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 di□ered 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 di□erences between pre-1850 China and Japan, and focus instead on areas where they were alike.

Indeed, early0.2ndnahiJa520011.-1.958t958and Ja958y -0.8(.2((52-026.2(i).2(a)(l)-1.2(a)-1(o)-25)-0.6

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,

[1] In 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

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 di□ers 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 ef-

2.1 Geography

Figure 1: Early Modern China and Japan

Figure 2: Tokugawa Japan in 1664

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 (Lat-

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 o□cials 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 o□

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 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

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 di" cult 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

small dictatorships, we assume that every region in the two regimes is “identical” and

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 misconducts only imperfectly with probability $D(\alpha)$ where $0 \leq D(\alpha) \leq 1$ and $D(0) = 0$. We assume that the detection probability increases with the rate of surcharge α at an increasing rate, but that the marginal rate of detection is concave in α: $D'(\alpha) > 0$, $D''(\alpha) > 0$, and $D'''(\alpha) < 0$.[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 α to maximizes his expected payoff and proceeds to collect taxes. (3) Peasants pay $\tau + \alpha$ of their outputs to Agents and decide whether or not to revolt. (4) Ruler conducts randomized audits and punishes Agents if the audits uncover misconducts.

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 α to maximize his expected payoff, given the monitoring mechanism, $A(\alpha), D(\alpha)$, and X:

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

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

$$Y(N) = A(S) \cdot D'(\alpha^*) \cdot X \tag{3.2}$$

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

[15] For simplicity, we use $D(\alpha)$ 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 τ then an audit will reveal a signal $\hat{\tau}$ drawn from a normal distribution $N(\tau, \alpha^2)$ bounded between 0 and 1 (i.e., truncated normal distribution). Suppose that Ruler punishes Agent whenever $\hat{\tau}$ is greater than some threshold value h. This delivers the properties $D(0) > 0$ and $D'(\alpha) > 0$. Ignoring corner solutions, it can be further verified that Agent will never set τ beyond the threshold h, which in turn implies that we can focus on the values of τ that correspond to $D''(\alpha) > 0$. Moreover, it can be shown that if α is large enough (i.e., if Ruler's information is sufficiently noisy), then $D'''(\alpha) <$

constrained by the no-revolt condition: $! + " ! \ r$. There are two main reasons why

3.2 The Dynamic Setup

We now consider a dynamic game ($t = 1, 2, 3...$) and introduce two additional fea-

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

To summarize, the timing of events in the dynamic game in period t ($t = 1, 2, 3...$) is as follows: (1) Ruler sets a tax rate $!_t$ and public good investment $\#_t$. (2) Representative Agent selects a rate of extralegal expropriation $"_t$. (3) Representative Peasant pays $!_t + "_t$ of his income to Agent, makes consumption and reproductive decisions (c_t, n_{t+1}), and revolts if $!_t + "_t > r$. (4) Ruler conducts randomized audits and fines Agents

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:

$$\max_{0" "_{t+j}" 1,\#_{t+j}\%0} V_t^R = \quad !_t \acute{a}Y(N_t)" \#_t + G(\#_t)$$

will expand; if $y_t < \underline{y}$ instead then population will contract. Either way, in the long

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:

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

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 $\tau_t^{\#} + \theta_t^{R\#} = r$ implies $\frac{d\theta}{dN} = -\frac{d\tau}{dN}$. Then it follows that:

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

From $\frac{d\tau}{dN}$ D

N

The above analysis makes it clear that population growth and the resulting economic

Figure 4: Two Dynamic Outcomes

(a) Small Dictatorship

(b) Big Dictatorship

expansion to take place. However, in a paradoxical manner, the r1Tf194(x)-0.8(i)0.6(m)-1(e)-44fi.8(

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

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 co

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.[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.

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 o 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

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 (Ho□man, 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 o□cial 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 o□cial 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.

[26] The actual gap could be even wider as Table 1 does not include corvee larbor. 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 Õ00 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) (Lingnan region only)	27 (1600) & 25.5 (1850)

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 Gokaidq 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

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

adversely a□ected. 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.

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 O□ce 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

[30] When 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).

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

[32] As 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 (McCarey, 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

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

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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