Taxation and Public Goods Provision in China and Japan before 1850

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May 18, 2012

Abstract

We develop a principal-agent model to study the state in China and Japan on the eve of the modern age. Before 1850, both Qing China and Tokugawa Japan were ruled by stable dictators who relied on bureaucrats to govern their domains. We hypothesize that principal-agent problems increase with the geographic size of a domain. In a large domain, the ruler’s inability to closely monitor bureaucrats creates opportunities for the bureaucrats to exploit taxpayers. To prevent overexploitation and maintain political stability, the ruler has to keep taxes low and government small. By contrast, in a smaller domain, lower monitoring costs allow the ruler to tax and regulate the economy to a greater extent without risking popular resistance. To test these implications, we assemble primary and secondary sources and find that tax rates were higher and the rulers more active in public goods provision in Japan than in China. Furthermore, tax revenues tracked demographic patterns more closely and public goods provision was more responsive to socio-economic change in Japan. We conjecture that these factors contributed to Japan’s greater resilience to the rise of the West after 1850.

Key words: Comparative Institutional Analysis, Corruption, Long Run Growth

JEL Codes: N15, N40, O43, P52

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1 Introduction

Why was Japan the first non-Western nation to industrialize? Why did China, historically the most culturally and technologically advanced country in East Asia, take longer to catch up? Traditionally, many believe that the answer lies with the Meiji Restoration. According to this view, Qing China (1644-1911) and Tokugawa Japan (1600-1868) were both governed by despotic regimes that were uninterested in promoting economic growth. Their paths diverged only after 1868, when the Tokugawa regime was overthrown and the new Meiji government introduced far-reaching reforms that transformed Japan fundamentally. As Beasley (1972) put it,

During the middle decades of the nineteenth century China and Japan both faced pressure from an intrusive, expanding West [...] Emotionally and intellectually, Chinese and Japanese reacted to the threat in similar ways [...] Yet they differed greatly in the kind of actions that this response induced [...] The Meiji Restoration is at the heart of this contrast, since it was the process by which Japan acquired a leadership committed to reform and able to enforce it. For Japan, therefore, the Restoration has something of the significance that the English Revolution has for England or the French Revolution for France; it is the point from which modern history can be said to begin.

Recent reassessments of global economic history have painted a more rosy picture of the Chinese and Japanese economy on the eve of the modern age. They have shown that, like Western Europe, China and Japan experienced widespread commercialization and proto-industrialization in the early modern age (Pomeranz, 2000). However, like the traditional narrative, the revisionist view, too, tend to play down the differences between China and Japan, and focus instead on areas where the pair were alike.

While indeed early modern China and Japan shared many striking similarities (most notably, dependency on rice cultivation, labor intensive economy, Confucian ideals of government and family; and an absence of explicit checks on executive power), there were subtle differences in their political economy that merit careful attention. For example, social and geographic mobility was lower in Japan than in China (Nakamura and Miyamoto, 1982). Their state-peasant relationship was dissimilar too: in Japan,
the state taxed the village as a collective unit and left the village to run its own affairs, while in China, individuals had to deal with agents of the state directly (Aoki, 2011).

Obviously, China and Japan were also different in terms of geography. China was a sprawling land empire with vast inner frontiers, while Japan was a relatively isolated small island nation. In this paper, we explore the influence of geography on the state’s ability to raise tax and provide public goods. We shall show that geography provides a powerful explanation to important dissimilarities in the political economy of China and Japan. We also find that in contrast to China, Japan already had a relatively strong state apparatus during the early modern period: The proactive Meiji government is a product of Japan’s history, not a radical break from its past.

We focus on the two and a half centuries between 1600 and 1850. During this period, both nations were ruled by stable dictatorships. Following Olson (1993), we interpret stable dictators as “stationary bandits” who understand that excessive exaction in the short run would hurt them in the long run. However, the ruler’s encompassing interest is by itself insufficient to guarantee good governance. Because dictators cannot rule alone and have to rely on agents to govern, a principal-agent problem is inherent in these regimes (Kiser and Tong, 1992; Ma, 2010; Sng, 2010; Brandt et al., 2011). As long as the interests of the ruler and the agents are not perfectly aligned, in the absence of perfect monitoring, the agents may pursue their self-interest at the ruler’s expense. For example, they may extort the taxpayers and thereby increase the likelihood of rebellion. We investigate, theoretically and empirically, how such agency problems influence the levels of taxation and public goods provision in China and Japan.

We hypothesize that in a stable dictatorship, agency problems increase with its geographic size. In a large domain, the ruler is unable to monitor the agents closely. This gives the agents strong incentives to extort the taxpayers. To prevent overexploitation that could foment rebellion, the ruler has to keep taxes low. By contrast, in a smaller domain, lower monitoring costs allow the ruler to impose heavier taxes without risking popular resistance.

\[1\] Unstable dictators behave like “roving bandits” since their horizons are too short for them to consider anything beyond the present. Our analysis does not cover unstable dictatorships.

\[2\] For expositional clarity, in this paper we equate “agents” with tax collectors, and “corruption” with extortion of taxpayers. One may easily think of other situations where state agents take self-serving actions that may weaken popular support for or acquiescence to the state: officials embezzling funds from public projects, judges taking bribes, and so on.
If the sole purpose of the fiscal process is to support the consumption of the ruling class, it would not matter to the taxpayers if the portion of wealth taken away from them ends up as taxes of the ruler, or corruption monies of the agents. However, taxation is rarely a pure rent seeking activity: The ruler, as the owner of the country, may use the tax receipts to provide public goods so as to keep his property productive. As such, the competition between the ruler and the agents over the economic surplus has an effect on the welfare of the taxpayers, especially in the long run.

To explore these implications, we build a principal-agent model and derive optimal taxation and public goods provision in a stable dictatorship. There are three players in our model. The ruler taxes the peasants through the agents. He also invests in a public good that protects the economy from random exogenous shocks (e.g. natural disaster). If the ruler under-invests in the public good and a large shock is concurrently realized, the shock destroys the economy and the ruler is left with nothing to tax.

The static predictions of the model are straightforward: As the geographic size of the domain increases, the ruler’s monitoring efforts are spread thinner over a larger area. As a result, corruption increases while the amount of taxes collected and public good provided in each region of the ruler’s domain fall.

Less straightforward are the dynamic implications. The model predicts that the ruler of a smaller domain has greater adaptability to socio-economic change. As the economy grows, he is able to capture a sizable share of the increased output and invest more in the public good. By contrast, in a large domain, tax revenue and public investment are less responsive to socio-economic change. If the principal-agent problem is severe enough, the ruler’s tax revenue and ability to invest in the public good could actually fall as the economy expands. This happens if economic expansion encourages corruption to grow faster than the economy itself.

To test these implications, we assemble primary and secondary sources to measure the fiscal capacities of the Qing state and the Tokugawa shogunate. Indeed, we find that per capita tax revenue in the shogunate was consistently and significantly higher than in China. Furthermore, while the shogunate’s tax revenue grew in step with demographic change, that of the Qing state followed an inverse-U trajectory: it peaked before the mid-18th century and contracted steadily thereafter, even as the Chinese economy and population continued to expand.

Next, we analyze public goods provision in the two domains. In line with the historians’ observations, we find that the shogun displayed a greater willingness and
capability to regulate the economy and provide public goods. Comparing to the Chinese emperor, the shogun did more in standardizing weights and measures, building and maintaining roads, providing urban public goods (e.g. fire fighting, waste management), as well as preventing ecological degradation.

This paper is intrinsically related to the strand of literature on state capacity. Traditionally, economists see a strong state that taxes too much as the main threat to economic growth. More recently, Acemoglu (2005) and Besley and Persson (2009) have argued that a weak state that provides too little public goods creates distortions too. Our findings suggest that the cost of building state capacity is not the same everywhere. Japan could afford to tax heavily because it was relatively easy for their rulers to oversee their small domains and check corruption. Doing likewise in China would lead to overexploitation due to the emperor’s high monitoring costs.

There exists a small but important literature that applies cost-benefit analysis to explain the size of nations (Alesina and Spolaore, 1997, 2003). For the period that we study, China was a unified country ruled by an emperor, while Japan consisted of 260-odd autonomous domains, each ruled by a daimyo (feudal lord). We take the size of these domains as given, and focus on analyzing its consequences. Historians have suggested that the constant need to coordinate defense efforts against nomadic incursions from Central Asia might have generated impulses that pushed China towards political unification (Lattimore, 1940; Huang, 1988). By the same reasoning, Japan’s geographic isolation before the mid-19th century likely contributed to the preservation of its fragmented political system, and unification came only when a powerful military threat from the West emerged. Unfortunately, to keep the scope of our discussion manageable, we have to leave a detailed explanation of these historical patterns to future research.

Social scientists have long recognized the influence of spatial scale on institutional and economic outcomes (See, for example, Jones 1981; Mokyr 1990; Rosenthal and Wong 2011). Three recent papers that explore the causal link between geographic size and institutional efficiency are of particular relevance to our analysis. Olsson and Hansson (2011) detect a strong negative causality between size and the rule of law among 127 former colonies. They also show that the rule of law tends to worsen when the capital is not centrally located. According to Stasavage (2010), high communication and travel costs in pre-industrial Europe created substantial obstacles for representative bodies in large territorial states to convene regularly, and rendered representative
assemblies in larger polities less effective than in smaller ones. Sng (2010) finds that the Qing state set up fewer counties and imposed lighter taxes in regions further away from the capital. Interestingly, all the major uprisings between 1750 and 1850 originated in regions far away from Beijing, suggesting that they were more likely to be caused by too little government than by an oppressive central authority.

The rest of the paper is organized as follows. In Section 2, we present the political, fiscal, and social structures of pre-1850 China and Japan. Section 3 provides the model and derives testable predictions. Section 4 tests the predictions with empirical data and historical evidence. In Section 5, we conclude with a discussion of some implications of our findings.

2 Historical Background

Pre-1850 China and Japan are natural “counterfactuals” in many aspects. Both economies depended heavily on small-scale, labor intensive, and rice-based agriculture. Both were ruled by stable and established governments long before the West became a dominant force in East Asia. Furthermore, they shared a common cultural, institutional, and technological heritage. As a result of active cultural borrowing from China, Tokugawa Japan too was also deeply influenced by neo-Confucianism and its associated political ideologies. Chinese administrative codes played an important role in shaping the way the Tokugawa shogunate was run (Jansen, 1992).

Geographically, however, some of their differences could hardly be more striking. Japan was an island archipelago comprising the four main islands of Honshu, Hokkaido, Kyushu, and Shikoku, as well as thousands of smaller ones, while China was a continental empire (Figure 1). At its peak, the Qing dynasty (1644-1911) controlled a landmass larger than China or the United States today. Even if we disregard the thinly populated regions north and west of the Great Wall, the region known as China proper is still bigger than India and Pakistan combined, or ten times modern-day Japan.

If pre-industrial communication technologies were an ever-present challenge to the proper functioning of pre-modern states, this challenge was far more acute in China than in Japan. In 1853, when the Taiping rebels captured Wuchang, a major Middle Yangzi city about 1000 kilometers from Beijing, the news took 8 days to reach the

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3During the Tokugawa period, Hokkaido was populated by the indigenous Ainu people and Japan’s control was restricted to the southern tip of the island.
Figure 1: Early Modern China and Japan

Figure 2: Tokugawa Japan in 1664

capital. To send an official report of the highest priority between Beijing and Shanghai through the imperial postal relay stations would take 10 days (Xie, 2002). By contrast, a similar trip between Japan’s two biggest cities, Edo (Tokyo) and Osaka, would require less than 4 days (Nakane and Oishi, 1990). It is also worth noting that no one in Japan lives more than 120 kilometers from the sea, which offered a relatively cheap mode of transportation and information transmission at an age without railroads.

This paper focuses on the two and a half centuries between 1600 and 1850. During this period, China was under the rule of the Ming (1368-1644) and Qing (1644-1911) dynasties. Sovereign power rested firmly in the hands of the emperor. In theory, there was no local government, as all rank-bearing local officials were agents sent to local districts to serve as representatives of the throne.

Meanwhile, Japan was led by the shogun of the Tokugawa house, who was one of the 260-odd daimyo with territorial control (Figure 2). While a daimyo had to swear allegiance to the shogun and subject himself to a sophisticated system of controls aimed to prevent dissent, he retained virtually complete autonomy over his domain. As such, instead of treating Pax Tokugawa as a unified but decentralized empire, we take a contract theory perspective and interpret it as a league of dictatorships. Every daimyo was a dictator of his own right, hence a “principal”, and should not be likened to a bureaucrat.

Since this paper applies the principal-agent framework to analyze China and Japan,

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4 There was significant continuity between the two dynasties, as the Qing adopted the fundamental political and socioeconomic institutions of the Ming (Leonard, 1996).

5 The position of the shogun in relation to other daimyo could be seen as one of “first among equals”. The shogun held special authority that distinguished him from his peers. For example, he could order a daimyo to provide military and logistical support or to make contributions to public projects—castles, roads, bridges, and so on. However, he had no right to tax daimyo lands. An important mechanism imposed by the shogun to ensure daimyo subservience and maintain political stability was sankin kotai. Essentially a hostage system, it required a daimyo to maintain two residences—one in the daimyo domain and the other in Edo—and to spend alternate years at each place. When the daimyo was absent from Edo, his wife and heir were required to stay there as hostages. This and other measures (including an extensive spy network) helped usher in an extended period of peace and stability known as Pax Tokugawa. Remarkably, before Japan was forced to open up by Western powers in the 1850s, there was no open military conflict or secret arms race among its domains for more than two centuries.

6 An analogy can be found in the industrial organization literature, which equates ownership to a firm with the control of residual rights to its assets (Grossman and Hart, 1986). Since a daimyo was the residual claimant to the fiscal resources of his domain, he, not the shogun, owned the domain.

7 For the rest of this paper, “daimyo” refers to all other daimyo except the shogun, and “shogunate” refers to the shogun’s domain. If a statement applies generally to all domains in Japan, we use the terms “Japan” or “the Japanese state”.

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we have to compare them at the regime level instead of the country level. In other words, we have to compare the government of Ming-Qing China with the governments of Tokugawa Japan. We focus primarily on the shogunate, for which historical records are most abundant, as the “counterfactual” to China. Due to the shogunate’s strong political and economic influences, it is said that the institutional features of daimyo domains shared much in common with those of the shogunate domain (Nakabayashi, 2008). However, due to data limitations, we have to leave a detailed analysis of other domains to future work.

2.1 Political Structure

2.1.1 China

Autocracy in China reached a peak during the early modern period (Miyakawa, 1955). The throne was the only position in government that was hereditary. There was no church, parliament or powerful magnates to challenge the authority of the emperor, who had full control over the apparatus of government.

To govern his huge empire from the capital, the emperor organized China proper into 18 provinces (sheng). Every province was in turn divided into several prefectures (fu), and every prefecture into several counties (zhou and xian). All in all, there were 20,000 odd positions in his bureaucracy, mostly staffed by men who obtained their credentials by passing civil examinations.

The responsibility of local administration fell on the county, which sat at the bottom of the bureaucratic hierarchy. There were about 1500 counties in Ming-Qing China, each headed by a magistrate (Ch’u, 1962).

According to Perkins (1969), the Chinese population expanded steadily from less than 200 million in 1700 to 410 million in 1850. By these estimates, an average county would govern over 100,000 people in 1700, and nearly 300,000 people in 1850. The magistrate could cope with this heavy workload because he was only expected to focus on the most important tasks: (1) collection of land taxes; (2) adjudication of disputes; and (3) maintenance of social order (Wang, 1890).

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8 The land tax accounted for about 80% of the Chinese state’s tax revenue (Wang, 1973). It was the magistrate’s responsibility to collect them and remit the portion owed to the central government promptly. The salt tax and customs duties were the two other taxes important to the Qing state during this period.

9 The magistrate was the only officer in the county authorized to preside over court proceedings.
To prevent the magistrate from being captured by local interests, his term was usually limited to three years. Furthermore, he must be a non-native in the locality where he served.\textsuperscript{10}

The imperial court kept an eye on the magistrate’s conduct via several channels. The first channel was supervision within the bureaucratic hierarchy. In a triennial exercise known as \textit{daji} (grand review), senior officials in the central and provincial administrations would review the magistrate’s performance and mete out reward or punishment accordingly. Failure to remit taxes to the central government in time, a huge backlog of court cases, and the presence of unsolved murders and major robbery cases would cost the magistrate dearly during the review (Watt, 1977).\textsuperscript{11}

Second, the imperial court established a surveillance agency independent of the executive branch of government to investigate and impeach shirkers and wrongdoers in the bureaucracy. Known as the Censorate (\textit{duchayuan}), its duty was to detect bureaucratic malpractices and report them to the emperor. At any one time, there were 56 censors attached to the provinces to act—in the words of the Qianlong emperor—as the “eyes and ears” (\textit{er mu}) of the imperial court (Feuerwerker, 1976, p. 49).

\subsection{Japan}

Between 1600 and 1868, Japan was divided into 260-odd mutually exclusive and administratively autonomous domains. The size of domains varied widely. The shogunate was rated at 4 million koku, but most domains were much smaller. The average size of a domain was only about 100,000 koku.\textsuperscript{12}

Within the shogunate, local administration was carried out by the daikan (magistrate). Like his Chinese counterpart, the daikan was responsible for tax collection, adjudication of disputes, and maintenance of social order. He was also subjected to regular rotation. On average, a non-hereditary daikan would serve in 2.54 locations.

\textsuperscript{10}To perform his daily duties, the magistrate relied heavily on the assistance of his private secretaries, as well as clerks and runners (operating as messengers, constables, or guards) hired locally. According to Qing statutes, the number of clerks in a county usually ranged from 10 to 30, while that of runners from 50 to 100. However, in practice it was not uncommon for a county office to be staffed with over a thousand clerks and runners (Watt, 1977). It was the magistrate’s responsibility to ensure the proper conduct of his underlings.

\textsuperscript{11}Punishments typically included pay forfeiture, fine, demotion, removal from office. Rewards usually came in the form of awarding merit points or rank promotion (DQHD, QL juan 6).

\textsuperscript{12}We use assessed agricultural output as a proxy of size. One koku is equivalent to 180.4 liters of rice, historically interpreted as the amount required to feed a person for a year.
and spend 5.7 years per location (Nishizawa, 1998).\textsuperscript{13}

The average jurisdiction of a daikan was around 70,000 koku (Hall, 1991).\textsuperscript{14} At any one time, there were 40 to 50 daikan reporting to the shogun’s cabinet (Totman, 1967). Accordingly, the shogunate had a relatively short chain of command. It had two layers of government (center–local), compared to four in China (center–province–prefecture–county). Furthermore, the daikan had fewer heads to govern than the Chinese magistrate (70,000 compared to 200,000 in 1800).

The mechanisms that the shogunate employed to monitor lower bureaucrats were similar to those that we see in China. The daikan office was audited regularly by the accounting office. Furthermore, the shogun also sent out censors (metsuke) to keep an eye on the quality of local administration (Totman, 1967; Nakane and Oishi, 1990).

2.2 Social Structure and the System of Land Taxation

2.2.1 China

Land taxation was the most important source of government revenue in Qing China as well as Tokugawa Japan. During the early Ming dynasty, the Chinese state designated the village (li), instead of households or individuals, as the primary unit of land taxation (Huang, 1974).\textsuperscript{15}

Furthermore, instead of having officials to collect taxes from the peasants directly, the wealthiest households within a group of villages would take turn to deliver the tax grain to designated government depots. Within each village, tax assignment was to be sorted out by the village members without interference from the state. Local officials and their underlings were actually prohibited from entering rural areas in their own jurisdictions. There were at least six known cases where officials were actually executed

\textsuperscript{13}In the early years of the shogunate, the daikan office was hereditary and was usually filled by some rich merchant or gentry member with strong local connections. In 1680, when the shogun Tsunayoshi initiated administrative reforms to strengthen the monitoring of daikan, he replaced the hereditary system with one based on regular rotation. According to Nishizawa (2004), daikan corruption was reduced after the reforms. Nishizawa (1998) found that among the 340 households that produced daikan in Tokugawa Japan, 81% of them produced just one generation of daikan, and 12% produced two generations.

\textsuperscript{14}Typically, a daikan overseeing a 50,000 koku district would have 10 assistants (tedai), and 20 staff members immediately under him. These personnels were in turn served by still lower-grade officials (Nishizawa, 1998).

\textsuperscript{15}Strictly speaking, the li was an administrative unit. Each should comprise 110 households. However, it usually overlapped with the natural village in practice (Heijdra, 1998, pp. 459-460).
for doing so (Schneewind, 2001). The system was designed to keeping potentially rapacious state agents away from village communities while ensuring that peasants continue to pay taxes to the state.

Besides the land tax, the other main form of taxation in early Ming was corvee labor. Households were classified by hereditary professions (civilian, military, artisan, and others) and were required to provide corvee services to the state according to their registered professions. As with the land tax, the state assigned corvee levies on the village, and left it to decide how the levies would be distributed among its members.\(^\text{16}\)

For such a system to work, it is imperative that the rural communities remained tightly knit to discourage free riding. To this end, the Ming state restricted domestic traveling and required travelers to obtain travel documents beforehand. Foreign traveling was banned outright.

It is therefore unsurprising that this rigid system came under increasing challenge in the 16th century as a result of economic change. According to China historians, the system was eventually undone by urbanization and large-scale population movements to inner frontiers. The migration of a household implies that its neighbors had to shoulder the extra corvee responsibilities that it left behind. This in turn increased the incentives for others to migrate (Fei, 2007). Meanwhile, due to a rising trend of the wealthy migrating into urban centers, it became increasingly common for less prestigious households to be appointed as tax captains. The social costs of tax collection rose in the process, as the new tax captains from more humble origins often lacked the authority to sanction free riding behaviors in their districts (Liang, 1957; Heijdra, 1998).

Unable or unwilling to reverse the trend of rising geographic mobility, the Chinese state adapted by expanding the role of local officials in tax collection. By the late Ming, tax liabilities switched from community-based to household-based. Every land-owning household had to pay a pre-determined amount of taxes, computed based on the size and grade of the land that it owned, regardless of how much the land actually produced that year. Corvee levies were first converted to a head tax, and eventually merged into the land tax. According to the Qing statutes, the magistrate would set up tax chests known as zitougui (self-deposit chests) at the county seat or at other convenient locations during the tax collection period, and invite taxpayers to deposit their taxes

\(^{16}\)The li did not exist solely to facilitate tax collection. Led by the village headman and elders, it was also a social and communal unit responsible for maintaining local order and providing basic social services (roads, small-scale irrigation works, schools, and temples) to its members.
into these chests in exchange for official receipts. In practice, however, the difficulties of enforcing such an arrangement meant that magistrates often sent their underlings to solicit payments from community heads or from individual households directly (Ch’u, 1962; Zelin, 1984).

While most taxes had been monetized in China by the 17th century, peasants still paid part of their land taxes in kind, which, depending on the region that they resided, could be rice, wheat, millet, barley, sorghum, beans, or other staple crops. For the portion of the land tax that came to be denominated in silver, they were often paid in copper coins (Ch’u, 1962). Commutation rates were fixed by the local magistrates and therefore varied from county to county.

2.2.2 Japan

While regional diversity necessitated the denomination and collection of taxes in a variety of crops and metals in China, a higher level of uniformity was observed in Japan. The fiscal base of the early modern Japanese state was measured in rice, the primary staple crop nationwide. Rice paddies were not the only plots subjected to taxation. Fields, forests, residential lands, mines, and fishing grounds were also assessed and taxed in terms of rice (Nishikawa, 1985, pp. 23-24). If rice were not the main crop cultivated, then part of the tax would be levied in cash (kinno) at a conversion rate set by the lord.

Otherwise, land taxation in Tokugawa Japan bore many important similarities with the early Ming system. Peasants were in theory bound to their land. They were not allowed to change residency or even travel without permission. The shogunate

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17Theoretically, this would allow the magistrate to receive tax payments without having to send runners for door-to-door visits, thereby saving on administrative costs and avoiding potential abuse.
18Apart from the annual land tax (nengu), the peasants were also subject to a variety of miscellaneous taxes (komononari), extraordinary levies on demand (goyokin), as well as corvee labor (Walthall, 1991).
19The Japanese state instituted a four-class status system of shi, nō, kō, shō (warriors, peasants, artisans, and merchants) nationwide. The warriors (samurai) were the ruling class, while the ruled consisted of peasants, artisans, and merchants. This four-class structure could be traced to the ancient Chinese concept of shì nòng gōng shāng. It was far more rigid than the early Ming’s household classification system, but it survived to the end of the Tokugawa period. On the eve of the Tokugawa fall in 1867, peasants constituted 85% of Japan’s population, while the warriors made up another 5-6% (Dore, 1965, p. 11).
20The lack of social and geographic mobility in Tokugawa Japan was relative (compared to China), not absolute. Many Japanese peasants moved to towns and cities in search of work.
imposed a village contract system (murauke-sei), and levied the land tax on village communities based on the total assessed yield of each village. In theory, the peasant who owned the cultivation rights to a plot of land would be directly responsible for its taxes, but in practice, members of the same village were collectively responsible for one another. Should one household fail to pay its taxes, their neighbors would have to make up the shortfall. The daikan rarely showed up in the villages, and generally left the villagers alone to run their own affairs (Walthall, 1991, p. 6).\textsuperscript{21}

\section{The Model}

Consider a discrete-time, infinite-horizon regional economy with 3 player-types: the ruler, his tax agents, and the peasants. The ruler rules $S$ homogeneous regions, where $S \geq 1$. We focus on one such representative region. Our primary concern are his decisions on taxes and public goods.

Each region in the dictatorship is populated by $N$ homogeneous peasants. The regional agricultural output $Y$ is increasing in $N$ at a diminishing rate. Mathematically, $Y = Y(N)$, where $N > 0$, $Y(0) = 0$, $Y'(\cdot) > 0$, and $Y''(\cdot) < 0$. We assume $N$ to be exogenous for now and will endogenize it later.

The ruler sets a tax rate $\tau$ and sends his tax agents to collect taxes from the peasants. In his course of duty, an agent may demand the peasants to turn in an extra $\epsilon$ portion of their output, which he pockets for himself. Therefore, the effective expropriation rate for the peasants is $\tau + \epsilon$. As $\epsilon$ is non-negative, there exists a potential wedge between what the ruler receives and what the peasants pay.

To discourage corruption, the ruler conducts audits on randomly selected regions after tax collection. Audits uncover corruption imperfectly. An audit detects the presence of suspicious activities with probability $q = q(\epsilon)$, where $q(\cdot) > 0$, $q'(\cdot) > 0$, $q''(\cdot) > 0$, and $q'''(\cdot) < 0$.\textsuperscript{22} The ruler punishes an agent indicted of malfeasance in the auditing

\textsuperscript{21}Akin to the situation in early Ming China, the principle of collective responsibility went beyond fiscal affairs. In each village, households were divided into groups of five (gonin gumi). An individual was expected to keep a close eye on the conduct of other members in the same gumi. If one was to commit a serious crime, his family members, gumi, and the village headman would all be liable to punishment—unless they reported the impending act to the authorities in advance.

\textsuperscript{22}An easy way to motivate a monitoring technology of this form is to suppose that whenever agent $i$ collects a surcharge of $\epsilon_i \geq 0$, the audit will reveal a signal $\hat{\epsilon}_i$, where $\hat{\epsilon}_i$ has a normal distribution $N(\epsilon_i, \sigma^2)$ that is bounded between 0 and 1 (i.e. a truncated normal distribution). The ruler punishes the agent whenever $\hat{\epsilon}_i$ is greater than some threshold value $0 < h < 1$. This delivers $q(0) > 0$ and
process by fining him some constant $U$.\textsuperscript{23}

Due to his time constraint, the ruler can only audit $Q$ out of $S$ regions, where $Q \leq S$. Hence, each region has a probability $\frac{Q}{S}$ to be audited. Both $Q$ and $S$ are treated as exogenous throughout this paper.

### 3.1 The Single Period

The timing of events is as follows. (1) The ruler announces $\tau$. (2) The representative agent selects a value of $\epsilon$ to maximize his expected payoff, and goes ahead to collect taxes. (3) Tax collection ends. The ruler conducts random audits in $\frac{Q}{S}$ of his domain, and punishes the agent if an audit indict the agent of corruption.

**The Representative Tax Agent.** Solving the game by backward induction, the problem of the representative agent in the representative region is given by:

$$
\max_{\epsilon \geq 0} v^A = \epsilon \cdot Y(N) - \frac{Q}{S} \cdot q(\epsilon) \cdot U
$$

(3.1)

This yields the following optimality condition:

$$
q'(\epsilon^*) = \frac{S \cdot Y(N)}{Q \cdot U}
$$

(3.2)

**The Ruler.** The ruler wishes to extract as much from the taxpayers as possible. However, taxpayers may revolt if they perceive that the state is expropriating too much from them. We assume that taxpayers will revolt if the tax collection process takes away more than $r$ fraction of their income, where $0 < r < 1$. For dynastic considerations, the ruler worries about rebellion. To avoid it, he will ensure that $\tau + \epsilon \leq r$.\textsuperscript{24}

$q'(\cdot) > 0$. Ignoring corner solutions, it can be further verified that the agent will never set $\epsilon$ beyond $h$, which in turn implies that we can focus on the values of $\epsilon$ which correspond to $q''(\cdot) > 0$. Finally, it can be shown that if $\sigma$ is high enough, in other words, if the ruler’s information is noisy enough, $q'''(\cdot) < 0$.

\textsuperscript{23}More generally, we can allow the ruler to pick a level of punishment to mete out from a range of possible values between 0 and $U$. As long as he is committed ex-post to execute the strategy that he has chosen ex-ante, in equilibrium he will always choose the value $U$.

\textsuperscript{24}Note that this no-revolt constraint does not show up in the representative agent’s problem. We assume that agents are unable to coordinate their actions. As such, although revolts may hurt them too, it is always individually rational for each agent to ignore the no-revolt constraint when exploiting the taxpayers.
The ruler’s problem is therefore given by:

$$\max_{0 \leq \tau \leq 1} v^R = \tau \cdot Y(N)$$

s.t. \( \tau + \varepsilon \leq r \) \hspace{1cm} (3.3)

Solving this static game by backward induction, in equilibrium, the agent maximizes his risk-adjusted corruption returns (condition 3.2 always holds), and the ruler maximizes his revolt-free tax receipts (\( \tau + \varepsilon \leq r \) always binds).

**Comparative Statics.** We compare the equilibrium outcomes in two identical regions, each belonging to a different dictatorship. Suppose that the two dictatorships differ only in size: One of them rules \( S_{\text{large}} \) regions, while the other rules \( S_{\text{small}} \) regions, where \( S_{\text{large}} > S_{\text{small}} \geq Q \).

The two equilibrium conditions (3.2 and \( \tau^* + \varepsilon^* = r \)) and the property \( q''(.) > 0 \) together give the following results:

**Result 1.** *The level of corruption is higher in the large dictatorship:* \( \varepsilon_{\text{large}}^* > \varepsilon_{\text{small}}^* \).

**Result 2.** *The tax rate is lower in the large dictatorship:* \( \tau_{\text{large}}^* < \tau_{\text{small}}^* \).

Therefore, the model predicts higher official tax rates in Tokugawa Japan, but more severe levels of corruption in Qing China. Within Japan itself, tax rates in the daimyo domains should be higher than those in the shogunate.

These results are driven solely by managerial diseconomies of scale: As the number of regions in a dictatorship increases, each region invariably receives less attention from the ruler.

## 3.2 The Dynamic Process

### 3.2.1 Additional Setup

We now consider how the equilibrium outcomes evolve over time by adding two features to the setup.

**Public Good Provision.** First, at the end of each period, the ruler receives an independent shock for every region in his domain. It may be useful to think of the
shock as a natural disaster (e.g. a fire, or heavy rains that could cause flooding). Failure to overcome the shock will destroy the region’s economy. To prevent this, the ruler may invest in a public good (e.g. a fire brigade, or planting trees upstream) before the shock is realized.

Let $G_t$ represent the level of public good investment in the representative region at time $t$. The ruler determines $G_t$ in the beginning of $t$ when he sets $\tau_t$. In addition, let $|W_t|$ represent the shock realized at the end of $t$. For ease of exposition, suppose that $|W_t|$ is drawn from a normal distribution with mean 0 and variance $\sigma^2$.

When the shock is realized, if $G_t < |W_t|$, the shock destroys the region and the game is terminated. Otherwise, $t$ ends and $t + 1$ begins.$^{25}$

Therefore, the higher is $G_t$, the higher the probability that the players survive into the next time period. Specifically, the continuation factor is given by:

$$\beta_{t+1} = \beta_{t+1}(G_t) = F(G_t; 0, \sigma^2) - F(-G_t; 0, \sigma^2)$$

(3.4)

Since $|W_t|$ is drawn from a normal distribution, $\beta(0) = 0$, $\beta'(\cdot) > 0$, and $\beta''(\cdot) < 0$.

**Population Growth.** Next, we allow the peasants to make reproduction decisions that determine the rate of population growth. Each peasant lives for one period, during which he works to earn income. After that income is taxed, whatever remains can either be consumed or expended to produce offspring. The offspring produced by all peasants in time $t$ then add up to give us $N_{t+1}$, the population in the next period.

The timing of events at time $t$ is as follows. (1) The ruler announces $\tau_t$ and $G_t$. (2) The representative agent selects $\epsilon_t$ and proceeds to collect taxes. (3) Tax collection ends. The ruler conducts randomized audits in $Q_S$ of his domain, and punishes the agent if the agent is indicted of corruption. (4) The peasants make consumption and reproduction decisions. (5) $|W_t|$ is realized. If $G_t \geq |W_t|$, $t$ ends and $t + 1$ begins. Otherwise the game is terminated.

$^{25}$In most models, the state invests in public goods to augment economic output. Here, we assume that the ruler provides public goods to improve his regime’s resistance to shocks. This is done to keep the model tractable, but it is also in line with what we observe historically. Arguably, the main object of government spending in the pre-modern world was to maintain political and social order than to raise national income.
3.2.2 Solving the Game

**The Peasants.** Solving the game by backward induction. Let $c_t$ denote the consumption of a peasant and $n_{t+1}$ the number of children that he produces at time $t$. Following Hansen and Prescott (2002), we assume that the two “goods” are complements and are subjected to diminishing marginal utility. The peasant allocates his net income between consumption and reproduction to maximize his utility:

$$\max_{c_t, n_{t+1} > 0} u_t = u(c_t, n_{t+1}) \tag{3.5}$$

$$s.t. \quad c_t + n_{t+1} \leq \left[1 - \tau^*_t - \epsilon^*_t\right] \cdot y_t = [1 - r] \cdot y_t \tag{3.6}$$

where $u_1(.) > 0$, $u_2(.) > 0$, $u_{11}(.) < 0$, $u_{22}(.) < 0$, $u_{12}(.) > 0$, $y_t = \frac{Y(N_t)}{N_t}$.

It follows from the above that the peasant’s optimal number of offspring is given by $n^*_t = g(y_t)$, where $g'(.) > 0$. This in turn gives us the population growth rate, since:

$$\frac{N_{t+1}}{N_t} = \frac{N_t \cdot n^*_t}{N_t} = n^*_t = g(y_t) \tag{3.7}$$

**Figure 3:** Converging to The Steady State Population Level

In the spirit of Malthus, Condition (3.7) implies that the direction and rate of population growth depends on the peasant’s net income per capita.\textsuperscript{26} Let $y$ denote the level of income that corresponds to $\frac{N_{t+1}}{N_t} = 1$ in (3.7). If $y_t > y$, population will grow

\textsuperscript{26}According to the setup, when making their individual reproduction decisions, the peasants are “short-sighted” and do not consider the negative externality of producing offspring today on the
so that \( N_{t+1} > N_t \). If \( y_t < \bar{y} \) instead, population will contract. Either way, the region’s population will converge to a stationary level associated with a net per capita income of \( \bar{y} \) in the long run (Figure 3).

**The Agent.** We assume that the agents has a fixed tenure term. As such, they are myopic and behave like short-run players. The representative agent’s optimality condition is essentially unchanged:

\[
q'(\epsilon_t^*) = \frac{S \cdot Y(N_t)}{Q \cdot U}
\]  

(3.8)

**The Ruler.** Let \( V_t^R \) denote the expected present discounted value of the ruler’s payoff stream at time \( t \). His problem at \( t \) is given by:

\[
\max_{0 \leq \tau_{t+j} \leq 1, G_{t+j} \geq 0} V_t^R = \tau_t \cdot Y(N_t) - G_t + \beta(G_t) \cdot V_{t+1}^R
\]

s.t. \( \tau_{t+j} + \epsilon_{t+j} \leq r \quad \forall \ j \geq 0 \)

(3.9)

As before, he will maximize his tax receipts by setting \( \tau_t \) to the level that binds the no-revolt constraint \( (\tau_t^* + \epsilon_t^* = r) \). Furthermore, he will set \( G_t \) to satisfy:

\[
\beta'(G_t^*) \cdot V_{t+1}^R = 1
\]

(3.10)

Condition 3.10 implies that the ruler will invest in the public good up to the level where the marginal revenue equals the marginal cost. The higher the expected present discounted value of his future payoff stream \( (V_t^R) \), the more willing he is to invest on the public good, even though there is diminishing returns in doing so (since \( \beta''(\cdot) < 0 \)).

### 3.2.3 Comparative Statics.

Consider again our earlier example of the two identical regions, ruled by the dictatorships of size \( S_{\text{large}} \) and \( S_{\text{small}} \) respectively. As long as the populations in the two regions are the same initially, they will grow at the same rate over time. Since \( \tau_{\text{large},t}^* < \tau_{\text{small},t}^* \) (Result 2), \( V_{\text{large},t+1}^{R*} < V_{\text{small},t+1}^{R*} \). This, plus \( \beta''(\cdot) < 0 \) and Condition 3.10 imply that:

19
Result 3. The large dictatorship provides less public good: $G_{\text{large},t}^* < G_{\text{small},t}^* \forall t$.

The intuition of Result 3 is straightforward. When the principal-agent problem is severe, the expected present discounted value of the ruler’s future payoff stream $(V_{t+1}R^*)$ is low, he is therefore less willing than otherwise to invest for the future. For ease of exposition, we assume that agency problems exist in taxation but not in public goods provision. Relaxing this assumption will only strengthen this result.

Finally, we analyze how a regime’s capacity to deal with external shocks evolves over time. We focus on the case where the initial population level is less than the stationary level, so that population will expand until it reaches $N(y)$, unless interrupted.

Result 4. Output expansion benefits the ruler relatively less in the large dictatorship.

Proof. The ruler’s period tax revenue at $t$ is given by $v_t^{R*} = \tau_t^* \cdot Y(N_t)$. Therefore:

$$
\frac{dv_t^{R*}}{dN} = \frac{d\tau_t^*}{dN} \cdot Y(N) + \tau_t^* \cdot Y''(N)
= \left[-\frac{q''(\epsilon^*)}{q''(\epsilon^*)} + \tau_t^*\right] \cdot Y'(N)
$$

(3.11)

Since $q''(\cdot) < 0$, $\frac{d\tau_t^*}{dS} > 0$ and $\frac{d\tau_t^*}{dS} < 0$ (Results 1 and 2), $\frac{d}{dS} \left(\frac{dv_t^{R*}}{dN}\right) < 0$. □

Result 4 implies that as the regional population and economy grows, tax revenue will increase relatively faster in the small dictatorship than in the large one. Condition 3.11 suggests that growth has two opposing effects on the ruler’s coffers. On the positive side, the tax base is enlarged. On the negative side, corruption increases and the fraction of the economic surplus available for the ruler to capture falls. The positive effect is always larger and the negative effect smaller in the small dictatorship than in the large one.

Condition 3.11 also implies that growth does not always enrich the ruler. For any given $S$, there is a unique population level $\hat{N}(S)$ such that if $N < \hat{N}(S)$, the ruler’s revenue increases with population growth. If $N > \hat{N}(S)$, the ruler’s revenue decreases with population growth. The larger is $S$, the smaller is $\hat{N}(S)$. In other words, the larger the dictatorship, the earlier the tipping point where the negative effect of growth dominates the positive effect arrives.

---

27According to the microfoundation that we provide in footnote 22, this condition is satisfied if the ruler’s information is sufficiently noisy.
Two Outcomes. For two dictatorships that differ significantly in size, the model predicts distinctive outcomes.

In the case of the small dictatorship, as its ruler is capable of capturing a significant portion of the economic surplus consistently (Results 2 and 4), he will invest relatively heavily in public goods (Result 3) to protect the economy from periodic external shocks. In the absence of extraordinary large shocks to disrupt the process, population in every region that he governs will expand until per-capita income falls to $y$. At this point, the economy enters a steady state and will stay there until some exogenous shock occurs to knock it out of that state (Figure 4a).

The picture is different in the large dictatorship. In this case, the ruler’s revenue begins to fall fairly early, even when the economy is still expanding. As fiscal decline deepens, the ruler cuts his investment in the public good. His regime could even go bankrupt before the economy enters the steady state. Here, we observe a clear pattern of dynastic rise and fall. The establishment of the dynasty brings order and stability initially. This allows economic expansion to take place. However, in a paradoxical manner, the regime finds itself increasingly incapable of managing the prosperity that it has helped create (Figure 4b).

This result affirms the conjecture in Usher (1989) that a society under despotic rule could either evolve into a stationary state or into a dynastic cycle. We shall see in the next section that the Tokugawa patterns match the description of the stationary state scenario fairly well. The Japanese population grew steadily between 1600 and the early
1700s, and stayed almost constant from then on until 1850. The shogunate’s revenue followed a similar path (growth in the 1600s and stagnation following that). On the other hand, China saw an almost uninterrupted population expansion from the 1680s right up to 1850. Yet the fiscal capacity of the Qing state began to contract in the first half of the 1700s, in a manner that is consistent with the predictions of the second scenario.

4 Empirical Evidence

We hypothesize that while pre-modern China and Japan may have shared roughly the same stock of knowledge on the technologies of government as well as production, differences in geographic factors created more severe agency problems in China. Specifically, our model predicts a lower incidence of corruption (Result 1), higher tax rates (Result 2), and higher levels of public goods provision (Result 3) in Tokugawa Japan than in Qing China. We also expect fiscal revenue in the Tokugawa shogunate to track changes in economic output (proxied by population) more closely than was the case in China (Result 4).

In what follows, we first discuss the issue of corruption in China and Japan with respect to Result 1. We then show that Results 2 and 4 are in line with the tax revenue and population patterns observed. Finally, we evaluate Result 3 by reviewing the regimes’ track record on public goods provision.

4.1 Corruption

Corruption, by its very nature, is difficult to measure. However, it is well known that during Ming-Qing China, bureaucratic graft and corruption was a topic that attracted immense attention in both official and scholarly discourse. The problem was being portrayed as pervasive and worrisome (Park, 1997).

In the land tax collection process, over-collection (fu-shou) by magistrates and their underlings appeared to be endemic (Feng, 1876; Ch’u, 1962; Zelin, 1984). A popular form of fushou involved the manipulation of commutation rates between silver and copper coins. It was observed that magistrates often demanded taxpayers to pay taxes in copper coins instead of the officially stipulated silver or grain. These officials would then set the commutation rate at a level higher than the prevailing market rate to profit
from arbitrage. An imperial edict noted in 1829 that residents in Linchang of Henan province were made to pay 8000 coins for each shi of rice they owed, when the market rate was less than 2000 coins (Ch’u, 1962, p. 142).

Some magistrates used their underlings as proxies to avoid directly engagement in extortion. Clerks and runners assigned to receive tax payments often used the pretext that the tax silver or grain presented by a taxpayer was of inferior quality to demand additional payment (Huang, 1694). It was customary for them to share their profits with the magistrate, who would then forward some of what he received to higher officials in the form of gifts (Xia, 1935). Ch’u (1962, p. 29) cites a case where the extra silver collected from land tax payments was shared among the magistrate and his underlings in the ratio of 60% to 40%.28

According to Zhang (1962, p. 32), in early 19th-century China, a magistrate would typically fetch 30,000 silver taels a year through extralegal channels. At a market price of 2.33 taels per shi of rice (Wang, 1992), this is equivalent to 12,880 shi (or 7,140 koku) of rice. By Zhang’s estimate, the extralegal incomes of the 1500-odd magistrates (45 million taels) would have exceeded the annual amount of tax silver that entered the state coffers (40 million taels in the 1840s).

By comparison, corruption appears to be a relatively minor concern in Tokugawa Japan. Its political and intellectual elites were preoccupied with other issues such as the rise of the merchant class and the increasing poverty of the ruling samurai class (Totman, 1993). Thomas Smith’s classic on the land tax in Tokugawa Japan spent only one paragraph discussing corruption, where he noted that “bribes and gifts to tax officials were the main form of illegal exaction, but it is doubtful that they bulked large in the total economic burden of the village” (Smith, 1958, p. 9).

This does not mean that Tokugawa Japan was corruption free. One particularly severe incident of corruption was exposed in the 1830s, when a peasant uprising led to the removal of the magistrate Nishimura Tokinori in the Koshu area. Among other things, it was discovered that 3 tedai (magistrate’s assistants) working under Nishimura

To be sure, some form of over-collection was necessary to cover the costs of tax collection and to keep local governments running. The Kangxi emperor (r. 1662-1722) once mentioned in private that he would consider a magistrate who imposed a surcharge rate of no more than 10% on the regular tax an honest official (Ch’u, 1962). His son, the Yongzheng emperor (r. 1723-35), legalized the collection of a “silver meltage fee” on top of the regular land tax to help pay for the cost of regional and local administrations. The sanctioned rates varied from province to province, with a nationwide average of about 12% on the regular tax (Zelin, 1984). However, the scale of the problem seemed to have gone beyond any level that cost recovery could justify.
collected 3000 ryo of bribes from taxpayers in Tanimura. Assuming the annual output of Tanimura was 44,400 koku and using a conversion rate of 1 koku to 1.1 ryo in 1835 (Iwahashi, 1981), the ratio of corruption to total output is a hefty 8.2%.

According to Nishizawa (2004), this episode was one of the worst corruption cases during the Tokugawa period and it could have been exaggerated. Teranishi Takamoto, a magistrate during Tokugawa times, observed in the 1790s that for a 50,000 koku territory, the peasants’ non-tax burden was typically about 500-600 ryo. Of this amount, 100-200 ryo would be spent on paying for maintaining and repairing the local office (jinya), and the remaining 400 ryo on bribing or entertaining local officials (Nishizawa, 2004). Using the exchange rate of 1 ryo-koku in 1794, the ratio of corruption to output is 0.8%. By comparison, Ni and Van (2006), building on Zhang’s earlier work, estimate that corruption consumed 22% of China’s agricultural output in 1873.

### 4.2 Tax Rate

Figures 5 compares per capita tax revenue in the Tokugawa shogunate with that in Qing China between 1650 and 1850. For the shogunate, we divide its land tax revenue by its population. For Qing China, aggregate tax revenue is used in place of land tax revenue. The results show that on a per capita basis, the Tokugawa shogunate extracted much more from the land tax alone than the amount the Qing state collected from all taxes. Depending on the year in question, per capita land tax revenue in the Tokugawa shogunate was 1.7 to 6.0 times heavier than per capita aggregate tax revenue in Qing China. Furthermore, in line with the model’s prediction, the gap widened over time.

Fiscal information on the smaller daimyo domains is incomplete and fragmented.

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29 The Koshu area had an assessed output of 222,000 koku and was governed by 3-5 daikan. Assuming that there were 5 daikan each governing an identical subregion, Tanimura’s assessed output would be 44,400 koku.

30 As in the case of China, not all tax surcharges were illegal. Before 1720, daikan were allowed to collect a 3% surcharge on the rice tax to finance personnel and other expenses. During the 1720s, the shogun Yoshimune instituted reforms to incorporate these expenses into the official budget. Interestingly, Yoshimune’s reforms coincided with the Yongzheng reform in China in terms of timing and content (see footnote 28).

31 We assume that 15% of the Japanese population lived in the shogunate throughout this period.

32 The gap between these regimes’ extractive capacity could actually be bigger than these ratios suggest as our calculations did not include corvee levies, which was effectively phased out in Qing China but remained a component of the peasant’s obligations to their lords in Tokugawa Japan.
Nonetheless, existing evidence suggests that tax rates were even higher outside the shogunate (Nakabayashi, 2008). Compared to an average tax rate of 34% in the Tokugawa shogunate, the lord of Aizu taxed his peasants at 50-55% between 1637 and 1764 (Furushima, 1963). In Choshu domain, agricultural outputs were taxed at an average rate of 40% in 1840 (Nishikawa, 1985). As Figure 6 illustrates, land tax rates in the Kumamoto domain were also higher than those in the shogunate (Miyamoto, 2004; Hosokawa Hanseishi Kenkyuukai, 1974).

It is important to note that unlike the case in early modern Europe where “war made the state and the state made war” (Tilly, 1975), high tax rates in Japan were not driven by interstate competition. Tokugawa Japan was an extraordinary era of peace. In the two centuries after the Shimabara rebellion (1637-38), no major armed incident occurred. Until the West forced Japan to open up in the 1850s, tensions between the shogunate and daimyo domains were never high enough to make war a real possibility.°

4.3 Population Growth and Fiscal Change

Historians often divide the Tokugawa era into two sub-periods. The 17th century was marked by output growth and the proliferation of towns and cities. Population more than doubled from 12 million in the beginning of the century to almost 30 million at the end of it (Hayami and Miyamoto, 1988). This was followed by a period of stasis where population level stayed at around 30 million from the early 1700s to the mid-1800s (Figure 7a). Consistent with Result 4, Tokugawa fiscal patterns evolved with the population patterns in a synchronized manner—land tax revenues grew steadily from the mid-17th century to the early 18th century, and stayed more or less flat after that (Figure 8a).°

While historians are still in disagreement over the exact rate of population growth in Qing China, there is broad consensus that the Chinese population expanded steadily from the late 1600s to around 1850 (Figure 7b). However, the Qing state’s tax revenue peaked in the first half of the 18th century and tailed off from then on (Figure 8b).

°The bulk of “military outlays” in Tokugawa Japan were stipends paid to samurai who had forgotten how to fight as a consequence of the long years of peace.

°Detailed information before 1657 is not available, but there is little doubt that tax receipts rose steadily in the first half of the 17th century, as land reclamation expanded the cultivated acreage and therefore the shogun’s tax base. Nationally, the total assessed yield rose from 18.5 million koku in 1600 to 25.8 million koku in 1700 (Nishikawa, 1985).
Ironically—but in line with Result 4—the turning point occurred in the midst of the High Qing Period, when the Chinese economy was expanding steadily and interregional trade has been shown to be flourishing (Shiue and Keller, 2007).
4.4 Provision of Public Goods

Table 1 compares the ordinary expenditures of the Qing state in 1766 and the Tokugawa shogunate in 1730. While China’s population was 53 times that of the shogunate, its expenditure was only 13 times larger (17.5 million koku compared to 1.4 million koku). On a per capita basis, the shogunate spent 4.3 times more than the Qing state. Since military spending is at least in part a private good for the ruling class (Hoffman, 2012), we may want to disregard it as well as the expenses of the ruling households. But by focusing only on the non-military expenses, the gap widens further...
Table 1: Expenditure Estimates of the Qing State (1766) and the Shogunate (1730)

<table>
<thead>
<tr>
<th></th>
<th>Qing State</th>
<th>Tokugawa Shogunate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rice (koku)</td>
<td>Rice (koku)</td>
</tr>
<tr>
<td>Aggregate</td>
<td>17,540,000</td>
<td>1,419,000</td>
</tr>
<tr>
<td>Military</td>
<td>60.1%</td>
<td>45.0%</td>
</tr>
<tr>
<td>Non-Military</td>
<td>38.4%</td>
<td>47.2%</td>
</tr>
<tr>
<td>Imperial/Shogun Household</td>
<td>1.5%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Per Capita</td>
<td>0.069</td>
<td>0.296</td>
</tr>
<tr>
<td>Per Capita Non-Military</td>
<td>0.026</td>
<td>0.140</td>
</tr>
</tbody>
</table>

Sources: For China, silver expenditure estimates from Sng (2010); Grain expenditure from QCWXTK (1787, juan 40. Assuming that revenue=expenditure); Population estimates from Perkins (1969, linear extrapolation); Silver-to-rice conversion based on Wang (1992). For Shogunate, expenditure estimates from Oguchi (2004); Population estimates from Hayami and Miyamoto (1988).

In line with this observation, we find that the shogunate had a bigger formal bureaucracy than the Qing state, once population size has been accounted for. Roughly 3,000 hatamoto (upper vassals of the Tokugawa house) held official positions in the shogunate. In addition, there were 17,000 gokenin (lower vassals), of whom some held public appointments too. By comparison, the Qing establishment had only 20,000 official positions in 1800 (Fairbank, 1992).

In the remainder of this section, we discuss the track record of the Chinese and Japanese regimes with regard to a few important public goods.

(a) Monetary Policy. If money supply is a good indicator, the Tokugawa shogunate did more than the Qing state in standardizing weights and measures. The shogunate produced gold, silver, and copper coins. The Chinese state minted copper coins only. Without a reliable government-issued large-denomination currency, the Chinese had to rely on silver bullion and foreign denominated silver coins for larger transactions. As Deng (2008) put it, “China’s silver stock was made of a collage of pieces in just about all shapes, sizes and qualities under the sun”.

Lin (2006) suggests that even in its heyday, the Qing state did not produce enough copper coins to satisfy the needs of its growing population. As a result, it had to tolerate the use of counterfeit coins to relieve currency scarcity. When the output of the Qing

---

35 The actual gap could be even wider as Table 1 does not include corvee labor. It was largely phased out in Qing China but continued to be deployed regularly to build and maintain public projects in Tokugawa Japan.
### Table 2: Public Goods Provision in Qing China and Tokugawa Japan

<table>
<thead>
<tr>
<th>(a) Coin Types</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coin Types</td>
<td>Gold, Silver, Copper</td>
<td>Copper only</td>
</tr>
<tr>
<td>Annual Output of Copper Coins, aggregate</td>
<td>3,639,800k (1756-65)</td>
<td>1,096,000k (1764-88)</td>
</tr>
<tr>
<td>Annual Output of Copper Coins, per capita</td>
<td>15 (1756-65)</td>
<td>35 (1764-88)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) Length of Imperial Routes/Gokaido, km</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length per '00 sq. km</td>
<td>11370</td>
<td>1440</td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>0.51 or 3.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c) Urban Population (Urbanization Rate)</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urbanization Rate</td>
<td>20.5m (5.8%)</td>
<td>5.1m (16.5%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(d) Forest cover (million ha)</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest cover (million ha)</td>
<td>18.5 (1700) → 9.6 (1850)</td>
<td>27 (1600) → 25.5 (1850)</td>
</tr>
</tbody>
</table>

Sources: (a) Lin (2006) and Tsuchiya and Yamaguchi (1972); (b) DQHD (Yongzheng edition) and Vaporis (1994); (c) Rozman (1973, Table 5); (d) Saito (2009).

Mints peaked between 1756 and 1765, national production reached 3640 million pieces annually, or 15 pieces of copper coins per head. By comparison, the shogunate produced 1096 million pieces of copper coins annually between 1764 and 1788, or 35 pieces per head (Table 2).[^36]

(b) **Transportation.** The Tokugawa period witnessed the development of an extensive road network nationwide. The shogunate built a system of five major highways, known as the *Gokaido*, centered on Edo (Figure 2). The daimyo for their part constructed roads and bridges to facilitate the flow of resources from rural areas to their castle towns (Yamamoto, 1993). While the purpose of expanding the transport system was primarily political, the availability of reliable and safe transportation contributed to the development of a national market in Japan.[^37]

The shogunate also encouraged the growth of a coastal transportation network to bring personnel and goods to Edo (Yamamoto, 1993). Coastal waters were charted and lighthouses built to guide ships through the rocky coastline. In the 1670s, the shogunate established two shipping routes—the eastern sea circuit and the western sea

[^36]: The shogunate monopolized coinage production in Japan. As such, we divide its coin output by the population of entire Japan instead of the shogunate’s population only.

[^37]: Historical accounts suggest that the quality of these roads was high by the standards of its day. Along the *Gokaido*, firs and Japanese pine trees were planted on the roadside to define the road and to provide shade for travelers. The Swedish doctor Charles Thunberg observed in 1776 that “the roads in this country are broad, and furnished with two ditches, to carry off the water, and [are] in good order all the year round”. On the eve of Meiji Restoration, the Swiss envoy Aime Humbert commented that “compared with the great roads of Europe, the *Tokaido* is not the least bit inferior” (Vaporis, 1994, pp. 39-44).
circuit (Figure 2)—that together formed a complete loop surrounding the main island Honshu and lowered the cost of trade (Nakai and McClain, 1998, pp. 164-5).

By contrast, the state in China did less to improve its transport infrastructure. With the notable exception of trade along the Grand Canal, most long distance trade was carried out among regions either well served by natural inland waterways or along the coast. Schran (1978) observes that “as a rule, the rivers and lakes were not made more passable for boats by the removal of obstacles such as rocks, silt, and debris, by the dredging or marking of channels, by the construction of two paths, etc”, and “the Chinese people adapted to this limited involvement of the government in communication by ‘struggling’ on their own (individually or in groups) against the natural elements as well as each other”.

In Table 2(b), we use the length of trunk roads as a crude measure of state investment in land transportation. The Qing imperial postal system, which the imperial court relied on to maintain communications with the rest of the country, is about 13,770 km in length (Figure 1). Compared to the Gokaido’s 1440 km, it is almost 8 times as long. However, trunk road density (length divided by domain size, in km per 100 km²) in China is a mere 0.26. By contrast, the comparative figure of the shogunate is as high as 3.37 if we assume that the Gokaido served the shogun’s domain only. Even if we divide the length of the Gokaido by the whole land area of Japan, the resulting road density, at 0.51, is still twice that of China.

(c) Urban Management. There are many negative externalities in cities. When one starts a fire carelessly, or dumps rubbish into water sources, others are adversely affected. For towns and cities to operate and grow, free rider problems like these have to be overcome. Since informal institutions (based on repeated interactions) alone could not ensure cooperative behaviors when the number of players is large (Kandori, 1992), the involvement of the state (formal institutions with coercive powers) is imperative for big cities to operate.

Historical case studies show that the state played an active role in Japan’s urban expansion. Local lords transformed their castles into towns as they strove to expand their tax base (Totman, 1993).\(^{38}\) As these castle towns expanded, their rulers imposed

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\(^{38}\)See McClain (1980) for a detailed account of how Kanazawa, under the close supervision of its daimyo, grew from a small castle town of a few thousand people in 1600 to among the twenty largest European and Japanese cities in 1700.
detailed regulations and devised new systems of urban administration to ensure that they were properly managed (Nakai and McClain, 1998). For example, after a big fire in 1657, the shogunate took steps to create open spaces in Edo to serve as fire breaks (Hanley, 1987). Professional fire-fighting units were set up and watch towers were built. According to the travel notes of Engelbert Kaempfer, a German physician who visited Japan between 1690 and 1692, it was common to see fire police patrolling the streets and equipments such as water-filled buckets and fire axes being placed at prominent intervals in Japanese cities (Kaempfer and Beatrice, 1999).  

Contrary to Weber’s claim that a heavy state presence in Chinese cities stifled China’s economic development, formal administration penetrated far less in Chinese cities than in Japanese ones (Rozman, 1973). Over 95% of the towns and cities in early modern China did not have a permanent bureaucratic presence (Zelin, 2004). Furthermore, the Qing state did not differentiate between cities and rural areas administratively, as both were administered by county magistrates who were technically interchangeable. A Chinese scholar observed in the early 20th century that “the hundred and one undertakings, such as roads, streetlights, removal of rubbish, water supply, school system, police, fire protection, etc., which people of the West are accustomed to regard as functions of a municipal government are, with a few exceptions of recent date, never undertaken by the proper government officials (Rowe, 1989, p. 135).”  

Unsurprisingly, urbanization rates in Japan were higher than in China (Table 2c). Rozman (1973) calculated that in 1800, Japan was more than twice as urbanized as China, and “the most urbanized province of China [Zhili] was considerably less urban than the least urbanized region of Japan [Tohoku].”  

Some scholars have pointed out that conventional measures of urbanization may have underestimated China’s true level of urbanization, for these measures overlook the proliferation of small market towns in early modern China (Li, 2000; Brandt et al.,  

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39In addition, measures were taken to ensure that waste materials were properly disposed, and streets and waterways were kept clean and open. In Edo, the construction of toilets along river banks was prohibited, and a waste disposal system was implemented for residents to dump their garbage on a designated outer island in Edo Bay instead of into the rivers. Sanitary standards in smaller towns and cities appeared to be high too. Susan Hanley commented that as a result of detailed regulation and constant inspection, “even [though] the main streets in most castle towns were relatively narrow, about twenty-four feet wide, but they were extremely well maintained and immaculately clean” (Hanley, 1987, p. 14).  

40William Rowe’s study of 19th-century Hankou, a major middle Yangzi city, suggests that government officials played a minor role in fire prevention as well as fire fighting. The Chinese state also left sewage removal and street cleaning to individual neighborhoods (Rowe, 1989).
2011). Our comparative analysis shows that the lack of state leadership in solving urban collective action problems may help to explain why, instead of seeing its largest cities growing, China’s “urbanization” took such a unique path.

(d) Environmental Management. Rapid population growth and urbanization brought about equally rapid deforestation in 17th century Japan. By the mid-17th century, few prime forests were still in existence.  

The shogun and the daimyo responded by issuing a plethora of regulations to restrict entry into forests and clearance of woodland for cultivation. Over time, they created new administrative bodies (e.g. the Office of Erosion Control in the Kinai basin) and positions (e.g. forest magistrates) to enforce the regulations, demanded the compilation of forest registers to track illegal logging, set up inspection points along rivers and roads to detect smugglers, and implemented sumptuary rules to prohibit the use of precious timber on “wasteful” activities. Attempts were also made to delineate the boundaries between domains as well as between villages, to prevent dispute over the use of forest produce and “the tragedy of commons”. Finally, the shogunate and some domains promoted reforestation programs actively (Totman, 1989).

Early modern China, too, saw forest disappearing quickly. Like the Japanese governments, the Qing state was acutely aware of the growing ecological challenge that the economy was facing. However, its efforts to address the problem appear to be thwarted by corruption and inefficient administration. When flash floods caused by excessive land reclamation began to plagued the upper-middle reaches of the Yangzi River in the second half of the 18th century, the Qing state intervened but found itself unable to enforce its ban on reclamation activities. Zhang (2006) observes that the government’s attempt to issue regulations to guide dike management and throw resources at the problem “generally did not work well”. Instead, money was wasted on

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41When the shogunate requested for wood from Tosa to rebuild Edo after the Meireki fire of 1657, the lord of Tosa replied that, “The mountains of our domain are exhausted. We have neither sugi nor hinoki. We are unable to provide good timber as requested by the shogun” (Totman, 1989, p. 75).

42For example, in 1706, the shogunate banned the use of large pine trees as New Year’s decorations.  

43As population pressure created a steady wave of immigration from plains and valleys to highlands, vast tracts of upland forests were cleared to make way for the cultivation of maize, sweet potatoes, and other crops introduced from the Americas (Naquin and Rawski, 1987, pp. 132-4). According to Li (1986), deforestation led to a shortage of timber and retarded the growth of ship building, construction, and other important industries in China’s most developed region, Jiangnan. Elvin (2004) noted that “the difficulty in finding timbers large enough to build ships led the Qing government to commandeer trees from gardens and even grave sites”.

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The Qing state’s inability to manage the rivalry among local communities in the region eventually contributed to the outbreak of the White Lotus Rebellion in 1796 (McCaffrey, 2003).

Saito (2009) provides a quantitative measure to compare the relative successes of China and Japan in environmental preservation. Between 1600 and 1850, the estimated woodland area in Japan fell from 27 million hectares to 25.5 million hectares, and the movement from one point to the other followed a U-shaped trajectory: forest cover first contracted sharply before rebounding. In Lingnan, a region in South China that “share[d] much the same flora and climate” as Japan, forest-covered area almost halved from 18.3 million hectares in 1700 to 9.6 million hectares in 1850.

(e) Other Observations. Jones (1988) describes the early modern Chinese state as “lethargic”, but it was high agency costs instead of an unwillingness to act that dissuaded the Ming-Qing state from playing a more active role in economic management. In an attempt to promote mass education, the Ming emperor Zhu Yuanzhang ordered the establishment of community schools (shexue) throughout the empire to teach the people to read (Schneewind, 2006). Yet the policy was abandoned a few years later, when the emperor found out that some local officials and their underlings were using these schools as a tool to profiteer. Similarly, in the late 18th century the Qing state rolled back its enlightened attempt to maintain a nationwide granary system against famine due to worries over corruption and high administration costs (Will, 1990; Wong and Perdue, 1983).

By contrast, the cost of a strong state appears to be relatively low in Japan. Even though the shogun and the daimyo taxed and regulated heavily, bureaucratic corruption appears to be reasonably subdued. Early modern European observers described Tokugawa Japan as “harshly but well governed” (Hall, 1974, p. 39). While a big portion of its tax revenue was “wasted” on feeding a class that was not economically productive, the Japanese state was at least able to monitor and direct the flow of the surpluses expropriated from the population. Whenever necessary, the shogunate could

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44 Similar situations were observed elsewhere. In the Hunan province, Perdue (1987) argues that it was not a lack of awareness of the problem but “the state’s limited impact on the society” that doomed the Qing government’s efforts to reverse the trend of ecological degradation there.

45 In an edict issued in 1383, Zhu complained that these “wicked, corrupt fellows” accepted bribes to release the indolent ones from school, and at the same time forbade those who wanted to study but had no money from attending school (p. 17).
mobilize the surplus captured by the elites to deal with collective action problems. For example, when it became apparent in the early 18th century that human encroachment on the rivers had heightened the risk of destructive floods along large rivers, the shogunate demanded local lords to make contributions known as \textit{kuniyakukin} to help finance river management projects. The lords in turn extorted forced loans from the samurai (Beasley, 1963, pp. 30-31). In the end, the entire ruling class was subjected to the implicit tax. This is unlike the case of China where the imperial court had little information on and control over the rents that agents of the state squeezed from the taxpayers.

Put differently, when it is easier to check bureaucratic malfeasance, the state—comprising the ruler \textit{and} his agents—is more likely to function as if it is a unitary player with an encompassing interest. As a result, expropriation becomes less harmful. Some good may even come out of it.

\section{Conclusion}

We propose that, due to differences in geography, political institutions in Japan had a stronger capacity to manage economic growth as compared with China. It has been argued that a more proactive government allowed Japan to move decisively ahead of China in building a modern economy after the Meiji Restoration (Beasley, 1972; Ma, 2004). We show that the source of difference can be traced to an earlier time. During the Tokugawa period, Japan already had a state that was reasonably competent in supplying essential public goods.

Where economic performance is concerned, differences in state characteristics between the two economies did not seem to matter much in the short run. Existing evidence suggest that both economies maintained comparable standards of living in the 18th century (Allen et al., 2011). While the Chinese enjoyed greater economic freedom, it came with higher transaction costs in economic exchanges, as typified by its use of silver bullion and the persistent problem of copper coin counterfeits.

In the long run, however, Tokugawa Japan enjoyed a significantly longer period of domestic peace.\footnote{Japan enjoyed two centuries of peace after the suppression of the Shimabara Rebellion in 1638. By comparison, the period of uninterrupted domestic peace in China lasted only for a century: from 1683 (annexation of Taiwan) to 1786 (Lin Shuangwen uprising).} Like China, it underwent Smithian growth in the 17th and 18th
centuries, but unlike China, it did not experience any major domestic upheaval before 1850.\footnote{To be sure, Japan suffered from the problems of commercialization and socioeconomic change too. For one, peasant protests increased over time (Aoki, 1971). But by and large, the Japanese state and society were able to cope with these problems as they arrived. As two prominent economic historians of Tokugawa Japan, Hiroshi Shimbo and Osamu Saito, noted, “while the penetration of a cash economy into the peasant society undeniably had a disturbing effect...”,“the Tokugawa peasantry did not exhibit any tendency towards polarization and disintegration” (Shimbo and Saito, 2004). It was only until the arrival of Commodore Matthew Perry’s black ships in 1853—an exogenous event—that a crisis with the potential to throw the country into chaos emerged.}

In summary, bringing Japan into the picture of pre-modern China shows that China’s lackluster performance after 1800 cannot be attributed entirely to anti-growth dictators, cultural conservatism, or exogenous events (e.g. Western imperialism). One also needs to understand the constraints that China’s extraordinary size placed on its institutional possibilities and development path. Conversely, by looking at Japan from the perspective of China, we find much credence in the view that the Tokugawa period left Japan a good foundation to deal with the rise of the West after 1850.

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