

State Capacity in Imperial China - Quantifying a Millennium of Public Finance (997-1911 AD)¹

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This paper reconstructs nearly a millennium series of Central governmental fiscal revenue and expenditure data for key benchmark periods between 997 A.D. and 1911 A.D. covering four imperial dynasties of Song, Yuan, Ming, and Qing. Our long-term fiscal revenue series is reconstructed based on archival historical documents such as well as secondary sources. We estimate total and per capita central governmental revenue both in nominal and real terms. We decompose our fiscal revenue by types: in-kind versus monetary, land versus commercial taxes, direct versus indirect taxes, and seigniorage revenue. Overall, we show a long-decline in real per capita fiscal revenue, increasing ratio of land taxes and an increasing trend towards monetization of taxation. We further make a comparison with major European series where available. Our result inform the large and growing literature station formation, fiscal capacity, institutional change, and long-run economic growth.

Key Words: long term fiscal revenue; tax burden per capita; tax structure

JEL Classification: E100, N350, O100

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I. Introduction

Ever since Schumpeter's seminal essay, there have been a large literature that attempted to understand the rise of fiscal state, in particular the formation of fiscal state through the shift from a system based on resources derived from the king's domain to another where the kingdom became involved in providing the prince with funds (tax state). New categories emerge as to delineate the stages of states moving from domain state to traditional and modern fiscal states (Wenkai He, Guanglin Liu, Richard Von Glahn and etc.). This has generated a large theoretical literature (Acemoglu 2005, Besley and Persson 2008, 2011, Koyama and Johnson) as well as empirical works (Dincecco 2009, Kivanc and Pamuk).

How do Chinese states fit into this whole literature of state capacity? Although economic historians have made great advances (Guanglin Liu, Koyama, Moriguchi and Sng 2018, Sng 2014, Ma and Rubin 2010), China historians have often reminded us the unique all-encompassing nature of Chinese imperial system where all land under the heaven belong the emperor (Liu Zhiwei). Building up on earlier works, our paper represents the first system to build a millennium series of Chinese imperial fiscal revenue in total, per capita, nominal and real terms. We further breakdown into categories of direct versus indirect taxes, taxes in kind and in cash. We provide estimates for each dynasty with much detailed categories. We also discuss the unique case of extralegal surge and corvée labor that are not well-captured in our estimates of official central government revenue. We finally provide an international comparison and build theoretical insights. Our work represents the first attempts to data series from ground up based a large number of primary source such as *Song ghuiyao jigao* (Veritable Records of the Ming Dynasty 宋会要辑稿), *Yuanshi shihuozhi* (History of the Yuan: Treatise on Food and Money 元史食货志), *Ming shilu* (Veritable Records of the Ming Dynasty 明实录), *Qing shilu* (Veritable Records of the Qing Dynasty 清实录), *Qingchao wenxian tongkao* (Comprehensive examination of the literature of the Qing Dynasty 清朝文献通考), etc.

Our paper is divided into three sections. Section I provides a historical narrative on Imperial Chinese fiscal system. The second section presents our estimates and the third section presents an international comparison.

II. Understanding Traditional Chinese Fiscal System

The Chinese fiscal system is as ancient and renowned as her imperial bureaucracy in terms of scale and degree of sophisticated. Nonetheless, compared with other major historical empires and states, China's uniquely ruler-centered political structure had stamped such distinctive imprints on her fiscal system that the adoption of usual modern categories such as agricultural versus non-agricultural taxes, direct versus indirect taxes would fail to capture certain nuances or critical differences.

Chinese imperial taxation is fundamentally founded on her control of various categories of resources. The first item on this list is human resources that can be divided into the tangible poll tax 人头税 and the non-tangible corvée labor 徭役. The second source of fiscal extraction is on land that should be literally translated as "land rent" 田租 or "tribute" 赋 even though we continue to retain the modern term land tax. This poll/land tax formed the most importance source of tax revenue through different dynasties. Registering household and population 编户齐民 (and surveying land) was the top priority or even formed the legitimacy of every new dynastic ruler. Even though population and land were two independent items in these surveys, the technical difficulty of measuring land acreage in pre-modern times often meant much of the so-called land acreage data were obtained by some form of self-assessment 自实 (Chao 1986; He 1995; Ho 1959). In that sense, the Chinese land tax had always been based on household level, making it closer to a form of poll tax.²

The Mid-Tang Twice-Year Tax reform (780 AD) by Yang Yan started a major transition from poll tax towards a form of household based land property tax. The transition from land/poll to pure land tax did not even complete even within the Song dynasty. It was only at the beginning of Ming that the Twice a Year Tax formed the core of a pure land-based tax system. Poll tax based on individuals and households then turned up mainly as corvée labor 徭役. But by the time of the Single Whip reform 16th century, even corvée labor was slowly being monetized into silver payment added as surcharge on land tax. Finally, this process progressed further through the "converting poll to acreage 摊丁入亩" tax reform implemented in the 17-

² For example, during the Northern and Southern Dynasties and the early Sui and Tang dynasties, the system of "equal distribution of land 均田" was designed not to care whether or not the people actually occupied a legal amount of land, but rather to tax them according to that set amount of land. This led to almost absurd figures for recorded cultivated land in the early Sui dynasty (Ho 1995: 18).

18th Qing China that finally completed more than a millennium of transition towards pure form of land or agricultural tax.

Outside land-poll taxes, Imperial China extracted revenue on other resources under her control or management. The first main type is tax on products under some form of governmental monopoly such as salt, tea, liquor and mining products. Unlike agricultural taxes that had to be collected from scattered space across the vast empire, production sites for goods such as salt and mining products that were geographically concentrated or circumscribed. Various dynasties often resort to governmental monopoly 禁權 and state management for revenue extraction. Overtime, however, inefficiency in state management often gave way to the entry of private capital and commercial management that would yield tax revenue remitted to the state.

Commercial taxes include those levied on domestic and overseas trade, stamp duties and 契稅. Domestic trade were carried by migrant merchants 行商 and stationary merchants 坐商. Taxes on migrant merchants were levied by various trade stations along trade routes. Taxes on stationary merchants were based on trading centers and towns. After Song, however, imperial government mostly focused on taxing the migrating merchants as tax stations along trading routes were vastly reduced and concentrated in several large trading towns during Yuan, Ming and Qing dynasties, a far cry from the several hundred tax collection stations in Northern Song. A large recovery occurred with the rise of likin tax after the mid-19th century as a response to the fiscal pressure stemming from the Taiping Rebellion. Similarly, taxes on foreign trade became important after the mid-19th century after the founding of the Maritime Customs as a result of China's forced opening to global trade and Western imperialism. Before that, taxes on foreign trade such as *Shibo Si* (customs station 市舶司) during Song and Yuan and *Yuegang* (Yue port 月港) during Ming and Qing and the so-called taxes on the thirteen co-hong 十三行 merchants in Qing had always been limited.

There are various taxes sometimes specific to different periods or dynasties in the form of confiscation, donations, sale of official titles or positions and license fees on Buddhist and Daoists 僧道度牒, etc. There are very specific type of tax such as *Heyumai* (forced textiles trading 和预买) only in Song dynasty. Originally, it was designed as an advance of government credit to support textile producers in return for finished products at the end. However, it soon

developed into compulsory acquisition of on textile products. Seigniorage is another source of revenue throughout the millennium where the government minted copper cash and issued paper money. However, Seigniorage copper cash is negligible due to the high cost of producing low-denomination currency (Wang 2003: 253-266). There are seigniorage profits from paper money but they were only in large circulation during Song, Yuan, Ming and very early Qing (Peng 2015: 597-603). We summarize the main categories of Imperial fiscal revenue in Table 1 below.

Table 1 Chinese fiscal revenue categories

Panel A: A general picture				
Corvée labor	Land-poll taxes	Industry	Commerce	Others
Regular projects: military, transport, grassroots governance, royal artisans, etc.	Land tax and poll tax	Salt, wine, vinegar, tea, mining (silver, gold, copper and others)	Commerce, sales, tariff, transaction and others	Penalties, government title trafficking, donation, interest, sovereign tax, royalty business etc.
Temporary projects: military, transport, water works, royal works, etc.				
Panel B: Song to Qing (960-1911)				
Dynasty	Population-land taxes	Industry: Excise (monopolization)	Industry: Mining revenue	Commerce and others
Northern Song Dynasty (960-1127)	Twice-a-year tax and its surtax (折纳、加耗), Green Shoots Law (青苗), corvée exemption, poll tax (charge on adult male labor)	Salt, wine, tea, vinegar, etc.	Gold, silver, copper, Iron, lead, tin, etc.	Commercial tax, customs (市舶), temporary, forced textiles trading (预买), license selling on monk and Daoist priest (度牒)
Yuan Dynasty (1279-1368)	Twice-a-year tax, land tax, poll taxes (plus a charge on household, 科差)	Salt, wine, tea, vinegar, etc.	Gold, silver, copper, Iron, lead, tin, etc.	Kiln tax, commercial tax, customs (市舶), revenue from local specialties (额外课), paper money seigniorage
Ming Dynasty (1368-1644)	Twice-a-year tax (plus a poll tax after the One Whip Law)	Salt, tea	Gold, silver, copper, Iron, lead, tin, etc.	Domestic circulation tax, customs and miscellaneous tax (杂税)

Early Qing Dynasty (1644-1840)	Twice-a-year tax and poll tax (地丁银)	Salt, tea	Gold, silver, copper, Iron, lead, tin, etc.	Domestic circulation tax, customs and miscellaneous tax (杂税), donations and Keju titles selling
Late Qing Dynasty (1840-1911)	Twice-a-year tax and poll tax (地丁银)	Salt, tea, opium, etc.	Gold, silver, copper, Iron, lead, tin, etc.	Domestic circulation tax (old and <i>Likin</i>), customs under Chinese and foreign jurisdiction, miscellaneous tax (杂税), donations and Keju titles selling

Sources: Zheng (1994); Huang (2015); Liu (2015b); Chen and Shi (2000); Zhang and Zhou (2015); Chen (2013a); Chen and Cai (2013).

One consequence of taxation through the governmental control of resources is that there is not a unified central fiscal system. For example, although the so-called Ministry of Finance 户部 which administered, transferred and audited the land-poll tax through its information gathered on national population and land comes closest to a modern treasury, it does not have control over all revenue extracted from resources. Often each of the six ministries has had its own source of income and revenue extracted from resources under their respective control and collected under its own respective warehouse. Largely outside the purview of the Ministry of Finance, for example, Ministries of Works 工部 or Army 兵部 would extract revenue independently (Hartwell 1988; Li 2019).

Above this structure stood the Imperial palace finance that in principle was independent from the state finance in the Ministry of Finance. Overtime, the palace finance 内帑 or 内务府 did become increasingly detached from the state revenue (Qi 2009). They derived income from imperial estates, loans, government-owned enterprises (silk weaving), etc. In Qing, the palace finance had achieved greater degree of business complexity and operational maturity than previous generations, such as monopolizing ginseng sales in Northeast China and Jiangning weaving in the city of Nanjing.

Another important feature is that under a highly centralized political system, there is no autonomous local fiscal budget or system as all local governments are in principle dispatched by the central government. Tax collection by local governments is essentially assigned by the

central government to its agencies. They need to manage and collect taxes in the areas under their jurisdiction according to the requirements of the central government and transfer most of the revenue to the center. The local government can retain part of it for themselves and cover administrative expenses. In other words, imperial China did not have a local fiscal system in the modern sense. However, due to the information asymmetry of the central government and many other reasons, the administrative expenditures legally reserved for local governments often cannot meet the daily operations of local governments. That has led to the so-called “corruption incomes” in various guises some of which were actually for making up for the gap in legitimate administrative expenses (Zhou 2019).

It is notable that historical records on these forms of corruption at the local level are relatively muted before the mid-Ming (16th century) large scale fiscal conversion of *corvée* service into monetary revenue. In essence, *corvée* is similar to poll tax but it is managed and extracted locally. Apart from some services required by the central government such as craftsmen and large-scale infrastructure projects, most *corvée* services mainly serve local governments including their administrative tasks. However, the fiscal reforms of the past dynasties have paid great attention to the *corvée* system and resource available there. Indeed, whether it is Wang Anshi’s *corvée* exemption law (1071) in the Song dynasty or Zhang Juzheng’s One Whip Law (1581) in the Ming, they all aimed at converting *corvée* labor into hired labor and eventually into monetized tax revenue that would become accessible to the central government (Liang 1936; Hu 2012b; Zhao and Ding 2013).

In other words, as long as the *corvée* system existed and formed the legitimate resource of local governance, local governments had much less incentive to acquire the non-statutory or “corruption income”. The fact that *corvée* services is difficult to centralize and inefficient to administer actually made it a relatively secure and useful source of local tax despite the inefficiency itself becoming a huge burden on individual households and overall economy. This also means that the conversion of *corvée* services into monetary form accessible within the reach of the central government coupled with the absence of any statutory provision for local governance, it inadvertently led to the hollowing out local administrative of fiscal revenue. This pushed local government towards exploring more of “corruption income”.

One case in point is the well-studied Yongzheng 雍正 fiscal reform during the 1720s and 1730s. After the conversion of land tax into silver from the late Ming, extralegal surcharge placed on land tax termed as Huohuo 火耗 – literally the monetary conversion charges of tax payments into standardized silver – became a form of local “corruption” that partly served local fiscal revenue as a way of curbing bureaucratic extraction on the local population. Yongzheng’s attempt to formalize the previously hidden Huohuo into a new form of revenue known as *Yanglian silver* 养廉银 as part of legitimate official revenue is lauded as the hallmark of rational fiscal reform. Unfortunately, once these surcharges soon became visible, this silver revenue once designated for local government was taken over by the Center under the subsequent Qianlong reign (1735–1796), pushing the local administration for new source of “corruption income” (Yu and Liu 2020; Zelin 1984). Therefore, the so-called extralegal income was very much a variation of the previously corvée labor.

III. A Millennium of Chinese Central Fiscal Revenue

1. The Long-term Overall Trend

Figure 1 plots the entire one millennium of Imperial central government revenue in terms of silver taels and units of rice. Figure 2 plots the one millennium of population and rice prices under our study. We standardize all revenue into silver tael unit even though taxation denoted in silver only became important from the middle of Ming dynasty (16th century) whereas copper cash, paper money or in kind payment co-existed and were actually more predominant during Song and Yuan dynasties (Li 2017). Figure 1 reveals the striking feature that imperial China’s central revenue remained largely below 50 million taels across four different dynasties until about the mid-19th century. This long-run stability reflected the rise of what China historians the frozen fiscal quota of 40 million silver taels especially after the founding of Ming dynasty (Ho 1959; Huang 1974). Even in nominal terms, Figure 1 already reflects the high level of fiscal revenue achieved in Northern Song whereas the entire Ming dynasty seems to have the lowest total fiscal revenue across the dynasties. On the other hand, the one benchmark of Yuan central governmental revenue seemed quite respectable compared with other dynasties that seems to contradict the prevailing view of Yuan public finance being poorly managed (von

Glahn 2016; Hou 2008).

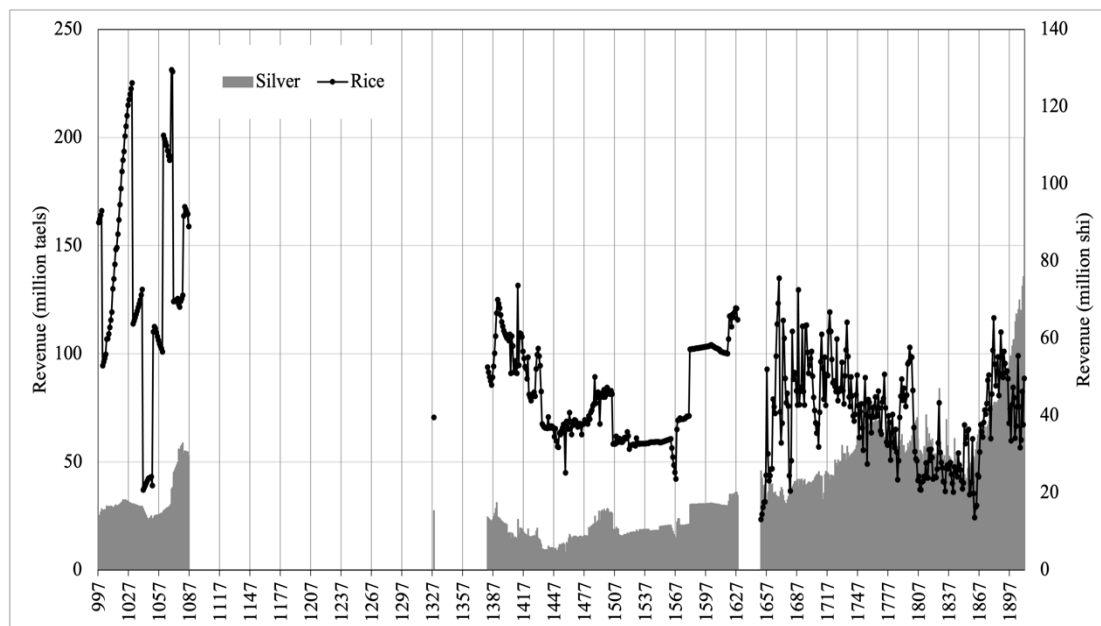


Figure 1 Central government revenue of China, 997-1911

(left axis in silver taels and right axis in rice shi)

Sources and notes: Fiscal revenue data are from this paper. Rice price data for Northern Song and Ming are from Peng Xinwei (1985). The rice price index for Qing is from Peng Kaixiang (2006), and the rice price level value is from Peng Xinwei (1985). The missing values are filled in using log-linear interpolation.

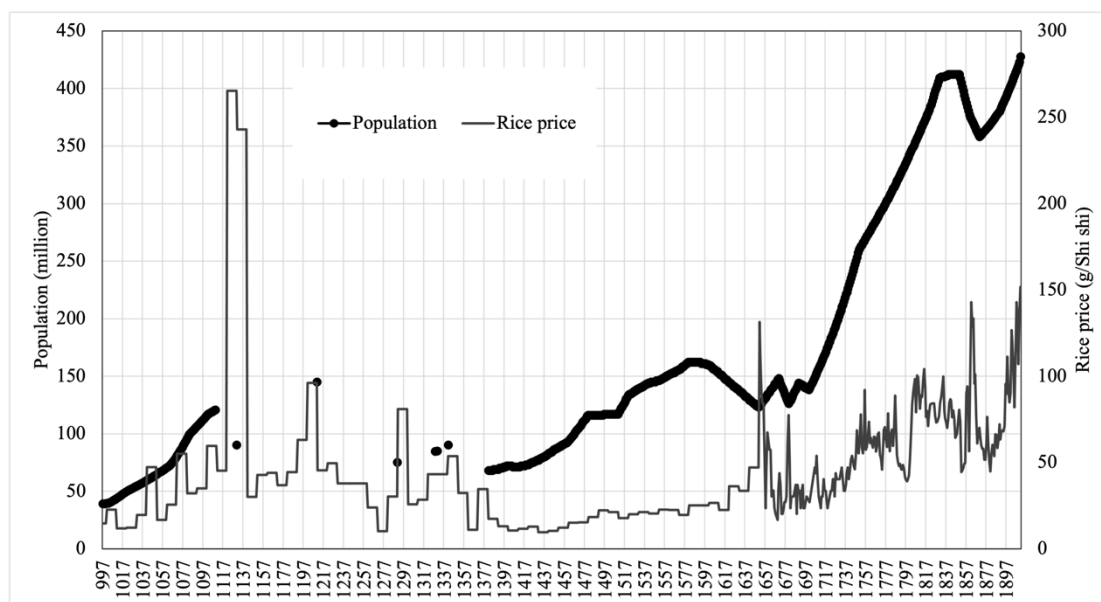


Figure 2 Population (million) and rice price (grams of silver/Shi shi of husked rice) in China, 997-1911

Sources and notes: Population data before 1850 are taken from Broadberry, Guan, and Li (2018) and Maddison (1998). Yuan's population data come from Wu Songdi (2000). Population data after 1850 are from Zhai and Lou (2022).

Rice price data for Northern Song and Ming are from Peng Xinwei (1985). Qing's data are from Peng Kaixiang

(2006). Yuan's price data come from Li Chunyuan (2014). The missing values are filled in using log-linear interpolation.

Figure 1 also shows our millennium of silver fiscal revenue into real term using rice price as a deflator. Even though rice price alone as a deflator is not ideal, it gives good approximation given the predominant share of grain/rice in Chinese agriculture and overall Chinese economy. The one millennium of fiscal revenue now converted in units of rice as displayed amplifies the high level of Song fiscal revenue whereas total revenue remained largely trendless throughout Yuan, Ming and Qing dynasties. Clearly, Song was the anomaly in more than one way as we will see later.

Among the important fiscal reform during this long millennium, both the Song dynasty Wang Anshi New Policy reform (1059) and Ming dynasty Zhang Junzheng reform (1581) led to visible rises in fiscal revenue whereas the effect of the well-known Yongzheng 雍正 reform in Qing (Haoxian guigong 耗羨归公, 1724; Tanding rumu, 摊丁入亩, 1729) were less pronounced.³ The two previous reforms focused on converting and monetizing corvée labor into central governmental revenue possibly at the expense of local revenue source possibly in the form of corvée labor. It is interesting to note that the Yongzheng fiscal form did raise fiscal revenue in silver terms, leading to the well-known peak surplus in silver reserve during the Qianlong era. However, this nominal effect as displayed in Figure 1 disappeared in real terms as shown in figure 1 owing to rising grain prices of the 18th century. To certain degree, the Yongzheng fiscal reform legalizes previously extra-legal charges in tax-collection that were part of local governmental resources. Its policy of converting polls tax into land tax 摊丁入亩 was largely a continuation and extension of the single-whip tax reform initiated in Ming. Figure 3 presents the fiscal revenue in per capita terms. The picture of Song anomaly followed by a secular decline throughout the millennium becomes starker in both nominal and real terms.

³ The study by Wang Yuhua documents a total of 57 major fiscal reforms during 221 BC – 1911 AD with 30 of them occurring after 960AD. See Wang (2022), Appendix Two.

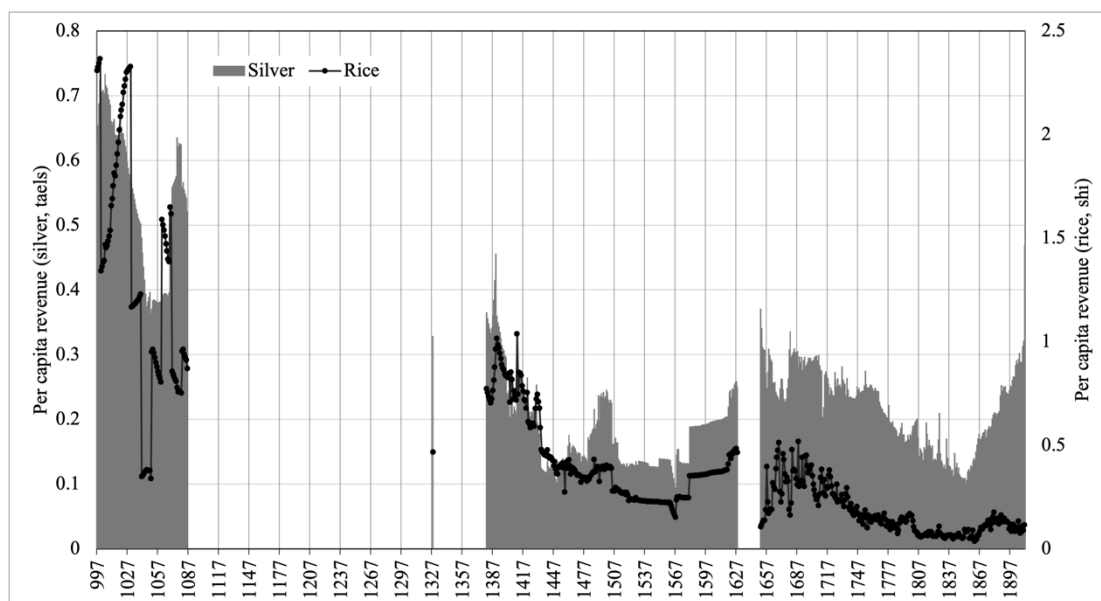


Figure 3 Per capita central government revenue, 997-1911
(left axis in silver taels and right axis in rice shi)

Sources and notes: Fiscal revenue data are from this paper. Rice price data for Northern Song and Ming are from Peng Xinwei (1985). Qing's data are from Peng Kaixiang (2006). The missing values are filled in using log-linear interpolation. Population data before 1850 are taken from Broadberry, Guan, and Li (2018) and Maddison (1998). Yuan's population data come from Wu Songdi (2000). Population data after 1850 are from Zhai and Lou (2022).

2. Fiscal Revenue and Structure by Dynasties

Figure 4 shows the series for Northern Song that shows a clear structural break during the Wang Anshi New Policy reform (1069). Before the reform, the total silver revenue hovered around 30 million taels but nearly doubled to reach about 60 millions taels after that. The shift was accomplished largely through a surge in commercial and excise taxes and a corresponding reduction in the share of land taxes. This is consistent with prevailing scholarship on Song being a fiscal state (Bao 2009; von Glahn 2016; Liu 2005; Liu 2015a). However, it is important to note that our estimate still reveal overwhelming importance of land taxes – more than half of the total revenue – certainly before the Wang Anshi reform in 1069.

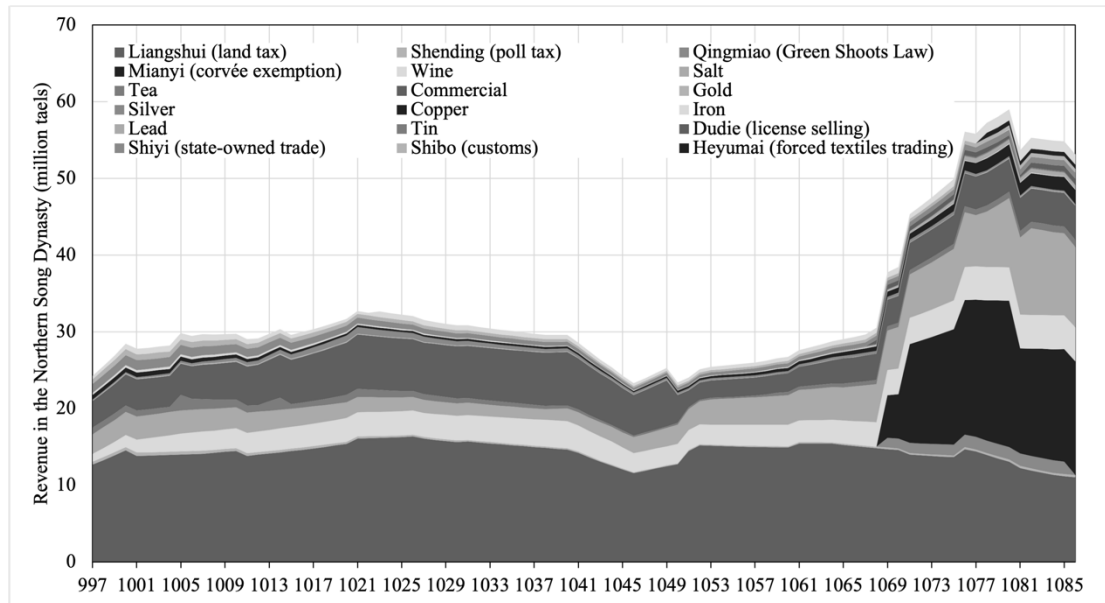


Figure 4 Central government revenue in the Northern Song Dynasty: categories and amounts, 997-1085 (in silver taels)

Sources: see the text.

Our estimate of Yuan fiscal revenue centered only on one year of 1328 as shown in Table 2. Firstly, agricultural tax – land-poll tax – occupies only about 30% of total revenue – a level as low as that of the post-Wang Anshi reform era. However, the main reason for the reduced share in agriculture tax in the post-Wang Anshi era came from the conversion of corvée labor. If corvée labor were still considered as part of poll tax, the land-poll taxes even in the post-Wang Anshi era of Northern Song would go above 50%. Thus judged, the Yuan fiscal revenue displayed a strikingly “modern” form – more “modern” than even Northern Song. The other main feature of Yuan fiscal revenue is that salt tax in 1328 remains the single largest source of revenue. Moreover, seigniorage profits and various forms of commercial and excise taxes were the major source revenue. It is remarkable that Yuan fiscal revenue is the least dependent on the agricultural sector even compared with Song (Deng 2012; Elvin 1973; Liu 2005).

Table 2 Categories, amounts and shares of central government revenues in 1328 (in silver taels)

Categories	Revenue in silver taels	Percent
Shuiliang (land tax)	8,325,260	30.02%
Kechai (poll tax)	568,048	2.05%
Gold	244,707	0.88%
Silver	77,561	0.28%
Copper	119	0.00%

Iron	21,561	0.08%
Lead and tin	1,654	0.01%
Alum	4,152	0.01%
Salt	12,768,333	46.03%
Tea	482,018	1.74%
Wine	782,603	2.82%
Vinegar	37,660	0.14%
Miscellaneous tax	278,014	1.00%
Commercial tax	1,582,560	5.71%
Seigniorage	2,562,595	9.24%
Total	27,736,844	100%

Sources: see the text.

We have reasons to believe the fiscal revenue as displayed in 1328 may be illustrative of the general picture of the Yuan dynasty. For example, there are more than seventy years of data on the issuance of paper money that showed a rising trend over time (Peng 2015: 434-440; Guan, Palma, and Wu 2022). Salt tax as a share of total revenue may even be rising over time, sometimes exceeding even 60 or 80% (Chen and Shi 2000: 422-423). Records show both salt quota and production have probably doubled between late 13th and early 14th century (Zhang 2009: 204-267).

The Hongwu 洪武 reign by the founding emperor Zhu Yuanzhuang started the Ming dynasty at a high level of fiscal revenue. The vigorous and notoriously brutal founding emperor conducted one of the most comprehensive population and land census in 1393 AD that laid the foundation for fiscal extraction. Fiscal revenue since then were on a downward trend with visible decline during the YongLe 永乐 reign (1403-1424). But it was during the Xuande 宣德 reign (1426-1435) and Zhengtong 正统 reign (1436-1449) that saw the biggest drop in land tax owing to the decline of the military farms and collapse of the paper money due to over-issuance, leading to decline in taxes on commerce and mining sectors often collected in paper money. This era of rapid fiscal decline corresponded to weakening military capacity that led to The Tumu Crisis 土木堡之变 in 1449 that saw the capture of a Ming emperor Zhu Qizhen by Esen 也先 of Mongol Wala. Fiscal revenue began to recover during the Chenghua 成化 (1465-1487) and Hongzhi 弘治 reign (1488-1505). Fiscal expansion began from 1581 when Zhang Junzheng embarked one of the most important fiscal reforms as mentioned earlier.

Political and military crisis triggered massive fiscal extraction 三饷加派 which may have in turn exacerbated the crisis and hastened the fall of Ming. All in all though, the entire Ming fiscal structure was locked into land-tax, a “physiocratic” structure that became far removed from those of mercantilist Song and Yuan dynasty.

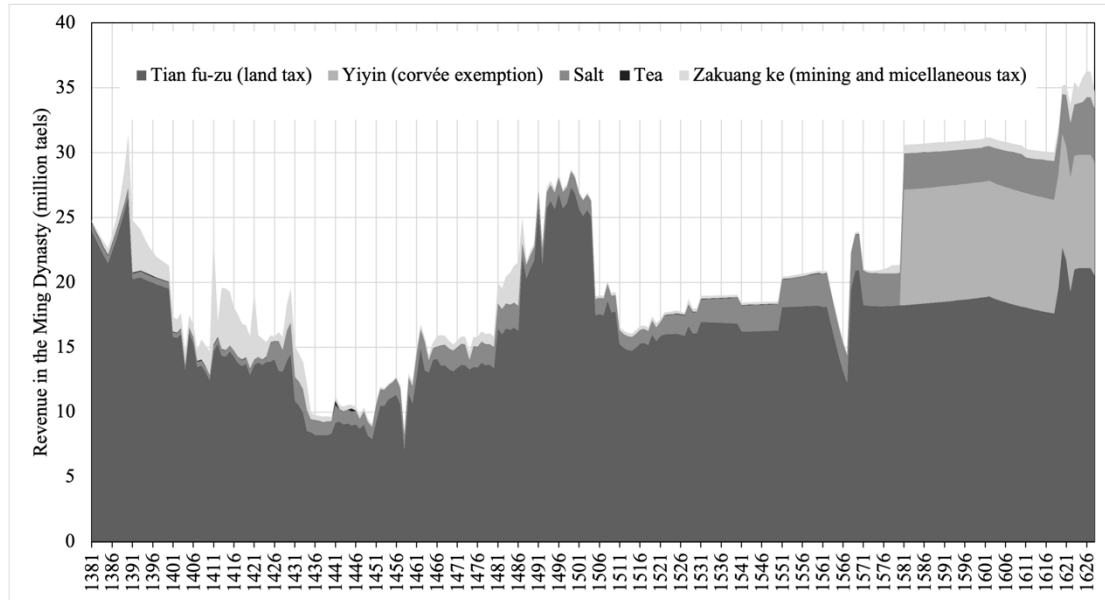


Figure 5 Central government revenue in the Ming Dynasty: categories and amounts, 1381-1626 (in silver tael)

Sources: see the text.

Qing shows three broad phases in Figure 6. The first phase runs from the founding of Qing in 1640s until about 1760s where the fiscal structure – and the concept of fiscal quota – largely inherited from the Ming marked by the overwhelming importance of agricultural tax. The second phrases goes from 1760s until 1840s. Although not fundamentally different from the land-tax based first phase, this phase does see a slow creeping up of other forms of taxation in customs and from the early 19th century, the rise in revenue from the sale of governmental titles and forced donations from elites and merchants. These have partially compensated for the periodic shortfalls between received revenue and the designated land tax quota. These shortfalls had emerged from the end of 19th century during Qianlong rein (1711–1799 AD) and progressively worsened towards the Jiaqing 嘉庆 and Daoguang 道光 rein (1796–1820, 1821–1850) (Chen and Cai 2013; Ni 2013; Shi and Xu 2008). As is well-known, the third phase starts from the mid-19th century that saw the rise of new commercial taxes in the name of Likin

and Maritime Customs tariffs both of which are a response to the need to repress the massive Taiping Rebellion and Qing's forced opening to Western imperialism.

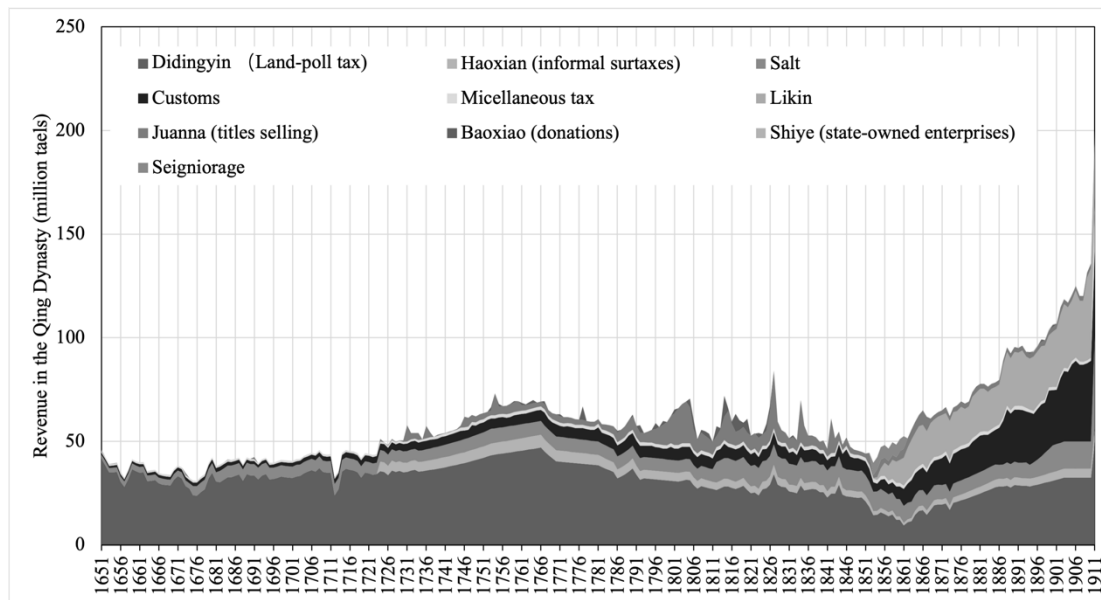


Figure 6 Central government revenue in the Qing Dynasty: categories and amounts, 1651-1911 (in silver taels)

Sources: see the text.

3. Fiscal Structure: a Millennium Perspective

We now organize our long-term estimates into several meaningful categories. Figure 7 presents nearly ten centuries of land-poll taxes which broadly correspond to what we refer as direct taxes against the category of indirect taxes defined by excise or levies on monopoly commodities and commerce correspond exactly to indirect taxes. We argue broadly in the sense that these two categories are not exact equivalent to these modern classifications as we discussed in the introduction. Nonetheless, Figure 7 allows us to trace the changing structure of taxation as well as economy shows a contrast in the share of direct (land/pool) taxes between Song/Yuan and Ming/Qing dynasties. In particular, Ming, especially the early Ming displayed an extreme dependence on land taxes possibly due to Zhu Yuanzhang's draconian policy of control and the rise of a type of command economy (Hu 2012). Qing largely inherited the agricultural tax based fiscal structure but reveal greater flexibility despite the nominal quota. With rising population, per capita land tax burden began to decline. In the final half century,

the share of indirect taxes began to rise almost to the level of Song and Yuan, a curious retrogression.

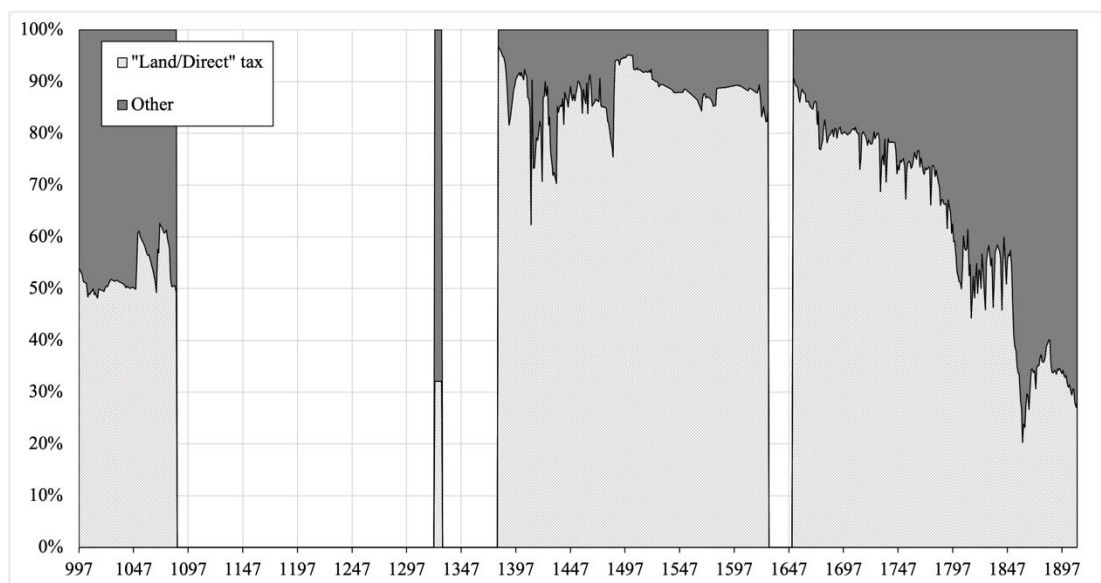


Figure 7 Share of Land (direct) and Other (indirect) taxes, 997-1911

Sources and notes: Data comes from this paper. There is only one year of data for the Yuan Dynasty, 1328. In order to show the Yuan situation more clearly in the figure, the data for the Yuan period in this figure is for the years 1323-1329, and the values are all for the year of 1328.

Table 3 provides a further breakdown the indirect tax across the four dynasties. One crucial feature is the consistent importance of salt tax that occupied roughly 10% of total indirect taxes for the millennium. The startling exception is Yuan dynasty that saw an average share of 46% but sometimes as high as 80%. Taxes on trade customs stayed at about 16% for Song but declined and stabilized to about 6% from Yuan onwards. We believe this share would be lower in early Ming but subsequently stabilized around 2% (Lin 1990). However, it was during the final half century of Qing that saw a sharp surge of likin taxes and maritime customs that fundamentally changed Qing fiscal structure.

Table 3 Average share of salt, trade, and seigniorage in central revenue in the Song, Yuan, Ming, and Qing

The salt revenue as a share of total revenue			
Song	Yuan	Ming	Qing
11.07%	46.03%	8.02%	12.00%
The trade revenue as a share of total revenue			
Song	Yuan	Ming	Qing
15.84%	5.71%	2.22%	20.81%
The seigniorage as a share of total revenue			

Song	Yuan	Ming	Qing
1.97%	9.24%	around 0	0.45%

Sources and notes: The trade revenues therein include both inland and maritime. We do not have a detailed breakdown of trade taxes in the Ming dynasty for our data. We use Wan Ming and Xu Kaiying's calculations for the Wanli trade share from *Wanli Kuaiji lu* 万历会计录 (Wan and Xu 2015: 2123).

Compared with England and Europe in general, Imperial China derived a relatively small share of seigniorage revenue partly due to the high cost of minting low-value copper cash. As shown Table 3, seigniorage profits remained low in Northern Song, at only about 2% of total revenue, despite the massive quantities of copper cash produced, some of which even circulated beyond the Chinese territories and continued their use throughout Ming and Qing dynasties (Liu, 2011). A major innovation in Song was the sustained issuance of paper money which was taken over by other minority rulers such as Liao and Jin. But it was during the Yuan dynasty that it vastly expanded to become a form of sustained national currency. Paper money generated a large seigniorage revenue that reached as high as 9% in 1328. This is even higher than commercial tax and taxes on liquor and vinegar. One important feature is that the value of Yuan paper and price level, apart from occasional collapses due to warfare, etc., remained remarkably stable throughout the entire dynasty (Guan, Palma, and Wu 2022). This is partly due to Yuan's commitment to redeem the paper currency and accept it as tax payment (Li 2014).

This is in sharp contrast to early Ming whose issuance of Daming Baochao 大明宝钞 sharply devaluated within a few decades. Between 1376 and 1413, the paper money Daming Baochao lost 98.8% of its value. One important reason is early Ming's failure to redeem the paper money or accept it as tax payment. Given such rapid loss in value and subsequent disappearance of the Ming paper money, Ming ended up with negligible seigniorage revenue (Peng 2015: 494). Ming also issued a small amount of copper cash, but they generated little seigniorage that we set overall Ming seigniorage revenue to zero. Although Qing paper in the early period and debased copper cash from the mid-19th century, we set the overall seigniorage revenue at 0.45% of total revenue as summarized in Table 3. This is in sharp contrast to the nearly 20% seigniorage profits in 16th century England (O'Brien and Hunt 1993).

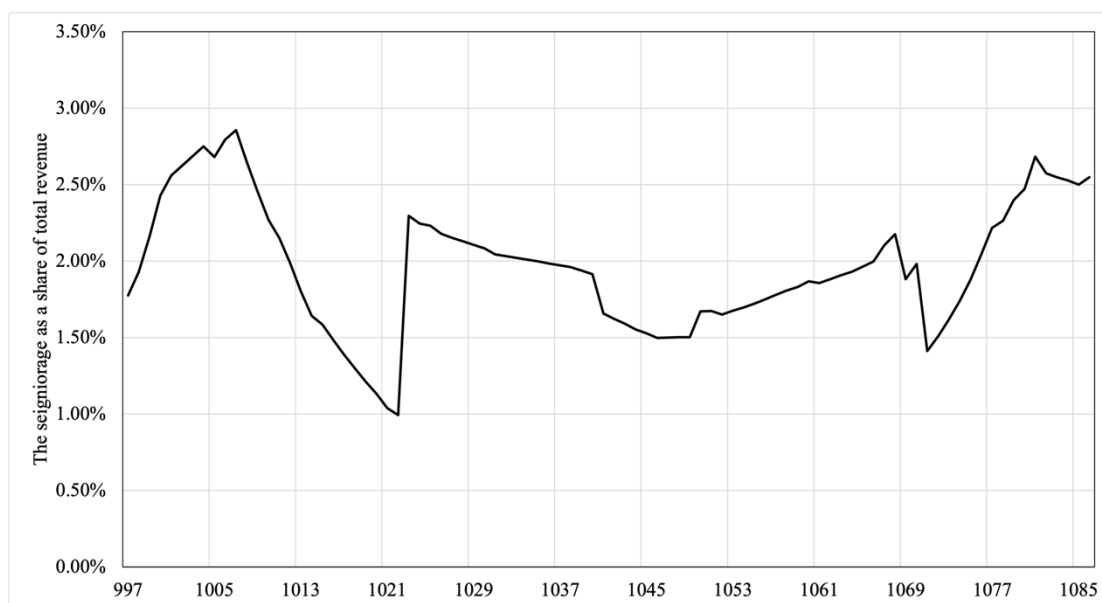


Figure 8 The seigniorage as a share of total revenue in the Northern Song Dynasty, 997-1085

Sources: see the text.

Figure 9 presents the major phases of corvée labor in the two dynasties. Figure 10 presents ten centuries of tax revenue in kind and in money. The trend towards monetization of fiscal revenue was clear throughout the millennium except for a sharp reversal towards payment in kind in the first half of Ming. This is consistent with qualitative records that Zhu Yuanzhuang's policy turning China into nearly a barter based economy. Indeed, the Ming revenue records used the in kind goods as its accounting units. A barter based economy and an in-kind dominance of Ming fiscal revenue led to the constant conversion of units among different goods and excessively high cost of collecting and paying taxes on the society as a whole within a vast empire. From 1436 saw the beginning of a process of converting all units into a governmental stipulated silver standard (*Jinhua Silver* 金花银). The conversion towards this silver unit eventually culminated in the well-known One Whip reform more than a century later. These have opened the path towards silverization of Chinese fiscal revenue and the increasing conversion of corvée labor into land-tax as officially begun in the reform by Zhang Junzheng in 1581. The trend towards monetization of public revenue continued throughout Qing especially following the decline in the use of Grand Canal for shipping the tribute grain.

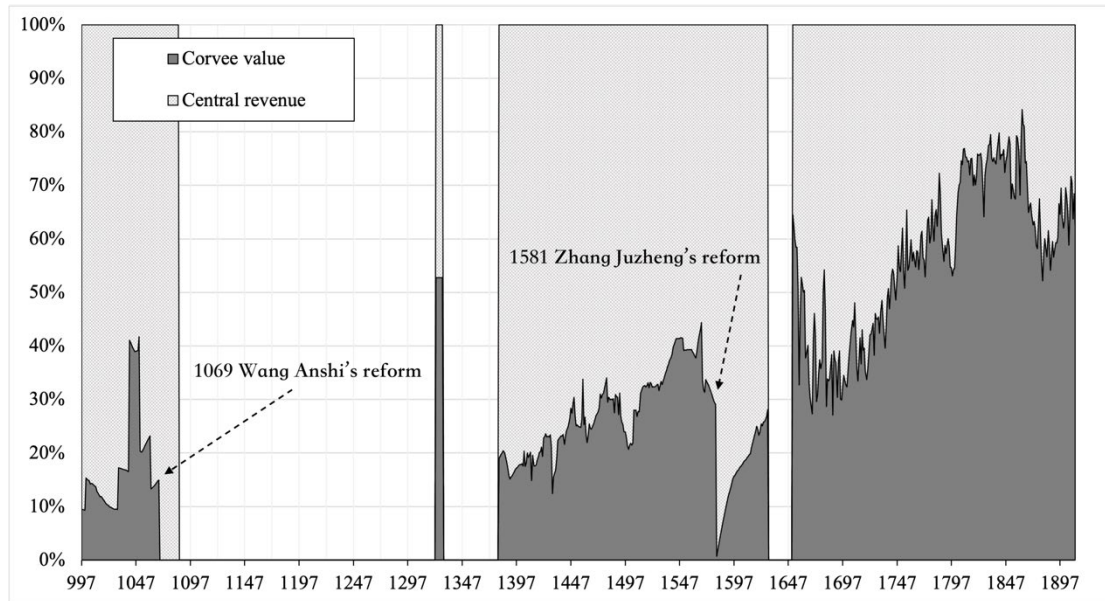


Figure 9 Corvée labor's value, 997-1911 (in taels of silver)

Sources and notes: Direct data for the calculation of the corvée are lacking. We use the total amount of national corvée data converted to money recorded at the time of the two corvée reforms in 1069 and 1581. We then divide it by the total number of households to obtain data per household. We find that the value of the corvée in rice borne by each household over the 500 years was almost the same. We therefore assume that the value of corvée in rice borne by each household was stable over time. From this, we can deduce the monetary value of the corvée labor.

However, from Zhang Juzheng's reforms, corvée in the legal sense gradually ceased to exist. From the Qing dynasty onwards, all legally governmental mandatory labor became employment. Theoretically, the value of the corvée should no longer be calculated. However the so-called Dingyin that supported employment was actually fixed. So in practice different forms of informal income still existed. If we assume that the public services provided by the corvée serves the entire population and that the value received by each person remained stable over time, then when the Dingyin was fixed in a given year, the excess population growth thereafter could not be met by the fixed Dingyin. Some informal extra-legal revenue must therefore arise to make up for the shortfall in expenditure on these public services. For this reason, even though the corvée no longer existed legally from the late Ming dynasty onwards, we can still estimate the value of those "illegal corvée" or informal revenues. This also helps us to understand the reality of the growing informal income during the Ming and Qing dynasties.

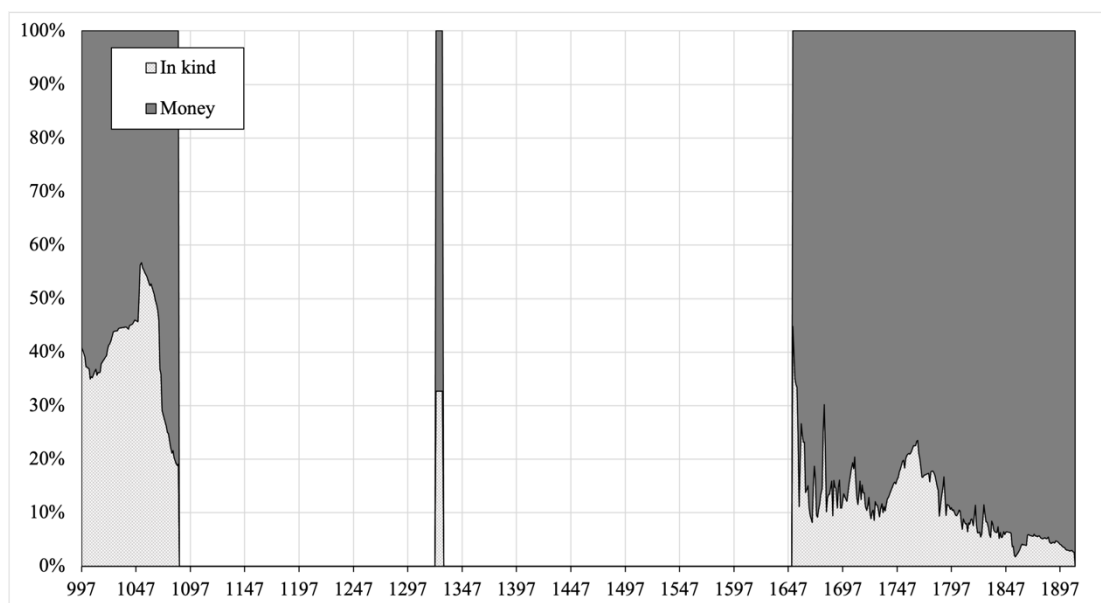


Figure 10 Share of fiscal revenues in kind and in money, 997-1911

Sources and notes: Data comes from this paper. There is only one year of data for the Yuan Dynasty, 1328. In order to show the Yuan situation more clearly in the figure, the data for the Yuan period in this figure is for the years 1323-1329, and the values are all for the year of 1328.

IV. Great Divergence in Public Finance: a Comparison

We are able to put our long-term estimates in a comparative perspective. First, let us compare our main outcome with the widely cited benchmark based study by William G. Liu. Table 4 presents comparison for state revenue and land tax against the five benchmark used by Liu (2005). Overall, the two estimates are fairly consistent but our Song estimate in 1085 is far higher possibly because Liu underestimated the revenue increase following the Wang Ansi reform. Our estimate for Qing in 1685 is also higher than Liu (2005).

Table 4 Comparisons with William G. Liu's estimates

	State revenues (Shi of rice)		Land tax share (%)	
	Our estimates	W. Liu	Our estimates	W. Liu
Song (1085)	98.2	72.1	51	33
Ming (1407)	51.28	47.66	91	96
Ming (1577)	39.52	42.19	86	88
Qing (1685)	50.91	38.04	80	82
Qing (1776)	32.38	36.62	73	75

Table 5 now presents benchmark comparison of total and per capita fiscal revenue across

Eurasia in grams/tons of silver. It shows that Imperial China had the largest total fiscal revenue in nominal silver terms until the 19th century when the rapidly advancing England and France began to overtake China. In per capita terms, China fiscal revenue was one of the lowest in the world from the 17th century. She fell even further behind England that at the time of China's defeat during the mid-19th century Opium War, her capita fiscal revenue was a mere 2% of England.

Table 5 Chinese central revenue: in comparison with major Eurasian regimes

Panel A. Aggregate revenue (tons of silver)							
	China	Ottoman	Russia	France	Spain	England	Dutch R
1650-99	1419	248		851	243	239	
1700-1749	1809	294	155	932	312	632	310
1750-99	2313	263	492	1612	618	1370	350
1800-1849	2121					6156	
1850-99	2589					10941	
Panel B. Per capita revenue (grams of silver)							
	China	Ottoman	Russia	France	Spain	England	Dutch R
1650-99	10.4	11.8		46.0	35.8	45.1	13.6
1700-1749	9.4	15.5	6.4	46.6	41.6	93.5	24.1
1750-99	7.8	12.9	21	66.4	63.1	158.4	22.8
1800-1849	5.5					303.8	
1850-99	6.8					344.1	

Sources: Chinese fiscal and population data, see the text, Broadberry, Guan, and Li (2018), and Maddison (1998). Other countries' data, see Brandt, Ma, and Rawski (2014).

Figures 11 and 12 plot the long-term fiscal revenue for China and England in terms of total and per capita fiscal revenue in silver. Figure 13 add series for shares of GDP with due recognition that GDP estimates for such a long stretch of period remain controversial. We compare with England it has the longest continuous series of fiscal revenue that also saw a fundamental transformation to emerge as the first modern fiscal state.

Figure 11 shows a sharp contrast between a stagnant Chinese revenue series against continuous rising English series. By the 19th century, England finally took over China even in total despite a population difference of about one to ten. Figure 12 shows that Chinese and English per capita fiscal revenue were roughly comparable. But with England advancing steadily, per capita fiscal revenue began to decisively break away from China. By the first half of the 18th century, English fiscal revenue in the wake of the Glorious Revolution was more

than ten times of that China. Given the relatively higher per capita GDP, Figure 13 shows that English series for fiscal revenue as a share of GDP only overtook China in the first half of the 18th century, but then subsequently went in completely opposite directions. It also confirms the striking result while the share of Song fiscal revenue reached as high as 16% of GDP - possibly an unprecedented level globally in the Medieval period -, per capita fiscal burden were very low at below 4% and during the Qing even below 2% of the GDP.

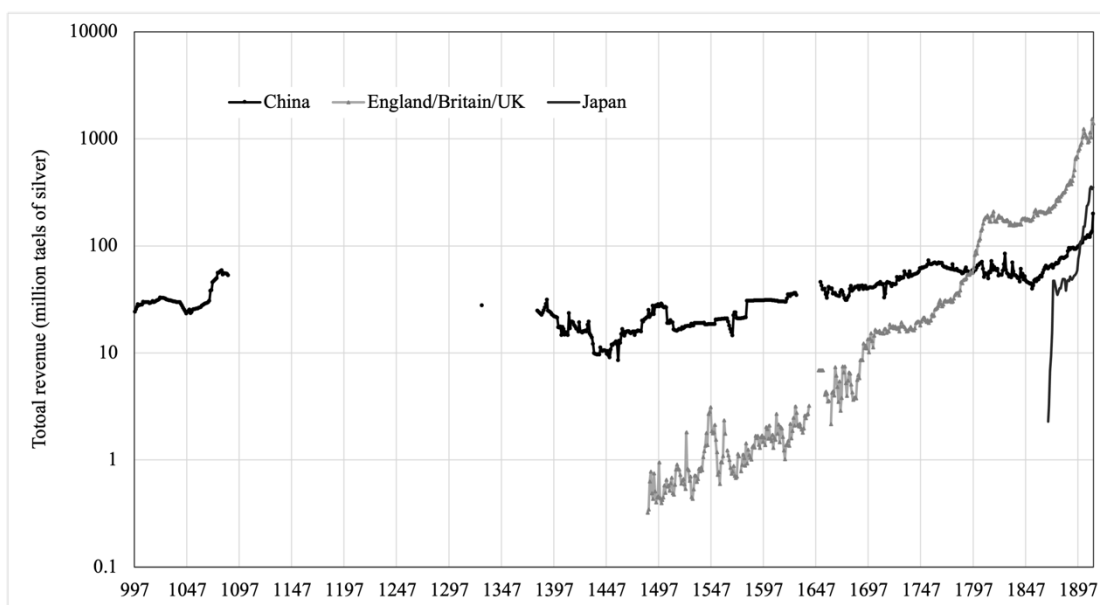


Figure 11 Chinese central government revenue: in comparison with England/Britain/UK and Japan, 997-1911 (in silver taels)

Sources and notes: Fiscal revenue data are from this paper. British data are taken from “A millennium of macroeconomic data for the UK, version 3.1” by the Bank of England (2018) (<https://fred.stlouisfed.org/categories/33839#>). Silver-GBP exchange rate data are from GPIH database (<https://gpih.ucdavis.edu/Datafilelist.htm>). Japanese fiscal data are taken from LTES ???. Japanese GDP data come from Fukao and Makino (2021).

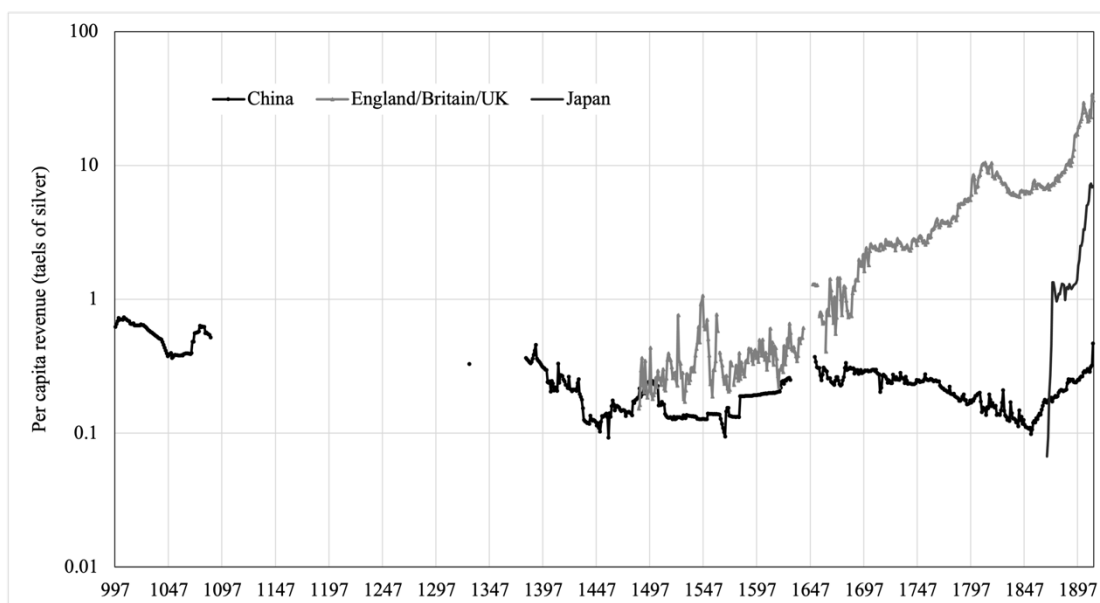


Figure 12 Chinese central government revenue per capita: in comparison with England/Britain/UK and Japan, 997-1911 (in silver taels)

Sources and notes: Fiscal revenue data are from this paper. British fiscal and population data are taken from “A millennium of macroeconomic data for the UK, version 3.1” by the Bank of England (2018) (<https://fred.stlouisfed.org/categories/33839#>). Silver-GBP exchange rate data are from GPIH database (<https://gpih.ucdavis.edu/Datafilelist.htm>). Japanese fiscal data are taken from LTES volume ????. Japanese GDP data come from Fukao and Makino (2021).

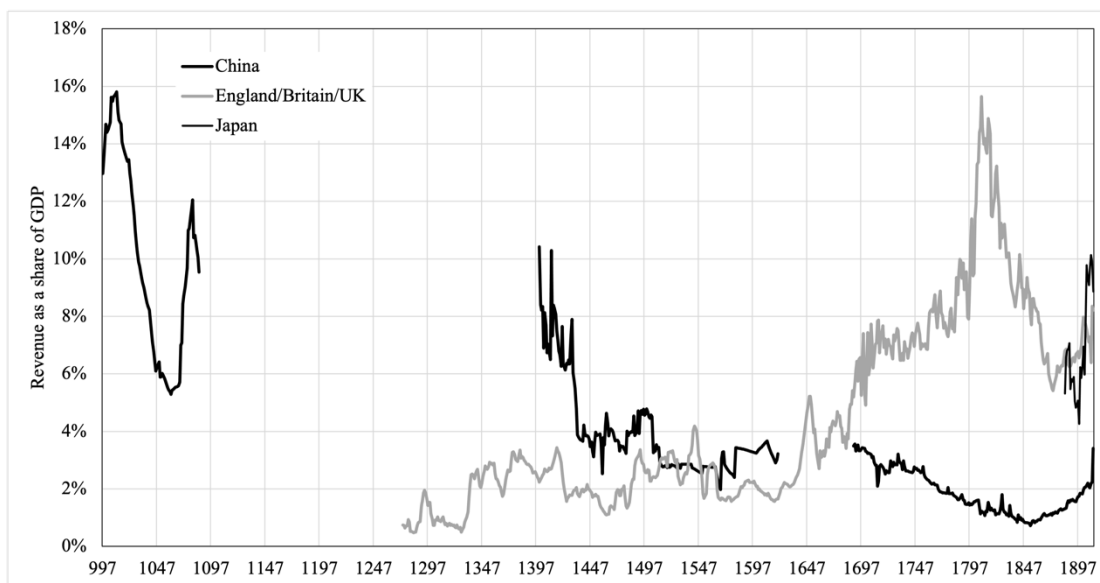


Figure 13 Chinese central government revenue as a share of GDP: in comparison with England/Britain/UK and Japan, 997-1911 (in percent)

Sources and notes: Fiscal revenue data are from this paper. Chinese GDP data from 997-1840 are derived from Broadberry, Guan, and Li (2021). GDP data from 1840-1911 comes from Ma and de Jong (2019). British data are taken from “A millennium of macroeconomic data for the UK, version 3.1” by the Bank of England (2018) (<https://fred.stlouisfed.org/categories/33839#>). Japanese fiscal data are taken from LTES volume ????. Japanese GDP data come from Fukao and Makino (2021).

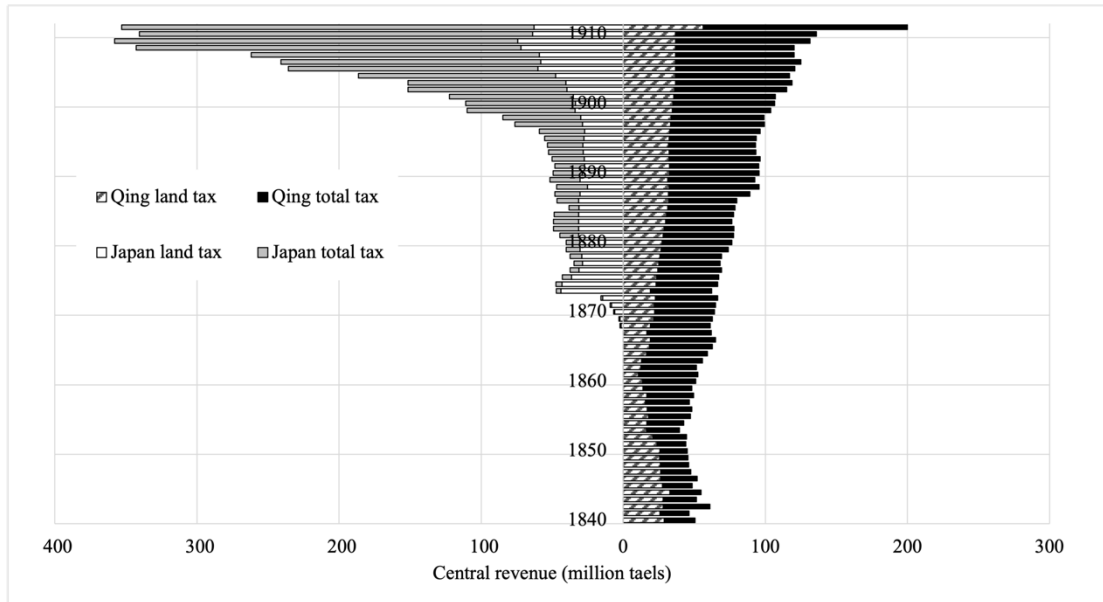


Figure 14 Chinese central government revenue: in comparison with Japan, 1840-1911
(in silver taels)

Sources and notes: Chinese data are from this paper. Japanese data are the same as before.

Finally, figures 11 through 13 plotted the Japanese revenue series from the Meiji period as a comparison with another East Asian nation that shared similar cultural heritage with China but rapidly modernized after the 1868 Meiji Restoration. Figure 14 puts this contrast in sharp relief. Japanese fiscal revenue started from modest level even compared with China. It is striking that total Japanese fiscal revenue relied even far more heavily on traditional land tax than China in the second half of 19th century. However, by the 1890s Japanese fiscal revenue began to take off largely driven by the sharp rise in taxation on excise tax on monopoly commodities and possibly the huge war reparation extracted from China's naval defeat in 1894-96.

Summary (*incomplete*)

Based on the calculation of fiscal revenue and land tax data in some benchmark years of the Song, Yuan, Ming and Qing Dynasties in my country, we present the first set of long-term fiscal revenue series for a whole millennium. Based on our data set, we aim to build further analysis on the relationship between taxation, warfare and state capacity.

Data Appendices

A1 The Song dynasty

A1.1 Overview

The formal revenues of the central government in the Song Dynasty are composed of “agricultural” taxes, “indirect” taxes and others. When it comes to “agricultural” tax, actually, as mentioned above, “agriculture” here is not agriculture in the strict sense. Because poll tax was still included in agricultural tax during this period and poll tax was not only for the agricultural sector, but for all eligible households in the country. However, given that it’s difficult to clearly distinguish poll tax from agricultural tax in historical Chinese fiscal structure, the “agricultural” tax we refer to here includes both the taxes generated in the narrow sense of agricultural production and the wider poll tax, that is, the land-poll taxes 人口-土地税 mentioned above. Specifically, twice-a-year tax 两税 and its surtax 折纳、加耗, poll tax and Green Shoots Law 青苗法 and revenue from corvée exemption generated by Wang Anshi’s reform are counted into “the land-poll taxes”. The twice-a-year tax in the Song Dynasty was levied both in kind and in money terms. The types of in-kind revenue were varied, including grain (millet, rice, wheat, panicum 黍, bean, etc.), cloth (leno 罗, damask silk 绫, thin silk 绢, yarn 纱, silk 绸, thread, cotton, cambric 布葛, etc.), metals (gold, silver, iron, copper), and local specialties (livestock, ivory 齿, leather, feather, fur, tea, salt, bamboo, wood, hemp, hay, fruit, herbal medicine 药, oil, paper, firewood 薪, charcoal, lacquer, wax, etc.). The twice-a-year tax levied in summer was mainly cloth, and the one levied in autumn was mainly grain. It should be noted in particular that miscellaneous items other than cloth and grain were not duplicated with the excise revenue or the “indirect taxes” later. In other words, we cannot fully incorporate the historical facts of the Song Dynasty in accordance with the contemporary standard of “agricultural tax”, which is the same in other periods of pre-modern China.

Indirect taxes mainly includes excise revenue or monopolization income (salt, tea, wine, vinegar, etc.), mining revenue (gold, silver, copper, iron, tin, lead, etc.), tariff and other miscellaneous taxes (commercial tax, customs 市舶, state-owned trade 市易, forced textiles trading 预买, license selling on monk and Daoist priest 度牒, etc.). The above items may not fully include all taxes throughout the Song dynasty, but they can be considered to include nearly

all formal revenues of the central government.

A1.2 The land-poll taxes (the “agricultural” tax)

The tax records of the Song Dynasty are mainly founded in *Song huiyao jigao* (Collected Statutes of the Song Dynasty) 宋会要辑稿, *Songshi shihuo zhi* (Food and Commerce Treatise of the Song History) 宋史食货志, *Xu zizhi tongjian changbian* (Extended Continuation to “Comprehensive Mirror in Aid of Governance”) 续资治通鉴长编, *Wenxian tongkao* (Comprehensive Examination of the Literature) 文献通考 and other notes of scholars. Although there are a lot of data at the macro level, the customary recording method of the Song dynasty is in the form of “*Guan shi jin pi liang* 贯石斤匹两”, which is essentially equivalent to simply aggregate the revenue of different units without unit, thus making the result nearly meaningless. Although in the historical documents there are some government revenues documented by repositories 库藏 in 1021, 1086 and the Southern Song dynasty (Wang 1995: 688-695), these records may not be suitable for calculating the fiscal revenue of the Song dynasty. On the one hand, these data are mainly documented based on the levied money and goods and do not contain specific details of tax sources, thus we can only see various final physical items or monetary items such as money, grain and cloth. On the other hand, considering that the aggregation of those different repositories may not cover all fiscal revenues and that there may be transfer payments among those repositories (Hartwell 1988), it’s hard to determine whether these data are the complete fiscal revenue. Therefore, we choose to make the calculation respectively according to the specific items of fiscal revenue discussed above.

The first item is the twice-a-year tax 两税. In historical documents, there are four concretely recorded years (997, 1021, 1064, and 1077) and one indirectly recorded year (1086) of data for the tax (Wang 1995: 53, 688-692). The former are recorded detailed in the form of grain, money, thin silk 绢 and some more trivial items like cotton, tea, firewood, charcoal, and feather, respectively. The latter is simply all the in-kind and monetary revenues received by the central government in 1086 without explicit information on the type of tax. For the data of the first four years, we mainly use grain, money and thin silk in concrete calculation. The price data of grain and thin silk come from Peng (2015: 356-371). For other items that vary from year to

year, we are not going to calculate them specifically. On the one hand, the prices of those items are not readily available. More importantly, those items only account for a very small proportion of twice-a-year tax (a little less than 10%, according to the rough calculations using price data from Cheng (2008: 214-228, 232-256, 320, 328, 527-529, and 535-542). So we give a 10% share estimate to the twice-a-year taxation revenue other than grain, money and thin silk. In addition, it should be noted that the records of grain revenue in 997 and 1021 in the *Xu zizhi tongjian changbian* (Extended Continuation to “Comprehensive Mirror in Aid of Governance” 续资治通鉴长编) and *Qunshu Kaosuo* (Examination of the Extensive Books 群书考索) are different from the records in *Wenxian tongkao* (Comprehensive Examination of the Literature, 文献通考), with a gap of nearly 10 million *shi*, which makes the revenue of grain in *Wenxian tongkao* surpass 30 million *shi*, significantly different from the average level of 20 million *shi* in subsequent years. This case is hard to understand considering there were no big changes in cultivated land and population in the Northern Song dynasty. We determine that there may have been a printing error in the original record. Therefore, we choose the data documented in the *Xu zizhi tongjian changbian*, which is more consistent with subsequent years, as the basis for calculating twice-a-year taxation revenue. In the year of 1086, we do not have a direct record of twice-a-year tax, but the data in 1064 show that the grain revenue in the twice-a-year tax accounted for 67% of the total grain revenue in that year and the money in twice-a-year tax revenue accounted for 13.4% of the total money income, which is similar with the situation in 1021 (Wang 1995: 689-691). Therefore we use the proportions in 1064 to indirectly derive the twice-a-year tax revenue in 1086. However, it should be noted in particular that in the total fiscal revenue of 1086, the silk 细绢 revenue was only 1.51 million *pi*, which was significantly lower than the level of nearly 10 million *pi* in 1021 and 1064’s total fiscal revenue, but was close to the level of the silk revenue in 1021 and 1064’s twice-a-year tax (Wang 1995: 689-691). In the absence of better evidence, in order to keep consistency with the level of the previous years, we set the silk revenue in twice-a-year tax in 1086 as 1.51 million *pi*. Then the total twice-a-year tax revenue in these five years above are all available.

Theoretically, poll tax revenue should keep pace with population growth, but we notice that the poll tax revenue kept a fixed value for a long time following the early years of the

Northern Song dynasty. Although evidence shows that the total poll tax revenue in 1186 in the Southern Song dynasty had already been very different from the fixed level in the early Northern Song, we still believe that the poll tax was levied at a fixed total amount for most of the Northern Song periods. Therefore, we take the fixed value in the early Northern Song (450400 *guan*) as the poll tax revenue level during most of the Northern Song dynasty (Huang 2013: 479).

The Green Shoots Law started in 1069 and ended in 1085. We can find two numbers about it, respectively in 1074 and 1083 (Huang 2013: 463). Its revenue is nearly 2.9-3 million *guan*. The revenue from corvée exemption started in 1071. We find one number in 1084 (Huang 2013: 457). The revenue from corvée exemption was based on population, so we can assume that the corvée exemption revenue per capita in grain was constant. Then we can get the total revenue from corvée exemption in various years based on the population data⁴. It's worth mentioning that during the reign of Emperor Huizong 徽宗 in the Northern Song dynasty, there appeared another revenue from corvée exemption called *Mianfu qian* 免夫钱, which was a big sum of money, increased from 17 million *guan* in 1100 to 62 million *guan* in 1126 (Huang 2013: 484). But the time of the item is beyond the scope of this paper, so it does not affect our calculation.

Revenue from rent and sale of the state-owned farmland also formed part of the central revenue, but due to missing data and minimal impact we do not calculate them in this paper.

A1.3 Revenues from Industry and Commerce (the “indirect” tax)

When it comes to the excise revenue in indirect taxes, we start with salt. Guo Zhengzhong (1990: 674-677) provides comprehensive data on the revenue of salt industry in the Song dynasty in his *Songdai yanye jingjishi* (History of the Salt Industry in the Song dynasty). From 997 to 1202, there are 23 data, among which 12 are from the period during which twice-a-year tax existed (997-1086). For some cases that the time of data is an interval form, we choose the middle year of that period as the time of the data. It's worth mentioning that in the late Northern Song dynasty, the data of salt revenue may include the production cost of salt, but since the salt profit was generally much larger than its cost, this problem will not have much impact on our

⁴ The population data come from Broadberry, Guan, and Li (2018). We set each person was levied about 0.38 *shi* of rice in 1084.

calculation.

Li Huarui (1995: 359-368) provides the data of wine revenue in his *Songdai jiu de shengchan he zhengque* (The Production and Excise of Wine in the Song dynasty). We can find 13 data from 995 to the end of Qiandao 乾道 (about 1173), among which there are about 10 available data within our research scope (from 997 to 1086). According to Li's research, we set the profit ratio of wine in the Song dynasty as 60%, thus we can obtain the net income of wine industry.

For the tea profit in the Song dynasty, we can find 11 data from 970 to 1109. Except for the data in the 2nd and 3rd years of Jiayou 嘉佑, which are documented in *Songdai jingjishi* (History of the Economy in the Song Dynasty) by Qi Xia (1987: 800-801), the rest of the data are all from Huang Chunyan (2013: 539-542). It should be noted particularly that, due to the implementation of the Trade Law 通商法 in 1059, the tea profits data recorded before may exist "overestimation 虚估", so we use the profit ratio of 0.55 provided by Huang to get the tea profit before 1059.

We choose the most important minerals including gold, silver, copper, iron, lead and tin to calculate the mining revenue. The data come from *Songdai kuangyeye yanjiu* (Research on the Mining Industry in the Song dynasty) by Wang Lingling (2005: 59-60). We find 10 time points during the period of 997-1188, among which there are about 8 available data in our study period.

Commercial tax data come from *Songdai jingjishi* by Qi Xia (1987: 1009) and *Beisong shangshui tongji jiqi jianxi* (Statistics and Analysis of Commercial Tax in the Northern Song Dynasty) by Cheng Minsheng (1988). We obtain 9 available data. The state-owned trade started in 1070 and we find 3 available data (Huang 2013: 569-576). For the customs, we find about 6 data from 977 to 1159, and there are 3 available data in our study period (Huang 2013: 580).

A.4 Seigniorage and Others

Other items do not account for a large proportion. We choose the available data of the items that have relatively important impact, such as religious license selling and forced textiles trading 和预买. The revenue from religious license selling started in 1068. We can find 19 data from 1068 to 1174 in historical documents, and there are 15 available data in our study period

(Huang 2013: 490). It should be noted in particular that these historical records are mainly about the number of the license selling on monk and Daoist priest, which was in denomination of “*dao*”. According to Huang Chunyan, we derive the revenue of each license based on the principle of 120 *guan* per *dao* before the 6th year of Yuanfeng 元丰, 130 *guan* per *dao* in that year and 90 *guan* per *dao* during the Dagan 大观 years. In the calculation of the revenue from forced textiles trading, it needs special explanation that before 1078, the mechanism of “public loan and then private repayment of cloth” under the forced textiles trading system had not broken down, so it was considered that there was no obvious profit during that period. Therefore, we believe that there was no revenue from forced textiles trading before 1078. After 1078, according to Huang’s research, we calculate the revenue from forced textiles trading on the basis of a profit ratio of 50% and the total amount of 1 million *pi* per year (Huang 2013: 463-467).

A1.5 Aggregation

Considering that the data of each revenue item available usually include different years, we use the five time points of twice-a-year tax (997, 1021, 1064, 1077 and 1086) as the benchmark for the whole calculations. For other items, we apply linear interpolation to get the data in years between 997 to 1086. For the aggregation of different items with different units, we use price data from Cheng Minsheng and Peng Xinwei for transformation⁵. All units are transformed in silver to facilitate the aggregation. Following such steps, the central revenue in the Song dynasty from 997 to 1086 can be summed up. It should be noted that, considering that the raw fiscal data of the Northern Song dynasty are not completely continuous, the result essentially reflects the long-term trend better than the short-term fluctuations.

A2 The Yuan dynasty

A2.1 Overview

The fiscal revenue in the Yuan dynasty follows the Song dynasty. Its tax items are very similar with its predecessor, and can still be roughly divided into the mix of land and poll taxes

⁵ The prices of grain, thin silk, gold and silver come from Peng (2015: 356-374); the prices of copper, iron, lead and tin come from Cheng (2008: 268-290).

on the entire registered population (including twice-a-year tax and poll tax charged on household 科差), indirect taxes (revenues from industry and commerce, including excise, mining revenue, tariff and others), seigniorage tax and other miscellaneous taxes.

A2.2 The land-poll taxes (the “agricultural” tax)

Different from the Song dynasty, twice-a-year tax did not dominate the agricultural tax in the Yuan dynasty. The Mongol regime’s unique household tax (poll tax) and land tax, which were mainly based on households and farmland, appeared in Northern China. This taxation system was actually similar to *Zuyongdiao* 租庸调 or *Juntian zhi* (land equalization system 均田制) before the Twice-a-year taxation reform in the mid-Tang dynasty. Taxable entities of all these systems took “headcount or household” as the dominant factor, although there were some differences in details (Chen and Shi 2000: 541-552). Southern China mainly continued the twice-a-year taxation system in the Song dynasty. But in some areas, the twice-a-year tax levied in summer was different from that in the Song dynasty (Chen and Shi 2000: 552-567). The tax above can be called *Shuiliang* (grain tax 税粮). Besides *Shuiliang*, another difference with the previous dynasty is that the Yuan dynasty levied another unique household tax, namely poll tax charged on household, *Kechai* 科差. The content of its collection was mainly composed of *Baoyin* 包银 and *Siliao* 丝料. *Baoyin* levied in money and *Siliao* levied in kind.

Fiscal data of the Yuan dynasty is quite scanty, which are mainly recorded in *Yuanshi shihuo zhi* (Food and Commerce Treatise of the Yuan History 元史食货志). Complete data may only be available for 1328 and 1329, with the 1328 data being relatively closer to the overall fiscal revenues. The data of *Shuiliang* are composed of *Xiashui* (tax levied in summer 夏税) and *Qiuliang* (grain levied in autumn 秋粮). *Xiashui* was denominated in *Chaoding* (paper money), while *Qiuliang* was levied in kind. We use the grain price data from Peng Xinwei (2015: 452) to convert the in-kind revenues of *Qiuliang* into *Chaoding*.

The record of *Kechai* charged on household of 1328 in *Yuanshi* (History of the Yuan 元史) seems to be incorrect. On the one hand, its categories are not only the regular *Baoyin* and *Siliao*, but also shell, thin silk, cotton and cloth, which should have been recorded in *Shuiliang*. On the other hand, the previous *Kechai* charged on household was about 50-100 thousand *Chaoding*, but now only 989 *Chaoding* were recorded in 1328. Chen and Shi (2000: 590-591)

notice that the number of *Siliao* in 1328 is very close to that in the past and seems reasonable, so the problem should be that the data of *Baoyin* is clearly wrong. For the data of *Baoyin* in 1328, we refer to the 110 thousand *Chaoding* reported in 1324 by the officers Zhang Gui et al. at the time. The reason why we choose this number is that it is within the quantity range in the period from Zhongtong 中统 to Zhiyuan 至元 and also the time of this data is close to 1328. We use the price data from Huang (2008: 102) to calculate the rest value of silk, thin silk 丝/绢, and the price data from Li (2014: 41) to get the value of cotton and cloth. The price of shell coin is referred to Peng (2015: 419).

A.2.3 Revenues from Industry and Commerce (the “indirect” tax)

The indirect tax in the Yuan dynasty were also known as *Zhuse kecheng* (all kinds of excises 诸色课程), including metal minerals (gold, silver, copper, iron, lead, tin, and alum), salt, tea, wine, vinegar, commercial taxes (including customs duties) and revenue from local specialties 额外课 (32 items including *Liri* 利日, *Qiben* 契本, *Hebo* 河泊 etc.) (Liu 2015: 566-618). We use the data in 1328 recorded in *Yuanshi shihuozi* (Liu 2015: 617-618). The price data of gold and silver come from Huang (2008: 5-6). The price of copper and iron come from Li (2014: 73-74). We cannot find the price data of lead, but the data in the early Ming show that there was not much difference between the prices of lead and copper (Huang 2008: 296). Therefore, we refer to the price of copper as a substitute.

A.2.4 Seigniorage and Others

Seigniorage revenue in the Yuan were different from other dynasties. Unlike other dynasties that mainly use metal currency, paper money that features prominently in the Yuan dynasty hardly had much mint cost. According to Peng (2015: 466), we set the mint cost at 3%. We use the paper money amount issued in the first year of Tianli 天历 period to get the seigniorage at that year (1328) (Peng 2015: 440), which accounts for nearly 8% of the total agricultural tax and indirect tax and is slightly higher than that in the Northern Song dynasty. Other items are not in our calculations due to insufficient data and also small impact.

A3 The Ming dynasty

A3.1 Overview

The fiscal revenue structure of the Ming dynasty follows the Yuan and can still be divided into agricultural tax and indirect tax. Agricultural tax is a mix of land and poll taxes that covered almost all the registered population. Indirect tax is the revenue from industry and commerce that mainly comes from non-agricultural activities. It should be noted in particular that the twice-a-year tax as the agricultural tax in the Ming dynasty was more mature and the poll tax of previous dynasties had been gradually abolished. In other words, to some extent, the mix of land and poll taxes in the Ming dynasty are closer to the land tax in normal sense. The taxes that levied on households or headcounts in previous dynasties had been completely transformed into corvée labor. It should be noted that the corvée, despite its large scale, had already begun to be paid in silver at a very early stage at the local level on a spontaneous basis, a trend that was not formalised into law until Zhang Juzheng's reign as Prime Minister, known as the One Whip Law 一条鞭法. Local gazetteers from the Wanli Period usually contain item called "Dingyin" 丁银, which is the tax item generated after the transformation of corvée and is actually equivalent to a type of poll tax. In the Qing dynasty, *Didingyin* 地丁银 was the general name of sum of the land tax and poll tax.

Indirect tax came from industry and commerce, mainly including salt tax, tea tax, mining tax and miscellaneous tax. Actually, the indirect tax in this period still followed the previous principle, but many miscellaneous items like commercial tax, wine and vinegar, fishery tax, and transaction tax (deeds, etc.) were included in the miscellaneous tax, and the proportion was very small compared to Song and Yuan. Other revenues that have relatively large impact also include paper money issued in the early Ming dynasty. As for other items, we do not calculate them such as penalties due to the limited data and the small impact.

A3.2 The land-poll taxes (the "agricultural" tax)

Compared with the land-poll tax of the previous dynasties, the structure of this revenue in the Ming dynasty was very clear, with the main components being the twice-a-year tax, farm rent, and the revenue from the garrison reclamation 军屯. In terms of records, compared to the fragmentary splicing of multiple sources in the previous dynasties, the original records of the

Ming dynasty are also very complete due to the survival of the Ming Shilu (Veritable Records of the Ming Dynasty 明实录). We have obtained direct tax records of 144 years from 1381 to 1626 in Ming shilu leizuan: jingji shiliao juan (Veritable Records of the Ming dynasty Compiled by Category: Volume of Economic Historical Materials 明实录类纂: 经济史料卷) (Li and Yang 1993: 429-515). Specifically, before 1464, the raw records did not differentiate between rice and wheat in twice-a-year tax, while after 1464, rice and wheat were documented separately. Therefore, we segment the data before 1464 by the ratio of rice and wheat after 1464. In addition to rice and wheat, we also calculate value of items like cloth, silk, cotton, paper money, and others. Except for twice-a-year tax, we calculate the size of *Tuntian zili* (revenue from the garrison reclamation 屯田子粒). Revenue from item like Water Transport of Grain 漕运 was also calculated. It should be noted that the tax deduction and exemption recorded in Ming Shilu is also included in our calculation. Besides, the extra-legal revenue 三饷加派 that started from the 47th year of Wanli (1619) is also added in our consideration (Liang 2008: 529).

It should be noted in particular that the records in Ming shilu used physical items as accounting units, but the phenomenon of converting physical items into money existed throughout most of the Ming dynasty. Even in the late Ming dynasty, almost all revenues were collected and received in silver. However, silver was not legal tender at that time. In most of the Ming dynasty, the official units of fiscal account were the physical items that had been determined in the Hongwu period. Therefore we need to use price data to convert all physical items recorded in Ming shilu into silver. The official conversion price was not based on the market price in many cases. So the prices we use are mainly based on the time series data of rice price provided by Peng Xinwei. The official conversion ratios given in *Ming huidian* (Collected Statutes of the Ming Dynasty 明会典) and *Wanli kuaijilu* (Accounting Records in the Period of Wanli 万历会计录) are use as the relative value of different physical items (Wan and Xu 2015). The rice price data of Peng come from about 400 observations in different areas of the country documented in *Ming shilu*. Since most of these observations are official conversion data, it is reasonable to use them to reflect changes in official conversion price. To some extent, that is why the rice price data provided by Peng were once criticized for not reflecting market price changes by Hu Tieqiu and others (Hu 2016; Qiu 2018: Appendix Six).

Prices of gold, silver, copper, and paper money (*Baochao* 宝钞) are taken from Peng Xinwei (2015: 468-482).

Although the phenomenon of converting corvée into silver appeared very early, corvée money did not become nationwide legalized until the implementation of One Whip Law in the reign of Zhang Juzheng during the early Wanli period (Liang 1952). Therefore, it can be assumed that corvée money had come into official possession of the central government since then. This is similar to the revenue from corvée converting during the Wang Anshi's reform in the Song dynasty. However, the documents of the central government in the Ming dynasty did not show how large the sum of corvée money was, neither in Ming shilu nor Wanli kuaijilu nor Ming huidian. One idea is to take the fact that the fiscal system in the early Qing periods followed the Ming as the starting point. Considering the long-term impact of “frozen fiscal system (quota 原额)”, the poll tax (*Dingyin* 丁银) records in the early Qing dynasty can be used as a substitute of corvée money in the late Ming dynasty. But different from the land tax, which was committed to restoring the Ming's quota, due to the large decrease of the population in the early Qing dynasty, size of Dingyin revenue of about 3 million taels, which was provided by the early Qing government that was conducting a new census, may be unable to reflect the situation in the Ming dynasty (Shi and Xu 2008: 20). Another approach is to attempt to directly calculate the value of corvée in the Ming dynasty.

Lijia (grassroots governance 里甲), *Junyao* (regular service 均徭), *Yichuan* (transport 驿传) and *Minzhuang* (military corvée 民壮) are the four common kinds of corvée in local government in the Ming dynasty. In addition, there were also artisans serving the central government in routine. The local gazetteers in the late Ming dynasty have a detailed description of corvée money, of which the best quality records are about the *Junyao* money 均徭银. The *Junyao* money was levied from each family according to the number of household registered officially, under the rule of “one family providing one labour for corvée 一户一役”. According to “*Shichang, jingdaihua, jingji shilun*” (Market, Modernization, and Economic History) by Wu Chengming (1996: 262), based on 149 conversion prices of *Junyao* corvée, Wu find that *Junyao* money was about 7.5 tael per person. In the Ming dynasty, each registered labor took turns working for corvée service every ten years, which was equivalent to about 0.75 tael per

household a year nationwide. According to the more records from 168 counties in gazetteers, we re-compute that *Junyao* corvée money was equivalent to about 0.55 tael per household, which does not have much difference with the calculation of Wu. Based on our new results, combined with household registration data, we can estimate the size of *Junyao* corvée money. Except for *Junyao* money, there were also *Lijia* money and other corvée money, which constitute “the four common kinds of corvée” mentioned above. Based on the data of 78 counties recorded in the local gazetteers around the country, we calculate and find that the sum of four kinds of corvée money roughly equaled 1.48 times of *Junyao* money. Therefore, the formula we use to calculate the sum of four kinds of corvée money is:

Sum of four kinds of corvée money = the number of households registered \times 0.55 \times 1.48.

As for the artisans, according to the calculation in *Zhongguo zibenzhuyi fazhangshi diyijuan* (The History of Chinese Capitalism, Vol. I) compiled by Xu Dixin and Wu Chengming (1985: 114-120), the total number of artisans nationwide equals 17% of the number of households registered. The artisans on duty by turns every four years accounted for 90% of all the artisans and their corvée money was 0.45 tael per person every year. The artisans on duty permanently 住坐匠 were treated in similar way. Therefore, the formula for artisan corvée money is:

The artisan money = the number of households registered \times 17% \times 0.45. Thus, the total corvée money nationwide mentioned above in 1581 was nearly 9 million taels of silver.

A3.3 Revenues from Industry and Commerce (the “indirect” tax)

Revenue of salt, tea, mining, and miscellaneous taxes are also taken from Ming shilu. The data coverage time is consistent with the agricultural tax, and the calculation of converting different physical items into silver is still referred to the above method.

A3.4 Seigniorage and Others

As in the Song dynasty, currency in the Ming Dynasty was mainly paper money and copper coins. But unfortunately, there was no accurate data on the amount of currency in circulation in

the Ming dynasty. Compared with the Song dynasty, the mintage size in the Ming dynasty was very small. The indiscriminate issuance of paper money (*Daming Baochao* 大明宝钞) in the early Ming dynasty led to a collapse in the credibility of paper money system. They were eventually unable to be recognized by the market as was the case in the Yuan dynasty, where paper money maintained their status as legal tender for almost a century. The amount of copper coins minted in the Ming dynasty was much smaller than that in other dynasties (Peng 2015: 468-482), thus making the mintage size in the whole Ming dynasty considerably small. We can generally believe that since paper money was still widely circulated in the market with an increasing inflating trend during the period of Hongwu 洪武 and Yongle 永乐, the seigniorage revenue at that time may exceed the 8% of the Yuan dynasty. While in the subsequent period, it might be much lower than the 3% of the Northern Song dynasty. Therefore, we can roughly assume that before the period of Xuande 宣德, the seigniorage revenue in the Ming dynasty might be around 10% of the total direct/agricultural tax and indirect tax. However, the seigniorage profit in subsequent years might be negligible. As for other items, we do not add them in our calculation due to the lack of data and their limited impact.

A4 The Qing dynasty

A4.1 Overview

The fiscal system of the Qing dynasty can be divided into two stages, namely the early period (before the mid-19th century) and the late period (after the mid-19th century). The former followed the fiscal system of the middle and late Ming dynasty, which was composed of the land-poll tax (dominated by *Didingyin*, namely twice-a-year tax and corvée money), indirect tax revenues from industry and commerce (dominated by salt tax, tariff, and miscellaneous tax) and other revenues (dominated by Keju titles selling 捐纳 and donations 报效). The land-poll tax and revenues from industry and commerce were consistent with the system in the middle and late Ming dynasty, while some revenues in earlier dynasties like revenues from tea, wine, mining, deeds etc. were included in the miscellaneous tax 杂课. In other words, the number of various tax items in other dynasties did not decrease essentially, but since the amount of these tax items was much lower than that in the Song and Yuan dynasties,

they were all classified as the miscellaneous tax in the Ming and Qing dynasties. This is also a big difference between Ming-Qing fiscal system and the earlier dynasties. Another distinctive feature of the Qing fiscal system was that some unusual revenues in previous dynasties like Keju titles selling and donations became increasingly important. The customary Keju titles selling revenue, which was a fixed amount, even remained at about 3 million taels for a long time (Ni 2017a: 59), nearly accounting for 5-10% of the total fiscal revenue. In addition, there were also some temporary Keju titles selling revenues that were levied occasionally. Besides, the donations from merchants also played an important role. The donations from salt merchants on military, water works, relief, etc. greatly eased the financial difficulties in some periods (Ni 2017a: 60).

In the late Qing dynasty, apart from the original fiscal system, there were two new sources of revenue appearing. Foreign tariff was a major innovation in this period. By establishing a modern tax administration system and employing professional managers, the Foreign customs system, with non-Chinese as its chief officer, greatly improved the tariff revenue in this period (Ni 2017b). Another new source of revenue was Likin 厘金 (similar to a local commercial tax). Due to the political and fiscal pressure caused by Taiping Rebellion and other rebellions, the central government of the Qing dynasty had to delegate its fiscal power to local governments and allow them to raise their own funds (Deng 2021). This is probably the first time in Chinese history after the late Tang dynasty that local governments separated so heavily from the central government in terms of fiscal power. In addition, in the late 19th century, as China entered the world market system, many different sources of revenues were generally developed, such as the seigniorage profit from the temporary restoration of paper money in the period of Taiping Rebellion, the establishment of state-owned enterprises in the Westernization Movement 洋务企业, the emergence of foreign debt, bonds, and modern financial market, or the Copper Coin Reform 铜元改革 in the late 19th century and early 20th century. These “new” sources of revenue increased the total revenue of the Qing governments (both central and local) to a large extent. However, many of these revenue categories were not included in central fiscal system, so they are not added in our calculation. We mainly focus on new changes in tariff, Likin, and modern enterprises.

A4.2 The land-poll taxes (the “agricultural” tax)

Compared with previous dynasties, fiscal data in the Qing dynasty are of higher quality. The cross checks of different historical publications and archives enables us to clearly figure out the true meaning of each records. The quality of data in the Qing dynasty is obviously higher than the vague fiscal entries documented in literature of previous dynasties. However, there is still no unified document including all the revenue records in the Qing dynasty. Therefore, we still need to search a large number of different materials to obtain a continuous fiscal revenue series.

The land-poll taxes (indirect/agricultural tax) in the Qing dynasty mainly consisted of *Didingyin* (twice-a-year tax and poll tax) and physical revenues like grain and fodder. There are detailed annual data of “*Diding qianliang*” (revenue of twice-a-year tax and poll tax 地丁钱银) from 1651 to 1734 in *Qing shilu* (Veritable Records of the Qing Dynasty 清实录) (Department of History, Nankai University 1959: 9-35). We tend to think that this data can reflect the actual tax received. According to Chen Feng’s (2013c: 213-228) discussion on the records of salt tax in *Qing shilu*, the data in the early Qing dynasty are reliable. However, Chen believes that after the Revolt of the Three Feudatories 三藩之乱, the salt tax data recorded in *Qing shilu* were only “frozen figures 原额”, not reflecting the real salt revenue received, which should have shown a decreasing pattern. Actually, in this period, the revenue of twice-a-year tax and poll tax did also show a certain trend of “frozen figures”, which means the data in this period probably could not reflect the real situation. However, considering that unlike salt tax, agricultural taxes like *Didingyin* strictly abide by the “quota system”. And in the late 17th century and early 18th century, the fiscal situation of the Qing government was getting better and better (Shi 2009), so the situation that real revenue did not reach the quota was not so severe at the time. Therefore, we believe that even if the data after the Revolt of the Three Feudatories documented in *Qing shilu* were not actual levies, they should not be too far from the actual amount received, and therefore could be used. After 1734, *Qing shilu* no longer recorded the revenue of twice-a-year tax and poll tax, so we refer to the data of 1753 and 1766 recorded in *Qingchao wenxian tongkao* (Comprehensive examination of the literature of Qing Dynasty 清

朝文献通考) and *Qingshi gao* (Draft history of the Qing 清史稿)⁶. Since then there have been a number of figures from a variety of sources, but most of them are not actual levies but merely a planned quota. After the middle of the 18th century, the planned quota could not always be met, so that the adoption of these planned figures would be biased. Therefore, as for the following data, we mainly refer to Ni Yuping's research. Specifically, we use the annual data of actual tax received from 1821 to 1850 (Ni 2013: 95-96). The annual data from 1851 to 1874 come from Ni's collection of most provinces in China (Ni 2017a: 109). It is important to note that Ni Yuping considered the size of the total provincial revenues to be roughly 1.3 times the size of the revenues he collected from some of the provinces (Ni 2017a: 110). Therefore, Ni's original figures can be multiplied by 1.3 to get the annual total *Didingyin* revenues data for the period. The data from 1885 to 1894 come from *Guangxu kuaiji biao* (Accounting Table in the Period of Guangx 光绪会计表) (Liang 2008: 574). The data in 1903 come from *Zhongguo caizheng lungang* (Chinese Fiscal Theses 中国财政论) (Liang 2008: 576-577). The data in 1911 are taken from the budget data from the Ministry of Finance 度支部 adopted by Wang Yeh-chien (2008: 97) in estimating the total fiscal size at the time. It should be noted that for this data of 1911, we do not use Wang's estimates but just adopt the budget data from the Ministry of Finance. This is because the interest of our study is the fiscal revenue held by the central government, so the unreported revenues or additional revenues of the local governments are beyond this paper's scope. In addition, since 1911 was the time when the fiscal clean-up was initially completed at the end of the Qing dynasty, here it essentially amounted to a fiscal reform, i.e., the central government got hold of more legitimate fiscal revenues for a short time. Therefore we initially set 1911 as the time point after the fiscal reform, while for the situation before 1911 we still adopt the size of the agricultural tax in 1903. In this way, the agricultural tax will have a jump in 1911 to reflect the effect of the central government's fiscal reform.

In conclusion, we totally obtain 153 data of twice-a-year tax plus poll tax (*Didingyin*) from 1651 to 1911, which can basically cover the situations in most of the Qing dynasty. Considering the "frozen figure/quota" attribute of *Didingyin*, we derive the data of missing years by linear interpolation.

⁶ Data of 1753 are from in Liang (2008: 547-548, 580-582) and data of 1766 from Shi and Xu (2008: 49). Fodder data come from Liang (2008: 550).

Except for *Didingyin*, the in-kind revenues of grain and fodder also need special attention. The data of in-kind revenues before 1766 have the same data source with the data of *Didingyin*, while after that, we cannot find reliable and continuous data until the data of revenues in kind that had been converted to silver in 1885. Therefore, our methods are as follows: (1) We first convert the in-kind revenues before 1766 into silver. The price data come from Peng Kaixiang, Peng Xinwei and *Wanli kuanji lu*⁷. It is worth mentioning that the in-kind revenues during the Qing dynasty included “rice”, “wheat”, and “bean”, but we do not know the proportion of each item. However, given that in-kind revenues were mainly rice-based, we have roughly calculated all in-kind revenues on the basis of rice. While this may result in overestimation, we believe that such an error would not have a major impact. (2) After obtaining the number of silver converted from in-kind revenues before 1766, we can link this series with the data after 1885. Generally speaking, considering the “frozen fiscal system”, using linear interpolation will not cause much bias. However, since 1766-1885 spans the severe mid-19th century national war, this may overestimate the size of in-kind revenues during this period. Therefore, we use the volatility information of silver revenues of the Qing Cabinet Treasury 内閣大庫 (Shi 2009), taking the silver revenues before and after the war obtained here as the benchmarks, and then interpolate to get the size of the silver price series of the in-kind revenues, a total of 99 figures. For the data of other missing years, we make the linear interpolation.

A4.2 Revenues from Industry and Commerce (the “indirect” taxes)

The revenues from industry and commerce in the Qing dynasty were mainly composed of salt tax, tariff (Likin), and miscellaneous tax. As mentioned above, the annual data of salt tax from 1651 to 1734 are completely documented in *Qing shilu*. However, according to the investigation of Chen, only the data before 1674 can reflect the real tax received. The data after 1674 was divorced from the real situation. Therefore, for the data after 1674, we refer to the studies of Chen and others: (1) For the data of 1675-1735 and 1811-1850, we use Chen’s revisions (2013c: 213-228). (2) For other years, the data of 1753, 1800, 1873, 1885-1894 and

⁷ Peng (2006: Appendix 5); Peng (2015: 630); Wan and Xu (2015: 667-668). Specifically, we take the data of 1751-1760 from Peng (2015) as the benchmark and use the annual rice price index from Peng (2006) to get the level value of the annual rice price for China average. The price of each bundle of fodder is set as 7.7% of the price for each *shi* of rice.

1900-1911 come from different studies, such as *Qingshi gao* 清史稿, *Shiqu yuji* (Records in the Royal Library 石渠余记), *Hubu xianban geyao jielue* 户部先办各要节略, *Guangxu kuaiji lu* (Accounting Records in the Period of Guangxu 光绪会计录), *Zhongguo caizheng lungang* 中国财政论纲 and *Qingchao xu wenxian tongkao* (Continuation to “Comprehensive Examination of the Literature” of the Qing 清朝续文献通考) (Deng 1998: 93-94).

As for the tariff data, we refer to Ni Yuping’s study (2017b). The data of 1652, 1682, and 1692 that Ni did not provide are taken from Deng Yibing (2008: 419). The earliest study about the amount of Likin after 1853 are from Luo Yudong (2010), and this data were later revised by Zhou Yumin (2011). Therefore, here we use the data from Zhou.

The miscellaneous tax includes many items but the total amount was not large. Therefore, in the study of fiscal history of the Qing dynasty, the items of the miscellaneous tax are generally calculated together. We totally find 20 figures about the miscellaneous tax. Among them, the raw data of 1652, 1685, 1725, 1753, 1776, 1812, and 1841 come from He Benfang (1987). But these figures seem too small, so we use the larger ones of 1753 and 1776 provided by Chen Feng as the benchmark (Chen 2013b: 368-369), and make interpolations with volatility information from He to get the revised results of the seven years above. The data of 1885-1894 come from *Guangxu kuaiji lu* (Liang 2008: 574). The data of 1903-1911 are derived from the reports and the budget of the Ministry of Finance 户部/度支部 (Wang 2008: 97). We set 1903-1910 to the case of 1903 so that the 1911 data reflect the results after the fiscal clean-up.

A4.3 Seigniorage and Others

Other revenues also include seigniorage, Keju title selling revenues, donations, etc. The first is seigniorage revenue. The legal tender in the Qing dynasty was copper coins and paper money of some periods. However, like previous dynasties, copper coins did not make much profit in most of the time, and paper money was soon withdrawn from circulation due to lack of credibility. According to the research of Liu and Ni, seigniorage profit in the early Qing dynasty and Taiping Rebellion may be positive. Specifically, from 1645 to 1656, the seigniorage profit was considerable and we adopt the data of Liu (1966). However, there is no data before 1652, so we set the situation as 100 thousand taels according to the average size during this

period. The data of 1654 is missing, so we use the average of the two years before and after to derive it. Our result shows that in the early Qing dynasty, seigniorage profit might only be 0.3% of the total direct/agricultural tax and indirect tax. For the seigniorage profit from 1853 to 1861, we use the estimates from Ni, which is about 6 million taels per year (Ni 2017a: 270), nearly 15% of the sum of direct/agricultural tax and indirect tax.

Data of Keju titles selling revenue come from *Zhongguo lijīn shī* (The History of Likin in China, 中国厘金史) (Luo 2010: 8-9), but these are not all the Keju title selling revenues. According to Luo, Keju titles selling revenues received by the Ministry of Revenue accounted for 53.4% of the total Keju titles selling (Luo 2010: 6-7). Therefore, we use this ratio and combine with the Keju titles selling revenues recorded in the Ministry of Revenue to estimate the total amount of Keju titles selling from 1724 to 1853. Data after the Xianfeng 咸丰 period are not available. We use the silver revenue series of the Ministry of Revenue to estimate the Keju titles selling revenues of the whole country. During the period from Jiaqing 嘉庆 to Xianfeng 咸丰, the Keju titles selling revenues in the whole country accounted for about 82.5% of the revenues of the Ministry of Revenue. If this proportion remained stable, combining the revenue information of the Ministry of Revenue, we can get the estimates of Keju titles selling revenues after 1853. Government title trafficking was not common in the period from Kangxi 康熙 to Qianlong 乾隆, so only the years with clear records of Keju titles selling items are selected in our calculation. And the quota in the early Yongzheng 雍正 period is used as a substitute when data are missing.

Donations can be divided as donations from salt merchants and donations from new enterprises in the late Qing dynasty. The data of donations from salt merchants are respectively counted by Chen (2013c: 294-300) and Jiang (2021). The data of donations from new enterprises from 1884-1911 come from Zhu (1997). Those donations mainly came from China Merchants Steam Navigation Company 轮船招商局, Mohe Gold Mine 漠河金矿, and Telegraph Office 电报局. It is clear that these data did not cover all the donations, but combined with the studies of Chen and Cai (2013: 373-385), we believe that such an underestimate will not have a large impact.

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