

Taxation and Public Goods Provision in China and Japan before 1850

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Abstract

We develop a principal-agent model to study taxation and public goods provision 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 agency problems increase with the geographical 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, Principal-Agent Problem, Dictatorships

JEL Codes: D73, 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. 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 economies on the eve of the modern age. They have shown that, like Western Europe, China and Japan experienced widespread commercialization and proto-industrialization during the early modern period (Pomeranz, 2000). However, like the traditional narrative, the revisionist view, too, tend to play down the differences between pre-1850 China and Japan, and focus instead on areas where they were alike.

Indeed, early modern China and Japan were similar in many aspects. Both depended heavily on small-scale, labor intensive, and rice-based agriculture. Both were ruled by stable and established governments long before the arrival of the West. 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 that the Tokugawa shogunate was run (Jansen, 1992).

But China and Japan were distinctly different in some other areas, most notably, in geography. China was a sprawling land empire with vast inner frontiers, while Japan was a relatively small island nation. This paper explores the influence of geography on a regime’s ability to raise tax and provide public goods. We show that geographical differences helped cause political institutions in China and Japan to evolve differently, despite much similarity in their original designs. We shall also demonstrate that in contrast to China, Japan already had a relatively strong state apparatus before the mid-19th century: the proactive Meiji government is a product of Japan’s history, not a radical break from its past.

We focus on the two centuries between 1650 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.¹ 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). Unless the interests of the ruler and the agents are perfectly aligned, in the absence of perfect monitoring, the agents tend to 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 geographical 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.

If the sole purpose of taxation is to support the consumption of the ruling class, it will not matter to the taxpayers if expropriation enriches the ruler or his agents. However, unlike corruption, taxation is rarely a pure rent seeking activity. The ruler,

¹In contrast, unstable dictators behave like “roving bandits” due to their short horizons.

as the owner of his domain, may use the tax receipts to provide public goods so as to keep his property productive. If so, the competition between the ruler and the agents over the economic surplus may have an impact on social welfare, especially in the long run.

To formalize our hypothesis, we build a principal-agent model and analyze optimal taxation and public goods provision in a stable dictatorship. In this model, the ruler taxes the peasants through the agents. He also invests in a public good that protects the economy from exogenous shocks (e.g. natural disasters). If the ruler under-invests in the public good, then a large shock may destroy the economy. This gives the ruler an incentive to provide the public good.

The static predictions of the model are straightforward: As the geographical size of the domain increases, agency costs increases due to managerial diseconomies of scale. Consequently, the ruler can collect less taxes and provide less public good per capita.

The important insights come from the dynamic implications. The model predicts that the ruler of a smaller domain responds more effectively to economic expansion. 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 economic expansion. If the principal-agent problem is severe enough, the ruler's ability to tax and invest in the public good could even fall as aggregate output increases. This happens if economic expansion encourages agency costs to grow at an even faster pace.

To test these implications, we assemble primary and secondary sources to present comparable quantitative data on the fiscal capacities of the Qing state and the Tokugawa shogunate. 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 examine public goods provision in the two domains. In line with the model's prediction, we find that the shogun displayed a greater willingness and capability to manage the economy and provide public goods. Comparing to the Chinese emperor, the Tokugawa shogun did more to standardize money, build and maintain roads, provide urban services (e.g. fire fighting, waste management), and prevent ecological degradation.

This paper is intrinsically related to the 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 too creates distortions. We build on this observation, and highlight further that the benefits of a strong state differs by societies.

Social scientists have long recognized the influence of spatial scale on institutional and economic outcomes (Jones 1981; Mokyr 1990; Rosenthal and Wong 2011). Three recent papers that explore the causal link between geographical size and institutional efficiency are of particular relevance. Olsson and Hansson (2011) detect a strong negative causality between size and the rule of law using a sample of 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. Furthermore, it is shown that all the major uprisings between 1750 and 1850 originated in regions far away from Beijing, which suggests that they were caused not by an oppressive government, but by too little government.

The rest of the paper is organized as follows. Section 2 provides the historical background. Section 3 presents the model and derives testable predictions. Section 4 tests the predictions with empirical data and historical evidence. Section 5 discusses some implications of our findings and concludes.

2 Historical Background

In this section, we compare the geography, political structure, and system of tax collection in Qing China and Tokugawa Japan to motivate our theoretical model.

2.1 Geography

Tokugawa Japan was an archipelago comprising four main islands,² 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 was still bigger than India and Pakistan combined, or ten times modern-day Japan.

If pre-industrial communication technologies posed any challenge to public administration in the pre-modern age, this challenge was clearly more acute in China than in Japan. In 1853, when the Taiping rebels captured Wuchang, a major Middle Yangzi city about 1200 kilometers from Beijing, the news took 8 days to reach the 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, about 520 kilometers apart, would only require 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 in an age before railroads.

2.2 Political Structure

Both China and Japan were ruled by a succession of stable dictators between 1650 and 1850. During this period, China was under the rule of the Qing dynasty (1644-1911). 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, multiple dictatorships coexisted in Japan. Nominally, the country was led by the shogun of the Tokugawa house. However, the shogunate controlled only 15% of the arable land (Figure 2). The bulk of the remaining land was divided into 260-odd mutually exclusive and administratively autonomous domains, each headed by a daimyo (territorial lord).³ While a daimyo had to swear allegiance to the shogun and subject

²During the Tokugawa period, Hokkaido was populated by the indigenous Ainu people and Japan's control was restricted to the southern tip of the island.

³The size of domains varied widely. The shogunate was rated at 4 million koku (a productivity measure), but most domains were much smaller. The average size of a domain was only about 100,000 koku. One koku is equivalent to 180.4 liters of rice, historically interpreted as the amount required to feed a person for a year.

Figure 1: Early Modern China and Japan

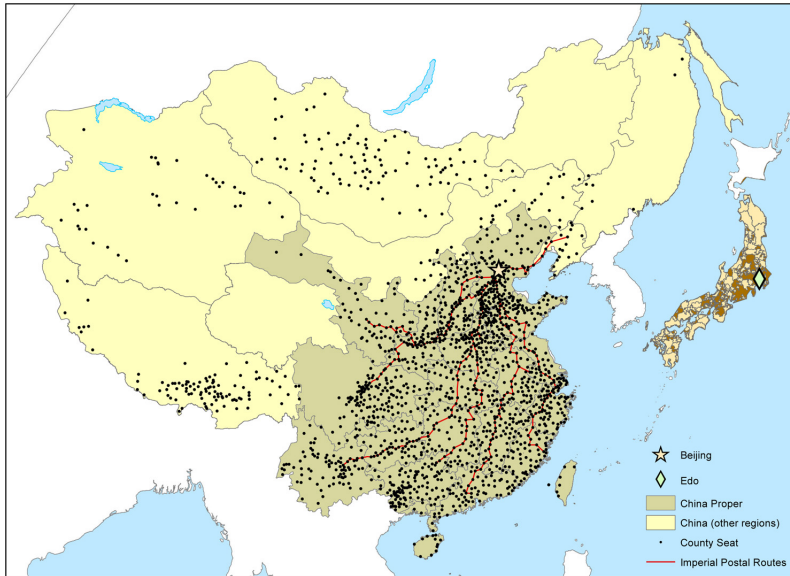
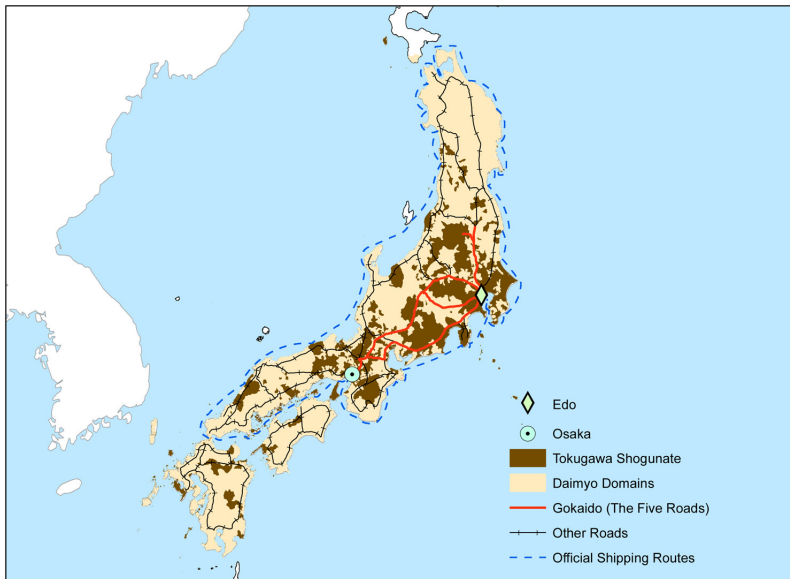


Figure 2: Tokugawa Japan in 1664



Sources: CHGIS, Version 4, Cambridge: Harvard Yenching Institute, January 2007 (<http://www.fas.harvard.edu/~chgis/>); China Historical GIS Project, "Tokugawa Japan GIS, Demo Version." Feb 2004 (<http://www.fas.harvard.edu/~chgis/japan/>)

himself to a sophisticated system of controls aimed to prevent dissent, he retained virtually complete autonomy over his domain.⁴ As such, instead of treating Tokugawa Japan as a unified but decentralized empire, we interpret it as a league of dictatorships and treat every daimyo as a dictator.⁵ We focus primarily on the shogunate, for which historical records are most abundant, and compare it with China proper.⁶

In the following analysis, we take the size of domains in China and Japan as exogenously given, and focus on analyzing its consequences. Researchers have suggested that the constant need to coordinate defense efforts against nomadic incursions from Central Asia provided the impetus that pushed China toward political unification (Latimore, 1940; Huang, 1988; Turchin, 2009; Lieberman, 2009). Following this logic, Japan’s geographical isolation before the mid-19th century might have contributed to the preservation of its fragmented political system. Its unification came only in response to a powerful military threat from the West. The interplay of historical and ecological forces in influencing the size of regimes is an intriguing topic. But to keep the scope of our analysis manageable, we leave it to existing and future work.⁷

To administer his domain, the Qing emperor organized China proper into 18 provinces. Every province was in turn divided into several prefectures, and every prefecture into several counties. The responsibility of local administration fell on the county, which sat at the bottom of the bureaucratic hierarchy. Each county was headed by a magistrate, whose term was usually limited to three years (Ch’u, 1962).

⁴The 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 (e.g. castles, roads, and bridges). 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 the West in the 1850s, there was no open military conflict or secret arms race among its domains for more than two centuries.

⁵An analogy can be found in the theory of the firm, 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.

⁶Due to the shogunate’s strong political and economic influences, the institutional features of daimyo domains shared much in common with those of the shogunate domain (Nakabayashi, 2008). However, due to data limitations, we leave a detailed analysis of other domains to future work.

⁷See also Alesina and Spolaore (1997), who pioneered the use of cost-benefit analysis to explain the size of nations.

In the Tokugawa shogunate, local administration was also carried out by non-hereditary magistrates (*daikan*).⁸ However, there were only two layers of government (center–local). At any one time, there were 40 to 50 magistrates reporting directly to the shogun’s cabinet (Totman, 1967). By contrast, there were about 1500 county-level jurisdictions and hence 1500 magistrates in Qing China.

That the chain of command was significantly longer in China should not be surprising since China proper was almost 90 times bigger than the shogunate domain. But it also means that unless the Chinese emperor possessed superior monitoring technologies, his ability to garner reliable information on the behaviors of local officials would be weaker than that of the shogun.

Otherwise, the systems of territorial administration in the two regimes were broadly similar. Like his Chinese counterpart, the shogunate magistrate was subjected to regular rotation.⁹ Their scope of responsibilities were also similar. In both regimes, the magistrate was expected to focus on two tasks: collection of taxes and adjudication of disputes (Wang, 1890; Totman, 1967).

There were also much in common between the two regimes in the mechanisms that they employed to monitor local officials. Both the Chinese emperor and the shogun kept an eye on their magistrates’ conduct through a combination of three approaches: top-down, parallel, bottom-up.

The top-down approach involved supervision within the bureaucratic hierarchy. In the shogunate, the magistrate’s office was audited by the Finance Office in Edo periodically (Totman, 1967, 76). In China, a grand review was held once in every three years, during which senior officials from Beijing and the provincial administration would evaluate the magistrate’s performance and mete out reward or punishment accordingly (Watt, 1977).

Top-down monitoring could be ineffective in the presence of bureaucratic patronage networks. To overcome this, the Chinese emperor established a surveillance agency independent of the executive branch of government to investigate and impeach shirkers

⁸In the early years of the shogunate, the *daikan* office was hereditary and was often filled by a gentry member with strong local connections. In 1680, the shogun Tsunayoshi initiated administrative reforms and replaced the hereditary system with one based on regular rotation. 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.

⁹After the 1680 reform, a typical *daikan* would serve in 2.54 locations and spend 5.7 years per location on average (Nishizawa, 1998).

and wrongdoers. Known as the Censorate, it was the duty of this agency to detect bureaucratic malpractices and report them to the emperor (Feuerwerker, 1976). Likewise, the shogun sent out censors to keep an eye on the quality of local administration (Totman, 1967; Nakane and Oishi, 1990).

Finally, both regimes set up petition systems that allowed bottom-up monitoring to be carried out. In Tokugawa Japan, it was common for rulers including the shogun to set up petition boxes in their domains to garner information about their officials from their subjects. According to Roberts (1994), the use of petition boxes grew over time. Apart from exposing corruption, petitions also contributed to the implementation of beneficial social policies such as the creation of fire brigades and a hospital for the poor in Edo.

The petition system had an even longer history in China. First institutionalized in the Tang dynasty (618-906) to “satisfy all grievances occurring under heaven”, it underwent significant changes over time and remained in existence in the Qing dynasty (Ocko, 1988; Fang, 2009). However, given the sheer size of the Chinese population, the Qing emperors were ambivalent toward encouraging their subjects to file complaints as it would be exorbitantly costly to verify the authenticity of every case. Qianlong (r. 1736-95) and Jiaqing (r. 1796-1820) took a lenient attitude toward accepting petitions from their subjects in the very early years of their respective reigns, but both of them changed their minds shortly after realizing that their encouragement had resulted in a flood of complaints into the capital that they could not possibly deal with (Fang, 2009). Consequently, the system did not operate as intended, to the extent that some complainants had to resort to extreme measures such as committing suicide outside the palace gates to attract the emperor’s attention to their grievances.

2.3 The System of Tax Collection

Land taxation was the most important source of government revenue in Qing China as well as in Tokugawa Japan. Both economies depended heavily on small-scale, labor intensive agriculture. In Japan, the fiscal base was measured in rice, the primary staple crop nationwide. This does not mean that rice paddies were 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, 23-24). If rice were not the main crop cultivated, then part of the tax would be levied in cash at a conversion rate set by

the lord.

By contrast, regional diversity necessitated the denomination and collection of taxes in a variety of crops and metals in China. While most taxes had been monetized by the 17th century, Chinese peasants still paid part of their land taxes in kind, which, depending on the region that they were residing, could be rice, wheat, millet, barley, sorghum, beans, or other staple crops. Furthermore, it was common for the portion of the land tax denominated in silver to be paid in copper coins when and where silver was relatively scarce (Ch'u, 1962). In these situations, commutation rates were set by magistrates based on local conditions, and therefore varied from county to county. In short, geographical size and heterogeneity made it impossible for the Qing emperor to adopt a "one size fits all" approach. All else equal, this would imply greater monitoring difficulties and higher agency costs in China than in the shogunate.

Monitoring costs in the shogunate were also kept low by the village contract system (*murauke-sei*), which was practiced in many parts of Japan. Under this system, the primary unit of taxation was the village instead of the household or the individual. The shogunate levied the land tax on village communities based on the total assessed yield of each village. Households in the same village were collectively responsible for one another. Should one household fail to pay its taxes, the rest of the villagers were to make up the shortfall. This arrangement reduced the frequency of contact between tax officials and individual peasant households, and therefore limited the opportunities for abuse. Indeed, the magistrate rarely showed up in the villages, and villages retained a high degree of autonomy in running their affairs (Walthall, 1991, 6).

For such a system to work, it is necessary that village communities remained tightly knit to discourage free riding. To restrict geographical mobility, the shogunate required its subjects to obtain permission before changing residency or traveling.

In Qing China, tax liabilities were household-based instead of community-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. According to the Qing statutes, the magistrate would set up tax chests at the county seat during the tax collection period, and invite taxpayers to deposit their taxes into these chests in exchange for official receipts. In practice, however, magistrates often sent their underlings to solicit payments from individual households directly, or allowed local strongmen to act as tax farmers (Ch'u, 1962; Zelin, 1984). In these situations, the highly asymmetric power relations between the

tax middlemen and the peasants often led to abuses (Xia, 1935).

We do not model the village contract system in Japan in the next section as doing so would further reduce the monitoring costs for the Japanese rulers and strengthen the main results. It should be noted, however, that the village contract system was not unique to Japan. In fact, China had instituted a similar system during the early years of the Ming dynasty (1368-1644). The system eventually unraveled, however, as the potential for migration given China's vast inner frontiers made it difficult to maintain tightly-knit communities that were necessary to implement collective responsibility (Liang, 1957; Heijdra, 1998; Fei, 2007).¹⁰

3 The Model

Motivated by the historical observations, in this section, we develop a formal model to study the impact of geographical size on a dictatorship's capacity to collect taxes and derive testable implications.

Consider a discrete-time, infinite-horizon game with three types of players: Ruler, Tax Agents, and Peasants. As a stable dictator with dynastic succession, Ruler is assumed to live infinitely long, while Agents and Peasants are assumed to be short-lived. For analytical simplicity, we consider a regime ruled by a single ruler that consists of S homogenous regions. Let the number of regions S represent the geographical size of the dictatorship.¹¹ We assume that S is exogenously given to the ruler and take a representative region as the unit of analysis. In other words, when comparing large and

¹⁰Akin to the situation in Japan later, in Ming China, the primary unit of land taxation was the village (Huang, 1974). Within each village, tax assignment was to be sorted out by the village members without interference from officials. Besides facilitating tax collection, the Ming village 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. The Ming state also restricted domestic traveling. Travelers were required to obtain travel documents beforehand. Foreign traveling was banned outright. However, in the 16th century, a rising trend of the wealthy migrating into urban centers as well as large-scale population movements to inner frontiers put this rigid system under increasing pressure. 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, and set off a chain reaction that caused the system to unravel (Heijdra, 1998; Fei, 2007). By the 17th century, tax liabilities had to be switched from community-based to household-based, and the Qing state inherited the new arrangement when it conquered China in 1644.

¹¹In historical terms, in the case of Qing China, a region roughly corresponds to a province and thus $S = 18$; in the case of Tokugawa Japan, the entire Shogunate domain can be seen as just one region and thus $S = 1$.

small dictatorships, we assume that every region in the two regimes is “identical” and that the two regimes differ only in the number of regions they encompass.

3.1 The Basic Setup

We first describe a basic single-period game in a representative region. Assume that the region is populated by N Peasants who engage in agricultural production.¹² Let Y denote the agricultural output in the region and assume that it increases with labor inputs at a diminishing rate: $Y = Y(N)$, where $N > 0$, $Y(0) = 0$, $Y'(\cdot) > 0$, and $Y''(\cdot) < 0$. In other words, the aggregate output increases with population, and hence population growth and economic growth are synonyms in our model.

In each region, Ruler sets a tax rate τ and sends a fixed number of Agents to collect taxes from Peasants, where each Agent is assigned to a single jurisdiction.¹³ When collecting taxes, a representative Agent may demand extralegal surcharge of rate θ from Peasants, in addition to the official tax rate τ , for his private benefit. As a result, the effective expropriation rate for Peasants is $\tau + \theta$, creating a potential wedge between what Ruler receives and what Peasants pay.

When Agent announces $\tau + \theta$, Peasants pay the portion of their outputs to Agent as demanded.¹⁴ If $\tau + \theta$ is within an exogenously given rate of r , then Peasants consider it acceptable and stay put. However, if it exceeds r , then Peasants revolt and engage in destructive activities. We assume that Ruler is adversely affected by peasant rebellion while Agents are effectively unaffected, as explained below.

To discourage Agents from engaging in extralegal expropriation, Ruler employs the following monitoring mechanism. First, Ruler conducts audits in randomly selected regions after Agents finished tax collection. Let $A(S)$ denote the probability of the representative region receiving audits where $0 \leq A(S) \leq 1$. Due to Ruler’s resource constraints, we assume that the probability of audits decreases with the number of regions in a dictatorship: $A'(\cdot) < 0$. In other words, in the absence of modern informa-

¹²For simplicity, we assume away commercial production, but it can be incorporated without changing main results.

¹³In historical terms, 18 regions were divided into about 1500 jurisdictions in Qing China (83 tax agents per region), and one region consisted of about 50 jurisdictions in the Shogunate domain in Japan (i.e., 50 tax agents per region).

¹⁴We assume that the tax unit is an individual. Incorporating the village contract system in Tokugawa Japan in the model would further reduce the monitoring costs for Japanese rulers and strengthen our results.

tion technologies, Ruler faces managerial diseconomies of scale. Next, when an Agent is indicted of misconduct in the auditing process, Ruler punishes an Agent by imposing a fine X . Audits, however, detect miscondacts only imperfectly with probability $D(\theta)$ where $0 \leq D(\theta) \leq 1$ and $D(0) = 0$. We assume that the detection probability increases with the rate of surcharge θ at an increasing rate, but that the marginal rate of detection is concave in θ : $D'(\cdot) > 0$, $D''(\cdot) > 0$, and $D'''(\cdot) < 0$.¹⁵

To summarize, the timing of events in the basic single-period game in the representative region is as follows: (1) Ruler sets a tax rate τ to maximize tax revenue. (2) Representative Agent selects θ to maximizes his expected payoff and proceeds to collect taxes. (3) Peasants pay $\tau + \theta$ of their outputs to Agents and decide whether or not to revolt. (4) Ruler conducts randomized audits and punishes Agents if the audits uncover miscondacts.

Representative Agent. To provide benchmark results, we derive an equilibrium of the single-period game. First, consider the optimization problem of the representative Agent. Agent chooses a rate of extralegal surcharge θ to maximize his expected payoff, given the monitoring mechanism, $A(\cdot)$, $D(\cdot)$, and X :

$$\max_{0 \leq \theta \leq 1} v^A = \theta \cdot Y(N) - A(S) \cdot D(\theta) \cdot X \quad (3.1)$$

The optimal rate of surcharge θ^* is given by the following condition:

$$Y(N) = A(S) \cdot D'(\theta^*) \cdot X \quad (3.2)$$

Ruler. Ruler chooses a tax rate to maximize tax revenue. In doing so, however, we assume that, unlike Agents, Ruler is deeply concerned about peasant rebellion and thus

¹⁵For simplicity, we use $D(\cdot)$ and X as the reduced form representation of Ruler's monitoring strategy and directly impose assumptions. The above assumptions, however, can be justified as follows. Suppose that when Agent collects a surcharge of θ then an audit will reveal a signal $\hat{\theta}$ drawn from a normal distribution $N(\theta, \sigma^2)$ bounded between 0 and 1 (i.e., truncated normal distribution). Suppose that Ruler punishes Agent whenever $\hat{\theta}$ is greater than some threshold value h . This delivers the properties $D(0) > 0$ and $D'(\cdot) > 0$. Ignoring corner solutions, it can be further verified that Agent will never set θ beyond the threshold h , which in turn implies that we can focus on the values of θ that correspond to $D''(\cdot) > 0$. Moreover, it can be shown that if σ is large enough (i.e., if Ruler's information is sufficiently noisy), then $D'''(\cdot) < 0$. Finally, even though Ruler can choose a level of fine from a range of possible values, in an equilibrium Ruler will always choose the maximum level of fine that is consistent with Agent's individual rationality constraint, which gives X in our model.

constrained by the no-revolt condition: $\tau + \theta \leq r$. There are two main reasons why Ruler is bound by the no-revolt condition while Agents are not. First, because peasant rebellion destructs productive capacity and affects future agricultural outputs, it hurts long-lived Ruler much more than short-lived Agents. Second, suppose that rebellion causes damages also to surrounding jurisdictions. Since Agents are unable to coordinate their actions across jurisdictions, even if revolts hurt them, it is individually rational for each Agent to ignore the no-revolt condition in setting θ . By contrast, as a sole dictator governing the entire domain, Ruler internalizes any externalities across space or time.

Formally, Ruler's maximization problem can be written as:

$$\begin{aligned} \max_{0 \leq \tau \leq 1} v^R &= \tau \cdot Y(N) \\ \text{s.t.} \quad \tau + \theta &\leq r \end{aligned} \tag{3.3}$$

Anticipating the responses by Agents and Peasants, Ruler sets a tax rate given the optimality condition (3.2) and the no-revolt condition. It is simple to show that there is a unique equilibrium in the single-period game in which τ^* and θ^* are determined by $Y(N) = A(S) \cdot D'(\theta^*) \cdot X$ and $\tau^* + \theta^* = r$.

Comparative Statics. To examine the effects of the size of a dictatorship on the optimal tax and corruption rates, we perform comparative statics with respect to the number of regions S . From the optimality condition $Y(N) = A(S) \cdot D'(\theta^*) \cdot X$ and the assumptions $A'(S) < 0$ and $D''(\theta) > 0$, we obtain the following result:

Result 1. *The equilibrium corruption rate θ^* is higher in a larger dictatorship: $\frac{d\theta^*}{dS} > 0$.*

From $\tau^* + \theta^* = 1 - r$, it also follows that:

Result 2. *The equilibrium tax rate τ^* is lower in a larger dictatorship: $\frac{d\tau^*}{dS} < 0$.*

In other words, assuming that production and monitoring technologies are identical across comparable regions in the two dictatorships, the model predicts lower official tax rates and higher extralegal expropriation rates in Qing China than in Tokugawa Japan. It is important to note that these results are driven solely by the assumption of managerial diseconomies of scale, $A'(S) < 0$.

3.2 The Dynamic Setup

We now consider a dynamic game ($t = 1, 2, 3, \dots$) and introduce two additional features. First, to provide a link between tax revenue and the economy, we allow Ruler to spend part of the revenue on public goods. Second, to study dynamic implications, we endogenize population and permit the economy to grow.

If Ruler spends entire tax revenue on non-productive purposes, such as private consumption or arms race, then from an economic point of view, there is little difference between taxation and corruption. Suppose, however, that Ruler may spend part of tax on productive purposes. For simplicity, assume that a random shock (e.g., natural disaster) hits the representative region at the end of every period. Assume also that, Ruler can invest in a public good in the beginning of every period to prepare for the possible disaster. Let γ_t be the level of public good Ruler provides in period t . Assume further that the shock destroys the economy in the region and terminates the game at the end of period t unless the level of public good investment is sufficiently large relative to the size of the shock. Let $G(\gamma_t)$ denote the probability that the region survives the shock and the game continues into period $t + 1$ given the investment γ_t . We assume that the continuation probability increases with γ_t but at a diminishing rate: $G(0) = 0$, $G'(\cdot) > 0$, and $G''(\cdot) < 0$.¹⁶ In other words, Ruler now has an incentive to invest in the public good to protect the regional economy from the random shock to secure future tax revenue.¹⁷

Next, we model consumption and reproduction decisions of a representative Peasant. Assume that Peasant lives for just one period, earns income from agricultural production, and spend his after-tax income on consumption and reproduction to maximize his utility. Let $u(c_t, n_{t+1})$ represent the utility Peasant receives from the consumption c_t and the number of offspring n_{t+1} produced in period t . Collectively, n_{t+1} gives total population in the next period N_{t+1} , namely, $N_{t+1} = N_t \cdot n_{t+1}$. Following Hansen and Prescott (2002), we assume that the two goods are complements and are subject to

¹⁶For example, let W_t denote the realization of the shock in period t and assume that the shock destroys the economy if $\gamma_t < W_t$. Suppose that W_t is the absolute value of a normally distributed random variable with mean 0 and variance σ^2 . Then, it follows that $G(\gamma_t) = F(\gamma_t; 0, \sigma^2) - F(-\gamma_t; 0, \sigma^2)$ and thus $G(0) = 0$, $G'(\cdot) > 0$, and $G''(\cdot) < 0$.

¹⁷More generally, Ruler may invest in public goods that directly increase the agricultural output Y in the region. In this model, we focus on public goods that only affect the continuation probability as it immeasurably simplifies the analysis. The model is also consistent with the historical observation that the primary objective of a premodern state was to maintain political and social order and not to promote economic growth per se.

diminishing marginal utility: $u_1(\cdot) > 0$, $u_2(\cdot) > 0$, $u_{11}(\cdot) < 0$, $u_{22}(\cdot) < 0$, $u_{12}(\cdot) > 0$.

To summarize, the timing of events in the dynamic game in period t ($t = 1, 2, 3, \dots$) is as follows: (1) Ruler sets a tax rate τ_t and public good investment γ_t . (2) Representative Agent selects a rate of extralegal expropriation θ_t . (3) Representative Peasant pays $\tau_t + \theta_t$ of his income to Agent, makes consumption and reproductive decisions (c_t, n_{t+1}) , and revolts if $\tau_t + \theta_t > r$. (4) Ruler conducts randomized audits and fines Agents if misconducts are detected. (5) Exogenous shock hits the region and destroys the economy unless γ_t is sufficiently large; the game continues to the next period with probability $G(\gamma_t)$.

Representative Peasant. We derive an equilibrium of the dynamic game by backward induction. First, the optimization problem of the representative Peasant in period t is given by:

$$\max_{c_t, n_{t+1} > 0} u_t = u(c_t, n_{t+1}) \quad (3.4)$$

$$s.t. \quad c_t + n_{t+1} \leq [1 - \tau_t - \theta_t] \cdot y_t \quad (3.5)$$

where individual income is defined by $y_t = \frac{Y(N_t)}{N_t}$. Note that y_t is exogenous to individual Peasant even though $N_t = N_{t-1} \cdot n_t$, because n_t is a decision variable of the previous generation of Peasant. From the first order condition and the assumption $u_{12}(\cdot) > 0$, it can be shown that the optimal number of offspring n_t^* is an increasing function of net individual income $(1 - \tau_t - \theta_t) \cdot y_t$.

Representative Agent. The representative Agent is assumed to be short-lived, as tax agents are subject to regular rotations. As a result, the maximization problem of the representative Agent is essentially the same as in the single-period game, and thus the optimal rate of extralegal expropriation in period t is given by:

$$Y(N_t) = A(S) \cdot D'(\theta_t^*) \cdot X \quad (3.6)$$

Ruler. Ruler is assumed to live for infinitely many periods. He sets the current and future values of (τ, γ) to maximize the expected discounted value of tax revenue stream. In doing so, we again assume that Ruler is bound by the no-revolt condition in every

period. Let V_t^R represent Ruler's present value of future revenue stream in period t . His maximization problem in period t is given by:

$$\begin{aligned} \max_{0 \leq \tau_{t+j} \leq 1, \gamma_{t+j} \geq 0} V_t^R &= \tau_t \cdot Y(N_t) - \gamma_t + G(\gamma_t) \cdot V_{t+1}^R \\ \text{s.t.} \quad \tau_{t+j} + \theta_{t+j} &\leq r \quad \forall j = 0, 1, 2, \dots \end{aligned} \quad (3.7)$$

The optimal level of public good investment γ_t is given by the following condition:

$$G'(\gamma_t^*) \cdot V_{t+1}^{R*} = 1 \quad (3.8)$$

In other words, Ruler invests in the public good up to the level where the marginal return from the investment equals its marginal cost. The higher is the present value of his future revenue stream V_{t+1}^{R*} , the more willing Ruler is to invest in the public good to increase the continuation probability.

Ruler sets an optimal tax rate, taking Agent's optimality condition (3.6) and Peasant's no-revolt condition as given. Because these conditions are the same as before, the equilibrium tax and corruption rates (τ_t^*, θ_t^*) in the dynamic game are again determined by $Y(N) = A(S) \cdot D'(\theta_t^*) \cdot X$ and $\tau_t^* + \theta_t^* = r$ ($t = 1, 2, 3, \dots$).

Population Dynamics. We now turn to equilibrium population dynamics. Because Peasant's net income is $(1 - r) \cdot y_t$ in the equilibrium and r is a constant, the optimal number of offspring can be expressed as $n_{t+1}^* = n_{t+1}^*(y_t)$, where $n_{t+1}^*(\cdot)$ is strictly increasing in y_t . This, in turn, provides the population dynamics, because by definition:

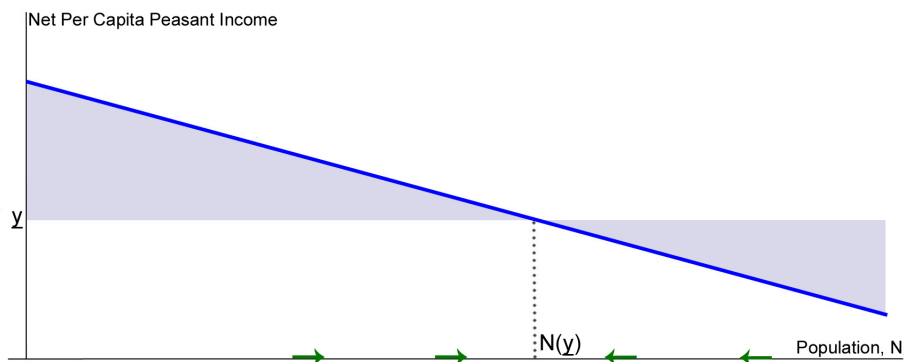
$$n_{t+1}^*(y_t) = \frac{N_t^* \cdot n_{t+1}^*}{N_t^*} = \frac{N_{t+1}^*}{N_t^*} \quad (3.9)$$

In the spirit of Malthus, Condition (3.9) implies that the direction and rate of population growth depends on Peasant's per capita income.¹⁸ Let \underline{y} denote the level of income defined by $n_{t+1}^*(\underline{y}) = \frac{N_{t+1}^*}{N_t^*} = 1$. If $y_t > \underline{y}$ then $N_{t+1} > N_t$ or population

¹⁸In our model, when making reproduction decisions, individual Peasants do not take into consideration the negative externalities of producing offspring today on the living standard of the next generation. We assume that even if each Peasant cares about the well-being of his offspring in the next period, Peasants in the region are unable to act collectively to regulate population growth to attain a socially optimal level of income. As such, individual Peasants take N_{t+1} and thus y_{t+1} as exogenous and beyond their control.

will expand; if $y_t < \underline{y}$ instead then population will contract. Either way, in the long run, the region's population will converge to a stationary level $N(\underline{y})$ associated with the steady-state per capita income \underline{y} (see Figure 3).

Figure 3: Converging to the Steady State Population Level



3.2.1 Comparative Statics.

We compare the two dictatorships that differ only in the number of regions that they encompass. In particular, we assume the same initial populations in the representative regions in the two dictatorships. Because Result 2 implies that the optimal tax rate is higher in a smaller dictatorship in every period, the present value of future tax revenue stream V_{t+1}^{R*} is also greater in a smaller state. Combined with Ruler's optimality condition (3.8) and the assumption $G''(\cdot) < 0$, this implies that:

Result 3. *A larger dictatorship invests less in the public good per region: $\frac{d\gamma_t^*}{dS} < 0 \forall t$.*

The intuition is straightforward. When the agency problem is more severe and hence the continuation payoff V_{t+1}^{R*} is lower, then Ruler has less incentive to invest in the future of the region. For ease of exposition, we assume that the agency problem exists only in tax collection but not in public goods provision. Relaxing this assumption will only strengthen this result.

Next, we explore dynamic implications. We focus on the case where the size of initial population in the region is below the stationary level $N(\underline{y})$. According to the equilibrium population dynamics, population will grow until it reaches the steady state unless interrupted by external shocks. Because aggregate output $Y(N)$ increases with

population, one may expect that Ruler's tax revenue also increases with population. The next result, however, establishes that Ruler's revenue first rises and then falls as population expands.

Result 4. *For any given S , there exists a unique threshold population $\hat{N}(S)$ such that Ruler's period tax revenue v_t^{R*} increases with N if $N < \hat{N}(S)$, and decreases with N if $N > \hat{N}(S)$. Moreover, the threshold population $\hat{N}(S)$ is smaller in a larger dictatorship: $\frac{d\hat{N}(S)}{dS} < 0$.*

Proof. From Agent's optimality condition $Y(N) = A(S) \cdot D'(\theta^*) \cdot X$ and the assumptions $Y(\cdot) > 0$, $Y'(\cdot) > 0$, $D'(\cdot) > 0$, and $D''(\cdot) > 0$, it follows that:

$$\frac{d\theta^*}{dN} = \frac{Y'(N)}{A(S) \cdot X \cdot D''(\theta^*)} = \frac{D'(\theta^*) \cdot Y'(N)}{D''(\theta^*) \cdot Y(N)} > 0 \quad (3.10)$$

which implies that the equilibrium corruption rate is strictly increasing in population. Recall that Ruler's period tax revenue is given by $v^{R*} = \tau^* \cdot Y(N)$. Note that $\tau_t^* + \theta_t^* = r$ implies $\frac{d\tau^*}{dN} = -\frac{d\theta^*}{dN}$. Then it follows that:

$$\begin{aligned} \frac{dv^{R*}}{dN} &= \tau^* \cdot Y'(N) + \frac{d\tau^*}{dN} \cdot Y(N) \\ &= \left[\tau^* - \frac{D'(\theta^*)}{D''(\theta^*)} \right] \cdot Y'(N) \end{aligned} \quad (3.11)$$

From $\frac{d\theta^*}{dN} > 0$, $D''(\cdot) > 0$ and $D'''(\cdot) < 0$, $\frac{D'(\theta^*)}{D''(\theta^*)}$ is strictly increasing in N .¹⁹ Because $\frac{d\tau^*}{dN} < 0$, $\tau^* - \frac{D'(\theta^*)}{D''(\theta^*)}$ is a strictly decreasing function of N . Since $Y'(\cdot) > 0$, the sign of $\frac{dv^{R*}}{dN}$ is determined by the sign of $\tau^* - \frac{D'(\theta^*)}{D''(\theta^*)}$. Let $\hat{N}(S)$ be the population level at which $\tau^* - \frac{D'(\theta^*)}{D''(\theta^*)} = 0$. It is simple to verify that $\frac{dv^{R*}}{dN} > 0$ if population is below $\hat{N}(S)$, and $\frac{dv^{R*}}{dN} < 0$ if population is above $\hat{N}(S)$.

Finally, note that $\tau^* - \frac{D'(\theta^*)}{D''(\theta^*)} = \tau^* - \frac{Y(\hat{N})}{D''(\theta^*) \cdot A(S) \cdot X} = 0$. This and $\frac{d\tau^*}{dS} < 0$ (Result 2) and the assumptions $Y'(\cdot) > 0$, $D'''(\cdot) < 0$, and $A'(\cdot) < 0$ together imply that $\frac{d\hat{N}(S)}{dS} < 0$. \square

¹⁹ $D'''(\cdot) < 0$ is the key assumption (i.e., a sufficient condition) for Results 4 and 5. As shown in the microfoundation provided in footnote 15, it is satisfied when Ruler's information is sufficiently noisy.

The above analysis makes it clear that population growth and the resulting economic expansion has two opposing effects on Ruler's tax revenue. On one hand, it enlarges the tax base. On the other hand, it increases the rate of extralegal expropriation and reduces the fraction of the economic surplus that goes to Ruler. Result 4 shows that the latter effect begins to dominate the former once the population in the region crosses the threshold. And what is more, it shows that, the larger is the dictatorship, the earlier the tipping point where the negative effect of economic growth dominates the positive effect arrives.

More generally, the following result holds:

Result 5. *For any given N , economic expansion is less beneficial to Ruler in a larger dictatorship: $\frac{d}{dS} \left(\frac{dv^{R*}}{dN} \right) < 0$.*

Proof. It follows from the equation (3.11), $\frac{d\theta^*}{dS} > 0$ (Result 1) and $\frac{d\tau^*}{dS} < 0$ (Result 2), and the assumptions $D''(\cdot) > 0$ and $D'''(\cdot) < 0$. \square

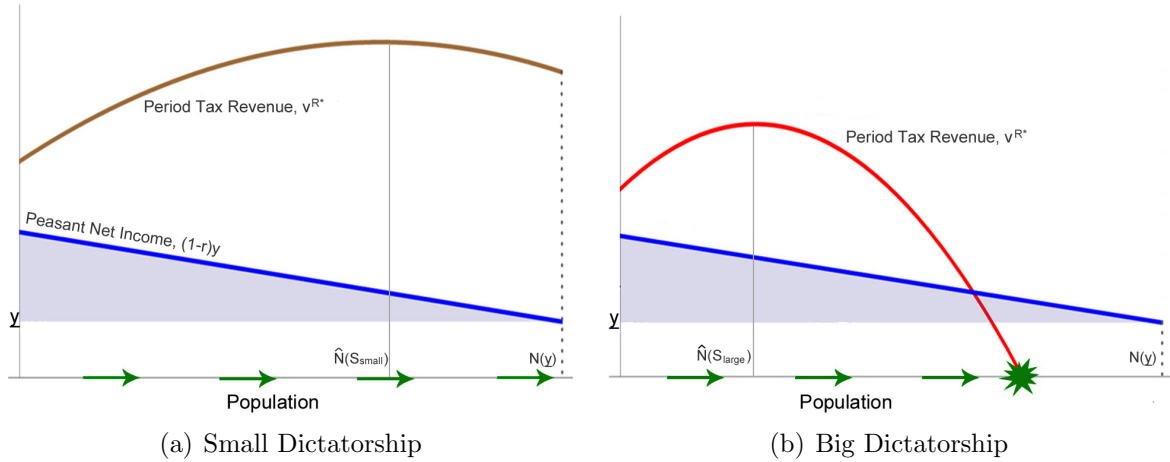
According to Result 5, at every population level N , the positive effect of economic growth on Ruler's revenue is always larger and the negative effect always smaller in a smaller dictatorship. In other words, Ruler in a larger dictatorships gains consistently less from the economic growth due to greater agency costs.

Two Dynamic Outcomes. For two dictatorships that differ significantly in size, the model predicts two 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 5), he will invest relatively heavily in the public good (Result 3) to protect the economy from periodic external shocks. In the absence of extraordinarily large shocks to disrupt the process, population in every region that he governs will expand until per-capita income falls to \underline{y} . At this point, the economy enters the steady state and will stay there unless large exogenous shock knocks it out of that state (Figure 4a).

The picture is different in the large dictatorship. In this case, Ruler's revenue begins to fall early while the economy still expands. As fiscal condition worsens, 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, which allows economic

Figure 4: Two Dynamic Outcomes



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).

Our results affirm 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

Assuming that pre-modern China and Japan had shared roughly the same production and monitoring technologies, due to different degrees of agency problems arising from the difference in geographical size, our model predicts lower rates 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. The model also predicts that, over

time, fiscal revenue in the shogunate would track changes in economic output (proxied by population) more closely than was the case in China (Results 4 and 5).

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, 4, and 5 are in line with the tax revenue and population patterns observed in historical data. Finally, we evaluate Result 3 by comparing the provision of several public goods in China and Japan.

4.1 Corruption

Corruption, by its very nature, is difficult to measure. Nonetheless, bureaucratic graft and corruption was a topic that attracted immense attention in Qing 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, 142).

Some magistrates used their underlings as proxies to avoid direct 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, 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%.²⁰

²⁰To 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

According to Zhang (1962, 32), in early 19th-century China, a magistrate would typically fetch 30,000 silver taels (12,880 shi or 7,140 koku of rice) a year through extralegal channels. By this estimate, the extralegal incomes of the 1500 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 contrast, political and intellectual elites in Tokugawa Japan were more concerned with issues such as the rise of the merchant class and the declining economic status of the ruling samurai class than with corruption (Totman, 1993).²¹

This does not mean that corruption was not a problem in Tokugawa Japan. In a particularly severe incident exposed in the 1830s, it was discovered that 3 magistrate assistants collected 3000 ryo of bribes, or 8.2% of the total output, from taxpayers in Tanimura of Koshu.²² According to Nishizawa (2004), this episode was one of the worst corruption cases during the Tokugawa period. More generally, 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.²³ Of this amount, 100-200 ryo would be spent on paying for maintaining and repairing the local office, 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) have estimated that corruption consumed 22% of China's agricultural output in 1873.

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 went beyond any level that cost recovery could justify.

²¹Thomas 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, 9).

²²The Koshu area had a assessed output of 222,000 koku and was governed by 3-5 magistrates. Assuming that there were 5 magistrates each governing an identical subregion, Tanimura's assessed output would be 44,400 koku. The official conversion rate of rice-to-gold was 1.1 in 1835 (Iwahashi, 1981).

²³As 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 20).

4.2 Tax Rate

Figure 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.²⁴ For Qing China, aggregate tax revenue is used instead. 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.²⁵ Furthermore, in line with the model's prediction, the gap widened over time.

Fiscal information on the smaller daimyo domains is incomplete and fragmented. 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, tax rates in Kumamoto were also higher than those in the shogunate (Miyamoto, 2004; Hosokawa Hanseishi Kenkyuukai, 1974).

Importantly, 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.

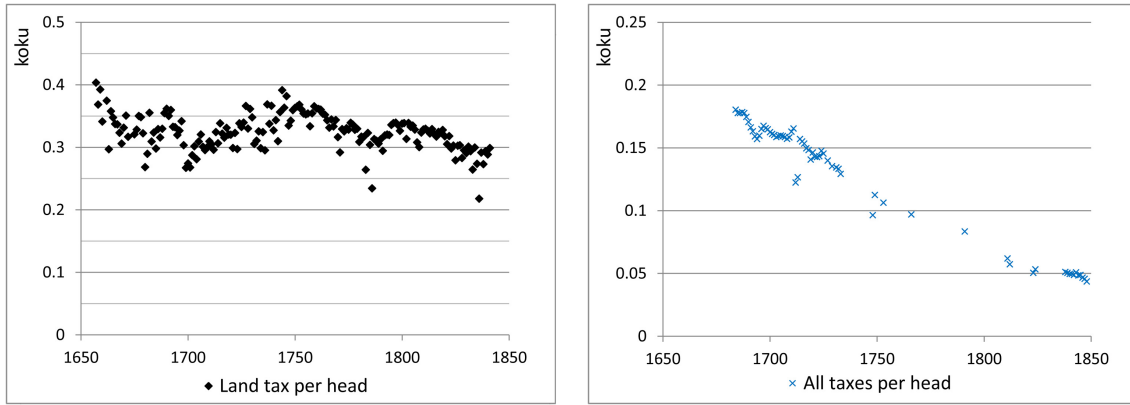
4.3 Population Growth and Fiscal Change

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

²⁴We assume that 15% of the Japanese population lived in the shogunate throughout this period.

²⁵These are lower-bound estimates as our calculations did not include corvée levies, which was effectively phased out in Qing China but remained a component of the peasant's obligations to their lords in Tokugawa Japan.

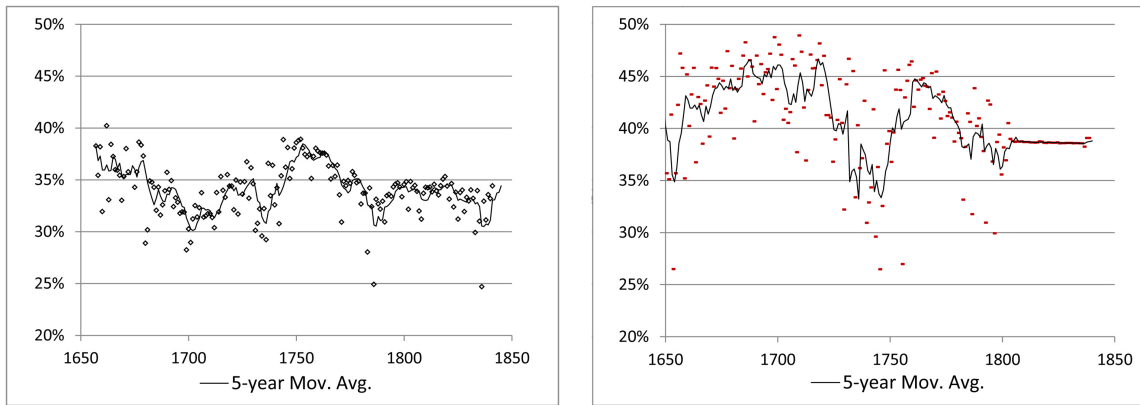
Figure 5: Per Capita Tax Revenue



(a) Japan (Tokugawa shogunate only)

(b) China

Figure 6: Tax Rate



(a) Tokugawa shogunate

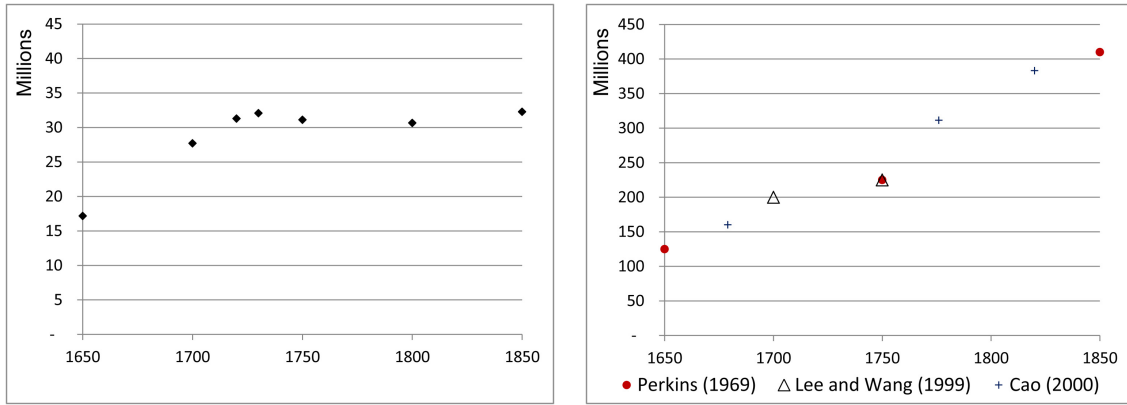
(b) Kumamoto domain

Sources: Shogunate’s land tax from Ohno (1996); Japan’s population estimates from Hayami and Miyamoto (1988); China’s tax revenues from Sng (2010); China’s population estimates from Perkins (1969).

where population level stayed at around 30 million from the early 1700s to the mid-1800s (Figure 7a). Consistent with Results 4 and 5, shogunate revenues evolved in parallel with population change—land tax revenues grew steadily before the early 18th century, and stayed more or less flat afterwards (Figure 8a).

Meanwhile, 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). Ironically—but in line with

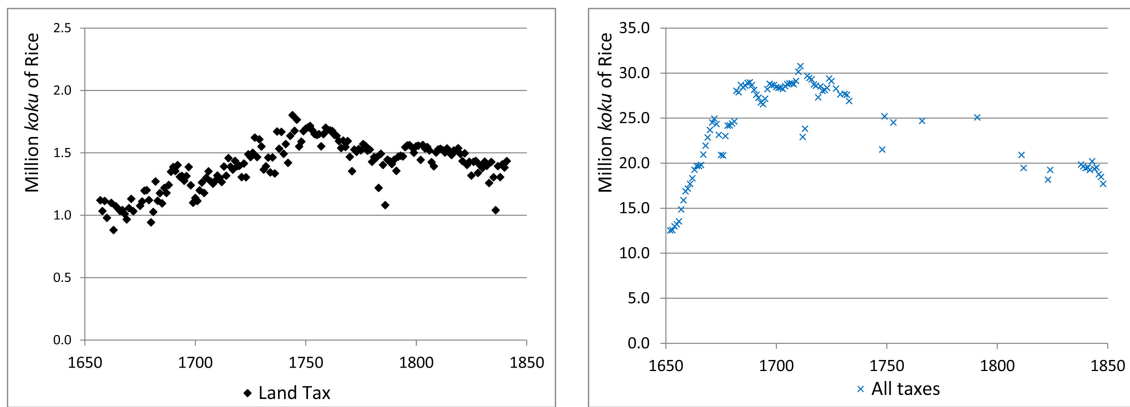
Figure 7: Population



(a) Japan (Entire country)

(b) China

Figure 8: Tax Revenue (Real)



(a) Japan (Tokugawa shogunate only)

(b) China

Sources: See Figure 6.

Result 4—the turning point occurred in the midst of the High Qing Period, when the Chinese economy was expanding steadily and interregional trade was flourishing (Shiue and Keller, 2007).

It is worth noting that even though the shogunate collected more taxes per capita, its aggregate tax revenue remained far lower than that of the Qing state (Figure 8). This may explain why a large dictatorship could persist despite its relative weakness in fiscal extraction: a ruler cares about aggregate tax revenue, not the per capita level. As such, it is perfectly rational for a ruler to prefer governing a large empire than to

devolve power away.

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 aggregate expenditure was only 13 times larger. 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), it might not have contributed to social wellbeing. If we focus solely on non-military expenses, however, the gap widens further to 5.4 times (0.14 versus 0.026 koku).²⁶

Table 1: Expenditure Estimates of the Qing State (1766) and the Shogunate (1730)

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

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).

The size of bureaucracy per capita was also larger in Japan than in China, suggesting a bigger public sector in Japan. Roughly 3,000 hatamoto (upper vassals) held official positions in the shogunate. In addition, there were 17,000 gokenin (lower vassals), of whom some held public appointments too. By comparison, in 1800 the Qing establishment had only 20,000 official positions to govern a population that was roughly 70 times larger than that of the shogunate (Fairbank, 1992).

In the remainder of this section, we compare the provision of four key public goods in China and Japan as shown in Table 2.

²⁶The 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

	China	Japan
(a) Coin Types	Gold, Silver, Copper	Copper only
Annual Output of Copper Coins, aggregate	3,639,800k (1756-65)	1,096,000k (1764-88)
Annual Output of Copper Coins, per capita	15 (1756-65)	35 (1764-88)
(b) Length of Imperial Routes/Gokaido, km	11370	1440
Length per '00 sq. km	0.26	0.51 or 3.37
(c) Urban Population (Urbanization Rate)	20.5m (5.8%)	5.1m (16.5%)
(d) Forest cover (million ha)	18.5 (1700) → 9.6 (1850)	27 (1600) → 25.5 (1850)
	(Lingnan region only)	

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

(a) Monetary Policy. If money supply is a good indicator, the 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. In the absence of a reliable government-issued large-denomination currency, the Chinese had to rely on silver bullion and foreign denominated silver coins for large 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 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).²⁷

(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

²⁷The 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.

was primarily political, the availability of reliable and safe transportation contributed to the development of a national market in Japan.²⁸

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 circuit (Figure 2)—that together formed a complete loop surrounding the main island Honshu and lowered the cost of trade (Nakai and McClain, 1998, 164-5).

By contrast, the state in China did relatively little 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 2b, 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 long (Figure 1). Compared to the *Gokaido*’s 1440 km, it is almost 8 times as long. However, this converts to a trunk road density (length divided by domain size, in km per 100 km²) of only 0.26, compared to 3.37 in the shogunate if we assume that the *Gokaido* served only the shogun’s domain. Even if we divide the length of the *Gokaido* by the whole of Japan, the resulting road density, at 0.51, will still be twice that of China.

(c) Urban Management. There are many negative externalities living in cities. When one starts a fire carelessly, or dumps rubbish into water sources, others are

²⁸Historical 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, 39-44).

adversely affected. For towns and cities to 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, or formal institutions with coercive powers, becomes necessary for big cities to operate.

Historical 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 (McClain, 1980). As these castle towns grew, their rulers imposed 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).²⁹

Contrary to Max 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. Consequently, China had a less developed urban infrastructure when compared to Japan (Mosk, 2011). 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,

²⁹In 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, 14).

1989, 135).

Unsurprisingly, urbanization rates were higher in Japan 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., 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.³⁰

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 Kinai Office of Erosion Control) 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.³¹ Attempts were also made to delineate the boundaries between domains as well as between villages to avoid “the tragedy of commons”. Finally, the shogunate and some domains promoted reforestation programs actively (Totman, 1989).

Early modern China, too, saw forest disappearing quickly.³² Like the Japanese governments, the Qing state was acutely aware of the growing ecological challenge that

³⁰When 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, 75).

³¹For example, in 1706, the shogunate banned the use of large pine trees as New Year’s decorations.

³²As 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, 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”.

the economy was facing. However, its efforts to address the problem were thwarted by corruption and inefficient administration. When flash floods caused by excessive land reclamation 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". "[I]nstead, money was wasted on a top-heavy, inefficient, and corrupt bureaucracy" (p. 100).³³ 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 between the two time points 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 historical evidence suggests that it was high agency costs rather than an unwillingness to act that dissuaded the Chinese 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 used these schools as a tool to profiteer.³⁴ Similarly, in the late 18th century the Qing state rolled back its enlightened attempt to maintain a nationwide granary system due to worries over corruption and high administration costs (Will, 1990; Wong and Perdue, 1983).

³³Similar 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.

³⁴In an edict 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).

By contrast, the cost of a strong state might have been relatively low in Japan. Even though the shogun and the daimyo taxed heavily, bureaucratic corruption appears to be reasonably subdued. Early modern European observers described Tokugawa Japan as “harshly but well governed” (Hall, 1974, 39). While a big portion of its tax revenue was “wasted” on feeding a ruling 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. When necessary, the shogunate could mobilize the surplus captured by the elites to deal with collective action problems. In the early 18th century, to guard against destructive floods along large rivers, the shogunate demanded local lords to make contributions known as *kuniyakukin* to help finance river management projects. The lords in turn extorted forced loans from the samurai (Beasley, 1963, 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 accumulated.

Put differently, when monitoring costs are low, the state—comprising the ruler *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, and some good may even come out of it.

5 Conclusion

We propose that, due to geographical differences, political regimes in Japan had a stronger capacity to manage the economy 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. In the Tokugawa period, Japan already had a state that was reasonably competent in supplying basic public goods.

Where economic welfare is concerned, differences in state characteristics between the two did not seem to matter much in the short run. Existing evidence suggest that they maintained comparable standards of living in the 18th century (Allen et al., 2011). The Chinese had enjoyed greater economic freedom than the Japanese, but it came with higher transaction costs in economic exchanges, as typified by its use of silver bullion.

In the long run, however, Tokugawa Japan experienced a significantly longer period of domestic peace: there were 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).³⁵

In summary, a comparative historical analysis of China and Japan shows that China's problems 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 placing Japan and China in comparative perspective, 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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³⁵To be sure, like China, 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 (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.

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