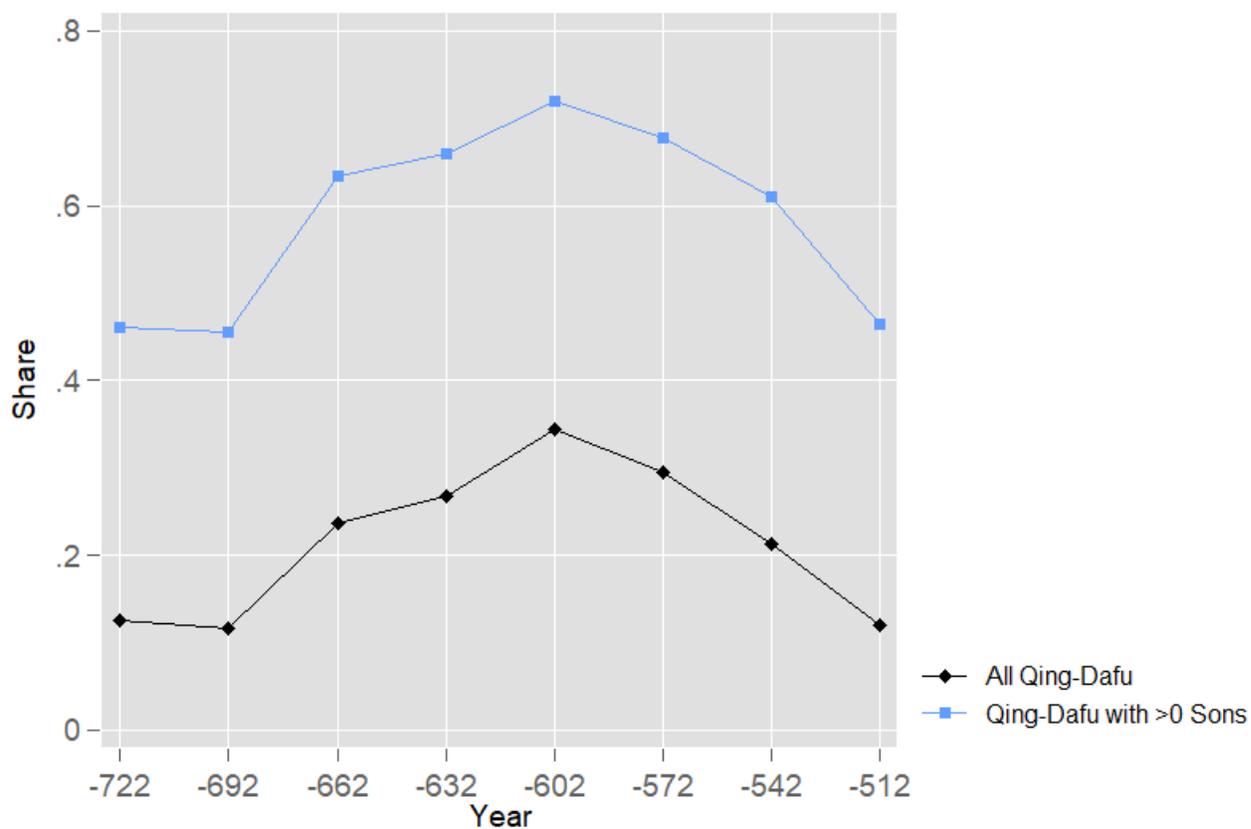
Notes: This figure plots the share of *shi* in all administrators, and the share of administrators who did not belong to a clan, from 722 B.C. to 468 B.C. The black line indicates the share of *shi* in all administrators. The blue line indicates the share of all administrators who did not have a clan.

Figure 4: Share of Ministers, High-Officials and Both Types without Clans, 722-468 B.C.



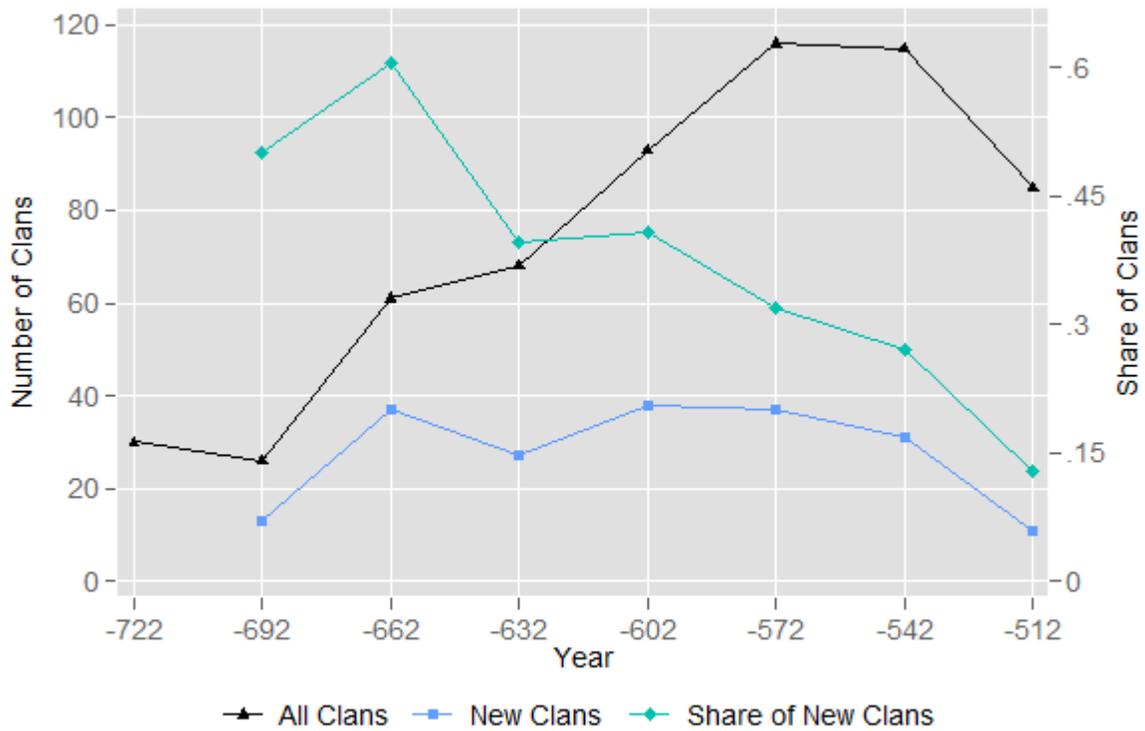
Notes: This figure plots the share of ministers who did not belong to a clan, the share of high-officials who did not belong to a clan, and the share of both types who did not belong to a clan in all high-officials and ministers (*qing-dafu*), from 722 B.C. to 468 B.C. The black line represents the share of ministers who did not have a clan in all *qing-dafu*. The blue line indicates the share of high-officials who did not have a clan in all *qing-dafu*. The green line represents the share of both high-officials and ministers who did not have a clan in all *qing-dafu*.

Figure 5: Hereditariness of the Office of High-Officials and Ministers (*Qing-Dafu*), 722-468 B.C.



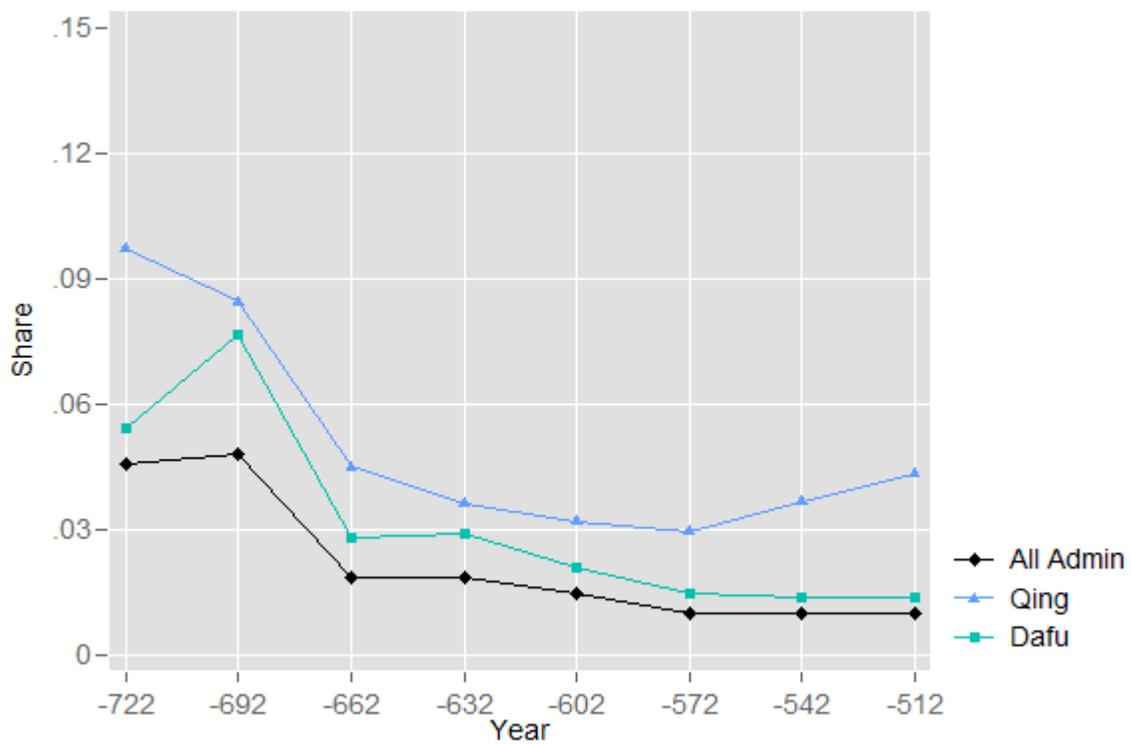
Notes: This figure plots the share of high-officials and ministers (*qing-dafu*) who had at least one son of equal or higher status, and the share of *qing-dafu* who had at least one son of equal or higher status in the subsample of *qing-dafu* who were recorded to have sons, from 722 B.C. to 468 B.C. The black line represents the share of *qing-dafu* who had at least one son of equal or higher status. The blue line indicates the share of *qing-dafu* who had at least one son of equal or higher status in the subsample of *qing-dafu* who had at least one son on record.

Figure 6: Activity of Clans, 722-468 B.C.



Notes: This figure plots the number of clans, new clans, and the share of new clans from 722 B.C. to 468 B.C. The black line represents the number of clans that appeared in *Zuo's Commentary* in each period. The blue line indicates the number of clans that appeared in *Zuo's Commentary* for the first time in each period. The green line represents the share of newly appeared clans.

Figure 7: Herfindahl-Hirschman Index of Clans over Administrators, High-Officials and Ministers, 722-468 B.C.



Notes: This figure plots the Herfindahl-Hirschman Index (HHI) of clans over administrators. The black line represents the HHI over all administrators. The blue line represents the HHI over high-officials. The green line represents the HHI over ministers.

Table 1: Political Elites by State, 722-468 B.C.

State	All Notables	All Clans	Dukes	Son of Dukes	High-Officials	Ministers	<i>Shi</i>
Chu	213	188	14 (0.066)	48 (0.225)	44 (0.207)	133 (0.624)	11 (0.052)
Jin	285	255	22 (0.077)	6 (0.021)	73 (0.256)	134 (0.470)	48 (0.168)
Lu	207	176	15 (0.072)	29 (0.140)	24 (0.116)	86 (0.415)	66 (0.319)
Qi	182	147	18 (0.099)	29 (0.159)	29 (0.159)	67 (0.368)	51 (0.280)
Song	130	100	17 (0.131)	22 (0.169)	58 (0.446)	31 (0.238)	11 (0.085)
Wey	137	99	21 (0.153)	26 (0.190)	30 (0.219)	48 (0.350)	21 (0.153)
Zheng	150	120	18 (0.120)	38 (0.253)	29 (0.193)	86 (0.573)	5 (0.033)
Total	1,304	1,085	125 (0.096)	198 (0.152)	287 (0.220)	585 (0.449)	213 (0.163)

Notes: This table displays the number of different types of political elites and administrators in the seven states of Chu, Jin, Lu, Qi, Song, Wey and Zheng during the Spring and Autumn Period. Numbers in the parentheses are the fractions of different types of political elites in all notables for each state.

Table 2: Family Background of Warring States Prime Ministers, 480-222 B.C.

State	Prince or King's Son-In-Law	Noble Descent	No Known Noble Ties	Total
Chu	3	5	5	13
Yan	0	0	5	5
Qin	3	3	11	17
Zhao	3	1	8	12
Han	3	2	6	11
Wei	5	1	9	15
Qi	2	0	4	6
Total	19	12	48	79

Notes: This table displays the family background of prime ministers in the seven states of Chu, Yan, Qin, Zhao, Han, Wei and Qi during the Warring States Period. The first column displays the number of prime ministers who were princes or were married to princesses. The second column displays the number of prime ministers who were born in noble families. The third column displays the number of prime ministers who were not known to have ties to the nobility.

Table 3: Exits of Political Elites, 722-468 B.C.

Panel A: Causes of Exits				
Type of Elite	Total	Exits	Exits Caused by Coups/Civil Conflicts	Exits due to Death in External Conflicts
All	1,075	294 (0.273)	276 (0.257)	10 (0.009)
Dukes	125	40 (0.320)	39 (0.312)	1 (0.008)
Sons of Dukes	198	82 (0.441)	77 (0.389)	1 (0.005)
High-Officials	287	70 (0.244)	65 (0.227)	2 (0.007)
Ministers	584	141 (0.241)	130 (0.223)	7 (0.012)

Panel B: Civil Rivals Responsible for Death				
Type of Elite	Deaths in Coups/Civil Conflicts	Deaths Caused by Dukes	Deaths Caused by High-Ranked Nobles	Deaths Caused by Low-Ranked Nobles
All	192	45 (0.234)	113 (0.589)	17 (0.089)
Dukes	33	3 (0.091)	19 (0.576)	6 (0.182)
Sons of Dukes	64	12 (0.188)	37 (0.578)	8 (0.125)
High-Officials	42	16 (0.381)	19 (0.452)	4 (0.095)
Ministers	83	19 (0.229)	55 (0.663)	4 (0.048)

Notes: Panel A of this table displays the number of different types of elites, and the causes of their exits. Column 1 is the number of elites. Column 2 is the number of exits. Column 3 is the number of exits attributable to coups and civil rivals. Column 4 is the number of exits due to dying in warfare. Fractions are computed by dividing the current column by column 1. Panel B of this table displays the number of deaths that are attributable to different types of civil rivals. Column 1 is the number of unnatural deaths. Column 2 is the number of deaths attributable to dukes. Column 3 is the number of deaths attributable to high-ranked nobles: high-officials, ministers and sons of dukes. Column 4 is the number of deaths attributable to low-ranked nobles such as members of noble clans and retainers of high-officials and ministers. Fractions are computed by dividing the current column by column 1.

Appendix A Additional Statistical Patterns

A.1 Trade and Commerce

I illustrate that trade and commerce had been expanding throughout the Spring and Autumn Period and the Warring States Period. I argue that this reflects a more widespread distribution of literacy and numeracy skills in the general population.

During this era, commerce had been booming and markets appeared in many cities. *Zuo's Commentary* documented the trading of everyday goods such as timber, fish, shoes, cattle and wine in the capital city of Qi, the collection of commercial taxes and city gate tolls from merchants by the government, and the institution of officers who were in charge of overseeing market activities (Gu and Zhu 2001). The development of commerce is likely to be associated with a changing distribution of skills across the population. To participate in trade, merchants would need to acquire basic writing and accounting knowledge in order to record transactions and inventory numbers and items, and to calculate profits and losses. It is also a reflection of increasing specialization in economic production and a rise in productivity across the society.

The rise in economic activities and a growth in population are reflected in changes in city structures. Initially, a city was an area of land that was enclosed by one set of walls and housed both the ruling aristocrats and the citizens. As non-citizens began to settle and inhabit areas outside of cities, city authorities constructed a set of “outer walls”, enclosing an extra block of land, to house new residents and to accommodate for new activities such as markets, trade posts and workshops (Du 1992; Yang 1998). A surge in city-building and construction of defensive walls took place in the Spring and Autumn Period (von Glahn 2016:47). Nonetheless, the main materials used for wall-building were still rammed earth (Ma 1998).

It is common knowledge that regular, large-scale trade cannot happen without money as a medium of exchange. In Western Zhou, the main type of currency was shells—most of them were seashells obtained from trade with coastal tribes, while some were made from stone, jade and various types of metals. Mintage of bronze coins began in the Spring and Autumn Period, and was concomitant with the expansion of trade and commerce. Dukes of major regional states actively participated in the minting of money, and as a result, many types of money differing in size, shape and character engravings were in wide circulation (Huang 2001).

For each historical period, I display in Table 4 the number of distinct present-day county-level locations that first became involved in trade in that period. I determine the earliest date of trade for a particular location by the period of mintage of the oldest coin that was

discovered at that location. We can see that the circulation of money had been growing throughout the Spring and Autumn Period and the Warring States Period.

Period	Number of Distinct Locations that First Became Involved in Trade
Western Zhou (1046-771 B.C.)	20
Spring and Autumn (770-481 B.C.)	43
Warring States (480-221 B.C.)	62

Table 4: Coin Excavations in Western Zhou, Spring and Autumn Period and Warring States Period

While this increased use of money is indicative of an expansion in trade and commerce, it also reflects, albeit indirectly, a rise in productivity. Trade emerges and grows in scale when there is a surplus of produced goods in the society, which increases with productivity. The growth in the size of cities is another piece of corroborating evidence: urban residents live off the land and are supported by the agricultural surplus to undertake non-agricultural or non-productive activities.

A.2 Iron Technology

In this subsection, I show that there had been an increase in the use of iron tools over the Spring and Autumn and Warring States Periods. I argue that this reflects increased productivity.

The substitution of stone and bronze tools by iron tools, and of bronze weapons by iron and steel weapons was a long, extended process that started in the Spring and Autumn Period, intensified during the Warring States Period and came to a completion in the Western Han (202 B.C.-A.D. 8). At the beginning, only a small number of nobles had access to wrought iron²⁵ and mainly used it to make weapon blades. When cast iron²⁶ was invented,

²⁵Wrought iron is produced by heating iron ores and charcoal together in a bloomery. Since temperature in the bloomery is usually below the melting point of iron, this method would produce softened, but not molten, iron. These softened iron blocks must undergo long, repeated hammering to have impurities removed, and will then be forged into different ironware. This method of production was costly because nearly half of the iron ore would be wasted and the removal of impurities would typically take a long time; but even so, the final iron product still contained a considerable amount of unremoved impurities and was therefore of low quality (Yang 2004).

²⁶The invention of the blast furnace during the Spring and Autumn Period enabled the production of cast iron, while also improving productive efficiency and the quality of the end product. Cast iron is produced by melting iron in the blast furnace (this is now possible because temperature can reach above the melting point of iron) and taking various procedures to remove impurities. To date, artifacts made of cast iron have

it was mainly used to make production implements such as hoes, shovels and carving knives, and as a result the utilization of cast iron expanded to the wider society. Since the brittleness of cast iron made it unsuitable for things that required a sharp edge (Wagner 1993), mass production of iron weapons only became possible after the development of technologies that enhanced the flexibility and durability of cast iron in early Warring States Period (Bai 2005).

The observations above can be corroborated by a dataset that I collect of excavated iron artifacts dating back to Western Zhou, the Spring and Autumn Period and the Warring States Period. I complement this source data with excavations that were made since the book was published and tabulate the data in Table 5. For Western Zhou and the Spring and Autumn Period, I show the number of iron artifacts that had been excavated (Column 3) and the number of sites and the exact regional states (Columns 2 and 4) at which they were excavated. I also show the types of those iron artifacts. Moreover, since the number of iron artifacts dating back to the Warring States Period is too numerous,²⁷ in Column 6 I show the number of unique types of artifacts by the earliest date at which they became available for use. The number of unique types of production tools is displayed in parentheses. We can see that the number of excavated iron artifacts increases over time, and especially towards the end of the Spring and Autumn Period. The number of unique types of iron artifacts and production tools also rise over time.

We should be very careful when evaluating the impact of iron technology on productivity and violence in the Spring and Autumn Period. While an improvement in iron technology did take place, the number of excavated iron artifacts was still very small compared to their bronze counterparts. Moreover, there have been several discoveries of relics of bronze foundries, but none of iron foundries, in the Spring and Autumn Period. In contrast, at least ten relics of iron workshops dating back to the Warring States Period have been discovered (Bai 2005:Appendix 1). This indicates that the scale of iron production was rather limited and a subsidiary to bronze production. On the other hand, it should be appropriate to say that iron tools were beginning to be employed in production in late Spring and Autumn Period (Bai 2005:47), while large-scale usage of iron weapons and tools took place in the Warring States Period.

Here I make a final, related remark on agricultural production: the use of bronze tools had also been growing during the latter part of the Spring and Autumn Period, and may have contributed to higher productivity. To date, archaeologists have only discovered 25 artifacts of bronze agricultural tools dating back to Shang (c. 1600-1046 B.C.) and Western Zhou, while thousands of agriculture tools made of stone and shell had been found for the same

been excavated from tombs dating back to mid and late Spring and Autumn Period (Bai 2005:23-29)

²⁷For a complete listing, see chapter 3 in Bai (2005).

Table 5: Iron Artifacts in Western Zhou, Spring and Autumn and Warring States Periods, 859-221 B.C.

Period	Number of Sites	Number of Iron Artifacts	Number of States	Types	Unique Types Available by This Date
Late Western Zhou (859-771 B.C.)	2	6	1	Sword, dagger-axe, spear; carving knife, adze	5 (2)
Early Spring and Autumn (770-674 B.C.)	6	6	2	Sword, dagger-axe, dagger	6 (2)
Mid Spring and Autumn (673-577 B.C.)	5	13	3	Sword; carving knife, knife, shovel, spade	9 (5)
Late Spring and Autumn (576-481 B.C.)	18	66	7	Arrows, sword, dagger; axe, carving knife, spade, shovel, adze, sickle, hoe, awl	14 (8)
Early Warring States (481-395 B.C.)	-	-	-	omitted	20 (11)
Mid Warring States (394-308 B.C.)	-	-	-	omitted	33 (19)
Late Warring States (307-221 B.C.)	-	-	-	omitted	85 (41)

Notes: This table displays the number of iron artifacts in different historical periods. Column 1 is the number of excavation sites of iron artifacts. Column 2 is the number of iron artifacts. Column 3 is the number of states to which iron artifacts belonged. Column 4 is the types of artifacts. Column 5 is the number of unique types of artifacts that have been excavated prior to or during each historical period. Parentheses contain the number of unique types of production tools.

time period ([Bai 1989](#)). In contrast, 25 such artifacts were found for early and mid Spring and Autumn Period, and 80 just for the one hundred years of late Spring and Autumn Period. Molds of agricultural tools were also found at two relics of Spring-and-Autumn bronze foundries ([Xu 1987](#)). At the same time, we should not overestimate the impact of those agricultural tools since bronze was still primarily used to make weapons and ritual vessels, of which thousands of artifacts have been discovered ([Chen 2002](#)).