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Constraining the Samurai: Rebellion and Taxation in Early Modern Japan*

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Abstract:

War is central to state formation, in part because it precipitates new and higher taxes. But what happens in the absence of war? In this paper, we study Tokugawa Japan (1603-1868), a period of nearly 300 years without foreign or domestic wars. The absence of war allows us to focus on the effects of pressure from below on state growth, and specifically taxation. We investigate if different types of peasant resistance and rebellion systematically affect how much rulers extract in taxes, by exploiting variation across 267 semi-autonomous domains within the Tokugawa shogunate. Given that these domains had widely varying tax rates, we study the extent to which peasant-led rebellions and flight lowered the subsequent tax rate imposed by the rulers. From newly compiled data on different types of peasant-led political mobilization, we find that large-scale rebellions and flight are associated with lower tax rates. We interpret the results as evidence of the underclass' limited but nevertheless significant influence in constraining the rulers' imposed tax rate by rebelling or fleeing, while the more complacent fail to win concessions. This suggests that peasant mobilization contributed to restricting the growth of the state.

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1 Introduction

On the eve of the Meiji Restoration in 1868, the 267 semi-autonomous domains across Japan had widely varying tax rates. Some villages had to hand over 70 percent of their rice yield to the ruler of the domain, while others only had to provide 15 percent. This variation existed in spite of the similar fiscal demands that the samurai rulers (*daimyo*) of the domains faced within the Tokugawa regime, the feudal system headed by a shogun that governed Japan between 1603 and 1868.¹ Relative to Western Europe, the Tokugawa era was more stable, free from both internal and external wars, and even threats, until the mid-19th century. The daimyo were free to set their own tax rates, and to send their retainers (lower-ranked samurai) to collect the revenue from the peasants in their realms. If each ruler aims to maximize extraction (Levi, 1988), what explains the tax rate variation we observe?

Though variation in levels and forms of taxation across and within autocratic regimes remains puzzling (Cheibub, 1998), the literature does provide insight into taxation under two broad approaches.² The first emphasizes the ruler's relative autonomy to impose the preferred tax, while the other allows for the possibility of bargaining by commoners. A classic political economy model theorizes that an autocrat determines an optimal tax rate so that he can maximize his payoff in the long run, by allowing his subjects to retain necessary resources

¹Here we follow Ikegami (1995, 179), who argues that "...Tokugawa society can be regarded as a version of feudalism from almost every angle, but [...] it still differs from the ideal types generated by the European medieval experience – particularly in its political structure." We return to these structural differences below.

²Another stream of literature focuses on the comparison between autocrats and rulers in representative institutions. The latter experience a more efficient allocation of resources and economic growth (Lake, 1992), mobilize popular support for war better (Reiter and Stam, 2002), convert mass mobilization for war into progressive taxation (Scheve and Stasavage, 2010), and deliver more successful public policies (Bueno de Mesquita et al., 1999). They also have easier access to credit and are able to finance prolonged wars, as they are more likely to be credible in repaying debt (Schultz and Weingast, 2003). Here, we restrict the discussion to variation among autocracies.

for continued economic activity into the future. In this framework, a ruler avoids over-extraction because the autocrat has sufficient information to calculate the point at which the tax rate becomes harmful to the economy, thereby reducing his long-term payoff (McGuire and Olson, 1996).³ Moreover, in this model, citizens generally have little influence over a ruler’s decisions on revenue and spending, partly because an autocrat has overwhelming coercive power relative to citizens, and partly because citizens face a collective action problem (e.g., Olson, 1971).

Another approach emphasizes the role of citizens and suggests that a high tax rate is likely to result in rebellion (e.g., Acemoglu and Robinson, 2006; Besley and Persson, 2009). The ruler’s imperative is to maximize revenue extraction while avoiding “fight or flight” of the taxed (Levi, 1988, 19), or he will lose resources and possibly the ability to govern. Case studies (e.g., Levi, 1988) and formal models (e.g., Acemoglu and Robinson, 2000) suggest that rebellion or flight are crucial mechanisms for citizens’ bargaining over taxation. Indeed, we have many examples of tax rebellions over time and across countries (see for example Kiser and Linton (2002) and Bush (1991)). Te Brake (1998, 8) notes that in early modern Europe, resistance to tax increases was “widespread and predictable,” and could “bend and shape public policy in significant ways [...]” However, evidence of whether or not resistance systematically altered rulers’ extraction is still lacking. In this article, we aim to fill this empirical gap by exploiting sub-national variation in peasant rebellions and migrations and systematic data from Japan to analyze if and how peasants were able to constrain their powerful samurai rulers’ extraction.

The period of the Tokugawa shogunate, also known as the Edo *bakufu*, is an especially interesting setting in which to explore the relative impact of internal

³See also Besley and Persson (2008) for their evolutionary political economic model of taxation.

pressure on taxation, because external war was not a critical factor during the period. While each daimyo was technically under the rule of the shogunate, he was free to set his own tax rate for his subjects, experienced no threat from powers outside of Japan, and was unable to engage in warfare with other daimyo within Japan.⁴ This is a key difference between early modern Japan and Europe. The absence of external wars and territorial expansion allows us to consider which domestic factors influenced extraction and state growth.⁵

In the case of Tokugawa Japan, historical records indicate that peasants rebelled in some form 1,787 times across the domains between 1603 and 1868, when the regime collapsed. According to Aoki (1971), 497 of those instances specifically involved resistance to taxation. Peasants collectively fled 35 times to avoid complying with a tax, of 161 total collective desertions.⁶ Were rebellious and mobile villagers able to win tax concessions from their rulers? Or did rulers crack down in these domains? In other words, do we observe lower tax rates where peasants were able to engage in fight or flight? Furthermore, were larger scale rebellions more successful, or was frequency of resistance more effective?

We consider each domain as an independent observation in a large-N empirical exercise, given the high levels of autonomy that each domain enjoyed. Migration – distinct from mass flight – was also restricted between domains, undermining a key driver of tax convergence. By disaggregating rebellion types, from petitions to large-scale mobilization, we also attempt to identify more nuanced conditions under which rebellions result in concession rather than repres-

⁴In the early stages of the Tokugawa regime, the shogun relocated and abolished various domains, but these practices were largely discontinued by the mid-18th century; we look at different rebellion time periods below to test whether the relationship between mobilization and tax rate stays robust across these cutoffs.

⁵Mares and Queralt (2015) make a similar point regarding their study of the origins of income tax in 19th century Germany.

⁶As we explain below, collective desertions were different from typical migration. In Tokugawa Japan, they were sanctioned forms of resistance.

sion. Our empirical analyses find that domains with more widespread peasant-led protests against tax rates achieve lower tax rates than their more pacific neighbors by 1868. In addition, less intense forms of resistance, such as official requests for tax forgiveness – no matter how numerous over time – were unsuccessful in winning lower tax rates. The results hold even when controlling for the autocrats' largest fiscal expenditure, stipends for samurai in the domain. We interpret these results as evidence that peasants were able to constrain their samurai rulers through rebellions and mass desertions. We find that domains which experienced insurrections have tax rates that are roughly five percent lower than similar domains on average.

This paper makes contributions to several fields of study. First, while early modern Japan has been studied industriously, this paper is the first that we know of to test the effect of organized peasant resistance on taxation in a systematic way. Our analysis finds support for political economy theories that emphasize commoners' bargaining power, and historical case studies on Japan. Second, by turning to Japan, this article constitutes a contribution to the broader historical literature on early modern state formation, which has focused primarily on Europe. While the issue of taxation went hand-in-hand with external threats in Europe, we exploit the external peace that the domains enjoyed within Tokugawa-era Japan to focus on the impact of pressure from below. Our analysis reveals that even in an arguably more restrictive context, peasants were able to effectively pressure rulers for tax relief and restrict the growth of the state.

This paper has four remaining sections. The next section provides background on the governance structure of Tokugawa-era Japan, and describes the spatial variation in taxation and rebellions during the period. Section three describes the dataset we constructed based on historical materials, and our empirical approach. Section four presents the analysis, and discusses the main findings and

caveats. Section five concludes.

2 Governance, Taxation, and Rebellions in Tokugawa Japan

This section describes the governance structure in Tokugawa Japan, and taxation and rebellions during the period, both for historical background and as a foundation for the inferences that we draw in the empirical section. Here we establish the comparability of domains, and contextualize them within Tokugawa Japan, which differed from Europe in key respects. In particular, Tokugawa Japan faced no foreign or domestic wars, and internally had no competing authorities, such as the church. We leverage these scope conditions to focus on the impact of peasant mobilization on rulers' extraction.

The Edo Period⁷ began when Ieyasu Tokugawa, himself a powerful daimyo, defeated his main rival and unified the country under his rule as shogun at the turn of the 17th century. It lasted for nearly 300 years, before the regime was toppled following the Boshin War (1868-1869), a civil war that ushered in the period known as the Meiji Restoration. Tokugawa established his dynastic rule in Edo (present-day Tokyo), and stripped the Emperor and royal court in Kyoto of their authority and wealth. The Tokugawa regime comprised nearly 300 domains, each of which featured similar governance structures. All domain rulers, the daimyos, were members of the samurai class, and as the shogun was the most powerful daimyo, the daimyo was the most powerful samurai in a domain or han.⁸ In effect, the shogunate was similar to 14th and 15th-century European rule, in which “The difference between the overlord and the others was ... one of degree;

⁷Tokugawa Japan and “Edo Period” are synonymous.

⁸A note on terminology: we use daimyo and ruler, and han and domain, interchangeably.

he was *primus inter pares*” (Schumpeter, 1991 (1918, 102)).⁹

The shogun imposed two key rules over the daimyo: they could not engage in warfare with each other, or conduct any foreign relations. These rules led to the internal stability and isolation that marked the shogunate. To enforce these tenets, daimyo were required to staff sufficient armed forces (i.e., samurai retainers), in the event that they would be ordered to send their forces into action against recalcitrant daimyo. Daimyo were also compelled to maintain two estates: one in Edo, and one in their domains, each staffed with numerous samurai. (The pageantry required was perhaps similar to that expected of nobles in early modern Europe (Braun, 1975, 254).) The estate in Edo was essential, because daimyo were required to engage in “alternate attendance” (*sankinkotai*) between Edo and their domains. When the rulers were not living in Edo, wives and children remained in the capital as hostages. If a daimyo were to challenge the shogun in any way, his wives, children, and retainers in the capital would all be slaughtered. This policy was perhaps the most effective for keeping daimyo in check. Jansen (1995, 44) estimates that the expenses associated with running the estates, including staffing by samurai, accounted for roughly two thirds of the revenue collected by the daimyo in 19th century Tosa domain. Though the daimyo did not pay direct taxes to the shogunate (Hall, 1995, 178), they were taxed indirectly in these ways.

In addition to these rules, han were also required to be “well-governed” (Bolitho, 1995*b*, 213), and had to enforce controls on Christianity (Jansen, 1995, 6). All daimyo had to submit to inspections and reviews of their justice-related decisions. They were also prohibited from preventing travel through their han, or from erecting barriers or collecting tolls. When the shogun traveled, he could request costly accompaniment by daimyos’ samurai and lavish accommodations.

⁹Semi-formal rules outlined in the *buke-sho-hatto*, first in 1615 and again in 1635, established the authority of the shogunate.

When emergencies occurred in other han, daimyo could be required to send assistance (Bolitho, 1995*b*, 231).

Tokugawa Japan shares some features of European feudalism, defined by the exchange of services between rulers and subjects in a fief (Ikegami, 1995). Ikegami (2003, 126-127) characterizes the shogunate as “neo-feudal,” because there was no direct oversight of landed properties and villages, and as a result, no aristocratic notion of property developed in Japan as it did in Europe. Rather than private property, land was viewed as gifted from the daimyo or shogun, and those who had access to land were its holders rather than owners (White, 1995, 176). Other key differences existed as well: Japan did not have any fragmentation of authority within its territory, such as with religious organizations, and forms of association among Japanese commoners did not exist (Ikegami, 1995, 179-181). Tokugawa bureaucracy was functionally similar to the Western early modern bureaucracy, but rooted in vassalage (Ikegami, 1995, 184); daimyo were “courtier-vassals” rather than independent rulers (Ikegami, 1995, 158). Only samurai were members of the political class, and they alone could become bureaucrats. One implication of these key differences is stability. In contrast with Europe, commoners in Japan could not exploit divisions within the ruling class to form alliances (Te Brake, 1998). As a result, revolts were about constraint rather than overthrow.

Though ultimately beholden to the shogun, daimyo “presided over most of Japan’s wealth and garnered most of its taxes” (White, 1995, 202).¹⁰ The daimyo were the lords over their own domains. The domains were semi-autonomous states within the broader shogunate; the daimyos’ autonomy amassed armies, setting the

¹⁰Daimyo were further divided into three classes, dating back to Ieyasu, the first shogun: *fudai*, who were allied with Ieyasu; *shimpan*, or houses related to the Tokugawa house; and *tozama*, or “outside” houses that did not ally with Ieyasu and were located in peripheral regions of the country. Regardless of these distinctions, han governance did not vary by daimyo class, and by the late 17th, there was no discrimination against the tozama daimyo by the shogunate (Bolitho, 1995*b*, 206) . Furthermore, only tozama and fudai domains remained by the 18th century (White, 1995, 169).

tax rate, and collecting taxes. The daimyo also had independent judicial systems (Ikegami, 1995, 160). Bolitho (1995*a*, 16) affirms that the daimyo were *de facto* independent, and that the only governance the majority of Japanese knew was the han. In addition, after the 17th century, daimyos' position was virtually guaranteed by the shogun – effectively removing any threats to their position, which was also hereditary. While they served at the shogun's pleasure, and could be removed at any time, such interventions by the shogunate declined over time: after the mid-17th century, daimyo removal happened less frequently than once a year (Bolitho, 1995*b*, 227).¹¹

In addition to the estates in Edo, the expenses of running domains were substantial, primarily because of the samurai retainers. Ravina (1999) notes that samurai stipends and personal expenses of the daimyo consumed most of the domains' revenues. Though samurais were quite powerful relative to commoners because they were the only stratum that could legally carry weapons, they lost authority relative to the daimyo when they were relocated to castle towns, where they were more easily monitored by the shogunate and han surveillance networks (Brown, 1988). The five higher-ranking samurai classes earned from the lands they oversaw directly, as well as a salary depending on their position in the administration.¹² The three lowest samurai ranks received stipends from the daimyo's rice warehouse (Jansen, 1995, 26).¹³ In theory, the samurai provided security for the han, but given the extended period of stability within Japan for roughly two and a half centuries, it was not clear that samurai were so much providing security as living off of peasants' provisions (Jansen, 1995).¹⁴ Other than samurai

¹¹Interestingly, while the shogunate increased its authority vis-a-vis the daimyo over time, it did not centralize (White, 1988*b*, 11).

¹²From time to time, these groups also received supplemental grants (Jansen, 1995, 25, fn 32).

¹³Though it seems that samurai would be in a powerful position to revolt when their stipends were reduced, we did not find any evidence of this (e.g., Jansen, 1995; Yamamura, 1971, 44).

¹⁴Several scholars echo Jansen (1995, 48), who writes that after centuries without military

stipends, public spending was minimal; domains did not provide services beyond rudimentary mechanisms for dispute resolution within and among villages in the han.

After the samurai were relocated to castle towns, “villages became self-governing to a degree that had previously been unknown” (Saxonhouse, 1995, 744). At the same time, Ikegami (1995, 167) observes: “Unlike medieval villages, the villages of Tokugawa Japan were subject to much more intense scrutiny and control from their samurai overlords.” All village inhabitants were listed in family registries and assigned to five-family units (*goningumi*), which were “responsible for providing one another with surveillance and mutual assistance – paying taxes, disciplining and prosecuting criminal behavior, and the like” (Ikegami, 1995, 167). This system made rural migration among han for landholding peasants exceedingly difficult: families were tied to their communities and could not easily become members of new ones. Additionally, land-holding peasants were barred from selling land (since it was not formally theirs), even though this was not always enforced (Ikegami, 1995, 167, fn5). As long as villages provided the required tax payments, they were largely left alone; but monitoring within villages was extensive. The village leaders, the *shoya*, were “the lowest unit of han control,” though they were not formally of the ruling class (Jansen, 1995, 30-31). The position was usually hereditary, though they were officially appointed by district magistrates. The *shoya* adjudicated disputes within the village and issued verdicts on all but the most serious offenses. In addition, they were responsible for distributing the tax burden among the *goningumi*, and for collecting the land tax.

conflicts, the upper samurai in particular were “men grown soft and overconfident in their security, slothful and limited in ability, totally devoid of imagination and resourcefulness.”

Taxation

Land taxes, *nengu*, were the primary source of revenue for both the domains and the shogunate. In theory, each han monitored productivity by assessing villages on a yearly basis.¹⁵ The han government issued a *menjo* to each village, which announced the assessed yield and the percentage required for that year (Smith, 1958, 4). As such, rulers faced a variation of the typical taxation problem: the challenge was to set a tax rate, given incentives for groups not to comply (as opposed to individuals (Slemrod, 1990)), and their ability to organize. The shoya assigned each villager their portion of the tax burden (Smith, 1958, 4). Given the clearly defined social hierarchy, it appears that there was little room for shoya to manipulate tax rates arbitrarily (see Oga, 2004).¹⁶ Both the shogunate and the daimyos' tax revenues were mainly paid in rice, part of which was then sold for cash in the market (White, 1995, 41).

Because *nengu* was the proportion of rice produced by a village, it was essential for the administration to know how much rice each village was expected to produce. However, after the mid-18th century, land surveys to estimate rice production do not seem to have been updated (Hall, 1995, 191).¹⁷ One reason for the lack of regular or accurate land assessments is the relocation of the upper samurai to the castle towns, which both prevented samurai from having regular contact with and information from villages, and inhibited the transferal of skills

¹⁵Domain productivity was measured in terms of *koku* per acre, or the *kokudaka* (Smith, 1958, 4). One *koku* was roughly equivalent to one quarter of an acre, which in theory produced 5 bushels of rice annually – the amount needed to feed one person for a year (Jansen, 1995, 23). No domain was “smaller” than 10,000 *koku* (White, 1995, 174).

¹⁶The shogunate collected taxes in its territories the same way that han did. The bakufu also taxed commercial activities in the urban centers that it gradually claimed from the daimyo whose rule officially encompassed those cities (Hall, 1995, 171).

¹⁷The most important and comprehensive land survey, the Taiko land survey, actually was conducted in 1588, before the Tokugawa era began (under Hideyoshi). The survey evaluated the productive capacity of each village, and was carried out along with the Sword hunt edict of 1588, which led to the confiscation of all non-samurai weapons. It became the building block in the construction of the Tokugawa shogunate's system of dominion (Ikegami, 1995, 153).

to conduct surveys (Brown, 1987).¹⁸ Jansen (1995, 11) writes that actual yield “...was frequently estimated to be double the formal estimate of koku with which the Tokugawa vassals were credited. Despite this, the official tax rates failed to rise proportionately.” Subsequently, during the Meiji Restoration, land reform – featuring the privatization of property – was accompanied by a new tax system, in which assessments were based on property size rather than estimated productivity, and payments were monetary. Taxes collected increased substantially (White, 1995, 46).¹⁹

Across Japan, expenditures outpaced revenue beginning in the 18th century (White, 1988*a*, 63), indicating that tax rates did not meet fiscal demands. One tactic to address revenue shortfalls was land reclamation, meaning the conversion of previously unused land to rice production. In fact, land under production doubled during the Tokugawa period – though the majority of these reclamations went unreported to the bakufu (Smith, 1958). While this tactic increased revenues through about 1710, they declined after that (Bolitho, 1995*b*). *Komononari* were taxes on everything besides rice, which were considerably less and uneven (Smith, 1958, 4). Cereals (“dry crops” other than rice) and taxes related to housing were typically paid in cash (Bolitho, 1995*a*, 232). Other forms of taxes from mines (Roppongi, 2002; Sugiyama, 2012) and non-agricultural commodities (Tanaka, 2009, 2010, 2011) were raised, but this was rare. At the same time, due to industrial underdevelopment, the only source of tax revenue that the government

¹⁸Lower samurai, though more likely to be based in the countryside, had no authority in the han administrations (Jansen, 1995, 30).

¹⁹Ikegami (2003, 131) writes of the reforms: “The result was a series of rural revolts: 56 in 1873, 21 in 1874, 19 in 1875, 28 in 1876 and 48 in 1877 [...]” which “forced the government to institute significant reductions in national and local tax rates.” Nevertheless, tax revenue increased: in 1870, revenue from land tax was 8.2 million yen; after the tax reform in 1873, revenue “rose to over 60 million yen, which constituted 90% of all taxes and 70% of the government’s total income” (Ikegami, 2003, 131). Furthermore, following this change in the property structure, tax reforms, and the accompanying mass conscription, people became more active in the political process (Ikegami, 2003, 132). In other words, once private property and mass conscription was introduced, demands for representation also emerged.

could increase was on the agricultural sector, even by the end of the Tokugawa period (Ikegami, 2003, 131).²⁰ Merchants were informally taxed through the practice of debt cancellation and forced loans. Sometimes daimyos defaulted on their loans, and ordered their debts canceled. The daimyo also exchanged rice revenue for cash in Osaka and Edo. Merchants who were involved in these transactions paid their dues indirectly, perhaps by charging less than favorable exchange rates (Sugiyama, 2012). Rulers also tried to exploit commerce and proto-industry for revenue, but were largely unsuccessful (White, 1988*a*, 37). Alternatively, some han took a longer-term approach and diversified their economic bases; one way was to create monopoly ventures. Satsuma, for example, held the sugar monopoly (Bolitho, 1995*b*, 18), and Tosa sold lumber from its forests (Jansen, 1995, 42-44).²¹ These alternatives to raising taxes, however, remained the exceptions rather than the norm. According to Saxonhouse (1995), the two most common reactions by daimyo to revenue shortfalls were to change the tax rate (or make a piecemeal adjustment), or to reduce samurais' stipends.

Rebellions in Tokugawa Japan

Raising the tax rate was risky in some domains, because it could spark protests and even insurrection. Though it was difficult, peasants were willing to organize and assume the costs of resistance. For one, mechanisms to manage discontent dated to before the Tokugawa period (Keirstead, 1990, 357). Peasants' rights were formalized to a certain extent by the bakufu in 1603: they could either lodge formal complaints or abandon their village or han altogether in protest (Bolitho, 1995*a*, 235). If the village could not collect the required amount of rice,

²⁰The shogun and daimyos also occasionally imposed corvées for public works (White, 1995, 41).

²¹Jansen (1995, 42-44) discusses measures that the peripheral domains took to diversify their economic bases.

for example, leaders could organize a petition (or appeal) to the daimyo for tax forgiveness.²² If villagers abandoned their fields, they could request to resettle in the new domain unless their demands were met, but the receiving daimyo could opt to turn them back.²³ Once the ruler accommodated the demand, they were expected to return to their original village and domain under the bakufu-han system. An example of petitions and flight comes from Oga (2008): in September 1690, after their appeal for lower taxes was rejected, about 1,418 peasants in Nobeoka domain (located in Kyushu) fled to a neighboring domain, Takanabe. Through the Takanabe daimyo, the peasants negotiated with their daimyo for ten months, which ended with the Nobeoka domain accepting all of the peasants' demands, including the pause of heavy taxes. The peasants returned to their original village as a result. Though legal channels of petition and flight became outlawed later in the period, peasants continued to use these forms of protest until the fall of the Tokugawa regime (White, 1988*a*, 19-20).

In addition to these traditional mechanisms, commoners occasionally mounted even stronger resistance by launching larger-scale rebellions. These could involve thousands of peasants across many villages, sometimes using farm implements as weapons and engaging in the destruction of property. Leaders of the revolts were typically village headmen, the shoya, though White (1988*a*, 53, 62) estimates that their involvement declined from 85 percent of the revolts between 1726 and 1825, to only 50 percent between 1826 and 1867. Even though the shoya were officially part of the han system, we consider these revolts to be conflicts between peasants and rulers, rather than among elites. Ikegami (1995, 167) explains that prior to the Tokugawa period, the *dogo*, wealthy land holders in a village – were typically

²²Not all appeals related to taxation: leaders could also file a complaint with the shogunate reporting the daimyo for poor governance or abuse of power.

²³Although *chosen* (flight) involved migration, rural labor was not generally mobile in Japan across different domains during this time period, as we noted above. By definition, *chosen* in Japanese is an act by peasants to demonstrate their complaints to their ruler.

leaders of revolts against samurai. At the outset of the Tokugawa era, many of these dogo purchased their way into the samurai class. As a result, “As the landed samurai-like wealthy farmers had always formed the core of village-based resistance to feudal military lords, the decline of the dogo in the villages secured the daimyo’s domination over them,” and rebellions from then on were decidedly peasant-led.

Though peasants were structurally disadvantaged, fight and flight were two ways that they could “bargain” with or constrain the samurai rulers (White, 1995, 191). Given the relative distribution of assets in agrarian societies, and the strict prohibition against peasants owning weapons, these two tools in particular were available to peasants as their primary resources for bargaining. Insurrections that disrupted internal order were particularly costly and potentially threatening to the ruler: such a rebellion could threaten the ability to govern or retain power. Alternatively, collective desertion by a village would deprive the ruler of his revenue. Rebellion was not only costly to rulers, but also to peasants because of the repression that would follow. Collective desertion was also costly to the peasants because it implied the abandonment of land already prepared for agriculture for an uncertain alternative elsewhere. Importantly, and similar to tax rebellions in early modern Europe, “[...] resistance was not always expressed in open revolt and most tax revolts did not result in revolutionary transformations of power” (Te Brake, 1998, 8).²⁴

In response to peasant rebellion or desertion, a ruler could concede to peasants’ demands, or repress them and forcibly extract the amount demanded. The daimyo reaction was usually twofold: pacify the protesters, and punish the leaders

²⁴Barkey (1991) finds that French peasants were able to mount large-scale revolts by allying with disgruntled nobles, while Ottoman peasants were unable to forge alliances that would sustain such revolts. In Japan, the structure of society differed: no aristocratic class existed independently of the ruling class. As such, peasants’ potential allies – and the reach of their revolts – were limited.

(White, 1988a).²⁵ Leaders and “ring-leaders” were almost always executed, regardless of whether or not a petition, desertion, or insurrection led to a concession in the tax rate. Though appeals (*shuso*) and collective desertion were “approved” channels by which villagers could resist, even they were not without severe consequences. In 1816, for example, a severe storm hit villages in Kakegawa domain, to the south of Tokyo. The storm ruined most crops, and villagers decided to protest against the ruler to demand a tax cut. Since the protests were widespread across the domain, the ruler agreed to reduce the tax rate. Yet, the villagers were not satisfied with the extent of the initial compromise, and they demanded a further concession. The ruler eventually yielded, but ordered that the village leaders be executed as punishment (Shimada, 1968, 568-71).²⁶

How could peasants manage to mount resistance through either rebelling or fleeing, given the costs involved? The ideology of the shogunate as well as the structure of its villages facilitated collective action. White (1988a, 23) observes: “[...the shogunate] was bound by its own ideology (and the cold rationality of a regime dependent on a land tax) to enable the peasants to survive. The term “peasant” (*hyakusho*) did not include everyone on the land, but only landholders; but they possessed a status granted them back at the very beginning of the era, by the state, which entitled them to economic viability under official policy.”²⁷

²⁵This double reaction, also evident in Europe (Te Brake, 1998, 118), is in contrast to what Besley and Persson (2010) expect in their model, which links threats to internal order and an increased extractive capacity with the provision of public goods. It is possible that internal disorder in Tokugawa Japan was, though costly, not an equivalent threat to order that contemporary insurgencies represent. As such, we expect rebellions to increase peasants’ bargaining power vis-a-vis the rulers, rather than incentivize rulers to enhance their extractive capacities. Furthermore, when security is not at stake, as it was not during the Tokugawa era, the value of a ruler’s extraction is more easily questioned (Tilly, 1985). We argue that this circumstance puts more pressure on rulers to concede as well as repress.

²⁶The Kakegawa example shows that external factors, such as natural disasters, also contribute to tax rates. As discussed below we introduce a set of geographic controls to address this issue.

²⁷O’Brien (1988) argues that in Britain between 1660 and 1815, high taxation was tolerated by taxpayers because the taxes were on non-essential commodities. By contrast, during the Edo period in Japan, the heaviest taxation was on the most important commodity – rice.

This entitlement is similar to the “right to subsistence” in (Scott, 1975), who argues that peasants are most likely to rebel when and where this right was threatened. Taxes that were especially onerous were violations of this entitlement, and legitimately challenged as a result.

The social hierarchy within villages also facilitated collective action. As noted above, peasants were forced to be members of *goningumi*, in which they were responsible for enforcing rules among their neighbors, and denouncing those who violated them. Further, the existence of clear village leaders – the shoya – also helped to solve collective action problems: “When new taxes and monopolies threatened the pattern they had developed and maintained, it was usually the village leaders who organized the protest and, if it failed, the resistance to the feudal overlords” (Jansen, 1995, 11).²⁸ In addition, the collective tax system gave villagers a common interest: because they were assessed together, they mobilized together (White, 1995, 54).²⁹ Finally, villagers also seemed to have increasing opportunities (Tarrow, 1996) to launch protests over the period, which arose perhaps as a result of accumulation of past rebellions and history of concessions taking place.

White (1988*a*, 63) suggests that peasant resistance was effective: beginning in the 18th century, “there followed a never-ending contest between the extractive efforts of the government and the resistance of the people” – and, he claims, it became clear that taxes could not be increased. In the next section, we systematically test the extent to which peasant mobilizations were successful in limiting rulers’ extraction by comparing rebellions and tax rates on the most important

²⁸Some resistance may have been prompted by perceived inequality within villages, or unfair distribution of the tax burden assigned by the shoya. However, such resistance is more likely to take the form of less confrontational forms of smaller magnitude: it is unlikely that villages would simultaneously organize to protest their own internal allocation of the tax burden.

²⁹Vlastos (1986, 11) argues that class and ethnic homogeneity within villages, in addition to shared communal tasks, also allowed peasants to organize as well.

tax - the rice tax - across all Tokugawa-era domains. Our analysis draws on the description of the Tokugawa regime from this section as the basis for our inferences. The domains were comparable in terms of their governance structure, their capacity to extract, assess, and repress, and they had autonomously set tax rates in a setting without wars or competing sources of authority. (In the empirical section, we control for sources of variation among domains that we could identify.) This setting allows us to focus on whether or not peasant rebellion and flight contributed to the considerable differences in tax rates that we observe across the domains at the end of the Tokugawa period.

3 Empirical Strategy

To test if “fight or flight” is associated with lower tax rates, we compare tax rates across domains in 1868, just before the end of the Edo period in Japan. (The years between 1869 and 1871 saw Japan’s feudal system transformed by the Meiji Restoration). While it would be ideal to have a full panel series data on domains over the Tokugawa period, the tax data only exist for 1868.³⁰ Accordingly, we rely on the tax rates in 1868 to test our hypothesis, and we reason that the tax rate for each domain is an outcome of bargaining over the period between peasants and rulers. Since we do not have information on the time trends of tax rates in each domain, we run a pooled estimation and observe whether different types of rebellions over this period had any effect on tax rates *on average* in 1868. We also note that during the Meiji Restoration, the Tokugawa-era taxation system based on rice production was abolished altogether, and the only existing tax records of this kind are available in 1868.

³⁰We looked for additional tax records to reconstruct time-series of tax rates, but were unsuccessful.

We also consider variation in rebellions using a dataset we created based on Aoki's (1971) records, which compiles different types of rebellions between 1590 and 1878 across Japan. We restrict the sample to rebellions between 1603 and 1868, when the Edo period begins and ends. By focusing on the Edo period, we take advantage of the country's domains as semi-autonomous states with their own fiscal policy and army. We assume that rebellions within domains were independent events. Though multiple villages within domains could be involved in a wide-scale protest or insurrection, we find only one case of a rebellion across domains Nanokaichi, Takasaki, and Yoshii in 1764. This is consistent with our assumption of the independence of our units of analysis, and our understanding of collective action against extraction: because tax rates were not coordinated across domains, peasants were not motivated to coordinate rebellions across them either.³¹

3.1 Data

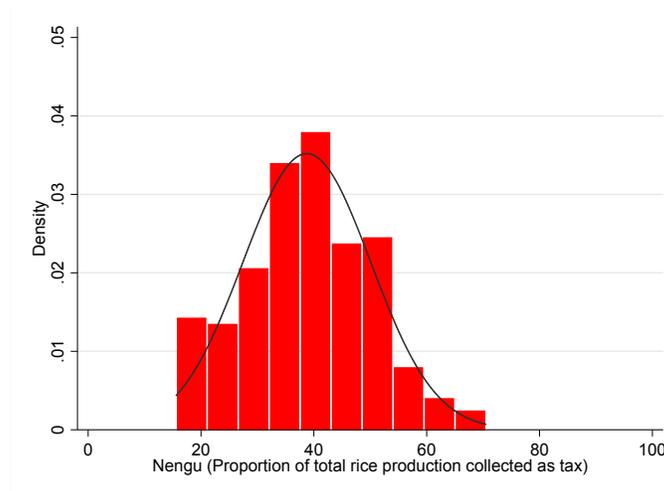
Dependent Variable: Taxation

Our dependent variable is taxation in 1868 (*nengu*), which we collected from Kodama and Kitajima (1977). The variable is constructed by dividing daimyos' reported rice revenue (*shunodaka*) by assessed rice output (*uchidaka*) in the domain, multiplied by 100. In other words, *nengu* represents the effective tax rate – the proportion of rice output a daimyo extracted from peasants, aggregated across villages in the domain. Figure 1 provides a distribution of tax rates

³¹Though the original data include rebellions in bakufu-controlled areas, we exclude those cases because bakufu-controlled territories are not equivalent to domains in terms of fiscal demands and tax rate assessments based primarily on the much larger size of the territories, and the fact that they were non-contiguous within Japan. Additionally, we do not have tax rate data from bakufu areas in 1868.

in Japan as of 1868, and confirms that it follows a normal distribution without outliers. To provide an example, the tax rate in Kuwana domain, in Ise province, was 38.7 percent in 1868, very close to the average tax rate across domains, 38.8 percent. According to Kodama and Kitajima (1977), the actual tax collection (*shunodaka*) in the domain was 23,450 koku, while *uchidaka*, the assessed total rice output, was 60,560 koku. As we explained above, the *nengu* was the most important source of revenue for the daimyos during the Tokugawa era.

Figure 1: Distribution of tax rates in Japan as of 1868



Independent Variables

Our key independent variables are various types of rebellions and collective desertions. We collected the data from the book *Hyakusho Ikki Sogo Nenpyo*, a chronicle of peasant rebellions between 1590 and 1876, originally compiled by Japanese historian Koji Aoki (Aoki, 1971). During the Edo Period, there were 1,787 events, which include rebellions of varying intensity, peasant flight, and different types of “appeals,” or petitions. For these, Aoki includes the motivation

of the event, including, importantly, whether tax relief was a primary goal.³²

Among different types of resistance, the most intense is the *hanran*, a large-scale rebellion usually involving thousands of peasants. The next is *hoki*, a widespread insurrection, of a large number of commoners. Its urban analogue is the *uchikowashi*, a destructive riot, most often sparked by an increase in the price of rice. We include *uchikowashi* as a control variable, but do not expect it to have an effect on tax rate, since urban commoners did not pay *nengu* while peasants did. We aggregate *hanran* and *hoki*, because we think the level of bargaining power they imply is comparable given their similar magnitude, and should have a similar effect on the tax rate.³³ We call this variable *insurrections*. *Fuon*, or *protests*, were less drastic, and ranged from a disorderly rally to minor violence.³⁴ Finally, *collective desertions* were known as *chosen*. *Chosen* is a direct measure of collective “flight” by peasants.

Between 1603 and 1867, over the span of the Edo period, peasants rebelled 497 times, including collective desertions for tax reduction purposes. The original data collect rebellion incidents at the district level (a smaller administration level than domain). Since our unit of analysis is the domain, where daimyo ruled and collected taxes, we aggregate the district-level data to the domain level. We code 1 for each type of rebellion that occurs within each domain in a given year and 0 otherwise.³⁵ Figure 2 illustrates the variation in our rebellion and flight variables

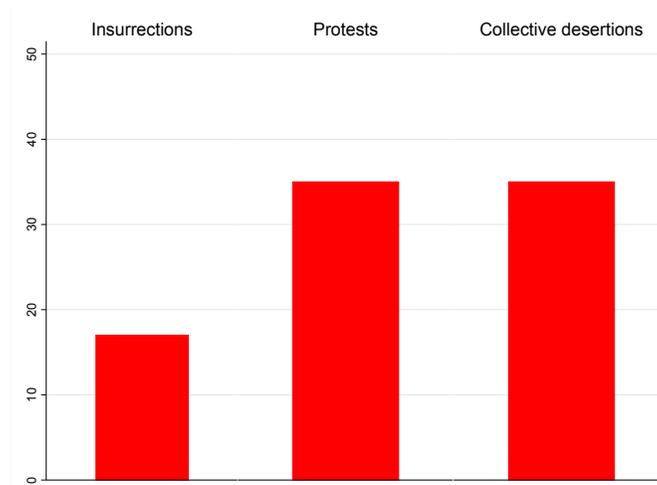
³²Research assistants (native Japanese speakers) transferred the data to electronic spreadsheets, and coded event motivation. The entries were then checked by one of the authors, who is a native Japanese speaker.

³³We also run the analyses with the completely disaggregated types and find that the results remain robust.

³⁴The original data include one more type, *Soujo* or *unrests* mostly in urban areas, but our dataset does not include this type of rebellions since there was no such event during the period of our observation.

³⁵Even if multiple villages within a domain experience the same type of rebellion in the same year, we only count this as one instance of that type of rebellion for that year, in order to avoid the possibility of double-counting what was in fact one rebellion that spread across more than one village in a domain.

Figure 2: Fight and Flight during the Edo Period, 1603-1868



at the domain level.³⁶

Figure 2 presents rebellions related to the tax rate itself, as coded by Aoki (1971), who records it for each rebellion based on the available primary and secondary sources. If taxes were listed anywhere, for example in the body of the appeal, then the event was coded as tax-induced. These are the types of rebellions of interest here: if peasants were not requesting a tax rate reduction, we do not expect the ruler would offer one. We construct a dummy variable: 1 if Aoki reports that at least one motivation for the rebellion was tax-related, and 0 otherwise.

Other more minor forms of resistance may have constrained the daimyo as well. The *goso* is a “coercive appeal,” meaning a petition accompanied by some sort of threat to protest, or to abandon the village. In contrast, the *osso* was a deferential overture – typically not to the daimyo, but rather to the shogunate. The *shuso* was also a petition but most commonly addressed to the closest governmental office, and was the legally approved mechanism to express discontent. Finally, there was also the possibility of lodging a secret appeal, or *hariso*, to a

³⁶Figure A in the Appendix shows the distributions of other tax-induced rebellion types.

governmental leader, seen as the least aggressive approach. We leave *goso* as its own variable – *coercive appeal* – but aggregate *osso*, *shuso* and *hariso* into one variable called *appeals*.

In addition, as coercion theory predicts (Drezner, 2003), the threat to rebel as well as foiled attempts may work to achieve desired outcomes. This means that if we only analyze observed rebellions, we may underestimate the actual impact of rebellions on the dependent variable. To reduce this concern, we use both actual rebellions and attempted rebellions, which are also documented by Aoki. Although Aoki did not clearly mention how he coded attempted rebellions, they appeared to be ones uncovered by the authorities prior to actual rebellions.

Controls

As an indicator of each domain’s level of fiscal needs, we include the number of samurai in each domain in 1868 (Kodama and Kitajima, 1977). Samurai were responsible for assessing land, collecting taxes, and repressing the population. All things equal, a greater number of samurai should lead to higher levels of taxes collected since more samurais mean greater demand for resources from the peasants.³⁷ The daimyo kept an average of 1,600 samurai in the domain. To control for the size of the domain, we divide the number of samurai by assessed rice output and the following analyses use the *relative size of samurai class* variable.³⁸

A possible alternative mechanism for explaining the variation in tax rate may be productivity growth. Higher productivity in rice production is likely to lead to stable or lower tax rates, because revenue would increase even without changing the rate (White, 1988a, 20). To test this argument, we include the long-

³⁷The bakufu required each domain to retain a fixed number of samurai, though the policy was relaxed in the late Tokugawa period (Yamamura, 1971, 383). Thus, we expect the concern for reverse causality is minimal.

³⁸We have also run the analyses with the absolute number of samurai, and the results hold.

term increase in rice production for each domain ($\ln(\text{rice production increase})$).³⁹ If this alternative is plausible, we should observe that higher levels of rice production growth are correlated with lower levels of tax, all things equal.

Another possible source of variation in taxation is presented by White (1988*b*) and Saxonhouse (1995): the changing economy, rather than rebellions, lead to lower taxes. As people shifted from agrarian labor to “proto-markets,” the argument goes, the daimyo left the tax rate alone while seeking new ways to extract resources. Presumably rulers of such domains would be more likely to concede to peasants’ demands than rulers that could only draw on peasants’ productivity. If this argument is correct, we would expect to observe that domains with more alternative resources would have lower tax rates. To test this hypothesis, we identify the domains with waystations along the *sankinkotai* routes that became prominent towns due to the annual processions of daimyo. As described above, *sankinkotai*, or alternate residence duty, demanded that the daimyo alternate his residence between Edo and his own domain. These towns along the routes became centers of commerce catering to the needs of the daimyo, his families and retainers. The commercial activities in turn likely provided revenues for the daimyos in addition to those from rice production. Many of these towns were also located along the coast, and became trading outposts with neighboring countries and merchants from the West. We have identified the locations of these towns from the Edo-era trade route map presented in Frederic (2002), and matched them to respective daimyos to create an indicator for domains with these towns along the routes.⁴⁰ The following analyses call this variable *Trade center*.

Next, we include a dummy variable (*Core emperor supporters*) flagging if

³⁹The increase in rice production is taken by looking at the difference in the assessed rice production between 1603 and 1868, the two years for which we have available data.

⁴⁰We focus on the domains outside the shogun’s direct control. The identified domains that contain the major towns along the sankin kotai routes include Akita, Hirosaki, Fukushima, Hirado, Hiroshima, Satsuma, Tosa, Yodo, Nagaoka, Shoni, Izushi, Chofu, Suwa, and Utsunomiya.

a domain participated in the *Boshin War* – the civil war that led to the regime’s collapse in 1868-1869 – as a supporter of the emperor.⁴¹ We include this indicator variable to control for any rebellion-driven factors that potentially influenced the domain tax rate, identifying the rebelling domains from the rest. Different daimyo classes may also face different incentives to raise taxes or concede to peasant demands. *Tozama* daimyo are considered as the ones who surrendered to the Tokugawa shogunate after the Battle of Sekigahara battle in 1600 – the decisive battle that led Tokugawa Ieyasu to control domains across Japan and subsequently establish the Tokugawa shogunate. The Tokugawa shogunate thus had an incentive to check *Tozama* daimyos’ behavior and their lands were sometimes taken due to the daimyo’s misconduct. From the *Tozamas*’ perspective, they had an incentive to repress possible rebellions or accept peasant’s demands before the shogunate could intervene. To our knowledge, a full list of *Tozama* daimyo is unknown. However, we do know which domains had *Fudai* daimyo (another class of daimyo who could take important positions in the Tokugawa shogunate administration),⁴² and which were *Gosanke* (three most important branches of the Tokugawa clan: Mito, Owari, and Kii), we can assume that the remaining domains were ruled by *Tozama* daimyos (Miyake, 2014). In our analyses, then, we use both *Fudai* and *Gosanke* variables to capture this.

We also include rebellions that were not coded as tax-induced. The majority of non-tax rebellions are those that White (1995, 142) terms “social conflict,” which involve disputes among peasants, rather than directed at the daimyo. In his typology, White (1995) finds that 53 percent of the rebellions were social in

⁴¹The domains include the four prominent domains (Tosa, Choshu, Satsuma, and Hizen) and others (Hikone, Hiroshima, Kanazawa, Kurobane, Matsushiro, Ogaki, Okayama, Omura, Sadowara, Tottori, and Tsu).

⁴²Following Miyake (2014)’s list, we include Hikone, Koriyama, Matsumoto, Kuwana, Tatebayashi, Utsunomiya, Takato, Taira, Kokura, Tanaka, Nagaoka, Sakura, Amagasaki, Yoshida (Mikawa province), Okazaki, Nishio, Himeji, Nakatsu, Akashi, Ogaki, Kano, Kariya, Shonai, Suwa, Matsushiro, and Murakami as *Fudai* daimyo.

nature. He elaborates:

Social ostracism, demands, meetings and plots, unneighborly squabbles of all sorts, tenant disputes, accusations leveled at community officials, arguments about shrine membership and religious prerogative and privilege, conflicts over social and political status, disagreements over village elections – all pitted some members of the community against others, in contravention of the ideal of community solidarity (White, 1995, 142).

Such disputes are unlikely, we reason, to lead the daimyo to lower tax rates, and may even prompt him to raise them as a punitive measure or to increase repression. As a result, we may see either no effect on the tax rate, or a positive correlation with such “social rebellions” and the tax rate. We aggregate all the nontax-induced rebellions and construct the *Nontax-induced rebellions* variable.

We also include the mean province population in 1720 (Hayami, 1992).⁴³ Larger populations may induce changes in tax rates in a number of ways: it can lead to higher rates levied on the agricultural sector if the bulk of the population live in urban areas where taxation was not possible; or lower rates to capture the same level of revenue from higher agricultural yields as a result of more labor in the countryside. In the absence of domain-level socio-economic indicators during this time period, we choose the provincial-level population figures of the earliest year from the available data (1720 to 1846), as a control for the initial conditions of the han.

Finally, we include geographic variables, including the mean elevation and its standard deviation, as well as geographic coordinates to further capture local variations in terrain and climate suitability for agriculture. We also include

⁴³There are on average 4.2 domains contained within a province, and 6.4 domains in a prefecture.

natural disaster variables.⁴⁴ Natural disasters likely affect taxes collected in two ways. First, the affected domains could receive tax relief if crops were destroyed, which would depress the need for higher tax rates. Second, non-affected domains could see taxes increase because the daimyo were required by the bakufu to provide assistance to other han after disasters (Bolitho, 1995*b*). Data on natural disasters are from Saito (1966). We code the total number of natural disasters by type within each prefecture between 1840 and 1868.⁴⁵ The variables include flood, famine, as well as tsunami, earthquakes and other natural disasters. Storms and floods are the two kinds of natural disasters that the average domain faced most frequently in the mid-19th century, followed by draughts and earthquakes. The rarest disaster type is tsunami, which usually “skips a generation,” but is nonetheless the most damaging in many cases.

Table 1 presents summary statistics, first showing the percentage of total rice production collected by the daimyo as tax from peasants. On average about 39 percent of the total assessed rice production was collected as tax. Between 1603 and 1868, the total number of incidents combined in Aoki’s (1971) data was 1,787. As explained in the section above, we disaggregate and classify protest incidents into six different types, depending on the severity, the size, and the type of the event. We further divided these incidents based on whether they were coded as tax-induced according to Aoki (1971). The summary statistics show that the majority of these incidents appear to have stemmed from reasons other than tax, and that most took the form of appeals. On average the domain experienced one appeal from peasants for tax reasons during the time period, but three appeals due to other issues. In fact, the average number of tax-induced incidents is smaller than non-tax induced for every type, regardless of whether attempted ones are

⁴⁴Original shapefiles for the domains come from (Nishizawa, 2010).

⁴⁵The data are only available at the prefecture level. By using the shapefiles above, we assigned values to each corresponding domain.

taken into account or not.

4 Results

In this section, we first discuss the results of our analyses before considering caveats. As a first cut at the analysis, we run a simple set of regressions of political mobilization on the tax rate. Here, we use an aggregate political mobilization variable, which includes any incident involving insurrections, riots, protests, desertions or appeals, including attempted ones. The base results in Columns 1 and 2 of Table 2 show that the coefficient value for the aggregate political mobilization variable is positive and at least initially weakly significant. This statistical significance disappears, however, when the set of controls described above are included. In columns 3 and 4, we separate tax-induced rebellions from those that are driven by other causes. The two types of incident counts again do not appear to be correlated with the overall tax imposed (except for the non-tax political mobilization variable in column 3).

To further investigate whether different types of rebellions have more nuanced effects on the tax rate, we next disaggregate this incident count data into the six different types. In Table 3, we take a simple pooled approach, regressing the tax rate in 1868 on our fight and flight count variables (insurrections, protests, and collective desertions) between 1603 and 1868. Our outcome variable is the same in Table 2. Standard control variables include the relative size of samurais, as well as agricultural productivity growth. In addition to these controls, in some specifications, we include provincial population, the dummy variable flagging whether a domain was a trade center, core Emperor supporter, Fudai and Gosanke daimyo, geography and natural disasters controls.

The main results show that the number of insurrections between 1603 and

Table 1: Summary Statistics

	(1) N	(2) mean	(3) sd	(4) min	(5) max
Dependent variables, 1868					
Nengu	231	38.75	11.33	15.60	70.50
Political mobilization, 1603-1868					
Tax-induced insurrections, 1603-1868 (excl. attempts)	267	0.0637	0.245	0	1
Tax-induced protests, 1603-1868 (excl. attempts)	267	0.131	0.492	0	5
Tax-induced collective desertions, 1603-1868 (excl. attempts)	267	0.127	0.512	0	4
Tax-induced coercive appeal, 1603-1868 (excl. attempts)	267	0.584	1.475	0	18
Tax-induced appeals, 1603-1868 (excl. attempts)	267	0.693	1.776	0	20
Tax-induced destructive riots, 1603-1868 (excl. attempts)	267	0.180	0.456	0	2
Tax-induced insurrections, 1603-1868	267	0.0637	0.245	0	1
Tax-induced protests, 1603-1868	267	0.131	0.492	0	5
Tax-induced collective desertions, 1603-1868	267	0.131	0.514	0	4
Tax-induced coercive appeal, 1603-1868	267	0.625	1.515	0	18
Tax-induced appeals, 1603-1868	267	0.704	1.787	0	20
Tax-induced destructive riots, 1603-1868	267	0.180	0.456	0	2
Nontax-induced rebellions (excl. attempts)	267	3.861	6.375	0	47
Nontax-induced rebellions	267	4.610	7.875	0	52
Variable for Samurai					
Relative size of samurai class	230	0.130	0.290	0.00703	3.538
Variables for alternative hypotheses					
ln(total assessed rice production in 1868)	232	10.63	1.129	9.165	14.12
ln(rice production increase)	204	8.415	1.947	1.946	13.34
Provincial population (1000's) in 1721	251	509.0	346.1	16.47	1,963
Trade center	267	0.0524	0.223	0	1
Core emperor supporters	267	0.0561	0.230	0	1
Fudai	279	0.0932	0.291	0	1
Tokugawa Gosanke	279	0.0108	0.103	0	1
Geography controls					
Mean elevation (in m)	267	168.5	175.2	7.322	1,054
Std. Dev elevation (in m)	267	99.32	71.10	2.937	457.4
Longitude	267	136.4	3.318	128.8	141.5
Latitude	267	35.48	1.684	31.60	41.43
Natural disaster controls					
Earthquakes in Prefecture, 1840-1868	267	1.543	1.428	0	6
Tsunamis in Prefecture, 1840-1868	267	0.120	0.337	0	2
Draughts in Prefecture, 1840-1868	267	1.543	1.467	0	5
Poor harvests in Prefecture, 1840-1868	267	0.775	1.402	0	8
Pests in Prefecture, 1840-1868	267	0.0749	0.264	0	1
Fires in Prefecture, 1840-1868	267	0.749	1.355	0	9
Floods in Prefecture, 1840-1868	267	5.273	3.698	0	13
Heavy snows in Prefecture, 1840-1868	267	0.307	0.645	0	5
Heavy rains in Prefecture, 1840-1868	267	0.543	0.962	0	6
Storms in Prefecture, 1840-1868	267	5.539	3.992	0	15
Epidemics in Prefecture, 1840-1868	267	0.397	0.917	0	5

Table 2: Tax Rates and Political Mobilization, 1603-1868

VARIABLES	(1) nengu	(2) nengu	(3) nengu	(4) nengu
Political Mobilization, 1603-1868	0.116* (0.070)	0.148 (0.100)		
Tax-induced political mobilization 1603-1868			-0.316 (0.331)	0.055 (0.411)
Nontax-induced political mobilization 1603-1868			0.270** (0.124)	0.177 (0.159)
Constant	37.940*** (0.852)	293.308*** (51.715)	38.000*** (0.851)	291.912*** (52.194)
Observations	231	186	231	186
R-squared	0.013	0.433	0.021	0.432
Relative size of samurai control	N	Y	N	Y
Alternative hypotheses controls	N	Y	N	Y
Geography controls	N	Y	N	Y
Natural disaster controls	N	Y	N	Y

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Note: Alternative hypotheses controls include agricultural productivity growth, the mean provincial population in 1720, indicators for core Emperor supporters, Fudai daimyo, and Gosanke. Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1. summary statistics.

1868 are negatively correlated with the tax rate in 1868. In total, 17 daimyos experienced one or more insurrections over the time period. The result under Column 5 of Table 3 for example suggests that a domain experiencing an additional insurrection is likely to end up with about a 4.7 percent decrease in the tax rate. To interpret the substantive effect of rebellions on tax rate, we return to the example of Kuwana domain. Recall that the tax rate there was 38.7 percent. As we explain above, the two main uses of revenue were to pay samurai stipends, and to maintain the daimyo's estates and personal wealth. As the total amount of samurai salary (*chigyō*) was 12,356 in 1868 for the domain (Kodama and Kitajima, 1977), and the daimyo expected to receive 11,094 koku, or 47 percent of the tax revenue, which was 23,450 koku for himself. Suppose that the ruler decided

to reduce the tax rate from 38.7 to 34 (a 4.7 percent reduction) due to an insurrection, and the reduction was split evenly between the samurai and the daimyo, then the samurai salary would have decreased from 12,356 to 10,919 koku, or a 12 percent decrease, while the amount for the daimyo would have been reduced from 11,094 to 9,682 koku or a decrease of 13 percent.⁴⁶

The regression results also show that more benign forms of fight and flight incidents (tax-induced protests and collective desertions) also lead to a reduction in tax by similar magnitudes, although tax-induced protests are not statistically significant at the 10% level. Additional protests and collective desertions reduce the tax rate by around 3.3 to 3.4 percent. Appeals of any kind, on the other hand, have a positive but non-significant influence on the tax rate. While more prevalent than other forms of resistance,⁴⁷ they were not the most effective means of protest against the daimyo. In addition, there are 40 domains that experienced destructive urban riot(s), but these riots have no significant relationship with tax rates. This finding is consistent with our expectations, as these riots, indicated as urban in Aoki (1971), should not have an impact on rice-based taxes because town residents did not pay taxes in rice – only peasants did so.

Turning to the issue of potential selection bias, Table 4 runs the same regressions as in Tables 3, but includes incidents that were attempted (but failed). The effect overall remains similar to Table 3, suggesting that regardless of the actual outcome, the act of fight or flight due to high tax had a strong, negative influence on the subsequent tax rate.

Another explanation for the variation in tax rates may be that daimyos

⁴⁶Salary per capita would have also declined from 9.33 koku to 8.24. As 1.825 koku is the lowest annual salary for samurai, a decrease of 1.09 koku could be a huge amount for samurai (Kodama and Kitajima, 1977).

⁴⁷More than half of the domains – 138 – experienced one or more appeals during this period. Twenty-two domains experienced one or more collective desertions, and 25 domains experienced protests during the same time period.

Table 3: Tax Rate and Rebellion Types excluding Attempted Ones, 1603-1868

VARIABLES	(1) nengu	(2) nengu	(3) nengu	(4) nengu	(5) nengu
Tax-induced insurrections, 1603-1868	-2.521 (2.855)	-4.229 (2.751)	-3.896 (2.745)	-4.686* (2.451)	-4.737** (2.362)
Tax-induced protests, 1603-1868	-3.628* (2.158)	-3.873* (1.996)	-3.183 (2.125)	-2.145 (2.313)	-3.334 (2.102)
Tax-induced collective desertions, 1603-1868	-0.865 (1.750)	-1.523 (1.875)	-1.641 (1.942)	-1.434 (1.974)	-3.452* (1.816)
Tax-induced coercive appeal, 1603-1868	-0.298 (0.576)	0.143 (0.883)	0.164 (0.900)	0.520 (0.852)	0.401 (0.827)
Tax-induced appeals, 1603-1868	0.115 (0.418)	0.227 (0.724)	0.089 (0.754)	0.708 (0.728)	0.215 (0.643)
Tax-induced destructive riots, 1603-1868	-0.134 (1.856)	0.170 (1.849)	0.196 (1.843)	0.202 (1.668)	0.248 (1.574)
Nontax-induced rebellions	0.502** (0.244)	0.572** (0.245)	0.597** (0.244)	0.404* (0.241)	0.597*** (0.222)
Relative size of samurai class	2.359 (3.443)	1.068 (3.148)	2.159 (3.646)	0.765 (2.774)	-1.199 (2.801)
ln(rice production increase)	-0.744* (0.396)	-0.603 (0.394)	-0.519 (0.413)	-1.144*** (0.370)	-0.595* (0.346)
Provincial population (1000's) in 1721		-0.005 (0.003)	-0.005 (0.003)	-0.001 (0.003)	-0.001 (0.002)
Trade center			0.511 (3.166)	0.542 (3.314)	1.289 (3.257)
Core emperor supporters			-4.446 (4.640)	-4.234 (4.027)	-1.919 (4.904)
Fudai			-0.367 (2.023)	2.940 (1.779)	1.636 (1.728)
Tokugawa Gosanke			-1.981 (2.822)	3.421 (2.547)	4.628 (3.414)
Constant	43.013*** (3.194)	44.206*** (3.416)	43.537*** (3.518)	293.700*** (36.112)	289.550*** (54.887)
Observations	201	186	186	186	186
R-squared	0.060	0.087	0.094	0.328	0.472
Geography controls	N	N	N	Y	Y
Natural disaster controls	N	N	N	N	Y

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1. summary statistics.

Table 4: Tax Rate and Rebellion Types including Attempted Ones, 1603-1868

VARIABLES	(1) nengu	(2) nengu	(3) nengu	(4) nengu	(5) nengu
Tax-induced insurrections, 1603-1868	-2.066 (2.897)	-3.647 (2.787)	-3.297 (2.766)	-4.289* (2.436)	-4.281* (2.395)
Tax-induced protests, 1603-1868	-3.650* (2.203)	-3.631* (2.072)	-2.952 (2.189)	-1.927 (2.336)	-3.079 (2.078)
Tax-induced collective desertions, 1603-1868	-2.363 (2.123)	-2.287 (2.254)	-2.415 (2.314)	-1.911 (2.260)	-4.303** (2.069)
Tax-induced coercive appeal, 1603-1868	-0.250 (0.519)	0.159 (0.825)	0.165 (0.842)	0.496 (0.804)	0.325 (0.797)
Tax-induced appeals, 1603-1868	0.135 (0.405)	0.429 (0.715)	0.310 (0.751)	0.887 (0.736)	0.356 (0.655)
Tax-induced destructive riots, 1603-1868	-0.118 (1.870)	0.194 (1.858)	0.223 (1.857)	0.201 (1.690)	0.249 (1.602)
Nontax-induced rebellions	0.444** (0.210)	0.449** (0.218)	0.467** (0.222)	0.307 (0.217)	0.489** (0.189)
Relative size of samurai class	1.736 (3.706)	0.679 (3.459)	1.700 (3.917)	0.530 (2.944)	-1.548 (2.902)
ln(rice production increase)	-0.698* (0.400)	-0.575 (0.399)	-0.498 (0.420)	-1.140*** (0.374)	-0.569 (0.350)
Provincial population (1000's) in 1721		-0.005 (0.003)	-0.005 (0.003)	-0.001 (0.003)	-0.002 (0.002)
Trade center			0.530 (3.208)	0.507 (3.277)	1.018 (3.139)
Core emperor supporters			-4.248 (4.567)	-3.988 (3.969)	-1.692 (4.865)
Fudai			-0.218 (2.009)	3.075* (1.777)	1.652 (1.736)
Tokugawa Gosanke			-1.704 (2.962)	3.599 (2.623)	4.710 (3.438)
Constant	42.661*** (3.216)	44.064*** (3.439)	43.457*** (3.550)	294.822*** (35.956)	293.286*** (54.299)
Observations	201	186	186	186	186
R-squared	0.064	0.086	0.093	0.329	0.474
Observations	201	186	186	186	186
R-squared	0.064	0.086	0.093	0.329	0.474
Geography controls	N	N	N	Y	Y
Natural disaster controls	N	N	N	N	Y

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1. summary statistics.

with high agricultural production capacity naturally faced less pressure to raise taxes, and that in such a context of abundant rice production, political resistance would then play only a minor role in tax rates. It appears that while growth in agricultural production does have a significant and negative influence on tax, this effect largely disappears when the number of natural disasters is controlled for (in Column 5 of Table 4). Furthermore, the statistical significance of fight or flight on reducing the tax rate remains robust to the growth in rice production. Next, while we find that the *sankinkotai* town indicator has a negative (but statistically insignificant) association with the tax rate in general, we also find that our main results remain robust to the inclusion of this variable. In addition, daimyo class controls are mostly insignificant, and in particular, those who supported the emperor during the Meiji Restoration period tend to have lower tax rates, which is consistent with our alternative hypothesis, but the relationship is not statistically significant.

Yet another explanation may be that domains with a large number of samurais is more likely to have a higher tax rate to pay the stipends; we see that the relative size of samurais, controlling for other variables, does not explain variation in tax in 1868. The literature suggests that the size of bureaucracy is not necessarily translated into state capacity and there may be a non-linear relationship between bureaucratic size and its effectiveness (Mann, 1984; Soifer and vom Hau, 2008). Table E in the Appendix examines whether there is an inverted U-shaped relationship between state capacity and tax rates. Although the coefficients of the square term show a negative sign, the results are not statistically significant in our full models, while our main variables of interest remain the same in statistical significance.

In sum, this section provides evidence that peasants can indeed win tax concessions from rulers by rebelling or deserting on a large scale. By looking at

the aggregate incidents and appeals, we showed that small-scale resistance – even if frequent – do not lead to concessions by autocrats. However, we found that insurrections and collective desertions were more likely to lead to tax concessions by rulers. The effect remained significant and consistent even with a set of controls that include proxies for alternative hypotheses.

Our data also reveal a relationship between political mobilization that is unrelated to taxation and an increase in the tax rate (especially in the case of protests). Both Tables 3 and 4 show that non tax-induced incidents generally have a positive (and opposite) effect on the tax rate from tax-induced incidents. We could interpret this result as indicating that the daimyo opted to repress unruly populations when they rebelled for social reasons. While this paper does not provide a theory on what explains this empirical pattern, the result nonetheless offers an interesting contrast to the main finding, and suggests that regardless of motivations, some political mobilizations are associated with a change in the tax rate. It is important to note that only tax-induced incidents succeed in extracting concessions from the ruler, while those motivated by other grievances seem to provoke increases in tax extraction. Such an increase in taxes could plausibly be linked to punishment for mobilization, or increased investment in repression.⁴⁸ Given its statistical significance, this finding warrants further research, which we leave for future work.

Caveats and Alternatives

In spite of the controls that we include in the empirical analysis above, there are a number of issues that potentially undermine our interpretation. First and foremost, we are not able to directly address a potential endogeneity problem,

⁴⁸In Table A of the Appendix, we conduct the analysis only with nontax-induced rebellion variable, and find that there is a positive association between nontax-induced rebellions and tax rates.

in that lower taxes may correlate with fewer rebellions because peasants are less aggrieved, or because the ruler is unable to effectively repress them. Although our account of various rebellions up until 1868 are events that occurred before the tax data in 1868, a reverse causal inference problem still exists if tax rates remained stable in the later Tokugawa period. That is, the tax rates in 1868 are likely serially correlated with previous levels, and may not avoid the inconsistency problems associated with simultaneity. We do not have reason to believe that there is a reinforcing mechanism from lower taxes to more rebellions, which would bias our result by inflating the magnitude of the mobilization effect. On the contrary, lower taxes would most likely appease farmers and reduce tax-motivated rebellions, and bias the magnitude of mobilization effect downward. The empirical results shown above therefore can be interpreted as a conservative estimate of the true impact of mobilization on tax rates.

A related potential concern about the reliance on tax data from a single year, 1868, is that this year also marks the end of the Tokugawa regime. The period may have been an aberration from the rest of the Edo period, because the Boshin war that led to the fall of the Tokugawa era started, and daimyos may have altered their local tax rates as a result. We were unable to find any evidence that this was the case in our review of the secondary historical sources.

A third concern is the extent of interdependence among daimyos, and potential errors that could result from our assumption that they are independent units. In our analysis, we attempt to control for potential factors that may cluster certain daimyos together from the rest, such as location, geography, and political ties (Core emperor supporters and Fudai as well as Gosanke). But actions such as collective desertion may have consequences on neighboring daimyos as well, since the deserters could move to their territories. To our knowledge, deserters did not choose destination domains based on repression or extraction, but rather on their

proximity; in addition, it was understood that the deserters would eventually return to their own domains. These demonstrations were rather akin to temporary strikes, in which residents refused to work the land for a time, to punish the daimyo by limiting the revenue he could collect, but did not involve severing ties and taking up permanent residence in other han. Furthermore, we were unable to find evidence showing that daimyos in neighboring hans intervened on behalf of peasants when desertions or other types of peasant-led riots took place. Finally, it is unclear how desertion from one han would influence either tax-related rebellions, or the tax rate in another domain.

A fourth concern is that the bargaining power of peasants may be a function of labor scarcity (Ardanaz and Mares, 2014). When labor is scarce, the peasants' capacity to influence tax policy should increase, and anticipating desertion, the daimyo may have an incentive to make tax concessions. However, rural labor does not appear to have been scarce during this period. Ikegami (1995, 167, fn5) also notes that even though they could not always discourage migration, "The authorities also found that as long as the village collectively owed the responsibility of paying taxes, and arranged cultivators for the land, it would not do much damage to the daimyo's interest even if there was a turnover of the individuals who composed the labor force." According to Ikegami (1995, 175), the population increased from 12 million in 1600 to 31 million by 1720. Rural residents also migrated to cities, partly as a result of surplus laborers in the fields.⁴⁹ In the absence of rural wage data, we cannot control for the possibility that the level of labor scarcity determined the peasants' bargaining power (only provincial-level population figures, and the absolute number of samurais in each domain are avail-

⁴⁹Beginning in 1649, peasants were permitted to move to *cities* (White, 1995, 192), and farmers did move into untaxed sectors, such as trade (Bolitho, 1995*b*, 32). However, migration was revoked by an edict issued in 1843 mandating that urban migrants return to their villages of origin (White, 1995, 51). This change was issued in order to improve order within the cities, though, not to meet labor demands in the countryside.

able as population controls). Given the population increase, we expect that mass desertions were likely less effective means of drawing concession from the ruler than insurrections, which we see in our empirical findings, in particular, in Table 3.

A fifth concern is that in our analysis, we do not directly control for each han's capacity to repress peasants, and its ability to assess and collect taxes. In the absence of data on assessment and shoyas' method of collection, we assume that extraction capacity was comparable across han. The secondary historical literature notes that while yearly assessments were important in theory, they do not seem to have been implemented. This lapse is explained by Bolitho (1995a) as stemming from the requirement that samurais reside in castle towns. It not only became costly to generate accurate assessments, but over time, the skills necessary to do so apparently fell by the wayside. Given that samurais in every domain were required to reside in castle towns, we assume that this rule affected assessment capacity similarly everywhere. In terms of tax collection, every village had a shoya, who was responsible for collection, and each village was organized into the gonin-gumi explained above, increasing oversight among families to pay their share of taxes. As every village was structured similarly, we think that our assumption of comparable extraction is reasonable. Finally, in terms of repressive capacity, in times of peace, more samurais did not necessarily mean greater capacity to repress. Over the generations without any internal or external wars, samurais even started to lose their skills, according to Jansen (1995). Rather, samurais served to increase daimyos' fiscal demands.

Finally, in pooling the data on rebellion, we assume continuity of domains throughout 1603-1878. This assumption may be problematic given that there were relocations and abolishments up until the mid-18th century. In order to address any potential bias arising from this issue, we created three different data sets.

The first consists of the period from 1652 to 1868, which begins following the fall of Shogun Tokugawa Iemitsu. Iemitsu (and the two previous shoguns) relocated many daimyos to consolidate the Tokugawa regime by the end of his rule. The second period is from 1713 to 1868, after the early Tokugawa period, which is also marked by significantly fewer relocations (Fujino, 1975; Oraisha, 1980). The third is 1761 to 1868, the beginning of the Shogun Ieharu's reign, which is a more conservative measure than the first two. Tables B, C, and D in the Appendix replicate Tables 2, 3 and 4 results in which all the controls are included. In all three periods, we note that the main results from above hold, and suggests that regardless of the period of rebellions we consider, the peasant mobilization effect on tax remains significant. In fact, the magnitude of certain types of political mobilization, such as tax-induced collective desertions, appears to increase by twofold or more. This increase is the most pronounced in the most recent period leading up to 1868 (1761 to 1868); while we are not able to determine how rigid the tax structure was before 1868, we find it reasonable that the most recent incidents of rebellions or desertions would have had the most impact.

5 Conclusion

Could peasants influence their powerful rulers, and state formation? We take advantage of the early modern Japan case to isolate the impact of peasant mobilization from potentially confounding factors such as domestic and foreign wars. We present fine-grained data from 267 domains, and find that peasant insurrections and flight are associated with lower tax rates. We argue that these results are evidence that even under the strict social hierarchy, rebellious and mobile peasants managed to extract concessions from autocrats, in this case samurai rulers. The findings hold even when controlling for the relative number of samu-

rais, natural disasters, and indicators of economic development. Insurrections and flight, we argued, are also more plausible than the alternatives.

We find this to be the case even though peasants were markedly isolated compared to their European counterparts. A crucial distinction between early modern Europe and Japan stems from the actors involved. In Europe, conflicts spanned over rulers, aristocrats and peasants, while in Japan the issue was confined to bargaining between the peasants and the daimyos. Crucially, the segmentation of authority in Japan also differed from Europe. The merchant class was largely absent from state formation of early modern Japan, and urban settings failed to play a pivotal role (Ikegami and Tilly, 1994). Competing governance institutions such as the church were non-existent too.⁵⁰ So while in Europe, opposition coalitions could form by combining a broad base of popular mobilization with locally significant elite leadership, often bound by a common religious faith (te Brake 1998, 118), in Japan, alliances across social groups were not established. Instead, “The common people resisted government pressures at every turn and forced it to expand, change, and occasionally acquiesce, but they had no aristocratic or clerical allies, no free-city sanctuaries, and no heretical or revolutionary ideological tradition, and thus they carried on alone” (White, 1988*a*, 14).

The advantage of the Japan case is that we can test for the efficacy of such resistance in a systematic way, and go beyond case studies given the independent domain units and the wealth of information on rebellions and flight. We not only provide a systematic test of existing theories on early modern Japan, but offer Japan as a unique case study to address early state formation questions. Our findings suggest that though rare and difficult, peasants did succeed in constraining their rulers.⁵¹ Despite the limited nature of the rebellions, they did restrict the

⁵⁰Shintoism, religion based on worshipping the emperor, remained important, but did not establish the same kind of public institution as Christianity in Europe.

⁵¹This conclusion is consistent with scholars like Totman (1986) and (White, 1995), who

growth of the state: everywhere the han were in dire fiscal straits by the late 19th century. Eventually, the regime collapsed, arguably in part due to its inability to extract more resources, even though any given peasant rebellion did not aim to topple local rulers or the shogun.

question the image of peasants as uniformly powerless.

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Appendix

Figure A: Other types of rebellion during the Edo Period, 1603-1868

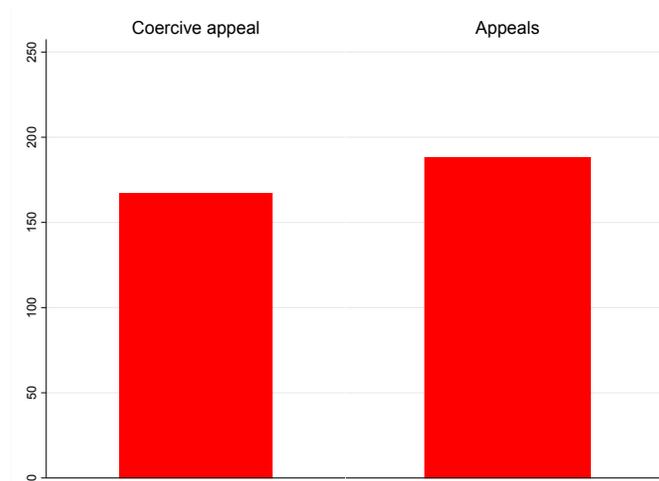


Table A: Tax Rate and Nontax-induced Rebellions excluding Attempted Ones, 1603-1868

VARIABLES	(1) nengu	(2) nengu	(3) nengu	(4) nengu	(5) nengu
Nontax-induced rebellions	0.266** (0.129)	0.294** (0.146)	0.372** (0.155)	0.323** (0.153)	0.326** (0.162)
Relative size of samurai class	3.014 (3.164)	1.676 (2.761)	3.531 (3.296)	1.720 (2.268)	0.848 (2.400)
ln(rice production increase)	-0.740* (0.391)	-0.604 (0.388)	-0.504 (0.399)	-1.080*** (0.354)	-0.620* (0.340)
Provincial population (1000's) in 1721		-0.004 (0.003)	-0.004 (0.003)	-0.000 (0.002)	-0.001 (0.003)
Trade center			-0.269 (3.436)	-0.980 (3.096)	-0.433 (2.882)
Core emperor supporters			-6.604 (4.397)	-6.214* (3.755)	-4.302 (4.424)
Fudai			-0.056 (1.904)	3.005* (1.714)	2.163 (1.768)
Tokugawa Gosanke			-3.315 (2.584)	2.276 (2.174)	3.098 (3.251)
Constant	43.001*** (3.156)	44.307*** (3.310)	43.372*** (3.365)	287.328*** (34.813)	283.202*** (52.365)
Observations	201	186	186	186	186
R-squared	0.034	0.055	0.073	0.306	0.442
Geography controls	N	N	N	Y	Y
Natural disaster controls	N	N	N	N	Y

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1 summary statistics.

Table B: Tax Rate and Rebellion

	(1)	(2)	(3)	(4)	(5)	(6)
	1653-1868		1713-1868		1761-1868	
Political Mobilization, 1603-1868	0.143 (0.105)		0.204* (0.114)		0.285* (0.147)	
Tax-induced Political Mobilization, 1603-1868		-0.024 (0.476)		-0.130 (0.547)		0.037 (0.713)
Nontax-induced Political Mobilization, 1603-1868		0.196 (0.170)		0.296* (0.176)		0.343* (0.207)
Constant	293.763*** (51.832)	291.622*** (52.297)	290.218*** (51.646)	287.643*** (51.957)	292.230*** (51.160)	290.447*** (51.383)
Observations	186	186	186	186	186	186
R-squared	0.431	0.431	0.437	0.439	0.437	0.438
Relative size of samurai control	Y	Y	Y	Y	Y	Y
Provincial population controls	Y	Y	Y	Y	Y	Y
Daimyo class controls	Y	Y	Y	Y	Y	Y
Geography	Y	Y	Y	Y	Y	Y
Natural disaster controls	Y	Y	Y	Y	Y	Y

Standard errors in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table C: Tax Rate and Rebellion, excluding Attempted Ones

	(1)	(2)	(3)
	1653-1868	1713-1868	1761-1868
Tax-induced insurrections, 1603-1868	-4.730*	-5.988***	-5.866*
	(2.553)	(2.251)	(3.472)
Tax-induced protests, 1603-1868	-3.200	-4.847***	-4.090*
	(2.241)	(1.813)	(2.382)
Tax-induced collective desertions, 1603-1868	-5.070*	-7.536***	-7.421***
	(2.578)	(2.304)	(2.477)
Tax-induced coercive appeal, 1603-1868	0.362	0.893	-0.297
	(0.884)	(0.763)	(1.198)
Tax-induced appeals, 1603-1868	-0.111	-0.423	0.983
	(0.742)	(0.906)	(1.325)
Tax-induced destructive riots, 1603-1868	-0.033	0.366	0.920
	(1.561)	(1.567)	(1.845)
Nontax-induced rebellions	0.671***	0.920***	0.958***
	(0.250)	(0.198)	(0.285)
Relative size of samurai class	-1.376	-3.237	-2.183
	(2.999)	(2.844)	(2.627)
ln(rice production increase)	-0.512	-0.360	-0.479
	(0.350)	(0.350)	(0.355)
Provincial population (1000's) in 1721	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)
Trade center	0.513	-0.071	-1.063
	(3.115)	(2.999)	(2.734)
Core emperor supporters	-2.176	-1.267	-2.416
	(4.976)	(4.717)	(4.603)
Fudai	1.201	0.780	1.421
	(1.755)	(1.659)	(1.704)
Tokugawa Gosanke	4.224	5.018	4.090
	(3.435)	(3.337)	(3.218)
Constant	289.988***	280.378***	277.922***
	(54.682)	(51.851)	(52.444)
Observations	186	186	186
R-squared	0.471	0.511	0.486
Geography controls	Y	Y	Y
Natural disaster controls	Y	Y	Y

Robust standard errors in parentheses; * $p < .1$, ** $p < .05$, *** $p < .01$.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1 summary statistics.

Table D: Tax Rate and Rebellion Types

	(1)	(2)	(3)
	1653-1868	1713-1868	1761-1868
Tax-induced insurrections, 1603-1868	-4.022 (2.601)	-5.419** (2.168)	-6.168* (3.454)
Tax-induced protests, 1603-1868	-2.931 (2.197)	-4.779*** (1.789)	-4.009* (2.380)
Tax-induced collective desertions, 1603-1868	-6.018** (2.910)	-9.401*** (2.374)	-9.719*** (2.777)
Tax-induced coercive appeal, 1603-1868	0.252 (0.860)	0.731 (0.754)	-0.498 (1.082)
Tax-induced appeals, 1603-1868	0.089 (0.757)	-0.121 (0.892)	1.522 (1.348)
Tax-induced destructive riots, 1603-1868	-0.014 (1.594)	0.473 (1.575)	1.101 (1.863)
Nontax-induced rebellions	0.543** (0.210)	0.809*** (0.159)	0.854*** (0.238)
Relative size of samurai class	-1.871 (3.148)	-4.656 (2.992)	-3.448 (2.787)
ln(rice production increase)	-0.483 (0.357)	-0.306 (0.358)	-0.427 (0.363)
Provincial population (1000's) in 1721	-0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)
Trade center	0.369 (3.029)	-0.225 (2.823)	-1.104 (2.604)
Core emperor supporters	-1.788 (4.924)	-0.505 (4.688)	-2.125 (4.582)
Fudai	1.292 (1.755)	0.898 (1.654)	1.475 (1.704)
Tokugawa Gosanke	4.486 (3.488)	6.013* (3.423)	4.869 (3.311)
Constant	293.095*** (54.243)	280.230*** (51.679)	278.730*** (52.316)
Observations	186	186	186
R-squared	0.472	0.519	0.493
Geography controls	Y	Y	Y
Natural disaster controls	Y	Y	Y

Robust standard errors in parentheses; * $p < .1$, ** $p < .05$, *** $p < .01$.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1 summary statistics.

Table E: Tax Rate and Rebellions excluding Attempted Ones, 1603-1868 - Non-linear Effect of Samurai Class

VARIABLES	(1) nengu	(2) nengu	(3) nengu	(4) nengu	(5) nengu
Tax-induced insurrections, 1603-1868	-3.988 (2.775)	-5.405** (2.648)	-5.233** (2.583)	-5.159** (2.381)	-5.100** (2.376)
Tax-induced protests, 1603-1868	-3.554* (1.903)	-3.815** (1.859)	-2.870 (1.978)	-2.058 (2.220)	-3.151 (2.100)
Tax-induced collective desertions, 1603-1868	-1.626 (1.813)	-1.969 (1.915)	-2.184 (1.958)	-1.746 (1.973)	-3.573* (1.836)
Tax-induced coercive appeal, 1603-1868	-0.014 (0.569)	0.379 (0.876)	0.462 (0.894)	0.656 (0.837)	0.451 (0.817)
Tax-induced appeals, 1603-1868	0.022 (0.409)	0.205 (0.696)	0.051 (0.716)	0.656 (0.718)	0.206 (0.639)
Tax-induced destructive riots, 1603-1868	0.090 (1.773)	0.317 (1.805)	0.316 (1.810)	0.335 (1.653)	0.354 (1.568)
Nontax-induced rebellions	0.363 (0.235)	0.428* (0.232)	0.407* (0.232)	0.319 (0.241)	0.532** (0.239)
Relative size of samurai class	24.068*** (6.972)	20.865*** (6.581)	26.195*** (7.406)	12.185 (7.751)	5.796 (9.566)
Relative size of samurai class (square term)	-6.867*** (1.871)	-6.177*** (1.746)	-7.312*** (1.890)	-3.444* (2.033)	-2.001 (2.348)
ln(rice production increase)	-1.473*** (0.423)	-1.274*** (0.427)	-1.263*** (0.447)	-1.453*** (0.411)	-0.764* (0.387)
Provincial population (1000's) in 1721		-0.004 (0.003)	-0.004 (0.003)	-0.001 (0.003)	-0.001 (0.002)
Trade center			1.175 (2.951)	0.808 (3.268)	1.153 (3.325)
Core emperor supporters			-5.598 (4.605)	-4.919 (4.041)	-2.658 (5.051)
Fudai			-0.166 (2.000)	2.797 (1.796)	1.626 (1.739)
Tokugawa Gosanke			-12.369*** (3.819)	-1.754 (4.055)	1.319 (5.740)
Constant	47.602*** (3.301)	48.068*** (3.458)	47.736*** (3.532)	284.836*** (36.671)	290.420*** (54.080)
Observations	201	186	186	186	186
R-squared	0.101	0.123	0.139	0.337	0.475
Geography controls	N	N	N	Y	Y
Natural disaster controls	N	N	N	N	Y

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Note: Geography controls include the mean elevation and standard deviation, latitude and longitude of the han centroid location. Natural disaster controls include the number of each of the disasters between 1840 and 1868 listed in Table 1 summary statistics.