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The Paradox of Power: Understanding Fiscal Capacity in Imperial China and Absolutist Regimes

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The Paradox of Power: Understanding Fiscal Capacity in Imperial China and Absolutist Regimes

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Abstract

Tax extraction in Qing China was low relative to Western Europe. It is not obvious why: China was much more absolutist and had stronger rights over property and people. Why did the Chinese not convert their absolute power into revenue? We propose a model, supported by historical evidence, which suggests that i) the center could not ask its tax collecting agents to levy high taxes because it would incentivize agents to overtax the peasantry; ii) the center could not pay agents high wages in return for high taxes because the center had no mechanism to commit to refrain from confiscating the agent's resources in times of crisis. A solution to this problem was to offer agents a low wage and ask for low taxes while allowing agents to take extra, unmonitored taxes from the peasantry. This solution only worked because of China's weak administrative capacity due its size and poor monitoring technology. This analysis suggests that low investment in administrative capacity can be an optimal solution for an absolutist ruler since it substitutes for a credible commitment to refrain from confiscation. Our study carries implications for state capacity beyond Imperial China.

Keywords: administrative capacity, fiscal capacity, state capacity, principal-agent problem, monitoring, credible commitment, absolutism, limited government, taxation, China, Europe, Qing Empire

JEL classifications: N45, N43, H20, P48, P51

I. Introduction

Tax extraction in Qing China was low relative to the leading Western European powers of the early modern period. This is paradoxical: China was much more absolutist and had stronger rights over property and people than any European power. Why did the Qing not convert their absolute power into revenue? Did the Qing face inherent impediments to enhancing their fiscal capacity, or was their limited fiscal capacity a conscious strategy informed by their history of governing an empire without any form of constitutional constraint (Ma 2011, 2014; Brandt, Ma, and Rawski 2014)?

A foremost priority for absolutist rulers whose source of power is derived from violence or coercion is to contain internal rebellion. Often, for that reason, rulers opt for institutional mechanisms that enhance their supreme and unchecked power and deliberately weaken the military and fiscal capacity of other potential power barons within the regime, including their own administrative agents who might pose a potential threat.[1] This internal self-weakening, however, also makes the rulers more vulnerable to external threats from enemies beyond the border or other exogenous shocks which require swift – sometimes maximal – fiscal extraction and resource mobilization. Here lies a fundamental inherent contradiction in absolutism: how do rulers prevent the same fiscal and state capacity built up in times of external threat from threatening their rule in times of peace? An ideal system is one in which resources are only gathered during times of external threat but minimal taxes are collected in other times to minimize the threat of internal revolt. Yet, given the unpredictability of threats, particularly external ones, an absolutist government is in need of a mechanism to smooth revenue between periods of peace and conflict.

We argue that in the face of no constitutional constraints protecting the rights and property of their administrative agents or the public in general, a solution to these problems was for the Qing to offer tax-collecting agents a low wage and ask for low taxes while permitting their agents to take extra, unmonitored taxes from the citizenry. Since the actual value of the agents' wealth would be unknown to the center – agents could hide the unmonitored portion – the agents were a less attractive target for confiscation during times of crisis. Meanwhile, unmonitored taxes collected by the agent formed rents which incentivized them to stay loyal to the empire. These rents were only subject to a limited possibility of confiscation from the center and therefore served to align the agents' incentives with the ruler's in the long-run.

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[1] See Ma (2012) and Haiwen Zhou (2012) for the case of Imperial China.

Such a solution only works when a ruler can commit to it. In the absence of constitutional constraints, a ruler can only commit to refrain from predating on his agents when he has little capacity to find and extract the agent's hidden, unmonitored wealth. In such a case, there is little to gain from predation since the agent has little for the ruler to confiscate. Hence, an absolutist ruler can commit to refraining from predation – or tying his own grabbing hands – when administrative capacity is weak and thus monitoring costs are high. This idea is related to Greif (2005, p. 755), who proposed that rulers can commit to protecting rights by creating an ineffective administration, which increases the cost of confiscation and thus makes property more secure.[2] Our analysis therefore suggests that low investment in administrative capacity can be an optimal *decision* for an absolutist ruler: it allows him to credibly commit to not confiscating agents' wealth while also discouraging the agent from collecting too much taxation from the masses. The downside to this arrangement is that the rulers are stuck in a "low wage-low tax" equilibrium, where they pay their agents low wages in return for low levels of tax collection. They cannot offer high wages since such wages are not secure from confiscation,[3] while they cannot request high levels of taxation because they must leave surplus for the agent to collect as an "extra-legal" wage (that is hidden and thus free from confiscation).[4]

Although our model focuses on the ruler-agent relationship, our analysis captures the fundamental uncertainty in property rights and contract enforcement issues pervasive in parts of the world ruled by arbitrary and unconstrained rule. Our model therefore sheds light on a number of stylized facts from the pre-modern era. First, it explains why the Qing rarely invested in administrative capacity and total Chinese taxation remained stationary despite population and territorial expansion. Rather than taking Confucian ideology or the Chinese ruling logic of light taxation themselves as explaining the low-taxation outcome (Rosenthal and Wong 2011; Deng

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[2] González de Lara, Greif, and Jha (2008) and Greif (2008) argue that constraint on executive power arises when administrators are sufficiently powerful to constrain rulers, where their power derives from the fact that rulers rely on them to implement policy.

[3] Such confiscation could lead to an escalation of extraction at all levels of the bureaucracy. As extractions throughout the hierarchy would in the end fall on the masses at the bottom, this in turn would heighten the risk of insurrection in the long run. Although our paper is restricted to the ruler-agent relationship, insecurity in property rights due to the absence of credible commitment was a pervasive phenomenon, especially in times of political crisis, for absolutist states like Qing China (Chen 1992, ch. 7; see North and Weingast 1989 for the case of England).

[4] Absolutist rulers may also desire a low level of taxation for a related, but different reason: they fear their administrative agents growing too strong and posing a threat to the center. See Haiwen Zhou (2012). Karaman (2009) made a similar argument for the case of the early modern Ottoman Empire as the sultan employed the judiciary to monitor tax farmers.

2015), our model suggests that low tax revenues may have been an endogenous outcome of an absolutist regime with no formal constitutional constraint, legitimized and reinforced by the Confucian ideology itself. This outcome contrasts with the constitutionally constrained regimes of Europe, which had incentive to make investments in administrative capacity and were therefore able to collect much higher taxes per capita (Brandt et al. 2014). Second, most absolutist regimes contain an element of informal or extra-legal taxation above the official level.[5] We show that the ruler's inability to commit from confiscating the *known* income of the agents entails that, in order to keep the agent in the system, it must turn a blind eye to the agent collecting informal, *unknown* (to the ruler) income. In other words, extra-legal taxation was a necessary component for the Qing system to work properly. Third, it explains why Chinese empires could be inward-looking while also seeking territorial expansion. By co-opting potential rivaling neighbors, the motivation behind an absolutist ruler's territorial expansion may be the reduction of threats rather than resource extraction from the populace. Our model reveals that weaker administrative capacity associated with large size could therefore be a *choice* made by the ruler, as the payoff of a weaker external threat would have been more than worth the "cost" of weaker administrative capacity.[6]

Our study draws on the Chinese imperial political structure as a prototype, as it developed one of the earliest forms of central bureaucracies in relative continuity and isolation. Yet, our study makes general contributions missing in the existing literature on state capacity.[7] Olson's (1993) well-known model of roving and stationary banditry has largely taken administrative capacity as given and rulers as simple revenue maximizers. Tilly (1990), Besley and Persson (2009, 2010), Acemoglu (2005) and Hoffman (2015) argue that investments in fiscal capacity – and hence administrative capacity – arise endogenously precisely because of common interests in the provision of protection against external enemies.[8] Our model indicates that a certain type of

[5] Tax farming also has features similar to informal or extra-legal taxation in that the ruler has little capacity to monitor the actual amount of taxes collected by tax-farmers. See Balla and Johnson (2009) and Johnson and Koyama (2014). Besley and McLaren (1993) report numerous cases, mainly in the developing world, where tax collectors regularly take bribes above the official level. Their model suggests that when enough tax collecting agents are dishonest and monitoring is expensive, permitting such bribery (and paying the agent a low, "capitulation wage") incentivizes agents to remit the highest amount of taxes.

[6] Sng (2014) suggests that the historically low levels of Chinese tax collection were a result of its size, which made tax collection difficult far from the center. His explanation on the incentive of agents to extort taxpayers beyond the level desired by the ruler is consistent with our model, although Sng does not consider the role of credible commitment in the ruler-agent relationship and treats size as exogenous.

[7] For excellent overviews of recent contributions to the literature on state capacity in economics and political science, see Dincecco (2014) and Johnson and Koyama (2017).

[8] Dincecco (2009) stresses the role representative institutions played in generating fiscal capacity through increased

administrative capacity arose in Europe only in the presence of *both* an external threat *and* an internal institutional arrangement which consisted of some degree of credible commitment or representative institutions. State capacity in these cases was often marked by the development of a fiscal-financial-legal nexus, the maturing of a market for public debt (Stasavage 2011; Besley and Persson 2011), and the establishment of a transparent taxation system where governments paid civil servants good wages in return for tax revenue. But this solution only worked if governments could credibly commit to not confiscating the agents' wealth in times of crisis. These insights imply that absolutist rulers faced a fundamental paradox where their unchecked power was ultimately constrained by a weak state and low administrative capacity. This paper therefore has implications for the long-run economic divergence between China and northwestern Europe, where the issue of fiscal and state capacity has not been given adequate attention.[9]

The paper proceeds as follows. Section II overviews the nature and structure of absolutist power in Imperial China. It illustrates the unique features of i) low and stationary formal governmental taxation despite population and territorial expansion, ii) an entrenched element of extra-legal taxation above the official level, and iii) the inability of the Qing to commit to refraining from confiscation in time of need. Section III presents a model addressing these features. It suggests that all three of these features of Imperial China are equilibrium outcomes in an absolutist regime with little monitoring power and no constitutional constraint. Section IV extends our model to shed light on the long-run evolution of the Chinese imperial political structure and the comparative fiscal and financial development of other types of regimes that prevailed in early modern Europe. Section V concludes.

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taxation and lower sovereign credit risk. Karaman and Pamuk (2013) argue that the connection between representative institutions, war, and fiscal capacity is dependent on the economic structure of the regime: the interests of representative assemblies align with rulers with respect to war in urban settings but not in rural settings, where local control over coercive power dominates. Gennaioli and Voth (2015) take this argument one step further, arguing that once fiscal and state capacity becomes important for war-making, a divergence arises between internally cohesive states and those without cohesion, with the latter set of states dropping out of existence.

[9] This is not to imply, of course, that the "Great Divergence" literature spurred by Pomeranz (2000) is devoid of insight into the mechanisms underlying the divergence between China and Western Europe. For instance, Rosenthal and Wong (2011) focus on the interaction between the quality of institutions and relative prices in China and Western Europe, emphasizing the contribution of informal arrangements to supporting long-distance commerce. Greif and Tabellini (2015) compare the kin-based Chinese culture, with its clan-based enforcement institutions, and the "generalized morality" cultures of Europe, which coevolved with corporate, group-independent institutional forms. Also see Ma (2011a, 2011b, 2014) and Brandt et al. (2014).

II. Historical Background: Qing China

II.1. The bureaucratic and fiscal structure of Qing China

The beginning of Chinese imperial absolutism can be traced to China's first unification under the Qin dynasty in 221 BC. At the time of the unification, the Qin's First Emperor Qin Shi Huang opted against a feudal type of political arrangement and instead implemented an empire-wide prefectural system with household registration. In this model of Chinese absolutism, the emperor held ultimate power, commanding property rights over all factors of production including land and labor. At the bottom of the socio-economic hierarchy were the masses (farmers or peasants), who were nominally the tenants and cultivators of land owned by the emperor.[10] The administration of the empire – tax collection, suppression of violence, and some minimal provision of public goods – was governed by direct imperial rules executed by an impersonal bureaucracy. This political arrangement implied the dominance of a single imperial household, along with the eventual disappearance of the hereditary aristocracy and the weakening of autonomous political units and civil society. It also led to the rise of the ideology of nomenclature in Imperial China. That is, the legitimacy of bureaucrats to rule within a jurisdiction was rooted in their appointment from within the imperial administrative hierarchy.

This model of Chinese autocracy was ruler-centered, with no formal or external institutional constraints placed on the powers of the Imperial rulers and their agents except perhaps the vaguely defined "Mandate of Heaven".[11] There was a system of checks against bureaucratic abuses of power, but only within the administrative hierarchy, with the emperor being the final arbiter. The Qing legal system, which was largely subsumed under the administrative hierarchy, contrasted greatly with European civil and common law, which were bound by a fixed set of precedents, rules, and procedures, and were interpreted and enforced by a neutral third party.[12] The primary

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[10] The imperial ownership of land was expressed by the traditional notion of 'Wang-tu wang-min (王土王民, king's land, king's people)', which appeared in The Book of Songs compiled during the age of Warring States (403-221 B.C.) and persisted throughout the imperial period. For more, see Kishimoto (2011).

[11] The problem of the absence of formal constraints on the emperor is succinctly summarized by Ray Huang's study of the Ming (1368-1644) imperial system, the heyday of Chinese imperial despotism: "…Final authority rested in the sovereign, bureaucratic action was limited to remonstrance, resignation, attempted impeachment of those who carried out the emperor's orders, and exaggeration of portents as heaven-sent warnings to the wayward emperor. When all these failed, there was no recourse left" (Huang 1974, p. 7).

[12] For the nature and problem of the so-called "disciplinary mode of justice" in traditional China, see Ma (2011a) and Stephens (1992).Under the disciplinary mode of justice, where the objective of political stability often took precedence over that of justice, the severity of punishments were determined not just by the nature of offense but also by political and other non-legal considerations.

constraint rulers faced was the threat of insurrection: if pushed below subsistence by excessive imperial or bureaucratic abuses, the masses might resort to violent rebellion to overthrow imperial power. Indeed, rebellions and insurrections were an enduring feature of Chinese history, which was marked by periodic political fragmentation and dynastic strife (Ma 2012).

Despite challenges and reversals, both the concept and practice of centralized rule with a hierarchical bureaucracy survived as enduring characteristics of Chinese political history. This system developed to its greatest maturity under China's last dynasty, the Qing (1644-1911). Under the Qing, a nationwide three-tier (capital-province-county) Civil Service Examination, open to nearly all males, was used to recruit official bureaucrats inculcated in the Confucian ruling ideology. Successful examination candidates were appointed to bureaucratic posts based on a system of 3-5 year empire-wide rotation and the rule of avoidance (which precluded appointees from serving their home county). By granting life-long privileges of tax-exemption and legal immunity to varying levels of civil service examination candidates, the system generated a class of career officials having no autonomous territorial or functional power base.[13]

The Qing fiscal regime reflected the nature of such a highly centralized and hierarchical political system. Underpinning this fiscal regime was an elaborate accounting and reporting system cross-cutting the three layers of governmental administration at the central, provincial, and county level. In principle, the use and allocation of almost every budgetary item had to be reported and matched with detailed imperial rules and regulations. Although taxes were collected at the county level from the highly decentralized producing units across a giant empire, almost all revenues were in principle under the purview of the Board of Finance.[14] There was no officially recognized local-level finance, although the Qing did distinguish between remitted taxes and retained ones with the latter often recognized as the local cost of tax collection, which formed part of the de facto local administrative budget. The remitted taxes were either directly transferred to Beijing or other regions in China facing revenue deficits.

By the 18th century, the Qing had largely consolidated most poll taxes into a fixed-target land tax despite their territorial and population expansion. Overall, the land tax accounted for 70% of

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[13] Those gentries with no official posts often resided in their home villages, extending the informal power of imperial rule beneath the official bureaucratic structure. See Chang Chung-li (1955) for the role of gentry.

[14] See Iwai (2004) and Shi and Xu (2008) for a description of Qing fiscal institutions. The Qing Imperial court had its own source of revenue and expenditure under the office of the so-called Nei-wu-fu (内务府). Overall, the share of Nei-wu-fu budget was small relative to that of the Board of Finance. For a recent in-depth study on Nei-wu-fu economic activities, see Lai (2014).

total taxation with the remainder coming from commercial taxes. The revenue system was largely monetized with silver supplemented by an in-kind tax in the form of grain tribute amounting to a little more than a 20% share of the total fiscal revenue (Wang 1973, p. 80). On the expenditure side, the Qing spent about 50% of revenue on direct payments to soldiers and another 17% on the salaries of officials and bureaucrats. Expenditure on public goods such as maintenance of river transport or famine relief was only slightly above 10% (Shi Zhihong 2008, p. 68; Iwai 2004, p. 32).

Figure 1 reconstructs scattered series of official expenditure under the direct purview of the Qing Imperial Board of Finance. It shows a largely trendless expenditure series with an average of about 36 million silver taels but a standard deviation of only 3.2 for the period between 1662 and 1849. The series only began to rise from the mid-19th century when China was forced to open by Western Imperialism, but even then it remained almost stationary in real terms. Yet, these trendless series belie the fact that *per capita* revenues declined dramatically under the Qing. During their two and half century reign, the population nearly tripled and the territory under control nearly doubled. Despite this growth, Qing administrative units hardly expanded: there were only 1,360 counties under the Qing compared to 1,180 under the Han and 1,230 under the Song (Skinner 1977, p. 19). Similarly, the size of the 18th-century Qing standing army of about 800,000 was lower in absolute number than during the Ming and Song (Iwai 2004, p. 33).[15]

INSERT FIGURE 1 AND TABLE 1 HERE

Panel C of Table 1 shows that Qing's official fiscal revenue in per capita terms amounted to only just over two days' earnings of an urban unskilled worker in the early-18th century, and dropped further by the late-18th century, reflecting the combined effect of a fixed revenue target accompanied by explosive population expansion. Table 1 suggests that absolutist regimes in general collected less per capita tax revenue than constrained regimes, although China's level of tax collection was especially low. The Qing collected anywhere from 1/3 to 2/3 of the per capita taxes of the Ottoman Empire from 1650-1800, while Ottoman tax collection efforts paled in comparison to their Western European rivals. Meanwhile, the constrained regimes in England and

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[15] The 18th century Qing emperors seemed to take pride in their relative frugality. K'ang-xi himself testified that "in our Dynasty, the total sum of military and civil expenses is about the same as that of the Ming period. But speaking of the Court expenses, the aggregate amount spent by the Court is even less than that for one palace of the Imperial Concubines. The accumulated sum of the past 36 years is less than that spent in one year's time during the Ming." (quoted in Ma 2011b).

the Dutch Republic collected many times the per capita taxes of the Chinese. The disparity in fiscal capacity was so great that the total taxes collected by the Qing in the latter half of the 18th century were only about 3.5 times of those collected by the Dutch despite the Chinese population being about 143 times greater.[16]

II. 2. Extra-legal taxation

The seemingly low level of taxes collected under the Qing is only part of the story. The largely fixed level of annual revenue at a time of rapid population and territorial expansion, further exacerbated by the absence of any officially designated local finance, eventually led to the rise of the so-called informal, unofficial revenue incurred beyond the official accounting system. In the ordinary revenue system, retained revenues were only about 21.5% of total revenue in 1685. Even among this 21.5%, the bulk was spent on local expenses connected with the center, such as provisions for imperial armies and imperial relay stations. As the official tax revenue allocated to local administration fell far short of the requirements of normal administration – often insufficient to cover the salaries of official bureaucrats let alone their expenses and support staffs – various levels of bureaucrats relied on the infamous extralegal surcharges beyond the official level. The sources of these revenues ranged from the levying of surcharges, manipulation of weights, measures, and currency conversion in tax collection, falsifying reports, shifting funds across fiscal seasons, retaining commercial tax revenue, hoarding tax revenue from newly claimed land, and exacting contributions and donations from local farmers or merchants. Provincial level officials and their "unofficial" staffs relied on the extraction of gifts and contributions from the lower level officials and engaged in practices such as skimming funds in purchases and allocations (i.e., buying at a low price but reporting a high price). Reliance on informal local taxation and the employment of unofficial staffs for public administration often led to the privatization of public services.[17]

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[16] While reliable GDP estimates for China in the 18 and 19th centuries are unavailable, guestimates place the official fiscal revenue of 36 million taels in the range of a mere 1-2% of GNP even in the 1910s (Wang 1973, p. 133). Wang's result also seems broadly consistent with the daily wage conversion in Table 1. This again contrasts with Britain, whose total tax revenue rose 17-fold from 1665 to 1815, with its share in national income surging from 3% to 18% between 1688 and 1810 (O'Brien 1988, p. 3). Unlike the Qing taxation system, the surge in British tax receipts came disproportionately from indirect taxes such as customs and particularly on excise duties, which together accounted for nearly 70% of total revenue towards the end of the 18th century (O'Brien 1988, p. 9-10; Daunton 2012, p. 119).

[17] See Zelin (1984, p. 46-71). Sometimes staffs kept duplicate set of account books, with the set for local use marked by secret codes impenetrable from the official examination. These special types of account books circulated informally within a wide area (Zelin 1984, p. 240). Official collusion could backfire in unexpected ways. Often, the extralegal nature of these surcharges forced the parties involved to pay blackmail (Iwai 2004, p. 3-4).

A seminal study by Chang Chung-li on Chinese gentry income put non-official income extracted above the reported level (i.e., excluding income earned through business or other activities) at 19 times of official income. The total unofficial income for officials above the provincial level were, according to Chang, 63 million taels – which was 81% of the total official tax quota around 1884 (Chang 1962, ch. 1). Hence, it was the informal, unregulated, and arbitrary nature of these extractions that help explain the apparent contradiction of a low tax rate and the rapacious image of the Qing.

In this political regime, perhaps the biggest irony is that reform to formalize local informal taxation may have had the unintended effect of exposing previously hidden revenue to possible extraction from the upper level officials, especially in times of distress. The well-known fiscal reforms carried out by the Yongzheng emperor from 1724 increased surcharges to land taxes and essentially legitimized previously "illegal" local extractions. While achieving some degree of success, the policy had to be largely abandoned toward the end of the 18th century as it could not solve the dual problems of the higher administration's inability to monitor the use of local revenue and the tendency for upper level bureaucrats to reallocate revenue designed for local use (Zelin 1984, ch. 7). The irony is that as soon as revenue became "official" or visible, it became less secure. In the end, extra-legal taxation – being outside the official purview – became the most secure source of local finance. The outcome was that officials at various levels opted to resist attempts to formalize extra-legal taxation, often with the sympathy of higher level officials or even emperors (Kaske 2016, p. 13; Zelin 1984, p. 301). In other words, the central Qing administration could *not commit* to not confiscating their agents' wages once those wages were known and transparent.

The Qing rulers' eventual acquiescence and accommodation of local corruption and extra-legal taxation became a rational compromise to reconcile the inherent contradiction between the discretionary power of the state and the ideological commitment to a fixed target of tax revenue as the foundation of Qing legitimacy. The mechanism was complimented with a state-centered legal system that punished, often selectively, what it viewed as excessive bureaucratic abuses that could imperil imperial stability and dynastic survival.[18] Hence the bane of "corrupt bureaucrats and

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[18] See He Ping (1998, p. 293-5) for the periodic and selective capital punishment on the so-called "economic crime meted out to high level government officials." Huang (1974, p. 13-14) counted in detail the sorry fate of all the 89 ministers of Revenue under the Ming from 1380.

agents" long-decried throughout Chinese history should be viewed as a product tolerated within the system rather than as a deviant.

II.3. Exogenous shocks and expenditure smoothing under the Qing

The combination of a largely fixed level of official revenue alongside extralegal taxation above the official level was far from sufficient to counteract recurrent episodes of political instability and exogenous shocks. To capture how various exogenous shocks impacted government revenue and expenditure, we would need a relatively continuous data series that reveals data on both ordinary and extraordinary expenditure in times of relative peace and instability. In the absence of such data, we can make use of an alternative data series constructed by Shi Zhihong (2008) on the annual warehouse (银库) receipts from the Board of Finance, which recorded the actual inflows (usually consisting of tax remittances from the provinces) and outflows (governmental payments for various expenditures from the warehouse). In the absence of organized public debt, the cumulative stock of silver reserves at the Board of Finance warehouse is equivalent to the cumulative stock of governmental savings. Figure 2 plots the annual stock of silver reserves against episodes of warfare. This conveys a fuller and more telling portrayal of the relationship between Qing fiscal policy and political stability.

<div align="center">INSERT FIGURE 2 HERE</div>

In its early years of military conquest in the 1660s, Qing silver reserves were minimal. As a non-Han minority ruler of China, the early Qing's reliance on Chinese generals and military force to suppress the former Ming loyalists led to the build-up of relatively autonomous power bases and political structures in Southern China. This ended in 1683 when Emperor Kangxi (1661-1722) quashed the rebellion of the so-called "three feudatories" and annexed their territories into the Qing centralized administration. Two years later, Kangxi broke the resistance of the rebellious naval kingdom of Zheng Chenggong and officially integrated the island of Taiwan into the Qing administration. The Qing gradually built up their reserves during the 18th century, which was a period of political stability and infrequent warfare. In the final decades of the 17th century, the Qing contained the threat from an expansionary Russia by signing the Treaty of Nerchinsk in 1689 and conquered China's North-western territory in 1696. In 1720, the Qing attained control of Tibet

with the installation of a new Dalai Lama. By the early 18th century, the Qing successfully consolidated power and established monopoly rule over China's largest ever territory.[19]

As seen in Figure 2, the Qing entered into a prolonged phase of silver reserve accumulation during the 18th century. Reserves peaked at over 70 million by the 1790s, roughly equivalent to two years of total tax revenue. However, the suppression of the White Lotus rebellion around the turn of the eighteenth century, towards the end of the Qianlong rule, led to a sharp drop in silver reserves. This heralded a turning point where the value of silver persistently increased as Chinese silver outflows regularly outpaced inflows. The Qing enacted desperate measures to replenish their dwindling silver stocks: the sale of governmental offices and titles increased sharply in 1804, 1827 and 1834, reaching over 10 million taels – nearly one-third to one-half of the annual central governmental revenue (Ma 2014). The 1840s Opium War followed by the devastating Taiping rebellion almost completely drained the Board's coffers of its silver reserves and left the Qing largely bankrupt by the mid-19th century.

The silver reserves data reported in Figure 2 are partially corroborated by Chen Feng's (1992, p. 275) meticulous yet incomplete calculation of the extraordinary expenses the Qing incurred in the face of various shocks. It shows a highly uneven inter-temporal pattern, ranging from several tens of thousands of taels in the mid-18th century to a peak of nearly 150 million taels for suppressing the White Lotus Rebellion of 1796-1804. Given that the Qing Board of Finance, even at its peak, had 70 million tales in its coffers – equivalent to no more than 3 or 5% of GDP[20] – the Qing had little room to maneuver within the normal fiscal framework to weather these shocks. As a result, the Qing resorted to numerous sources of extraordinary revenue raised to cover military expenditure, including on-site confiscation and predation, advanced collection of land taxes, temporary but arbitrary surcharges on existing categories of taxation, an increased share of remitted revenue at the expense of retained revenue for the local government or deductions of formal salaries, forced contributions from wealth holders, and the sale of governmental offices and titles (Chen 1992, ch. 7). In the devastating mid-19th century Taiping Rebellion, the desperate Qing eventually succumbed to monetary debasement (Chen 2008, ch. 11). Qing fiscal history therefore suggests that in a political regime marked by the absence of sound fiscal capacity or a well-

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[19] See Jonathan Spence (1990) for the standard narrative.
[20] These figures are from Wang Yeh-chien's (1973) calculation.

functioning market for public debt, the deterioration of public finance could become a direct threat to private property rights.

In this section, we described three key features of Qing's China's fiscal history: low and fixed official revenue, high levels of off-book revenue taken by tax administrators, and the central government's encroachment on property rights in times of unpredictable crisis. Are these features inter-related? Are they all necessary components of an equilibrium in which an absolutist ruler wishes to collect taxes but cannot commit to refraining from predating its agents? To answer these questions, we turn to a model which captures these historical features and generates predictions allowing for comparisons across and within societies over time.

III. The Model

In this section, we model the relationship between a ruler and a tax-collecting agent. While we focus on the ruler-agent relationship for the sake of parsimony, the model's insights apply to the situation more closely describing the Qing case, where a ruler's relationship with the top of the administrative hierarchy funnels down into the decisions made at the lower ends of the hierarchy and, ultimately, to the masses. The model addresses the puzzles highlighted in the previous section.

Our model's revenue-sharing arrangement between the ruler and agent bears structural equivalence to a standard sharecropping model for agrarian contracts (Stiglitz 1974). In the sharecropping setting, the landlord (the ruler in our case) could opt to hire tenants (tax agents) on a fixed wage, share-cropping, or fixed rental contract. The choice of contracts is determined by the degree of information asymmetry and risk preference between the principal and agent. However, an important variation of our model is that we do not take contract enforcement itself for granted. In other words, we model two cases: one in which the contract is enforceable through credible commitment and one in which it is not.[21] We are interested in how administrative capacity affects the ruler-agent relationship as well as how a ruler's capacity to commit to refrain from confiscation affects this relationship. The primary outcomes of interest are the level of tax receipts sent to the ruler, the degree to which the ruler permits extra-legal (informal) taxation, the level of administrative capacity invested in by the ruler, and the size of the ruler's empire.

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[21] Risk preference of the principal or the agent is not our main concern, so we do not model it explicitly.

III.1.   Setup

Consider an economy in which a ruler (R) and a tax-collecting agent (A) interact for infinite periods. The agent's primary job is to collect taxes, $T_\tau \in \mathbb{R}^+$, from the (unmodeled) population.[22] The agent is also tasked with and evaluated by his ability to maintain local order and suppress local insurrection.[23] There is some exogenous, taxable surplus produced by the population.[24] The agent has the authority to collect any taxes he chooses. However, the population successfully revolts with probability $p(T_\tau) \in [0,1]$, where $p' \geq 0$, and $p'' \geq 0$.[25] If the population succeeds in revolting, the agent loses his job and receives reservation utility $\underline{u} > 0$ for the remainder of his life, while the ruler is overthrown. For the remainder of this section we call this revolt an "endogenous threat", because the severity of the threat is a function of the decisions made by the players.

The agent's goal is to maximize the present value of all future income streams from wages and rents, which in turn depends on retaining his job within the bureaucratic hierarchy. The ruler aims to maximize dynastic tenure. In other words, during periods of peace the ruler will act in a manner akin to Olson's (1993) "stationary bandit", choosing actions which benefit him over a long time horizon.[26] As we will show later, only when unexpected shocks occur and drastically reduce the ruler's time horizon will an absolutist ruler consider switching from a stationary banditry equilibrium to that of roving banditry. Even in this case, however, the ruler still aims to maximize dynastic tenure; such shocks threaten the ruler's capacity to stay in power in both the short and long-runs. Our model considers rulers who face two threats to their power: the "endogenous threat"

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[22] Subscripts denote the period in question.

[23] A more realistic model includes the agent incurring administrative cost $c^A \in \mathbb{R}^+$ to collect taxes and run the local government. Adding such a cost does not change the model's insights, so we have omitted it for the sake of parsimony.

[24] We assume that the surplus is large enough that a corner solution does not exist (i.e., where the agent collects all of the surplus in taxes). Or, likewise, the probability of a revolt succeeding could equal one if all of the surplus is taken, meaning that the agent would never attempt to collect such a tax in equilibrium.

[25] The revolt probability can be interpreted as the level at which some of the population feels that revolt is better than their opportunity cost. As the total taxes collected increases, more of the population will feel this way, and the probability the revolt succeeds increases.

[26] Even an absolutist with unconstrained and unlimited power will – as soon as he secures his power – switch from a roving bandit objective function to that of a stationary bandit. This objective function involves maximizing dynasty tenure with an infinite time horizon of future revenue streams. This makes sense in the Chinese case where, given that in principle everything under the heaven belonged to the emperor (as the Chinese saying goes), maximizing tax revenue was less attractive than retaining power and dynastic tenure. This may be less true of a limited ruler whose power over property rights is somewhat constrained. A limited ruler is also more likely composed of a coalition of elites ruling over what North, Wallis, and Weingast (2009) termed a natural state rather than a standalone imperial household.

from over-taxation (described above) and exogenous, temporary threats such as external invasion or natural disaster that require massive expenditures to address. The latter threats, $X_\tau \in \{0,1\}$, which we denote as "exogenous threats" for the remainder of this paper, last one period and occur in each period with probability $\theta \in [0,1]$. We assume for parsimony that such exogenous threats do not occur in two consecutive periods.[27]

Each period consists of three stages. Prior to the first stage, the exogenous threat is realized with probability θ. In the first stage, the ruler sets a statutory tax $t_\tau \geq 0$ for the agent to collect. The ruler also chooses a fraction of the statutory tax for the agent to remit, $\alpha_\tau \in [0,1]$, while the agent keeps fraction $1 - \alpha_\tau$. The retained fraction includes the agent's wage, but it can also include taxes earmarked for distribution to other locations or for local expenditure.[28] The total amount remitted to the center, $\alpha_\tau t_\tau$, must be at least large enough to cover the central government's administrative expenses, which we normalize to zero. Assume that the agent loses his job at the end of the period if he remits less than $\alpha_\tau t_\tau$ to the ruler. Remitted or retained, the crucial feature of statutory taxes is that they are "on-the-book" and can be tracked within the official accounting system.

In the second stage, the agent collects taxes T_τ from the population. T_τ has two components: statutory taxes, t_τ, which are visible to the ruler, and the residual, $t_\tau^O = T_\tau - t_\tau$, or off-book taxes. Statutory taxes require minimal supervision because they are broadly equivalent to the tax quota delivered to the destination by the tax-collecting agent. On the other hand, t_τ^O is vaguely defined and informal. Off-book taxes can consist in part of the administrative costs of tax collection by the tax-farming agents, which is usually unknown to the principal. They are not visible to the ruler unless he invests in building a monitoring infrastructure and incurs a monitoring cost.

The agent's income in period τ is therefore $(1 - \alpha_\tau)t_\tau + t_\tau^O$ (i.e., the total taxes not remitted to the ruler). The agent's income defined as such serves three purposes simultaneously: it forms the personal income of the agent, covers the administrative cost of tax collection, and covers local administrative expenses as well as some provision of local public goods. In other words, there is a blurring of the distinction between public revenue and personal income.[29] It is precisely the nature

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[27] A more general (and more realistic) shock structure that permits shocks in back-to-back periods would require a second solution to the model without altering its insights. We therefore do not consider such a shock structure here.

[28] Historical evidence from China indicates that about two-thirds of taxes were remitted to the ruler (i.e., $\alpha_\tau = 2/3$) and one-third retained locally.

[29] In a traditional society, we might consider t_τ^O to include political, social, and legal privileges (which allows one to accumulate wealth much more securely). Here we include them in one term.

of the multiple objectives of the agents' income, some of which may be corruption but others are perfectly legitimate and necessary, that make off-book taxes difficult to regulate. After the second stage, the "endogenous threat" succeeds with probability $p(T_\tau)$.

If the endogenous threat fails to succeed, the game proceeds to a third stage. In this stage, the ruler decides whether to monitor, $M_\tau \in \{0,1\}$, and/or punish the agent, $P_\tau \in \{0,1\}$. The ruler can always observe t_τ but can only observe t_τ^O if it chooses to monitor, which incurs a cost $m \in \mathbb{R}^+$. Punishment ($P_\tau = 1$) simply entails that the ruler confiscates the agent's observable income from the current and previous period.[30] The total amount confiscated equals $\sum_{j=\tau-1}^{\tau}\left[\left(1 - \alpha_j\right)t_j + M_j t_j^O\right]$. The capacity for the ruler to confiscate the agent's income from a previous period is a key feature of the model, as it provides incentive for agents to collect off-book revenue even in periods where there is no exogenous shock, as such income is free from confiscation in the following period unless the ruler invests in monitoring. Figure 3 summarizes the progression of game play within each period, and Table 2 summarizes the model's key variables and parameters.

INSERT FIGURE 3 AND TABLE 2 HERE

We interpret m to reflect the administrative capacity of the ruler. For example, $m = 0$ entails that the ruler has the administrative capacity to costlessly monitor the agent, while $m \to \infty$ indicates that it is impossible (i.e., too costly) for the ruler to monitor, and monitoring is therefore useless. When $m = 0$, the ruler can perfectly monitor t_τ^O, and the so-called off-book taxes simply form part of the statutory taxes. This is close to the ideal of modern democratic governance institutions where a professional and impartial bureaucracy collects and remits taxes. In such a system, net tax revenues include the costs and expenditures of collecting these revenues, and tax revenues and expenditures are revealed to the ruler (or the public in a democracy) through a transparent accounting system.[31]

We solve the model by considering two different types of rulers: a *limited* ruler and an *absolutist* ruler. The distinction between the two is that the limited ruler can *credibly commit* to not confiscating the agent's on-book income ex post, whereas the absolutist ruler cannot make such a commitment. Therefore, the distinguishing feature between a limited and absolutist ruler is

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[30] For simplicity, we ignore the possibility of the agent accumulating wealth over time. Adding wealth accumulation to the model would introduce a different type of strategic behavior – rulers waiting until agents are old before confiscating – without altering the model's primary insights. We permit the ruler to confiscate two periods worth of observed income in order to introduce inter-period considerations in the most parsimonious manner possible.

[31] This was the intended aim of the Qing's Yongzheng fiscal reform, which commenced in 1724.

that an absolutist can act like an arbitrary despot in its relations with the agent when it wishes.[32] To be clear, either type of ruler can confiscate off-book taxes, should they be visible (i.e., when the ruler monitors the agent). Such taxes are extra-legal and their confiscation therefore does not violate conventional definitions of credible commitment. It is only on-book income – which covers the agent's wages, administrative costs, local public goods, etc. – that the limited ruler can commit to not confiscating. Therefore, a critical and distinctive feature of our model is that we capture the scenario in which an absolutist ruler can renege on the contract opportunistically while a limited ruler can credibly commit to refrain from confiscating on-book income, thereby keeping future rents high for the agent.[33]

We assume that either type of ruler can choose two different tax levels in periods of peace ($X = 0$) and periods of crisis ($X = 1$). This condition does not breach our assumption of credible commitment, since it is based on the alignment of the ruler's and agent's interest to preserve political power and tenure rather than ruler's forceful ex post confiscation of the agent's on-book income.

When there is an external threat, the ruler can use resources to combat the threat (i.e., provide famine relief, defense against invasion). The probability that the ruler is removed from power due to the external threat is therefore decreasing in the level of net revenue available to the ruler, R_τ. For simplicity and consistency, we assume that the net revenue available to the ruler is the statutory taxes remitted in the present and previous period plus any revenue confiscated from the agent minus monitoring expenses. That is, in order to increase R_τ the ruler may resort to raising t_τ, α_τ, or confiscating the agent's income. These short term measures may help combat external threats, but they also decrease the attractiveness of staying in the system for the agent. R_τ is defined by the following equation:

(1) $\qquad R_\tau = \sum_{j=\tau-1}^{\tau} \left(\alpha_j t_j + P_j \left[\mathbb{I}_A (1 - \alpha_j) t_j + M_j t_j^O \right] - M_j m \right),$

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where $\mathbb{I}_A$ is an indicator equaling one if the ruler is an absolutist (limited rulers cannot confiscate on-book wages by definition).

Denote the probability that the ruler successfully combats the outside threat by $q(R_\tau) \in [0,1]$, where $q' > 0$, $q'' < 0$, $q(0) = 0$, and $\lim_{x \to \infty} q(x) = 1$. Denote the utility the ruler derives from staying in power in any one period by u,[34] and denote by $\pi_\tau^R \in \{0,1\}$ whether the ruler is still in power in period τ. Assuming that the ruler and the agent have the same discount factor, $\delta \in (0,1)$, the period τ expected utility of the ruler is written:

(2) $\quad E[U_\tau^R] = \sum_{j=\tau}^{\infty} \delta^{j-\tau} E[\pi_j^R (1-p)(X_j q(R_j) + 1 - X_j)u].$

Meanwhile, the agent's period τ expected utility is its discounted expected income should it keep its job. Denoting by $\pi_\tau^A \in \{0,1\}$ whether the agent has been fired ($\pi_\tau^A = 1$) by period τ, the period τ expected utility of the agent is written:

(3) $\quad E[U_\tau^A] = \sum_{j=\tau}^{\infty} \delta^{j-\tau} E[(1 - \pi_j^A)([1 - \mathbb{I}_A P_j][1 - \alpha_j]t_j + [1 - P_j M_j]t_j^O) + \pi_j^A \underline{u}].$

III. 2. Equilibrium outcomes and comparative statics

In the following sections, we provide intuition for comparative statics relating the level of on-book and off-book taxes to changes in administrative capacity (i.e., monitoring costs, m). We then examine how these comparative statics results differ in absolutist and limited regimes.

We focus on equilibrium decision rules for the ruler and the agent conditional on whether the external threat is realized or not (i.e., $X_\tau = 0$ or $X_\tau = 1$). In each period, the ruler makes four choices – $t_\tau, \alpha_\tau, P_\tau$, and M_τ – while the agent makes one choice, t_τ^O. We focus on a specific class of equilibria: the ruler plays a mixed strategy where he monitors the agent with probability $\eta_\tau \in [0,1]$, and punishes the agent if and only if the total level of observable taxes exceeds $\bar{t}_\tau$ (i.e., if $(1 - \alpha_\tau)t_\tau + M_\tau t_\tau^O > \bar{t}_\tau$), where the choices of both η_τ and $\bar{t}_\tau$ are conditional on X_τ. Note that the ruler will only play a strategy $\{\eta_\tau, \bar{t}_\tau\}$ if it is optimal for him to do so. In the analysis, we only consider equilibria in which the ruler can commit to η_τ and $\bar{t}_\tau$ ex post.

We focus on these equilibria for both theoretical and historical reasons. First, permitting the ruler to play a mixed strategy η_τ imposes the least possible restrictions on the action set, since it encompasses the possibility of the ruler playing a pure strategy where he never monitors ($\eta_\tau = 0$)

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[34] We assume that the ruler derives no additional utility from resources.

or where he always monitors ($\eta_\tau = 1$). This formulation also allows us to capture the historical reality that a 'mixed punishment strategy' may have been optimal for a ruler facing high monitoring costs who wished to align the incentives of his agents with his own desires.[35] We employ punishment rule $\bar{t}_\tau$ merely for expositional simplicity. Since the ruler must be able to commit to $\bar{t}_\tau$ ex post, this is tantamount to focusing on a subgame perfect Nash equilibrium where the ruler's optimal strategy is to punish the agent if and only if the agent's observed income, $(1 - \alpha_\tau)t_\tau + M_\tau t_\tau^O$, exceeds $\bar{t}_\tau$. Equilibrium choices are denoted by * and an equilibrium set is one in which the agent's optimal choice of total taxes collected is $T^{*,k}$ (broken down into t^k and $t^{O,k}$)[36] in state of the world $k \in \{0,1\}$ (i.e. the state of the world in which $X = k$) and the ruler's equilibrium decision set is $\left\{t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k}\right\}$.

We can therefore write the ruler's constrained optimization problem, conditional on the agent's equilibrium decision set $\{T^{*,k}\}$. The ruler chooses $\left\{t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k}\right\}$ (for $k \in \{0,1\}$) to maximize his utility subject to an incentive compatibility constraint. That is, the ruler must have incentive to commit ex post to the choices he made ex ante. This is not an issue with $t^{*,k}$ or $\alpha^{*,k}$, as these choices are realized prior to the agent's action in each period. However, the ruler's choice of $\eta^{*,k}$ and $\bar{t}^{*,k}$ presents a commitment problem in that, after the agent has chosen his action, the ruler may want to renege on monitoring with probability $\eta^{*,k}$ or punishing if the total taxes collected exceeds $\bar{t}^{*,k}$. We therefore write the ruler's constrained optimization problem as follows:

(4) $\quad \max_{\left\{t_j^k, \alpha_j^k, \eta_j^k, \bar{t}_j^k\right\}_{j=\tau}^{\infty}} E\left[U_\tau^R\left(t_j^k, \alpha_j^k, \eta_j^k, \bar{t}_j^k\right)\right]$, for $k \in \{0,1\}$, subject to

 i) $E[U_\tau^R(P_\tau^k = 0)|T^{*,k}] \geq E[U_\tau^R(P_\tau^k = 1)|T^{*,k}]$ if $\left(1 - \alpha_\tau^{*,k}\right)t_\tau^{*,k} + M_\tau^{*,k} t_\tau^{O*,k} \leq, \bar{t}_\tau^{*,k}$,

 ii) $E[U_\tau^R(P_\tau^k = 1)|T^{*,k}] \geq E[U_\tau^R(P_\tau^k = 0)|T^{*,k}]$ if $\left(1 - \alpha_\tau^{*,k}\right)t_\tau^{*,k} + M_\tau^{*,k} t_\tau^{O*,k} \geq \bar{t}_\tau^{*,k}$, and

 iii) $E\left[U_\tau^R\left(Pr(M_\tau^k = 1) = \eta_\tau^{*,k}\right)|T^{*,k}\right] \geq E[U_\tau^R(Pr(M_\tau^k = 1) = \hat{\eta})|T^{*,k}] \ \forall \hat{\eta} \neq \eta_\tau^{*,k}, \hat{\eta} \in [0,1]$.

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[35] Note the distinction between disciplinary justice and the mixed punishment strategy in our model. The strategy reflects selective punishment or enforcement of legal rules due to high monitoring costs whereas disciplinary justice refers to punishment or reward by the authority with or without rules or procedures.

[36] The agent choosing T^k is tantamount to the agent choosing $t^{O,k}$ conditional on the ruler's choice of t^k, since $T^k = t^k + t^{O,k}$.

Constraints i) and ii) indicate that the ruler must have incentive to punish the agent ex post if and only if the observed taxes exceed $\bar{t}_\tau^{*,k}$. Constraint iii) indicates that the ruler must have incentive to monitor the agent with probability $\eta_\tau^{*,k}$ ex post.

Meanwhile, the agent solves a constrained optimization problem conditional on the ruler's equilibrium decision set $\left\{ t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k} \right\}$. The agent's primary constraint is a participation constraint. Unlike the ruler, the agent does not have to participate in the tax collection regime; if the agent's remuneration from staying in the system is sufficiently low, it prefers its reservation utility, $\underline{u}$, to staying in the system. We therefore write the agent's constrained optimization problem as follows:

(5) $\max\limits_{\left\{ T_j^k \right\}_{j=\tau}^{\infty}} E\left[U_\tau^A \left(T_j^k \right) \right]$, for $k \in \{0,1\}$, subject to

   i) $t_\tau^{O,k} \geq 0$,

   ii) $t_\tau^k \geq t_\tau^{*,k}$,

   iii) $E\left[U_\tau^A \left(T_j^k \right) | t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k} \right] \geq \frac{1}{1-\delta} \underline{u}$, and

   iv) $E\left[U_\tau^A \left(T_\tau^k \leq \bar{t}_\tau^{*,k} \right) | t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k} \right] \geq E\left[U_\tau^A \left(T_\tau^k > \bar{t}_\tau^{*,k} \right) | t^{*,k}, \alpha^{*,k}, \eta^{*,k}, \bar{t}^{*,k} \right]$.

Constraint i) indicates that off-book taxes cannot be negative, while ii), iii), and iv) form the agent's participation constraints. Constraint ii) indicates that the agent must remit at least as much taxes as the ruler asks for if it wishes to participate in the system. Constraint iii) indicates that the agent's utility from participating must be at least as great as its reservation utility. Constraint iv) implies that the agent is better off from collecting taxes less than or equal to the amount permitted by the ruler than it is from collecting more taxes than permitted.

The key tradeoffs we analyze are as follows. The ruler faces a tradeoff of increasing the probability of an exogenous threat succeeding against that of endogenous threat succeeding. If the ruler asks for too much taxation to combat the exogenous threat, he leaves open the possibility that the agent will overtax the masses to make up for the lost revenue, thus driving up the probability the endogenous threat succeeds. On the other hand, if the ruler asks for little tax revenue in order to encourage the agent to not overtax the masses, there is a higher probability of the exogenous threat succeeding. The ruler can mitigate this tradeoff by monitoring and therefore having the capacity to punish an agent who overtaxes the masses. However, monitoring by an absolutist comes at the cost of decreasing the credibility of his commitment to refrain from confiscating the

wealth of the agent should an exogenous threat arise. Both absolutist and limited rulers choose levels of monitoring and statutory taxes to balance these tradeoffs.

The agent faces a tradeoff between overtaxing the masses (and pocketing all of the off-book proceeds) and triggering a revolt. In a one-shot game, the agent is incentivized to act like a roving bandit, taxing up to the point where the marginal tax revenue equals the marginal cost of increased revolt probability. Of course, it is in the ruler's interest to limit the probability of an endogenous revolt succeeding. The ruler can therefore align its preferences with those of the agent by providing long-run incentives to "stay in the system" and by monitoring and punishing agents who collect taxes above the level announced by the ruler (i.e., $\bar{t}^*$). The model considers these tradeoffs and provides intuition for how they affect the decisions rulers and agents make as well as how these decisions differ in absolutist and limited regimes.

III. 2. A. *First best solution from the ruler's perspective*

We begin by analyzing the first best solution from the ruler's perspective. This allows for a more straight-forward comparison of how the actual taxes (both collected and remitted) compare with the optimal tax. There are two reasons that actual taxes differ from the first best. First, a ruler who faces monitoring costs will not always choose to monitor the agent, thereby incentivizing the agent to take "off book" taxes beyond what is optimal. Such taxes increase the probability of the endogenous threat succeeding beyond what is optimal. Such a problem is faced by both absolutist and limited rulers (if $m > 0$), and thus neither type of ruler achieves the first best. Second, an absolutist ruler cannot commit to refrain from confiscating the agent's income when $X = 1$. This disincentivizes the agent to remain in the system, and agents must therefore be remunerated beyond what is optimal in order to have incentive to collect taxes. This problem is only faced by an absolutist ruler, suggesting that the absolutist equilibrium differs more from the first best than the limited equilibrium.

In the first best solution, the agent never takes more than the ruler demands, and therefore the ruler never monitors or punishes the agent (i.e., $M^{*,k} = P^{*,k} = 0$), for $k \in \{0,1\}$. When the outside threat occurs (i.e., $X = 1$), it is optimal for the ruler to balance the marginal benefit of extra revenue used to repel the outside threat with the increased marginal threat of the endogenous revolt succeeding. It is straight-forward to see this entails that the optimal share of taxes remitted is $\alpha^{*,1} = 1$, while the optimal total taxes collected, $T^{*,1}$, solves the equation $p'(T^{*,1}) = q'(T^{*,1})$. On

the other hand, when $X = 0$, the ruler's optimal solution is to collect zero taxes while providing the agent enough of an expected wage to remain in the system (and therefore collect taxes when $X = 1$). This entails that the optimal share of taxes remitted is $\alpha^{*,0} = 0$, while the optimal total taxes collected, $T^{*,0}$, solves the equation $\theta[1 - p(T^{*,0})]T^{*,0} = \underline{u}$.

III. 2. B. Administrative capacity and tax collection

In this section, we analyze how administrative capacity affects the level of off-book taxes taken by the agent, $t^{O*,k}$ and the taxes collected by the ruler, $\alpha^{*,k}t^{*,k}$. We first state propositions and proceed to provide intuition. All proofs are in the Appendix.

Since the ruler and agent solve different problems when $X = 0$ and $X = 1$, we analyze each case separately. This is useful for analytic purposes, but it also sheds light on how rulers act differently during times of peace ($X = 0$) and conflict ($X = 1$). We begin by analyzing comparative statics with respect to administrative capacity in times of peace.

Proposition 1 (off-book taxes and administrative capacity): In an absolutist regime, $t^{O*,0}$ and $T^{*,0}$ are weakly increasing in m, ceteris paribus. In a limited regime, $t^{O*,0} = 0$ and $T^{*,0}$ is weakly increasing in m, ceteris paribus.

When $X_\tau = 0$, an absolutist ruler has incentive to collect as little tax as possible, leaving as much as possible for the agent. But the ruler has incentive to allow the agent to collect all of his income *off-book*. In other words, the off-book income works as a "capitulation wage", as in Besley and McLaren (1993), where the ruler has abandoned any attempt to solve the moral hazard problem (i.e., the agent collecting more than the ruler desires), but it is still optimal to offer a low wage because it permits collection of the most possible tax revenue collected (in our case, in periods where $X_\tau = 1$). In our model, the ruler permits the agent to collect off-book income as a mechanism to tie his own prying hands. In an institutional setup where the agent has little attachment to the local regions they serve (through a rotating system, as was the case in Qing China and the Ottoman Empire), the ruler has strong incentive to align the agent's interest in short-term maximal fiscal extraction with the ruler's interest in maximizing dynastic tenure. The logic is that the ruler wants to maximize the desirability of "staying in the system" so that the agent is willing and able to remit as much tax as possible when there is an external threat. An absolutist ruler

increases the benefit of remaining in the system by allowing all of the agent's income to be off-book so that it is not a target for confiscation unless the ruler monitors. That is, the absolutist chooses $\alpha^{*,0} = t^{*,0} = 0$,[37] allowing the agent to keep tax revenue up to $t^{O*,0} = \bar{t}^{*,0} = T^{*,0}$.

The agent's off-book revenue serves as an incentive to stay in the system only if the ruler will not confiscate it in the following period should the external threat be realized ($X_{\tau+1} = 1$). Unlike a limited ruler, the absolutist can only credibly commit to refrain from confiscating off-book revenue when monitoring is expensive (and hence η^* is small). Therefore, as monitoring becomes more expensive and the absolutist's commitment becomes more credible, an absolutist can permit the agent to take higher levels of taxes ($\bar{t}^{*,0} = t^{O*,0} = T^{*,0}$) while credibly refraining from confiscating them. This increases the value to the agent of staying in the system and therefore permits the ruler to extract more statutory taxes, $\alpha^{*,1}t^{*,1}$, should an external threat occur in the following period. This logic indicates that $t^{O*,0}$ and $T^{*,0}$ are weakly increasing in m.

Meanwhile, a limited ruler chooses to collect zero taxes by setting $\alpha^{*,0} = 0$, but it sets on-book taxes such that $t^{*,0} = \bar{t}^{*,0}$. Since the limited ruler can commit to refrain from confiscating the agent's on-book income, it can ask the agent to collect less taxes and collect them on-book. This income is free from confiscation, and hence the agent's participation constraint holds even at a low level of income – the agent is willing to have lower per-period income because the income is secure. In turn, the lower tax level lowers the probability of the endogenous revolt succeeding. Yet, even under a limited ruler, the incentive for the agent to take off book taxes increases as m increases, and the ruler must therefore permit the agent to collect more tax income.

Next, consider how administrative capacity affects the ruler's ability to collect statutory taxes when the external threat is realized ($X_\tau = 1$):

Proposition 2 (tax collection and administrative capacity): In absolutist and limited regimes, $\alpha^{*,1}t^{*,1}$ is weakly increasing in m, ceteris paribus.

When $X_\tau = 1$, the ruler desires the maximum level of taxes the agent is willing and able to collect up to the point that the marginal benefit from additional taxes – used to repel the exogenous threat

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[37] The absolutist chooses zero taxes because we have normalized the ruler's administration costs to zero. It is more appropriate to think of the ruler demanding the minimal amount of taxes necessary to cover administration costs.

– equals the marginal cost of increasing the chance of an endogenous threat succeeding. The key insight is that the agent is only willing to collect taxes if it is worth it for him to stay in the system. That is, the agent's participation constraint must hold: he must be better off from his income in the present period and discounted expected future earnings than he is from his outside option.

In either type of regime, Proposition 1 implies that the agent's benefit of staying in the system is increasing in m. The agent's primary benefit from staying in the system is its per-period expected income in periods where no exogenous shock occurs, or $(1 - \theta)t^{O*,0}$.[38] As m increases, the agent's expected future income increases because the ruler permits the agent to have greater income ($T^{*,0}$ increases). Therefore, when $X_\tau = 1$ the agent is more willing to collect and remit more statutory taxes as m increases because it has more incentive to keep its job and receive a higher expected income in the future.

III. 2. C. Absolutist vs. limited regimes

Proposition 2 may at first appear counter-intuitive. It indicates that regimes with weaker administrative capacity can collect *more* taxes to combat an outside attack. The logic of the model makes this result clear, however. In an absolutist regime, a high m increases the ruler's capacity to credibly commit to refrain from confiscating the agent's income, in turn permitting the agent to take more off-book wages in equilibrium and thus increasing his benefit of staying in the system. On the other hand, when m is sufficiently small, the ruler is not able to generate much tax revenue when $X_\tau = 1$, since there is less benefit for the agent of staying in the system. Hence, the absolutist ruler is better off when m is *higher*, since this permits the ruler to collect more taxes when facing an exogenous threat. We will return to this insight in subsection III.3.

In a limited regime, a low m strengthens the ruler's capacity to make a tradeoff between minimizing the probability of an endogenous threat succeeding and minimizing the probability of succumbing to an exogenous threat. In the extreme case, when $m = 0$, the ruler can make this trade-off optimally by setting $\bar{t}^{*,0}$ and $\bar{t}^{*,1}$ to the point that perfectly balances the marginal benefit of incentivizing the agent to stay in the system with the marginal cost of an endogenous threat succeeding. As m increases and monitoring becomes costlier, the ruler has to permit the agent to take more in periods where $X_\tau = 0$, because the threat of punishing an agent who collects taxes

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[38] This income may be confiscated by an absolutist ruler if the ruler monitors and there is a shock in the following period.

above $\bar{t}^{*,0}$ is less credible. This increases the probability of an endogenous threat succeeding beyond the ruler's optima, though it does come with the benefit of increasing the attractiveness to the agent of staying in the system, thereby allowing the agent to extract more taxes when $X_\tau = 1$. Revealed preference indicates, however, that the limited ruler is worse off as m increases; it could have set $\bar{t}^{*,1}$ higher when $m = 0$ in order to extract more taxes when $X_\tau = 1$, but it did not.

This logic indicates that when m is small, the agent's benefit from staying in the system is greater in a limited regime than in an absolute regime. As m increases, the absolutist's commitment problem is partially mitigated, narrowing the gap between the two regime types. Only at the limit, as $m \to \infty$, does the absolutist no longer face a commitment problem and can thus permit the agent to take as much in taxes as a limited ruler. This entails that, for any m, limited rulers can generate more on-book tax revenue when $X_\tau = 1$ than absolutist rulers, since they provide better incentives for staying in the system to their agents. Proposition 3 summarizes this intuition.

Proposition 3 (tax collection in absolutist vs. limited regimes): $\alpha^{*,1} t^{*,1}$ is weakly larger in a limited regime than in an absolutist regime, ceteris paribus.

Table 3 overviews the primary insights of Propositions 1-3.

INSERT TABLE 3 HERE

III. 3. Endogenous administrative capacity

The analysis in the previous section indicated that absolutist rulers are better off when administrative capacity is weak (i.e., m is large), since it gives them a mechanism through which they can commit to not confiscating their agents' income. This indicates that an absolutist ruler may decline to invest in improved administrative capacity *even if* it is inexpensive. In this section, we briefly extend the model to capture this insight.

Suppose the ruler plays the same game with the agent as described above, except that monitoring cost m is a choice variable. Specifically, assume that prior to each period the ruler can choose an investment in administrative capacity which allows it to monitor at cost $m \geq 0$. The investment in administrative capacity costs the ruler $c(m)$, where $c' < 0, c'' > 0$, and

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$\lim\limits_{x \to \infty} c(x) = 0$. The intuition of Proposition 3 suggests that limited rulers will invest in more monitoring capacity than absolutists. By investing in administrative capacity, limited rulers gain the ability to reduce taxes collected by the agent and thus reduce the probability of an endogenous threat succeeding. This comes at a cost of reducing the benefit for the agent to stay in the system. The limited ruler therefore weighs the benefit of a lower probability of the endogenous threat succeeding with the costs of reduced tax revenue during periods of exogenous threat and the cost of investing in monitoring capacity to choose an optimal level of investment.

The absolutist ruler faces a different set of incentives from the limited ruler. Because the absolutist cannot commit to refraining from confiscation, especially when m is low, the agent's equilibrium income is increasing in m: at higher m, the ruler can credibly commit to not confiscating the agent's income because it is too expensive for him to do so. Therefore, investing in lower m only minimally reduces the probability of an endogenous threat succeeding for an absolutist, while it greatly reduces the ruler's capacity to collect taxes during periods of exogenous threat. Hence, relative to a limited ruler, the absolutist ruler has a lower marginal benefit and a greater marginal cost of improving administrative capacity. Proposition 4 summarizes this intuition.

Proposition 4 (administrative capacity in absolutist vs. limited regimes): An absolutist ruler invests in less administrative capacity than a limited ruler.

Combined, Propositions 3 and 4 indicate that a low level of on-book taxation and low investment in administrative capacity – the "Qing equilibrium" described in Section 2 – may be a rational outcome for a ruler who cannot credibly commit to constraining himself in time of need. Such constraint is especially important when unexpected shocks reduce the ruler's time horizon, making maximal fiscal extraction in the present desirable. Without such constraint, an absolutist would act like Olson's (1993) "roving bandit", undermining future revenue streams in order to maximize present revenue in time of need. Our analysis suggests, however, that an absolutist interested in maximizing dynastic tenure can commit himself to acting like a "stationary bandit" by refraining from investing in administrative capacity and asking the agent to remit low statutory taxes.

III. 4. Endogenous size of empire

In this section, we extend the model to account for the size of empire. The model is conducive to such an analysis because one of the key difficulties of extending empire is administrating the newly-conquered territory. The further the new territory is from the ruler's capital, the more costly it is to monitor. However, there are numerous reasons why a ruler may want to conquer a new territory: personal glory, co-opting a potential rival, or increased tax revenue or resources (Alesina and Spolaore 2005; Ko, Koyama, and Sng 2017; Zhou 2012). Indeed, the model suggests that limited and absolutist rulers may have different motivations for conquering new territory. A limited ruler can build a monitoring infrastructure which permits it to extract resources from the new territory. Meanwhile, although an absolutist will have a difficult time extracting revenue, precisely for this reason it has incentive to co-opt a potential rival, who poses a costly threat should they attack.[39] Hence, an absolutist ruler's incentive to conquer new territories lies more in internalizing a potential external threat than revenue extraction, even though this comes at the expense of higher monitoring costs. Which one of these factors dominates the other depends on the monitoring costs each ruler faces, as we spell out below.

Suppose the ruler plays the same game with an agent in the territory he currently rules as laid out in Section III.1. In addition, suppose the ruler is considering conquering a new territory. For simplicity, assume that the ruler will conquer the territory with certainty if he spends resources r (and he will not conquer it otherwise), and the cost of monitoring an agent in the new territory is $\hat{m}$, which is greater than m because the new territory is further from the capital and thus more costly to monitor. Assume the new territory has some surplus which the ruler can extract via a new agent, subject to the same constraints as in the previous game. Finally, the ruler faces outside threat $q(R_\tau)$ with probability $\hat{\theta}$ if he conquers the territory. We assume that $\hat{\theta} < \theta$, since the ruler is co-opting a potential outside threat. Therefore, the benefits of conquering new territory are greater access to revenue, which can be used to defeat an external threat, as well as a lower probability of facing an external threat. The primary cost to the ruler is the resources expended to conquer, r.

A limited ruler will be able to extract more from the new territory than the absolutist ruler for the reason laid out in Proposition 3. However, it is more attractive for an absolutist to lower the

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[39] In the same spirit, a larger and diverse territory also gives the ruler more leeway to better cope with natural disasters and other (internal and external) shocks through redistribution of resources within its jurisdiction.

probability of an exogenous threat occurring from θ to $\hat{\theta}$ by co-opting part of the threat, since the probability that the absolutist will succumb to the threat is greater.[40]

This intuition, summarized in Proposition 5, indicates that when $\hat{m}$ is small, say $\hat{m} \leq m^*$, a limited ruler has more incentive to conquer the new territory than an absolutist. At small $\hat{m}$, the limited ruler extracts much more revenue from the new territory than the absolutist. In other words, the driving force behind a limited ruler conquering new territory, especially when monitoring costs are low, is access to additional revenue. However, when monitoring costs in the new territory are sufficiently large, $\hat{m} > m^*$, an absolutist ruler has more incentive to conquer the new territory than a limited ruler. In this case, there is a minimal difference in revenue extraction from the new territory between the absolutist and the limited ruler, but the marginal benefit of reducing the probability of an exogenous threat is larger for the absolutist, entailing that the benefits of conquering are also greater. In other words, the driving force behind an absolutist ruler conquering new territory is the co-option of potential threats.

Proposition 5 (conquering territory in absolutist vs. limited regimes): $\exists \, m^*$ such that an absolutist ruler is more likely than a limited ruler to conquer new territory if and only if $\hat{m} > m^*$, ceteris paribus.

One implication of this logic, which we will return to in Section IV, is that an absolutist ruler is more likely than a limited ruler to attempt to conquer neighboring states – which are the most likely to pose a threat – whereas a limited ruler has more incentive to conquer resource-rich, but not necessarily neighboring, rivals. In the case of England or the Dutch Republic, conquering new territories was largely driven by the motivation for revenue or resource extraction for the sake of commercial interests such as the East India Company. For Imperial China, conquering new territories was more likely driven by reducing or eliminating external threats by absorbing external territories. Although this increased the probability of internal rebellion, given the much larger territories, the totalitarian nature of absolute rule allowed the emperor to better control internal rebellion through its control over the legal system, ideology, and information. This explains why

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[40] Moreover, the difference in the amount the limited and absolutist rulers extract from the new territory is decreasing in $\hat{m}$. At high levels of $\hat{m}$, the absolutist is better able to commit to not confiscating the agent's income, thus partially mitigating the commitment problems underlying the reason that absolutists have lower capacity to collect taxes.

Chinese imperial expansion often involved contiguous units which could pose a potential external threat. Indeed, at its peak, the Qing largely succeeded in eliminating any potential inter-state competition until the onset of mid-19th century Western imperialism.

In conclusion, the model generates numerous predictions which help explain the stylized facts of the "Qing equilibrium". We summarize the primary predictions below and proceed, in Section IV, to re-visit the relevant histories in light of these predictions:[41]

Prediction 1: An absolutist state will permit agents to collect off-book taxation (Proposition 1).

Prediction 2: Limited states will collect more statutory (on-book) tax revenue than absolutist states (Proposition 3).

Prediction 3: A limited state is more likely than an absolutist state to invest in administrative capacity (Proposition 4).

Prediction 4: Absolutist states are more likely to attempt to conquer neighboring territories than limited states (Proposition 5).[42]

IV. Revisiting the Puzzle: Administrative Capacity and Credible Commitment in Chinese and European History

Our model explains the contradiction that Imperial China, endowed with the world's earliest and longest civil bureaucracy, paradoxically evolved towards a low fixed revenue target (on-book income) with weak administrative capacity. With little or no information due to (deliberately) weakened monitoring capacity, the emperor was better off extracting from the agent a fixed tax quota. By leaving their agents the residual (roughly equivalent to off-book income), the Qing managed to better align the short-term incentives of their agents with their long-term objective of dynastic tenure.

Through a combination of incentives and discipline, this system helped rein in the worst form of decentralized corruption often witnessed in more fragmented authoritarian regimes (Bardhan 1997). Yet, the Qing emperors' undisputed power to reward and punish agents was critical to the

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[41] We do not re-phrase Proposition 2 as a prediction because there are not enough contemporaneous cases to compare regimes with varying administrative capacity. There is variation over time, but such a comparison would clearly violate the ceteris paribus condition, especially with respect to the technology available to collect and enforce taxation.

[42] Prediction 4 is only true if $\hat{m}$ is sufficiently large. This is a reasonable assumption in the pre-modern context where monitoring technology was expensive and inefficient.

survival of the regime, especially in times of crisis. A legal system controlled within the administrative hierarchy may not deliver the best justice but may be far more effective in disciplining agents and pacifying the populace in times of discontent. Likewise, the power to confiscate gave the Qing the capacity to rapidly mobilize resources and combat short-run shocks. As shown in our model, even though limited rulers can generate more *on-book* revenue than absolutists during periods of exogenous threat, the fact that an absolutist can resort to confiscations during periods of particularly acute threats means that the *total* amount of revenue available to the ruler – the on-book taxes plus the one time confiscation – may be significantly greater.[43] Hence, in the absence of an alternative mechanism such as public debt, absolutists may have a better expenditure smoothing mechanism than limited rulers, at least in the short run.

Unconstrained coercive power also allowed the absolutist Qing to exert political control, resulting in the placing of limits on migration and the use of ideological propaganda.[44] These tools eventually yielded the Qing a comparative advantage in suppressing internal rebellion within its own jurisdiction relative to limited rulers. In this regard, the Qing's successful territorial expansion, particularly during the 18th century, partly aimed at the reduction of external threats and the potential for inter-state competition. This helps explain the apparent contradiction of the Qing's vast territorial expansion and increasingly inward looking mindset, while at the same time reinforcing the "Confucian equilibrium" of low tax extraction and low administrative capacity. At a time when the Qing vastly expanded its territories into China's northwestern frontiers, which had historically been the source of military conflicts, it restricted its overseas trade to the port of Canton under a monopoly trading cartel and banned Chinese migration to Southeast Asia, which traditionally posed no military threat (Brandt, Ma, and Rawski 2014). When visited in 1792 by the British trade mission led by Lord George Macartney, who aimed to show off the best of Western trade and technology, the Qianlong emperor famously replied that "Our Celestial Empire possesses all things in prolific abundance and lacks no product within its borders. There is therefore no need to import the manufactures of outside barbarians in exchange for our own produce."[45]

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[43] If the exogenous threat occurs with varying severity, i.e., requiring a varying amount of resources to combat, then the absolutist ruler may not be able to commit to refrain from confiscations when the threat is sufficiently stark. While our model does not address this question directly, it is easy to see how the addition of minimal complexity provides insight. By "minimal complexity" we mean complexity to the model's setup, not its solution. What we are proposing here adds significant complexity to the model's solution without altering its basic insights.

[44] For a case of an absolutist state with massive monitoring capacity and coercive power in the early Ming dynasty during the 14th century, see Guanglin Liu (2005).

[45] Quote from https://en.wikipedia.org/wiki/Macartney_Embassy, accessed August 14, 2016.

Absolutist states do not always have incentive to evolve towards rule of law as long as mechanisms are in place to effectively control internal rebellion, repel external threats, and perpetuate dynastic rule. Yet, we show that the absolutist power that had initially given political stability to large states such as China also ended up impeding the long-run development of fiscal and financial capacity fostered under a limited regime and the rule of law. We can therefore extend our model to the historical prototypes of fiscal regimes in Western Europe. With credible commitment, the ruler commits to not arbitrarily raise the statutory tax quota without prior consent from the agent. So, even with very high monitoring costs, the agent may not need to hide the amount of taxes it collects, as it is secure from extraction from the ruler.

We view the deal between medieval/early modern European rulers and the autonomous, free cities as a case of low monitoring capacity at the center but with credible commitment. In exchange for a fixed sum of tax revenue, European rulers granted cities a secure charter which guaranteed their rights. As autonomous cities could collect taxes (formal and informal) within their jurisdiction without fear of extraction from the ruler, the accounting and revenue system of these autonomous cities become increasingly open. The openness of the revenue system was crucial. Off-book income, which made up a majority of the wage of Qing tax collecting agents, could not be used as collateral for government bonds. Public debt, particularly on the secondary market, also became more viable because it could be securitized with a relatively stable and transparent revenue stream.[46] Thus, credible commitment allowed autonomous rulers to develop a viable public debt market to help deflect exogenous crises and smooth expenditure.

The combination of credible commitment and taxation with low monitoring cost also applies to the case of post-Glorious Revolution England. Here, even though the Crown knew both statutory and off-book taxes given strong monitoring capacity, the Crown's credible commitment not to raise taxes or confiscate arbitrarily provided its agents a secure and large present value of future income (all visible). Hence, the value to the agent of staying within the bureaucracy and being honest remained high. Indeed, a modern civil bureaucracy in the form of an excise bureau, where bureaucrats are paid high, transparent wages in order to deter short-term dishonest behavior, came into shape in the post-Glorious Revolution Britain. Here, modern bureaucrats valued long-term tenure over entrepreneurship (Daunton 2012; North and Weingast 1989). Similarly, the Crown

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[46] For much more on the joint growth of sovereign debt and limited rule in medieval and early modern Europe, see Stasavage 2011, 2016.

met one-time revenue demands in times of crisis through public debt – a sustainable public debt required credible commitment – or through parliamentary consent (Johnson and Koyama 2014). In this regard, the credible commitment mechanism reinforced through rule of law (and increasingly through social contract) offered the political regime a way out of the cycles of roving-stationary banditry equilibria and extended the time horizon of political rule beyond the tenure of individual rulers or a coalition of rulers.

Turning back to China, many of the advantages of absolutist rule turned out to be impediments in the long run. In China, the dominance of a single and centralized absolutist state ended up as a serious obstacle to the growth of a viable market for public debt. While absolutist regimes in Europe faced difficulties in the development of a domestic market for public debt given the absence of credible commitment, they could still float public debt abroad or in international markets within a multi-state framework. Such an option was not viable for the Qing given that the entire territory was under the reign of a single centralized state. As Max Weber hinted at one point, the Chinese type of warfare may not seem to have achieved the same type of fiscal and financial capacity as their European counterparts partly due to the combined absence of an internal constitutional constraint and external political fragmentation (Weber 1951, p. 103-4). As long as the state could resort to coercive means of extracting resources without facing external competition, it was less inclined to develop state capacity based on market forces such as long-term debt.[47]

Hence, absolutism also carried big costs. To retain the loyalty of agents, absolutist ruler needed to keep rents high for his agents, much of which came in the form of legal and social privileges. In China, rulers awarded gentries or bureaucrats highest social-status, followed by peasants, craftsman and merchants, which generate distortions to markets. Likewise, short-term extractions and periodic trampling of property rights in times of shocks led to pervasive uncertainty and insecurity in the general economy and strategic behavior on the part of agents to hoard assets and exacerbate information asymmetries. Yet, improved monitoring infrastructure may result in even worse outcomes for absolutist states. As revealed in Chinese history, when the absolutist state amassed massive monitoring infrastructure and state coercive power, these infrastructures, coupled with the unconstrained coercive power of the state, often became menacing tools of political

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[47] See Ma (2016) on the rise of public debt in early 20th century China under a differential institutional set-up, which offers some insights into why public debt and the related secondary market was hard to come by in early modern China.

repression, sometimes leading to massive human disasters and political instability.[48] This explains the contrast that while state capacity in Western Europe successfully co-evolved as a nexus of legal-financial-fiscal capacity, in absolutist states it led to the strengthening of administrative capacity at the expense of legal and financial capacity (Belsey and Persson 2011, Brandt Ma and Rawski 2014). Hence, the Qing equilibrium of low fiscal and administrative capacity can be viewed as a softer version of absolutism far more "benevolent" and hence resilient than a more ominous totalitarian version.[49]

V. Concluding Thoughts

Motivated by the case of the absolutist Qing Empire, our paper seeks to explain why fiscal capacity (the ability to collect taxes from the masses) and administrative capacity (the ability to monitor and punish administrators tasked with carrying out the ruler's policies) are frequently weak in absolutist regimes, despite the ruler's absolute power over people and property. We suggest that the absolutist's unconstrained power and inability to refrain from confiscation could turn out to be a weakness in the long run compared with constitutionally constrained regimes. The lack of credible commitment means that absolutists are only able to encourage their administrators to collect and remit taxes when the ruler lacks the ability to inexpensively monitor and punish his agents. Under such circumstances, agents value "staying in the system" because they have a steady stream of income via the collection of extra-legal taxation, which is secure from the ruler because the ruler does not know it exists. This logic entails that an absolutist's failing to build up administrative infrastructure is an equilibrium *outcome* in the situation where the ruler faces few constitutional constraints. Moreover, it entails that extra-legal taxation – so common in the Qing Empire and other absolutist states – is a *necessary* component of an equilibrium where an agent collects and remits taxes to the center.

This paper also brings to the fore the issue of fiscal, financial, and legal capacities in the long-run economic divergence between China and Northwestern Europe. In particular, it suggests that once the rulers of England and the Dutch Republic were subject to sufficient constitutional

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[48] For another case of a command economy built under Mao Zedong in the 1950s, which partly accounted for the 1959-61 Great Leap Famine, see Chen and Kung (2011).

[49] If an absolutist state strengthens its monitoring infrastructure, it creates perverse incentives on dynamism and innovation. For a model of how slavery was usually most effective in an economy with simple and easily measurable tasks, see Dari-Mattiacci (2013). Indeed, Chinese reform in the post-1978 era was successful in partbecause the government retreated from a strict monitoring of many sectors of the economy, (Bai et al. 1999).

constraint – following the Dutch Revolt in the Dutch Republic and the Glorious Revolution in England – they were incentivized to build administrative infrastructure, develop public debt markets, and increase the level of taxation (see Table 1). On the other hand, absolutist regimes – both Qing China as well as the absolutist regimes of Europe including France, Spain, and the Ottoman Empire – often sought other means to consolidate their power rather than build such infrastructure and markets based on some form of credible commitment mechanism.[50] It is no surprise, therefore, that the Dutch Republic and England – both of whose territories and population size were minuscule compared with the Chinese, Russian, or Ottoman Empires – became the world's two leading economies of the early modern period and for better or worse, constructed the world's most dynamic modern global empires.[51]

In this regard, our paper sheds new light on the Great Divergence debate. A critical point put forward by Pomeranz is the importance of New World resources in the rise of the West versus China (Pomeranz 2000, ch. 6). We argue that China's lack of overseas explorations is best understood by a lack of motivation rather than lack of access: the main motivation of Qing territorial expansion or conquest was the reduction of external threats rather than the control or extraction of economic resources. So, it was not just simply constitutional constraint or the government's credible commitment to repay public debt that mattered. Instead, limited governance directly contributed to the build-up of fiscal, administrative, and financial institutions, all of which are hallmarks of the modern economy.

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[50] For the case of Spain, see Irigoin and Grafe (2013). Like the Qing, the early modern Spanish Empire had little administrative capacity. The Spanish Crown was nonetheless able to extract significant revenue, mainly from the New World, by outsourcing fiscal functions to private individuals. Irigoin and Grafe argue that Spanish coercive power helps explain this observation. Their model suggests that fiscal capacity is a function of coercive power and it follows an inverted-U shape; initial investments in coercion pay off well, but eventually diminishing returns kick in.

[51] For more on the rise of the Dutch in the early modern period, see de Vries and van der Woude (1997). van Zanden, Buringh, and Bosker (2012) recognize the Dutch and English "little divergence" as associated with the divergence in parliamentary development between northwestern Europe and southern Europe between 1500 and 1800. Rubin (2017) adds to this insight, arguing that the little divergence in parliamentary development can be explained by the Dutch and English adopting the Reformation, which necessitated that rulers legitimize their rule and capacity to collect taxes via parliaments.

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Tables and Figures

Figure 1: Government Expenditure in Qing China
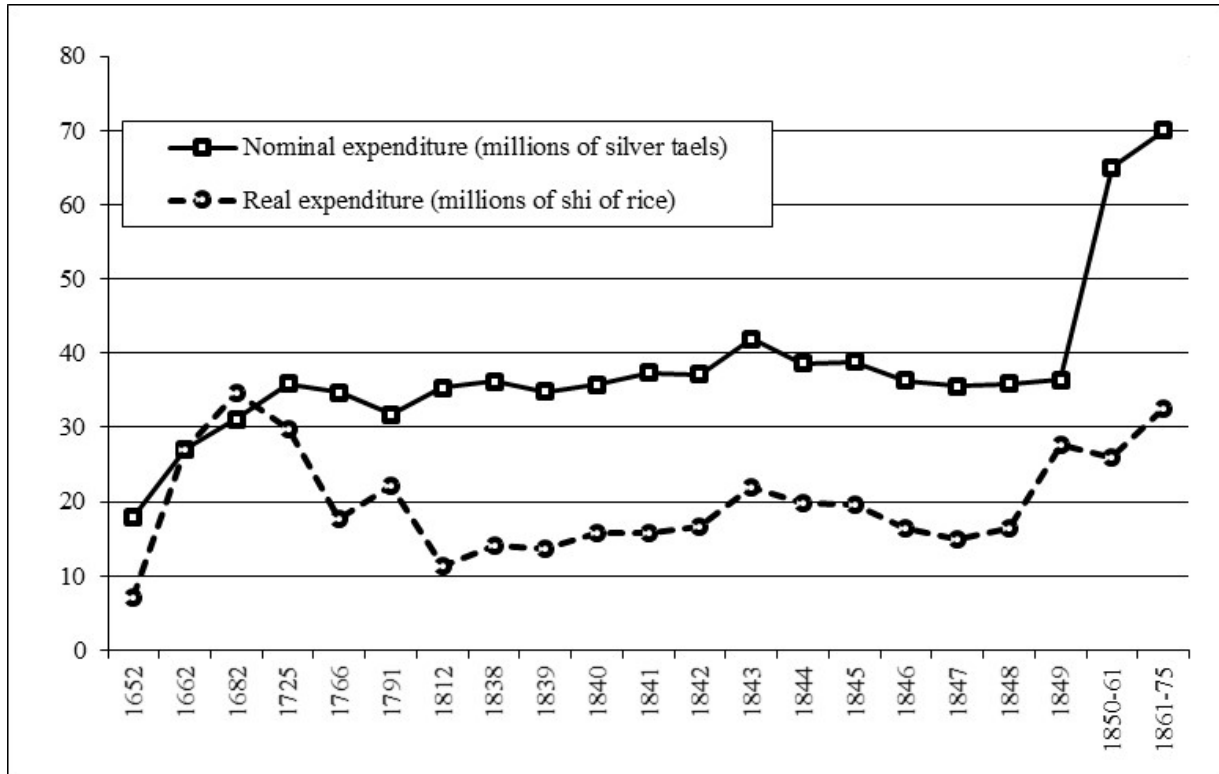
Source Notes: Ma (2014).

Figure 2: Annual Recorded Incidences of Warfare (left axis) and Silver Reserves (in ten thousand taels; right axis) in Qing China (1644-1911)
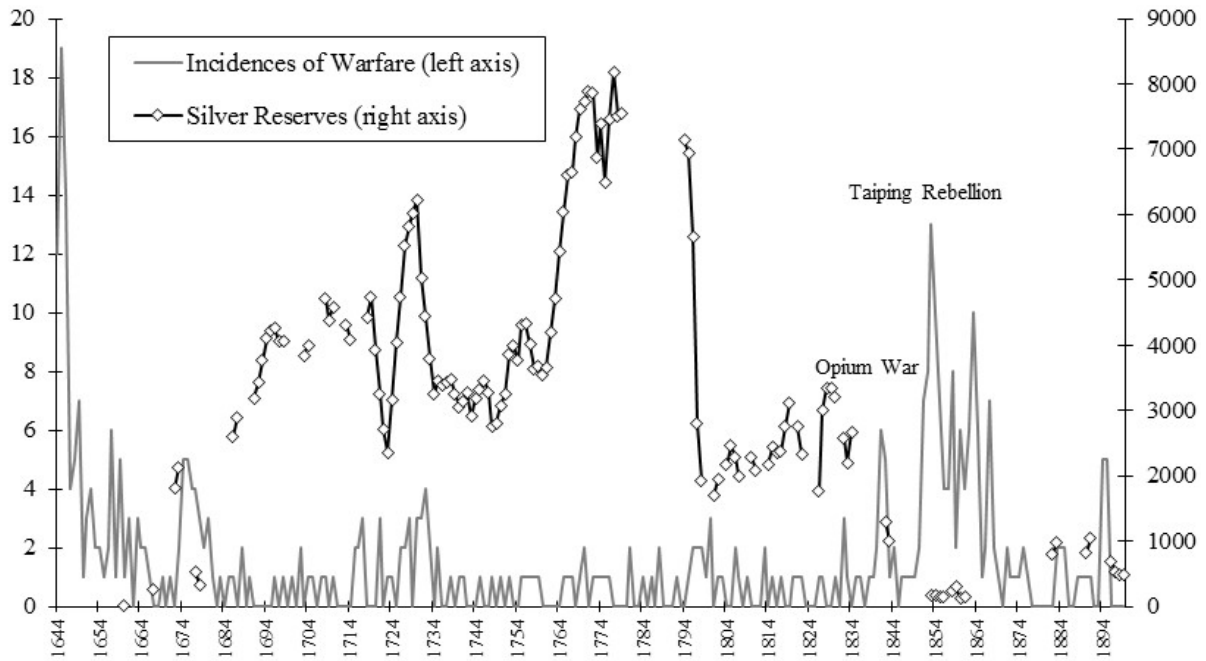
Source notes: Ma (2014).

Figure 3: Game Play within each Period

<u>Stage 1</u> Ruler sets statutory tax t_τ and share α_τ	<u>Stage 2</u> Agent collects and remits taxes	<u>Stage 3</u> Ruler decides to monitor and/or punish agent

Table 1: Qing Central Government Annual Revenue in International Comparison

Panel A. Aggregate Revenue (tons of silver)

	Absolutist Regimes					*Constrained Regimes*	
	China	Ottoman	Russia	France	Spain	England	Dutch Rep.
1650-99	940	248		851	243	239	
1700-49	1,304	294	155	932	312	632	310
1750-99	1,229	263	492	1,612	618	1,370	350
1800-49	1,367					6,156	
1850-99	2,651					10,941	

Panel B. International comparison of per capita tax revenue (grams of silver)

	Absolutist Regimes					*Constrained Regimes*	
	China	Ottoman	Russia	France	Spain	England	Dutch Rep.
1650-99	7.0	11.8		46.0	35.8	45.1	
1700-49	7.2	15.5	6.4	46.6	41.6	93.5	161.1
1750-99	4.2	12.9	21.0	66.4	63.1	158.4	170.7
1800-49	3.4					303.8	
1850-99	7.0					344.1	

Panel C. Per capita revenue expressed in days' wages for unskilled workers

	Absolutist Regimes					*Constrained Regimes*	
	China	Ottoman	Russia	France	Spain	England	Dutch Rep.
1650-99		1.7		8.0	7.7	4.2	13.6
1700-49	2.3	2.6	6.4	6.7	4.6	8.9	24.1
1750-99	1.3	2.0	8.3	11.4	10.0	12.6	22.8
1800-49	1.2					17.2	
1850-99	2.0					19.4	

Sources: Brandt et al. (2014); Dincecco (2009) for absolutist/constrained distinction

Table 2: Summary of Key Variables and Parameters

Choice Variables		*Parameters*	
t_τ	Statutory tax set by ruler	m	Monitoring cost
α_τ	Share of statutory tax remitted	p	Probability of successful revolt
t_τ^O	Off-book taxes ($t_\tau^O = T_\tau - t_\tau$)	X_τ	External event (0/1) w/ probability θ
P_τ	Ruler's decision to punish (0/1)		
M_τ	Ruler's decision to monitor (0/1)		

Table 3: Overview of Primary Insights and Comparative Statics

Choice Variable	Variable Interpretation	Direction of change w.r.t. Δm		Equilibrium value greater for
		Absolutist Ruler	Limited Ruler	
t_τ^0	statutory taxes when $X = 0$	0	+	Limited
$t_\tau^{O,0}$	off-book taxes when $X = 0$	+	0	Absolutist
t_τ^1	statutory taxes when $X = 1$	+	+	Limited
p^0	probability of endogenous revolt succeeding when $X = 0$	+	+	Limited
q	probability of successfully combatting exogenous revolt	+	+	Limited

Appendix A: Proofs of Propositions

A.1.   Proof of Proposition 1

In periods where $X = 0$, an absolutist must collect zero on-book tax revenue, i.e., $\alpha^{*,0}t^{*,0} = 0$, as long as θ is not too large and m is not too small. There is no exogenous threat for the ruler to repel, and setting $\alpha^{*,0}t^{*,0} = 0$ maximizes the amount the agent can keep as a wage. Note that when θ is large, say $\theta > \overline{\theta}$, the possibility of the ruler having to defend against an exogenous threat in the following period is large enough that the ruler desires to smooth its income – preventing over-taxation of the masses when $X = 1$ – and collect positive on-book tax revenue when $X = 0$. For the remainder of the analysis, assume that $\theta < \overline{\theta}$; i.e., exogenous threats are sufficiently unlikely that the ruler optimizes by collecting revenue to counter the threat only when it is actually realized, and hence $\alpha^{*,0}t^{*,0} = 0$. Also note that there is no equilibrium where the agent remits a positive tax level $\alpha^{*,0}t^{*,0}$ when m is sufficiently small, say $m < \underline{m}$. In this case, the absolutist cannot commit to refrain from confiscating anything but a very low level of income for the agent. If the agent's income is low enough, it prefers its reservation utility over collecting taxes. Hence, $t^{O*,0} = 0$ when $m < \underline{m}$.

Setting $\alpha^{*,0}t^{*,0} = 0$ entails the highest possible continuation value for the agent, Π^A, thus allowing the ruler to extract more revenue (by paying the agent less) in periods where $X = 1$. This implies that the agent collects all taxes off-book when $X = 0$. This is optimal from the perspective

of the agent since it will not be subject to confiscation should $X = 1$ in the following period (unless the ruler monitors).

Knowing that $\alpha^{*,0} t^{*,0} = 0$, we re-consider the agent's participation constraint from inequality (5) iv), i.e., the condition under which the agent collects the permitted taxes, $\bar{t}^{*,0}$. The agent's utility when $X = 0$ is $\bar{t}^{*,0} + \delta \Pi^A$ if it keeps its income from the present period. The agent keeps its income if and only if the following two conditions hold:

i)   the endogenous revolt does not succeed (this occurs with probability $1 - p$), and

ii)   there is no exogenous revolt in the following period OR the ruler does not monitor in the present period: either of these conditions entail that off-book income is free from confiscation (this occurs with probability $1 - \theta \eta^{*,0}$).

Given these equilibrium conditions, we write the agent's participation constraint in periods where $X = 0$ as:

$$(A.1) \quad (1-p)(1-\theta\eta^{*,0})\left(\bar{t}^{*,0} + \delta\Pi^A\right) + [1 - (1-p)(1-\theta\eta^{*,0})]\frac{1}{1-\delta}\underline{u} \geq$$
$$(1-\hat{p})(1-\eta^{*,0})(\hat{t} + \delta\Pi^A) + [1 - (1-\hat{p})(1-\eta^{*,0})]\frac{1}{1-\delta}\underline{u},$$

where $\hat{t} > \bar{t}$ is the optimal amount the agent collects if it chooses to collect more taxes than $\bar{t}$ and $\hat{p} > p$ is the probability of the endogenous threat succeeding associated with $\hat{t}$.

Before proceeding, note that the following four relationships hold:

i) $\hat{t}$ is not a function of m: t is calculated by weighing the agent's marginal benefits of additional income against the increased marginal change in probability of an endogenous revolt succeeding,

ii)   therefore, $\hat{p}$ is not a function of m,

iii) $\eta^{*,0}$ is decreasing in m: as monitoring becomes more expensive, the ruler cannot credibly commit to monitoring as frequently, and

iv)   (A.1) must bind in equilibrium; otherwise, the absolutist ruler could lower $\eta^{*,0}$ (saving it the cost of monitoring) and (A.1) would still hold.

To prove Proposition 1, we show that an increase in m tightens the agent's participation constraint (A.1). Since $\eta^{*,0}$ is decreasing in m while $\hat{t}$ and $\hat{p}$ are not functions of m (points i-iii), the RHS of (A.1) is increasing in m, holding Π^A constant. Of course, Π^A is not constant in m – but it is straight-forward to show that Π^A must be increasing in m. This can be proven by contradiction. Π^A is decreasing in m if and only if $\bar{t}^{*,0}$ is decreasing in m. However, if $\bar{t}^{*,0}$ and Π^A decrease while $\eta^{*,0}$ is also decreasing in m, then the LHS of (A.1) decreases by a greater amount than the RHS with an increase in m, meaning that the agent's participation constraint does not hold. Hence, in any equilibrium where the agent's participation constraint holds and is binding, $\bar{t}^{*,0} = t^{O*,0} = T^{*,0}$ must be increasing in m, ceteris paribus.

The intuition underlying the comparative static results in a limited regime is similar to that in an absolutist regime, but with an important difference. A limited ruler faces a similar incentive as an absolutist ruler to set $\alpha^{*,0} t^{*,0} = 0$. The key difference is *how* the limited ruler sets $\alpha^{*,0} t^{*,0} = 0$. It could do so by setting $t^{*,0} = 0$, as the absolutist does, encouraging the agent to take all of his income off book. This would entail that the agent's participation constraint is exactly as in (A.1), since the limited ruler can confiscate off-book income in the following period should an exogenous threat arise. An alternative strategy would be for the limited ruler to set $\alpha^{*,0} = 0$ but set $t^{*,0} > 0$. Indeed, by setting $t^{*,0} = \bar{t}^{*,0}$, the agent collects all income on-book should the participation constraint hold. The limited ruler can set $t^{*,0} = \bar{t}^{*,0}$ whereas the absolutist cannot because the limited ruler can commit to not confiscating the agent's on-book income should there be an exogenous threat in the following period. In this case, the agent's participation constraint is as in (A.1), with the exception that the two appearances of $(1 - \theta\eta^{*,0})$ are dropped from the left-hand side (these enter the left-hand side of (A.1) because there is a probability $\theta\eta^{*,0}$ that the ruler will confiscate the agent's income in the following period). This entails that, relative to the case where $t^{*,0} = 0$, the agent's participation constraint is slackened (i.e., the LHS is greater while the RHS remains the same). Hence, the ruler could lower $\bar{t}^{*,0}$, and thus lower the probability of the endogenous revolt succeeding, by setting $t^{*,0} = \bar{t}^{*,0}$ instead of $t^{*,0} = 0$. In equilibrium, the limited ruler therefore sets $\alpha^{*,0} = 0$ and $t^{*,0} = \bar{t}^{*,0} = T^{*,0}$. Moreover, $t^{*,0} = \bar{t}^{*,0} = T^{*,0}$ is increasing in

m, ceteris paribus, for precisely the same reason that $\bar{t}^{*,0} = t^{O*,0} = T^{*,0}$ is increasing in m for the absolutist ruler.

A.2. Proof of Proposition 2

To prove the proposition, consider an equilibrium with monitoring cost $\tilde{m} \geq \underline{m}$ (no tax is collected when $m < \underline{m}$). Compare this with an economy with a marginally higher monitoring cost, $\tilde{m} + \varepsilon$ (where $\varepsilon \to 0^+$). The agent's continuation value Π^A is weakly greater when the monitoring cost is $\tilde{m} + \varepsilon$ (by Proposition 1), while it is also more expensive for the ruler to monitor the agent.

As m increases, the ruler must balance the agent's willingness to take a lower wage when $X = 1$ (knowing Π^A is greater) with its inability to commit to monitoring the agent with the same probability (because it is more expensive). In equilibrium, the following conditions must hold:

i) $\eta^{*,1}$ and $\bar{t}^{*,1}$ are set so that the ruler can commit to not confiscating the agent's income unless the ruler observes the agent collecting taxes greater than $\bar{t}^{*,1}$,

ii) if the absolutist agent cannot commit to not confiscating on-book income, it sets $\alpha^{*,1} = 1$, meaning that there is no on-book income,

iii) therefore, any on-book income is not confiscated in equilibrium (in both absolutist and limited regimes),

iv) therefore, if the participation constraint holds, on-book *and* off-book income is not confiscated in equilibrium, although the agent's income may equal 0.

Given these equilibrium conditions, we write the agent's participation constraint in periods where $X = 1$ as:

$$(A.2) \quad q\left[(1-p)\left(\bar{t}^{*,1} - \alpha^{*,1}t^{*,1} + \delta\Pi^A\right) + p\frac{1}{1-\delta}\underline{u}\right] + (1-q)\frac{1}{1-\delta}\underline{u} \geq$$
$$q\left[(1-\hat{p})(1-\eta^{*,1})(\hat{t} - \alpha^{*,1}t^{*,1} + \delta\Pi^A) + [1-(1-\hat{p})(1-\eta^{*,1})]\frac{1}{1-\delta}\underline{u}\right] + (1-q)\frac{1}{1-\delta}\underline{u},$$

where, as in the proof of Proposition 1, $\hat{t} > \bar{t}$ is the optimal amount the agent collects if it chooses to collect more taxes than $\bar{t}$ and $\hat{p} > p$ is the probability the endogenous threat succeeds associated with $\hat{t}$.

We simplify (A.2) by assuming that q is the same regardless of whether or not the agent collects more than $\bar{t}^{*,1}$. This is not exactly true – if the agent collects taxes exceeding $\bar{t}^{*,1}$ and is caught, the ruler receives extra funds by punishing the agent. Yet, we assume that this is not part of the agent's decision-making calculus – that is, the agent does not collect extra taxes in the "hope" of being caught so that these extra taxes can be used to fight against the external threat.[52] Under this assumption, we re-write (A.2) as:

$$(A.3) \quad (1 - p)\left(\bar{t}^{*,1} - \alpha^{*,1}t^{*,1} + \delta\Pi^A\right) + p\frac{1}{1-\delta}\underline{u} \geq$$
$$(1 - \hat{p})(1 - \eta^{*,1})(\hat{t} - \alpha^{*,1}t^{*,1} + \delta\Pi^A) + [1 - (1 - \hat{p})(1 - \eta^{*,1})]\frac{1}{1-\delta}\underline{u}.$$

As in the proof of Proposition 1, note that $\hat{t}$ (and therefore $\hat{p}$) does not change as m increases. Meanwhile, from Proposition 1, Π^A is increasing in m. Therefore, holding the ruler's choice variables $\eta^{*,1}$, $\bar{t}^{*,1}$, and $\alpha^{*,1}t^{*,1}$ constant (and thus also holding p constant), it must be true that the LHS of (A.3) increases more than the RHS when monitoring costs increase from $\tilde{m}$ to $\tilde{m} + \varepsilon$. This means that as m increases, the agent's participation constraint (A.3) slackens (holding $\eta^{*,1}$, $\bar{t}^{*,1}$, and $\alpha^{*,1}t^{*,1}$ constant).

Since (A.3) slackens with an increase in m, the ruler can decrease $\eta^{*,1}$, ask for an increase in remitted taxes, $\alpha^{*,1}t^{*,1}$, or ask for a decrease in overall tax collected, $\bar{t}^{*,1}$, while the participation constraint still holds. The ruler must therefore decrease $\eta^{*,1}$ (thus saving monitoring costs), increase $\alpha^{*,1}t^{*,1}$ (to repel the exogenous threat), or decrease $\bar{t}^{*,1}$ (to reduce the probability of the endogenous threat succeeding) – or some combination of the three – in equilibrium when monitoring costs increase from $\tilde{m}$ to $\tilde{m} + \varepsilon$. Note that by revealed preference the ruler will *not* choose the opposite of these three choices (i.e., increasing $\eta^{*,1}$, decreasing $\alpha^{*,1}t^{*,1}$, or increasing

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[52] This is a reasonable assumption if the agent is one of many, each of whose tax receipts are small relative to the overall amount.

$\overline{t}^{*,1}$); the ruler could have chosen to do so at $\widetilde{m}$ but chose not to do so. Therefore, $\alpha^{*,1}t^{*,1}$ is weakly increasing in m.

A.3. Proof of Proposition 3

We first show that Π^A (from participation constraint (A.3)) must be larger in a limited regime than in an absolutist regime. By definition, when $X = 0$, the absolutist chooses levels of $\eta^{*,0}$ and $\overline{t}^{*,0}$ such that it can commit to not confiscating the agent's observed income in the following period should $X = 1$. Moreover, from the proof of Proposition 2 we know that $\eta^{*,0}$ and $\overline{t}^{*,0}$ are such that the absolutist would prefer to increase $\overline{t}^{*,0}$ – the increase in Π^A would more than offset the higher probability of an endogenous revolt succeeding – but it cannot commit to refrain from confiscation at higher values of $\overline{t}^{*,0}$. Hence, when $X = 0$, if a limited ruler were to choose the same $\eta^{*,0}$ and $\overline{t}^{*,0}$ as the absolutist, it could increase $\overline{t}^{*,0}$ while still being able to credibly commit to refrain from confiscation in the following period. Since this would make the ruler better off, the limited ruler *must* choose $\eta^{*,0}$ and $\overline{t}^{*,0}$ such that Π^A is greater than it is under an absolutist.

To prove Proposition 3, consider the levels of $\eta^{*,1}$, $\overline{t}^{*,1}$, and $\alpha^{*,1}t^{*,1}$ the absolutist sets in equilibrium when $X = 1$. Since Π^A is greater in a limited regime, it must be true that the limited ruler could choose a lower value of $\eta^{*,1}$ or $\overline{t}^{*,1}$ or a higher value of $\alpha^{*,1}t^{*,1}$ than an absolutist while (A.3) still holds. In equilibrium, therefore, the limited ruler must choose either a lower value of $\eta^{*,1}$ or $\overline{t}^{*,1}$ or a higher value of $\alpha^{*,1}t^{*,1}$ than the absolutist ruler – or some combination of the three – up to the point that the agent's participation constraint binds.

A.4. Proof of Proposition 4

Consider the marginal net benefits (i.e., MNB = MB – MC) that limited and absolutist rulers derive from a decrease in m, absent the cost $c(\cdot)$. First, note that they set $\eta^{*,k} = 0$ at $m \to \infty$ (for $k = \{1,2\}$), meaning that they never monitor and thus agents extract up to the point where their MB of additional tax income equals the MC of a higher success rate of the endogenous threat. As m decreases, the agent's continuation value, Π^A, decreases by more in an absolutist regime (see

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the proofs of Propositions 1 and 3 for more detail). Hence, as m decreases, it follows from the proof of Proposition 2 that limited rulers are able to extract more on the margin when $X = 1$ since their agent's participation constraint is slackened to a greater degree. Thus, the MNB of a decrease in m is greater for limited rulers than absolutist rulers. Since the marginal cost, c', of decreasing m is the same for both types of rulers at all values of m, the limited ruler chooses to decrease m by a greater amount than the absolutist.

A.5.   *Proof of Proposition 5*

A ruler will conquer the new territory only if the marginal benefits from doing so are sufficiently large. We focus on the ruler's expected utility in periods where there is an external attack, since conquering the new territory does not affect its utility in periods where there is no attack.[53] We can therefore ignore the endogenous threat and simplify the intra-period expected net marginal benefits of conquering the new territory for ruler $i \in \{A, L\}$, where A is absolutist and L is limited, as:

$$(A.4) \quad \left[\hat{\theta}q\left(\hat{R}^i\right) + (1 - \hat{\theta})\right]u - \left[\theta q\left(R^i\right) + (1 - \theta)\right]u,$$

where $\hat{R}^i(> R^i)$ is the revenue the ruler is able to collect if it conquers the territory. Hence, the absolutist ruler will be more likely to conquer the new territory – there is a larger set of values of r for which it conquers – if and only if:

$$(A.5) \quad \hat{\theta}q\left(\hat{R}^A\right) - \theta q\left(R^A\right) > \hat{\theta}q\left(\hat{R}^L\right) - \theta q\left(R^L\right).$$

This can be rewritten:

$$(A.6) \quad \theta\left[q\left(R^L\right) - q\left(R^A\right)\right] > \hat{\theta}\left[q\left(\hat{R}^L\right) - q\left(\hat{R}^A\right)\right].$$

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[53] We assume that the probability of the endogenous threat succeeding is the same in the new province than it is in the ruler's current domain, all else equal.

Note that while $\hat{R}^L - \hat{R}^A > R^L - R^A$, since the limited ruler can take more on the margin from the newly conquered territory, it is not necessarily true that $q(\hat{R}^L) - q(\hat{R}^A) > q(R^L) - q(R^A)$, since q is concave.

From Proposition 3, we know that $\hat{R}^L \geq \hat{R}^A$ and $R^L \geq R^A$ for any value of m. Moreover, as m increases, it must be true that $\hat{R}^L - \hat{R}^A$ decreases faster than $R^L - R^A$. To see this note that $\hat{R}^L - \hat{R}^A$ is greater than $R^L - R^A$ at $m = 0$ but both $\hat{R}^L - \hat{R}^A = 0$ and $R^L - R^A = 0$ at $m \to \infty$. This entails that $[q(\hat{R}^L) - q(\hat{R}^A)] - [q(R^L) - q(R^A)]$ is decreasing in m. Since $\hat{\theta} < \theta$ and $[q(\hat{R}^L) - q(\hat{R}^A)] = [q(R^L) - q(R^A)]$ at $m \to \infty$, there must therefore exist some sufficiently large value of m, which we denote m^*, such that whenever $m \geq m^*$, $[q(\hat{R}^L) - q(\hat{R}^A)] - [q(R^L) - q(R^A)]$ is sufficiently small that inequality (A.6) holds.