

Monopolistic Pricing and Intergovernmental Fiscal Relations: Evidence from a State-owned
Wine Enterprise in Twelfth-century China

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This study uses a rare set of firm-level data to investigate the mechanism through which the Southern Song (1127-1279) central state managed to enlarge its share of profit from wine monopoly by lifting the official price and how this practice affected the relative fiscal power of the local prefecture adversely. The finding that the state's increased demand for revenue was ultimately achieved by the brewery's decision to ignore the central command of price lifting in practice and to expand production instead highlights the flexibility that local economic institutions demonstrated in responding to both the commands of the central government and market forces. It reveals that the nature of the nationalization of the brewery was in effect a state-firm division of maximized monopolistic profit realized by following market principles.

The linkages between political regimes, fiscal policies, and economic growth have long attracted the interest of economic historians. In the studies on early modern states across Eurasia, scholars have demonstrated how the reforms in fiscal systems contributed to modern state building. The need to restrain the monarchy's capacity to raise taxes for warfare fostered the development of, among other fiscal institutions, the representative institutions in early modern Europe. In contrast, the traditional scholarship pictures the despotic Chinese emperors as never facing the kind of formal restraints in fiscal policy as their European counterparts were under parliamentary monarchism. It is tempting to attribute differences in economic performance within Europe and across Eurasia to the fiscal consequences of

different political regimes(North, et al. 2009). The recent revisionist scholarship, on the other hand, demonstrates that the Chinese state exerted only moderate taxation and invested more on public goods compared to contemporary European states during the seventeenth and the eighteenth centuries. This leads to the argument of Wong and Rosenthal (2011) that the Chinese state, with a large polity and few external enemies, was most concerned with the domestic challenges of social order, and viewed public goods as an important material basis for maintaining order and control. Despite two attempts to reform taxation system in the sixteenth and the eighteenth century respectively, the Chinese state during the long period of 1500 to 1900 can be characterized in general as one of restrained taxation and limited fiscal innovation. The European states, in contrast, had to constantly devise new ways of collecting revenue from their subjects to face the fiscal consequences of constant warfare with neighboring enemies (Bonney 1999, Hoffman and Rosenthal 1997). But the Chinese state had not always conformed to this characterization. If there was a time when China was more like Europe in this respect, it was during the Song dynasty (960-1279), especially the Southern Song (1127-1279), when the enormous burden on the national finance from constant warfare with strong neighboring enemies was the main theme for over a century.

It is no exaggeration to say that Song dynasty was a peak (if not *the* peak, according to some) in Chinese history in lots of respects. Of most relevance here is the development of the commercial transactions and the monetary economy and the increasing efficiency in the state apparatus. The rapid commercial growth and monetization of the economy in Song China was accompanied by an unprecedented degree of state activism in economic life. Through investments in mining, metallurgy, transportation, and irrigation, expansion of the money supply, and its efforts to disseminate new knowledge and techniques, the Song financial administration initially helped promote China's medieval economic revolution (Elvin 1974, Shiba 1970). If there is anything that troubled this glorious period, it was the successive

failures of the Song state in its defense against the northern nomadic powers. The Khitan Liao, Tangut Xia, and Jurchen Jin states formed constant threats to the northern and northwestern frontiers of the Song and forced the Song into a perpetual search for new resources to meet the costs of national defense. Expenses to support a large army stationed on the frontiers and to wage wars had been a huge burden to shoulder ever since the early days of the dynasty. Most fiscal innovations and reforms during the Song were carried out to meet the challenge of enormous military expenses. Rather than sticking to the regime of light taxation and minimum interference in commerce, the Song state adopted an activist presence in economic life and innovated new ways to generate revenues. These fiscal innovations transformed the structure of national finance in significant ways. The Southern Song was the rare moment in the Chinese imperial history when commercial taxes loomed large in comparison to agricultural revenues. Indirect taxes from commercial tariffs and duties and profit from state monopolies contributed more than half of the fiscal revenue (Bao 2001). Innovations in the monetary system and the debasement of paper currencies also played a big role in financing wars (Gao 1999, Von Glahn 1996). The way in which the Song state dealt with its fiscal demands within the technical, bureaucratic, and economic constraints of the time and how it was similar to and different from measures taken in the other extreme of Eurasia several centuries later will add to our understanding on the set of approaches available to pre-modern states and their applicability in various environments.

This study provides a microscope examination on two major trends in the Song fiscal system. The first was the expansion of state-owned enterprises and the increase in the share of commercial revenues in national finance, either from commercial taxes or the profit of monopolistic enterprises. The second trend was the expansion of the central state revenues and the decrease, at least in relative terms, of the local government's fiscal power. Bao Weimin (2001) has documented the different means through which the central state expanded

its revenues, including adding new tax categories, increasing tax rates, and enlarging the proportion of revenues claimed by the central government, at the expense of the financial powers of the prefectures and circuit-level fiscal commissions. Wine excises had been a source of prefectural revenues in the early Northern Song. Around the New Policies era (1068 -1085), the central state began to raise official wine prices and to claim a portion of the increased sales revenue, thus initiating the process whereby wine revenue increasingly became a revenue source for the central government. In the Southern Song, wine revenue comprised the largest component of the newly introduced supplementary and capitation taxes collectively known as *Jingzongzhi qian*, and its contribution to the central fiscal revenue expanded rapidly. This study provides a case study to show how the expansion of central revenue and the erosion of prefectural fiscal powers through wine excises were reflected in the daily operations of a state-owned brewery.

This study benefits from the availability of a rare set of firm-level data from the twelfth century. In terms of the state-owned enterprises, most of the available information is on changes in central-level regulations and sometimes revenue data aggregated at the prefecture or national level from national budget records and excerpts from local gazetteers. Paul Smith's study of the Sichuan Tea and Horse Agency and Li Huarui's study of wine production and management are representative scholarly works utilizing such materials(Li 1995, Smith 1991). However, we know little about the organization, accounting, pricing, and profit distribution in the daily operations of a state-owned firm except for very general information scattered among government records. This omission, of course, has resulted from a lack of data: almost no local archival records have survived from the long period from the tenth to the seventeenth century. One rare exception is the material used in this study, which is the only extant set of firm-level accounting records for the whole Song dynasty: the accounting records of the state-owned Shuzhou Brewery from early 1163. From an analysis

of this material, we are able to gain precious insights into how abstract state policies were put into effect in the operation of a prefectural brewery. In particular, these records reveal how an individual enterprise obtained raw materials for production, carried out official price changes, and implemented orders for profit distribution among different government agencies.

Based on the daily accounting records and production manuals of the state-owned Shuzhou Brewery and Yaxi Wine Shop from early 1163, this study looks through the lens of a firm to investigate the mechanism through which the Southern Song central state managed to enlarge its share of profit from wine monopoly by lifting the official price and how this practice encroached the fiscal power of the local prefecture adversely. Moreover, it sheds light upon considerable innovation and flexibility of local entities in their response to the ever-increasing demands from the center. The prefectural government provided a stable supply of raw material to the brewery. The Brewery in turn was obliged to sell the product at a fixed price set by the central state and to meet the formal revenue demand from the prefecture, the circuit, and the center. So the amount of revenue demanded by the state corresponded to the official sale price set by the center. When the official price became too high for the brewery to make enough sales in the market to meet the central government's revenue quota, as supply-demand relations would predict, the brewery purchased raw materials from its own purse and expand production so that the profit from selling the total amount of wine at a much lower price in the market would suffice to cover its costs and satisfy the revenue demand of the state. The finding that the state's increased demand for revenue was ultimately achieved by the brewery's decision to ignore the central command of price lifting in practice and to expand production instead highlights the flexibility that local economic institutions demonstrated in responding to both the commands of the central government and market forces, and reveals the local market conditions which enabled such monopolistic pricing.

In the following part of this paper, section II introduces the sources and the way in which the revenues from wine sales were divided among different levels of government. Section III deals with two puzzling terms, *maoshu* and *zhengjiu*, in the sources and leads to the first major finding in paper, namely, the actual selling price of bulk wine was not the officially set price of 195 *wen*, but only 78 *wen*.¹ Section IV specifies how this gimmicky pricing and accounting system actually arose from the strategies of local entities in response to the center's demand for more revenues and supports this argument with modeling. Section V discusses the implications that we could draw from this forensic accounting system on the market conditions that enabled such monopolistic pricing and on the process and nature of nationalization. Section VI concludes.

¹ The actually unit here is “*wengsheng*” (文省), which is the official monetary unit in Song and equals 0.77 *wen* (文). One bronze coin is one *wen*, and one thousand *wen* is one *guan* (贯). However, because of the shortage of bronze coins, ever since late Tang dynasty (618-907) the “*sheng*” (省) system developed in private trade where one *guan* contained only 770 *wen*, more or less. The “*sheng*” system was officially recognized by the Song state, thus 1 *wensheng*=0.77 *wen*, 1 *guansheng*=0.77 *guan*. In this paper, to keep matters simple, I have converted all numbers into the unit of “*wensheng*”. But I use the word “*wen*” as the unit to avoid the possible confusions for non-Chinese readers between “*wensheng*” and the similar looking “*sheng*” (升), which is the unit for rice and wine. See Li Weiguo, *Songdai caizheng he wenxian kao lun*, pp. 81-85, for a full description of the “*sheng*” system in monetary account during the Song.

II

The object of this investigation is the daily accounting record of the state-run Shuzhou Brewery and Yaxi Wine shop from the twelfth month of 1162 to the first month of 1163 of the Chinese calendar (January to February 1163).² Shuzhou was a prefecture in Huainan West Circuit, along the frontier facing the Jurchen Jin state in the north. There were nineteen official breweries within the jurisdiction of Shuzhou prefecture. The Shuzhou Brewery and the Yaxi Wine Shop mentioned in the documents were located in the Huaining County, the prefectural seat. The prefectural government controlled the Shuzhou Brewery directly and provided it with rice and other raw materials from the prefectural granary. Other official breweries were under the management of county governments.

² The accounting records of the Shuzhou Brewery and the Yaxi Wine Shop are contained in the collection *Songren Yijian*. Thanks to the Song dynasty practice of recycling governmental papers for commercial printing, these documents were preserved by being reused for the printing of the Longshu edition of Wang Anshi's anthology. Recently, Sun Jimin and Wei Lin have reorganized, punctuated, renamed and annotated the Shuzhou documents. They corrected and retrieved eight mismatched documents, including six daily journals, the *Estimated Yearly Account of Gongshi Wine House*, and the *Usual Practices and Regulation of Shuzhou Brewery*. The correction of the *Usual Practices and Regulation of Shuzhou Brewery* is the most significant. This document recorded the guideline and accounting rules of the brewery, but the original document was severely mismatched so as to affect understanding. Documents used in this study were based on Jimin Sun and Lin Wei, *Nan Song Shuzhou Gongdu Yijian Zhengli Yu Yanjiu* (Shanghai: Shanghai guji chuban she, 2011)..

The Shuzhou Brewery was the official state-owned brewery in Shuzhou, which is the focus of our study. The sixteen daily journals of the Shuzhou Brewery contained detailed daily information on the sources of revenue, the cost of production, and the profit distribution. All the daily journals are uniformly structured. As shown in Table 1, the daily total revenue was composed of two parts, that is, the revenue from the Shuzhou Brewery and the revenue from the Yaxi Wine Shop. The income of the Shuzhou Brewery was divided among the center, the circuit-level agencies, and the prefecture itself. It received a portion of raw materials from the prefectural granaries and purchased the remainder by itself at the “harmonious purchase” price³, which was lower than the market price. Central policies on price and profit distribution applied to the Shuzhou Brewery.

[TABLE 1 ABOUT HERE]

³ “Harmonious purchase” (*hemai*) was the practice of the Song state to purchase commodities, essentially grain and silk cloth, from the people mainly to meet the demands of military logistics. It was initially adopted in the 1030s in the circuit of Hebei to supply military clothes within the circuit. The practice was then expanded to other circuits and to include other commodities. The state initially stipulated that the prices offered to people in harmonious purchases should be equal to, or ideally, higher than the concurrent market prices to benefit the people. But as early as the 1060s, the Prime Minister Zhang Fangping already complained that the official prices in harmonious purchases were way lower than the market prices. See Zhang Fangping, “Lun Guoji Chuna Shi,” in *Lequan ji*, Siku Quanshu.

Almost every prefecture had one official brewery like the Shuzhou Brewery, which was considered to be owned by the state at the national level. In some prefectures, there were other breweries established by the prefectural government, the prefectural agencies, or the county governments as their own sources of income. The Yaxi Wine Shop was an example of this practice. Although the Yaxi Shop was also state-owned in the broad sense, in contrast to the Shuzhou Brewery, it was only responsible to the orders of the prefectural government. The prefecture provided all the raw materials so the Yaxi Shop did not need to make purchases on its own. It was a fiscal resource for the prefecture, not the center, and the center had no authority to claim any revenue from it. The Yaxi Shop also had more flexibility in producing different kinds of wine and determining the price for the new innovations. To distinguish between the two, I shall refer to the Shuzhou Brewery as a state-owned enterprise and the Yaxi Wine Shop as a prefecture-owned one.

Daily variations in sales and its components were fairly small. The sample mean of the total daily revenue was 166,521 *wen*, with a standard deviation of 8,470. The Shuzhou Brewery contributed about 60% to the daily total, with most of its revenue coming from wine sales and a very small portion from the sales of yeast. The Yaxi Wine Shop, on the other hand, contributed about 40% of the daily total revenue, of which 35% came from the sales of the Yaxi Shop itself while 65% came from its franchised shop located in Huodian, which was located outside of the prefecture seat.

The revenue from wine sales (item three in Table 1), with the daily average of 100,280 *wen*, was the single largest source of the Shuzhou Brewery's income. The daily journals provided detailed information on how this amount was to be divided to defray the costs of production and to distribute the revenue to different government agencies. Table 2 lists the items under the "Revenue from Wine Sales of the Shuzhou Brewery" as they appeared in the daily journals.

[TABLE 2 ABOUT HERE]

The income from the wine sales of the Shuzhou Brewery was divided among four categories: the “six daily levies,” the “extra raw material cost undertaken by the Brewery,” the “extra subvention to the central government,” and “residuals.” At first sight, the four categories seem to be organized in an arbitrary and random way. Grouped under the “six daily levies” were five items that were subventions to different government agencies including the prefecture, the central state, and two circuit-level agencies; however, one category of expenditure, the “daily management cost”, was also included in the “six daily levies”. Moreover, we should duly note that the amount of “extra raw material cost undertaken by the Brewery”, with an average of 26,418.3 *wen*, was not the total amount of raw material cost of production. The information the “six daily levies” reveals that the prefecture government provided for about 27% of the material costs, with a sample average of 9,841 *wen*. Therefore, the total material cost was 36,259.3 *wen*. Furthermore, we should also note that since the prefecture government provided raw materials, the “Subvention to Shuzhou Prefecture” was composed of the reimbursement for material costs as well as the net subvention to the prefecture government.

After clarifying these nuances in the accounts, Table 3 divides the income of the Shuzhou Brewery from wine sales into two parts, that is, the cost of production and the net profit payable to the government. It is worth mentioning here that although the arrangement of accounting items in the daily journals as shown in Table 2 may seem irrational and random, our analysis on the pricing and intergovernmental fiscal relations will explain that there are good reasons why they were arranged in this way.

[TABLE 3 ABOUT HERE]

As shown in Table 3, the central state took 64% of the profit. The prefecture, which actually invested in the production of the brewery, was taking 32%. The two circuit level agencies, the circuit fiscal commission (*zhuanyun si*) and the stabilization fund supervisorate (*tiju changping si*), were taking the remaining 4%. This division of profit confirmed our understanding of the Southern Song's fiscal arrangement obtained from the more generalized narratives of the time. Revenue from wine management previously had been a fiscal resource of the local government, with the central state taking only a slight portion. Within the first decade of the Southern Song, however, wine revenue claimed by the center under the name *Jingzongzhi qian* had already become the central government's most important fiscal resource. How the central state managed to realize its expansion of revenue through pricing and how that affected the absolute and relative fiscal power of the prefecture is the topic of the next section. As for the two circuit level agencies, in the Northern Song, especially before the New Policies era (1068-1085), the fiscal commission had been an intermediary between the center and the prefectures and exercised sufficient control over financial resources to command inter-prefecture transfers of revenues. The stabilization fund supervisorate, which became preeminent during the New Policies era, had controlled most of the increased revenues generated by the New Policies. However, as will be seen in this division of the Shuzhou Brewery's revenues, within the first few decades of the Southern Song the

expansion of the central's state's income eroded the fiscal authority of the circuit level agencies.⁴

III

From the last section, we know how the revenue from the Shuzhou Brewery's wine sales was distributed. In this section, we address the problem of how the revenue was generated, calculated, and recorded, which is the most puzzling issue in this study. This is indeed against intuition. Should this not be very obvious? Revenue equals unit price multiplied by the amount sold, of course. But further examination on the daily journals will show that both the price and the amount sold become accounting fictions and cannot be taken at face value without further investigation. However few occasions that economic historians encounter in our studies where textual analysis, or more precisely, a re-interpretation on key terms, will revolutionize our understanding of the whole system, this is definitely one of those cases.

In the journals, before listing how the revenue from wine sales of the Shuzhou Brewery is to be divided into the four categories as seen in Table 2, there is a short entry on how the revenue was generated:

Today the "crude amount of wine (maoshu)" sold was 1345 sheng, which is equivalent to 538 sheng "official amount of wine (zhengjiu)". For each sheng of wine, we collected 195

⁴ For a full discussion of the transformation of the fiscal system in the transition from the Northern to the Southern Song, see Weimin Bao, *Songdai Difang Caizheng Shi Yanjiu* (Shanghai: Shanghai guji chuban she, 2001), 76-163.

wen. In total it is 114,107 wen. 1345 sheng of rice was consumed for the production of the wine sold.⁵

We can see that there are two numbers for the amount of wine, “*maoshu*” and “*zhengjiu*” respectively. In general, the character “*mao*” means “crude” or “gross,” while “*zheng*” means “correct” or “official.” Thus I literally translate *maoshu* as the “crude” amount of wine and “*zhengjiu*” as the “official” amount of wine. However, we cannot know for sure what the two terms mean in this accounting scenario because they never appear in other documents concerning the regulation of the wine industry in the Song. This uncertainty poses the main obstacle to decoding the daily journals.

Li Weiguo (2007) and Sun and Wei (2011) have both made attempts at interpreting the meanings of and the relationship between the two terms of *maoshu* and *zhengjiu*, without much persuasiveness. Both of their interpretations lead to other inconsistencies in the daily journals. If, as Sun and Wei suggest, *zhengjiu* is the actual account of wine sale within the day, why going through the trouble of calculating it by taking 40% of *maoshu*? How can we explain the constant relationship that *maoshu* and the amount of rice used always equaled each other? Although we can explain this by saying that one unit one rice produces 0.4 unit of wine, but this wine-rice ratio is way too low for the production level in Southern Song, in other words, the production technique at that time has not yet reached such high level of efficiency and alcohol concentration. The common wine-rice ratio in Song is around 1:1. From the Yaxi Wine shop, we see that the ratios were 1:1, 0.9: 1 and 0.85:1 for wine of different qualities. If, as Li Weiguo suggests, *maoshu* was the amount of wine sold and the daily journal only reported 40% of the total revenue as the profit due to the government, how shall we understand why the other 60% of revenues did not even show up in the daily journal,

⁵ “The Daily Journal of the Twenty-first Day of the Twelfth Month, 1162.”

and the brewery's own expense on "extra cost on raw materials" was reimbursed out of the 40% profit rather than out of the 60% retained revenue? The idea of retaining 60% of revenue in the brewery could not be supported by any entries in the official regulation. Moreover, why was the unit price of the bulk wine more than twice the price of the bottled wine, which was in fact of a higher quality according to the production manual? ⁶ The alternative explanation that I will provide in this section, that the actual selling price was only 40% of the official price, will put the pieces together and be free from any of these inconsistencies.

Just as exemplified in the passage quoted above, the following relationships are fixed in all the daily journals. Firstly, the "official" amount of wine is equal to 40% of the "rough" amount of wine. Secondly, the "rough" amount of wine is equal to the amount of rice used in the production of the wine sold. Thirdly, the total revenue is equal to 195 times the "official" amount of wine. These quantitative relationships hold in all the daily journals. The daily journals include the line "for each sheng of wine, we collected 195 *wen*" immediately after the term "*zhengjiu*". However, it is important that we should be cautious to refer to the 195 *wen* as the "price": to the best of our knowledge now, it is only the price corresponding to the "official" amount. We will designate this figure the "official price."

The section on pricing in the *Usual Practices and Regulation of Yaxi Wine Shop* gives an important hint for interpreting the distinction between the "official" amount of wine and the "rough" amount of wine as well as the actual selling price, which differed from the official price. The wording in this document is more revealing that that in the daily journals:

⁶ See Weiguo Li, *Songdai Caizheng He Wenxian Kaolun* (Shanghai: shanghai guji chubanshe, 2007), 97-122. Sun and Wei, *Nan Song Shuzhou Gongdu Yijian Zhengli Yu Yanjiu*

For each sheng of new wine, we officially collect 195 wen. But in fact 2.5 sheng is to be sold to yield 195 wen, of which 1 sheng is the “official” amount (zhengjiu) and 1.5 sheng is the extra amount consumed (haojiu).⁷

Now we see familiar term “zhengjiu” showing up in a document of the Yaxi Wine Shop, with a counterpart called “haojiu”. The character “hao” has the meanings of being used, consumed or wasted. So if 2.5 sheng of wine was sold in the market, the accountant would record that 1 sheng of zhengjiu was sold at the price of 195, with 1.5 sheng of haojiu being written down too. The total amount of 2.5 sheng then is the so-called “crude” amount that we see in the daily journals. That is to say, the 195 wen was to be earned by selling 2.5 sheng of wine in the market, which gives us the actual selling price of 78 wen. This passage in the *Usual Practices and Regulation of Yaxi Wine Shop* is seamlessly complementary to the previously quoted passage from the daily journals. This coincidence suggests that the Shuzhou Brewery was doing the same accounting exercise and was actually selling at 78 wen per sheng.

This finding the actual price was 78 wen also explains another puzzle found in the daily journals. The Yaxi Wine Shop was selling two kinds of wine, bulk wine and bottled wine. The bulk wine was produced with a wine-to-rice ratio of 1:1, which is the same as the bulk wine produced in the Shuzhou Brewery.⁸ On the other hand, the bottled wine was produced

⁷ See *Usual Practices and Regulation of Yaxi Wine Shop*.

⁸ In the *Usual Practices and Regulation of Yaxi Wine Shop*, we can obtain information on wine production that is not available for the Shuzhou Brewery. According to this source, every 100 sheng of bulk wine could generate 90 sheng boiled wine, using 100 sheng of rice and 16 jin of yeast as raw materials. So the wine-to-rice ratio for producing bulk wine was 1:1 in the Yaxi Wine Shop. For the Shuzhou Brewery, the total amount of rice consumed in

with a higher wine-to-rice ratio of 0.85:1 and yet was sold at a lower price of 104 *wen* per bottle (one bottle contained one *sheng* of wine). It would not be possible for the Yaxi Wine Shop to sell its lower-quality bulk wine at the official price of 195 *wen* without resorting to some form of coercion to compel customers to buy at this much higher price. Now we know that the Yaxi Shop was actually selling the bulk wine not at the official price of 195, but at the price of 78 *wen*, which makes a lot more sense.

In sum, the brewery was selling the wine in the market at a price that was substantially lower than the official price. The “rough” amount of wine was the actual amount sold in the market at the selling price of 78 *wen*, which is 40% of the official price of 195 *wen*. The “official” amount of wine was inferred using the formula:

$$\frac{\text{amount of wine sold} \times \text{actual selling price}}{\text{official price}}$$
. There are profound reasons why this accounting

gimmick was used, which will be explained in the next section.

IV

As Li Huarui has documented, the official wine prices were raised dramatically during the early years of the Southern Song, by about 80 *wen* between 1128 and 1139 (the official

production always equals the “rough” amount of wine sold in the market. The argument that the “rough” amount of wine was the actual amount being sold and the argument that the Shuzhou Brewery was producing bulk wine at the same wine-to-rice ratio as the Yaxi Wine Shop reinforce each other. Otherwise, if the “official” amount was the actual amount being sold, the wine-to-rice ratio would be 0.4:1, which is both beyond the technical capabilities at that time and highly unlikely given that the comparable ratio for Yaxi Wine Shop was 1:1.

price of Shuzhou in 1163 was 195 *wen*).⁹ This dramatic increase of the official price has led scholars to conclude that it must have led to increased burdens on consumers and forced purchases. The finding in the previous session that the actual selling price of wine was only 40% of the official price, however, revises the accepted wisdom. This session will examine the process from which the disparity between the official price and the selling price was originated and how this was intertwined with changes in intergovernmental fiscal relations between the center and the locality.

Let us first lay out the basic logic for the operation of the brewery and its subvention of revenue towards the state. The prefectural government provided a fixed amount of raw materials including rice, yeast, and firewood to the Shuzhou Brewery (see the appendix on cost analysis). The bulk wine was produced at a wine-rice ratio of 1:1. In principle, the amount of wine produced from the rice provided by the Shuzhou Prefecture (which equals that amount of rice) should be sold at the official price, which was exactly the purpose of setting an official price in the first place. The income from these sales would be distributed as the “six daily levies”. In other words, the amount of the “six daily levies” equals the official price multiplied by the amount of wine produced from the rice provided by the prefecture, which is exactly what we see in every single daily journal. Following this logic, by providing a roughly stable supply of raw materials and exercising the power to determine the official price, the state was in effect claiming a fixed tax quota from the brewery.

When the central state wanted to expand its revenue from local breweries, it sanctioned official price lifting. Presumably the amount of wine produced will be sold at this lifted price. Because the amount of raw materials provided by the prefecture remained unchanged, the

⁹ Huarui Li, *Songdai Jiu De Shengchan He Zhengque* (Baoding: Hebei daxue chuban she, 1995), 384-351.

state's revenue would increase in proportion to the price increase. The center then claimed a portion or all of the increased revenue from the price lifting. Notice that how much the revenue would increase was directly calculated from how much the price would rise, so it was a pre-determined amount, which did not allow for the adjustment of demand, and thus the volume of sales, to the higher price. The analysis on supply and demand dynamics will be covered in the next section. Suffice to say here that what was demanded from the state was in effect a lump-sum tax quota from the brewery. The way in which the state pronounced any increase in the quota was through the announcement of official price lifting.

In the early Southern Song price lifting was so frequent and on such a scale that if the wine was really to be sold at the official price, it was too high to guarantee that the fixed volume of sales could be maintained. But the "six daily levies" demanded by the state still equals the official price multiplied by the amount of wine produced from the rice provided by the prefecture. So the brewery then faced the dilemma that it could not meet its revenue quota: on the one hand, at the official price its sales volume would fall short of the quota, and on the other at prices lower than the official price it could not sell enough wine produced from the raw materials provided by the prefecture. The way to solve this problem was to expand production by purchasing extra raw materials on its own and sell the wine at a price lower than the official price. The profit made from the enlarged production capacity was used to meet the increased revenue demand from the center. The actual selling price must be one at which the market was able to consume the increased amount of wine for sale.

I will illustrate the mechanism of the Shuzhou Brewery's adjustment in response to official price lifting by doing a simulation for a series of hypothetical official price rises. We know from existing records that when the central state increased the official price, it did it by a relatively small amount each time, definitely not from 78 wen to 195 wen at once. Li Huarui shows from existing records that in the Northern Song each time the state increased

wine prices it did so by an increment of only 1 or 2 *wen*, or 5 at most; while in the Southern Song, the price was typically lifted by 20 to 30 *wen* each time.¹⁰ Although records after 1139 are not extant, for the hypothetical scenarios I model four price lifting situations to simulate what would happen as the official price goes up from 78 to 195: from 78 to 100, from 100 to 130, from 130 to 160, and from 160 to 195. Based on the knowledge we have, this should be fairly close to what actually happened. We do not know whether the price of 78 *wen* was once an official price: it might or might not have been. But we do know that the official price used to be lower than 78. In the process during which the official price increased from that lower price to reach 78, the increased price was still in the range that the profit made from selling the wine produced from the materials provided by the prefecture was enough (or more than enough, as will be discussed in the next section) to meet the revenue demand from the state. When the official price was further lifted to be higher than 78, the brewery chose to keep the actual selling price at 78 and use the profit made from expanded production to meet the revenue demand of the state. So 78 was the threshold, after which the mechanism that I specified applies. For simplicity, I will just suppose that the official started from 78 and gradually increased to 195 in the modeling exercise.

Suppose the following hypothetical conditions: the official price is to be lifted from 78 to 100, to 130, to 160, to 195 *wen*. The actual selling price keeps at 78 *wen*. The prefecture provides 357 *sheng* of rice (the sample average) to the brewery. Using the rice provided by the prefecture, at a wine-rice ratio of 1:1, the brewery will produce 357 *sheng* of wine. Selling this 357 *sheng* of wine at the actual selling price of 78 generates revenue of 27,846

¹⁰ Huarui Li, *Songdai Jiu De Shengchan He Zhengque* (Baoding: Hebei daxue chuban she, 1995), 299-302.

wen. The amount of the “six daily levies” demanded by the state is the theoretical revenue from selling the 375 *sheng* of wine at the official price.

For now, suppose that the brewery is only concerned with meeting the tax-quota demand from the state. This assumption will enable us to see clearly the necessary increase in the quantity of sales in response to the increasing demand for tax from the state. In the next section, this assumption will be forgone to consider the situation in which the brewery is a profit-maximizing monopolistic enterprise and to examine the residual profit of the brewery retained after meeting the demand of the state. So for the current purpose, suppose that if the quota for the “six daily levies” is more than 27,846 *wen*, the brewery will purchase the amount of rice (and other raw materials) needed to increase production so that its sales at the price of 78 *wen* will *exactly* compensate for its increased raw material costs and meet the revenue quota for the “six daily levies,”

The following symbols will be used:

P_O : the official price

R_B : the amount of rice to be purchased by the brewery

The following equation determines how much rice the brewery should purchase:

$R_B \times 78 = \text{cost of purchase} + (\text{six daily levies} - 27,846) = R_B \times 27.6 + (375 \times P_O - 27,846)$. The figure of 27.6 for the “cost of purchase” in the equation is the monetary cost of raw materials associated with one *sheng* of rice (see the Appendix on the cost of production).

[TABLE 4 ABOUT HERE]

As shown in Table 4, when the official price is 78 *wen*, the brewery does not need to purchase any rice on its own. Revenue from sales is just enough to satisfy the demand for the six daily levies. The second column shows the situation when the official price is lifted to 100

wen and the actual selling price remains the same. The revenue from selling that 357 *sheng* of wine remains 27,489 *wen* since the actual selling price remains the same. Remember that because the amount of six daily levies increase at the same pace as the price increase, it always equals the amount of wine produced from rice provided by the prefecture, 357 *sheng*, multiplied by the official price. When the official price is 100 *wen*, the amount of six daily levies increases to 35,700 *wen* (row 1). To make up the shortage of 7,854 *wen* (row 2), the brewery will purchase 156 *sheng* of rice (row 3) and all the yeast, fuel, and other incidentals proportional to that increased output following the normal production practice. With these purchases, now the brewery contributes 30% of the total material costs (row 4). The total amount of rice, which equals the total amount of wine being sold, i.e. the “rough” amount, is now $156+357=513$ *wen* (row 5). The inferred “official” amount of wine is the total revenue numerated by the official price. The six daily levies take 89% of the total revenue. The remaining 11% is to cover the costs of the brewery for purchasing additional rice. The total material cost, including both the expense of the brewery and that of the prefecture, is 14,154 *wen*, leaving a profit of 25,847 *wen*, which is all forwarded to the state under the six daily levies. Remember from the analysis in Table 2 that the six daily levies are the net profit. One item in the six daily levies, the “subvention to the prefecture”, includes both the repayment of the material costs assumed by the prefecture as well as the profit forwarded to the prefecture.

As the official price further increases, the brewery will purchase even more rice to make up the increasing deficit, with the share contributed by the brewery to the total material cost increasing to 51%, to 62%, and finally to 70% when the official price reaches the level (195 *wen*) recorded in the daily journals. The profit from production, which is all forwarded to the state with no residual left to the brewery, also increases substantially. Since the brewery spends more on rice and other raw materials and the revenue remaining after covering these

costs goes to the six daily levies, the six daily levies' share of total revenue decreases to 75% percent when the official price reaches 195 *wen*.

What if the brewery purchases even more rice than the necessary account to make up the deficit? In that case, there will be profit left after paying the six daily levies. This is exactly what we see in the daily journals, except that the extra profit was not retained by the brewery but rather was forwarded to the central government under the designation "extra subvention to the central government" (see Table 2). As the brewery purchases more rice, the share of rice paid by the brewery increases (row 4 in Table 4). At the official price of 195 *wen*, the brewery must purchase an additional 829 *sheng* of rice, thus contributing 70% of the total rice to be used, in order to meet the demand of the six daily levies. From the sample of the daily journals, we see that the brewery actually purchased even more rice than this amount. The share of rice purchased by the brewery had a mean of 73% with a standard deviation of less than 1% (Table 5). The min and max in the sample are 71% and 75%, respectively. Columns 1 to 3 in Table 5 shows the mechanism through which the extra rice purchased by the brewery led to extra profit, which was forwarded to the center government under the name of "extra subvention to the center".

Columns 1 to 3 in Table 5 continue the modeling in Table 4. Following the assumptions in the last column of Table 4, if we suppose that the official price is 195 *wen*, then the amount of rice provided by the prefecture is 357 *sheng*. In all three columns, the amount of six daily levies is thus 195 *wen* multiplied by 357, which equals 69,615 *wen*. In columns 1-3, the brewery contributes 71%, 73%, and 75% respectively to the total rice consumed. Item 2, "Rice to be Purchased," is calculated directly based on the share of rice paid for by the brewery. For example, when the brewery contributes 71% of the rice, "Rice to be Purchased" then equals $\frac{357}{(1-71\%)} \times 71\%$. Item 9 is the net profit after reimbursing the brewery's expenses for rice and paying the six daily levies. This amount, the extra profit from the further

expansion of production, is claimed by the central state under the name of "extra subvention to the center".

[TABLE 5 ABOUT HERE]

The last column in Table 5 is not the result of any modeling but the true sample averages calculated from the daily journals. Notice how close the figures in column 2, which are the modeled results using the average share of rice paid by the brewery of 73%, are to the sample averages in the last column. This substantiates that the two-step modeling conducted in Tables 4 and 5 corresponds to the actual operation and decision-making of the brewery.

In a nutshell, we have detected the dynamic behavioral patterns of the brewery in response to official price lifting. The prefectural government provided a rather stable amount of raw material to the brewery (fixed at 357 *sheng* of rice in the modeling; the sample mean is 357, with a standard deviation of 25). The quota for the "six daily levies" demanded by the state is a product of the official price and the amount of rice provided by the prefecture.

When the official price became too high for the brewery to generate enough sales volume to meet its quota under the "six daily levies," it chose to purchase raw materials and expand production so that the profit from the total amount of wine at a much lower price in the market will suffice to cover its expenses as well as satisfy the state's demand. This strategy means that the brewery would end up providing 70% of all the raw material needed in production. Besides the regular "six daily levies," apparently the central state was demanding even more revenue, which it acknowledged as an "extra" subvention to the center. To meet this additional demand for revenue, the brewery further increased its purchase of rice, raising its contribution to the total materials cost to 73%. The proximity of the modeling results based on this behavior pattern to the sample statistics substantiates the reliability of this

characterization of the brewery's decision-making strategy when it was only concerned with meeting the demand for revenue from the state. In the next section, we will discuss the possibility that the brewery is acting as a monopolistic enterprise and these price-lifting scenarios represent the increasing share taken by the state from the already maximized profit made by the brewery.

V

To summarize what we have known for sure so far: the brewery was selling much more wine than it was provided raw materials for at a much lower price than it was permitted to. What does this tell us about the equilibrium price and quantity in this monopolistic market? If the brewery was behaving as a rational profit-maximizing monopolist, as we have good reasons to expect it to be, what did it mean to the brewery when the state demanded more tax from it? We know that the brewery was "state-owned", but how did nationalization actually work in reality? Remember that all the accounting journals that we have are submitted to the prefecture government by the brewery, which means the amount of wine sold recorded in the journals must be equal or less than the actual amount sold by the brewery. In other words, we know from the journals about how much the brewery needed to expand its production in order to meet the increased demand for tax from the state; what we don't know is whether the brewery in fact produced and sold even more than the amount that they disclosed to the government in the journals. And it is highly probable that it did, in order to maximize its own profit. In this section, I will provide some inferences on the equilibrium price in this monopolistic market based on what we have known, and some further speculations on the behaviors of the state and brewery based on the rationality assumption that the brewery had chosen the amount of production and selling price at the profit-maximizing level.

Assume that the brewery maximizes its profit in a monopolistic market. Following the normal setup for a monopolistic enterprise, suppose the brewery faced a downward sloping demand curve. As for the supply curve, since the unit cost of production for the brewery was constant due to its ability to purchase all the needed raw materials at the “harmonious purchase” prices, which were remarkably lower than market prices, for simplicity suppose the supply curve is horizontal (an upward sloping supply curve will not affect the result). P_E and Q_E denote the equilibrium price and quantity of production for the brewery as a profit-maximizer. Q_E is determined at the intersection of the supply curve and the marginal demand, which in turn determines P_E on the demand curve. Regardless of how much tax is demanded by the state, the optimal option for the brewery is to choose (P_E, Q_E) . There are two direct implications. First, the total amount of wine sold as recorded in the journals, denoted as Q_R , must be on more than Q_E . Second, the finding that the official price was 195 *wen* while the selling price was 78 *wen* means that the P_E must be less than 195, because otherwise to adopt the strategy of selling at lower price and expanding production would lead to lower, rather than higher, profit.

What the state demanded was in effect a lump-sum tax quota, which was the product of the official price P_o and the amount of wine produced from prefecture-provided materials Q_o . The state might well know that the official price had become ridiculously high that there was no way to sell any wine at this price, but it had to present its demand for more taxes using the rhetoric of official price lifting. Because otherwise, if the state were to increase the tax quota while keeping the price stable, it immediately meant that more wine was to be produced. Then within the framework of the principles that state-owned enterprises should follow, the state had to address the issue of whether the state was to provide more raw materials for production. Remember that prices were determined by the central state while raw materials were provided by the prefecture. Ordering the prefecture to appropriate more grain out of its

granaries in order to enrich the center would no doubt add to the already serious central-local tensions on financial issues. More importantly, I highly doubt that the practice of the brewery could be carried out unnoticed by the central state for long. At least the prefecture definitely knew it since all the accounting journals that we now have access to were initially reports turned in to the prefecture government. So the state, at least the prefectural level government, knew pretty well that the brewery was already producing more by purchasing raw materials on its own to make profit anyway and there was indeed no need at all for more prefecture-allotted grain. So the easiest way was for the central state to indicate its need for more taxes by increasing the official price. And as long as the brewery was able to fulfill the demand, the state acquiesced to whatever means the brewery adopted to do it.

[FIGURE 1 ABOUT HERE]

Let us assume that the brewery was indeed maximizing its profit, that is, P_E equals 78 *wen*. Figure 1 demonstrates the mechanism. The brewery would produce at the level of Q_E and sells at P_E . Remember the brewery received raw materials for free from the prefecture enough to produce Q_o amount of wine; the brewery had to pay for the raw material cost on its own for any volume of wine produced above that amount. So, from the perspective of the brewery, the profit from production was the gray area. Now that the official price P_o is raised above the equilibrium price P_E , there is an extra amount of tax demand, area A in figure 1, that cannot be paid in full with the profit made from prefecture-covered materials. The brewery then would have to cut a piece, area B, from its total profit to meet this tax demand. So in figure 1, area B equals area A, and area C is the residual profit retained by the brewery. Notice that the amount of wine sold to fulfill its tax obligation is Q_R , which is the amount of

“*maoshu*” or “total amount of wine sold”, reported in the daily journals. The difference between Q_R and Q_O corresponds to recorded “extra raw material cost paid by the brewery” in the daily journals. But the difference between Q_E and Q_R is omitted from the daily journals and thus concealed from the knowledge of the government and us. When the official price P_O is raised even higher, it means a bigger A, and consequently bigger B and smaller C. So the “price lifting” scenarios were actually re-division of monopolistic profit between the state and the brewery.

The way in which state-owned enterprises were supposed to work was to produce with state-provided materials and sell at official prices, and hand in whatever profit being made from these sales. But in reality, the brewery was producing at profit-maximizing levels based on demand-supply relations, and then handed in a lump-sum tax to the state. Such was the nature of the nationalization of the brewery, which was a state-firm division of maximized monopolistic profit realized by following market principles.

VI

In principle, for the state-owned breweries located in the prefecture seat such as the Shuzhou Brewery, the prefectural government should provide *all* the raw materials out of the prefectural granary. The wine produced from these materials would be sold at the official price. Apart from paying for workers’ salaries and other management costs, the income from wine sales should all be forwarded to the prefectural government, with barely any residual left in the brewery. So the revenue delivered to the prefecture contained the compensation for the prefecture’s raw material expenses and a net profit. Since the amount of rice provided by the prefecture was roughly constant, so too was the amount of wine the brewery was supposed to produce. Because of the limitations imposed upon private breweries, the state-

owned brewery monopolized the supply of wine within the city walls. When the official price was stable, the annual revenue transferred to the prefecture was relatively stable too, providing a reliable fiscal source for the prefectural government. This is how the system was ideally designed.

But from the data, we observe a different reality: the brewery was selling much more wine than it was provided raw materials for at a much lower price than it was permitted to. The official price was 195 *wen* and the amount of rice that the brewery received from the prefecture was on average 375 *sheng* per day. But the brewery was selling at 78 *wen*. And the amount of wine sold daily as reported by the brewery to prefecture was on average 1312 *sheng*. The state demanded a lump-sum tax quota from the brewery and expressed any increase in this quota in terms of an increase in official price. As long as this quota was met, the state chose to be indifferent to whether the brewery was selling at the official price and whether the brewery was selling the specified amount wine produced with materials provided by the prefecture. The rhetoric of official price lifting was convenient for the state. Imagine if the state was to announce an increase in the tax quota of the brewery without granting an increase of the official price, it would have to address the problem of whether the prefecture was to provide more raw materials to the brewery to expand production. Then it becomes troublesome both jurisprudentially and pragmatically. If the prefecture was not to provide the needed materials, the state had to formally acknowledge the obvious deviation from the model of state-ownership as prescribed in the regulations and come up with a new set of rules to rationalize the practice. The state would not want to order the prefecture to provide the needed materials either since that would generate a whole corpus of intra-bureaucratic communications and negotiations. Moreover, there is a possibility that the state knew that the brewery was already producing at a large scale and there was no need for more prefectural investment at all, and that all it needed to do was to appropriate a larger portion from the

profit that the brewery was already making. So even as the tax quota was increased to such a level that everyone knew that at the correspondent official price level no real sales of wine could be made, the state did not make an attempt to change the regime.

By now there is something that we can say with considerable confidence: that the brewery was producing much more wine at its own cost so that the profit from the enlarged production could be used to meet the increased tax demand. However, the level of production that we know was based on the report sent to the government by the brewery, it might well be the case that the brewery was hiding any more production that it was engaged in beyond the amount necessary to meet the tax demand. So it remains ambiguous whether the brewery was only responding to the increased demand from the state or it was producing at a larger scale all the time. These two alternative stories fit the observed data equally well but have very different implications for our evaluations on the market conditions.

The first story is one with inelastic demand to price changes and the brewery only concerned with meeting the tax demand from the state. So when the central state only sporadically raised official wine prices in small increments, as was the case in Northern Song, thanks to the state's control of wine production, market demand decreased little, if any, in response to the increased price. Presumably the amount of production remained the same and the whole output could be sold at the lifted price. The central state then claimed almost all the increased amount of income. This presumption could hold when the price lifting was within a certain range, as the restrictions on private breweries and the state's control over the total supply of wine might have resulted in a shortage of supply in the market and relatively low demand elasticity. The losses to its agricultural tax base and the desperate need for military funding compelled the Southern Song state to raise the official wine price so frequently and on such a scale that by the 1160s the official price was too high to guarantee the necessary volume of sales to meet the state's revenue demands. Consequently the brewery had to

purchase raw materials on its own and expand production so that the profit from selling the total amount of wine at a much lower price in the market would be sufficient to cover its expenses and satisfy the regular and extraordinary revenue demands of the state. The official price deviated from the actual selling price and became a mere index of how much more income the state, the central government in particular, was demanding. The accounting practice adjusted to this trend by converting the actual amount of sales and the selling price, i.e. the “rough” numbers, to fit the official standard.

The second story is one with the brewery as a monopolistic profit-seeker making decisions based on demand and supply relations. The state-specified price and production levels were from the beginning detached from the actual practices of the brewery. The brewery was producing at profit-maximizing levels based on demand-supply relations, and then handed in a lump-sum tax to the state. When the official price was raised, the brewery just cut a bit more from its profit and disclosed to the state the extra cost incurred with the increased tax demand. The “price lifting” scenarios were actually re-division of monopolistic profit between the state and the brewery.

Whichever was the case, this study revises the familiar story of the Southern Song state’s revenue expansion significantly. That the actual selling price was in fact much lower than the official price alerts us to danger of concluding—based only on sporadic records of official price increases—that the cost of living in the Southern Song increased at an enormous rate and that forced purchases became an everyday phenomenon. It may well be the case that this accounting practice applied not only to wine, but also to tea, salt and other commodities controlled under the state monopoly or monopsony. That the state’s increased demand for revenue was ultimately achieved by expanded production also highlights the flexibility that local government economic institutions demonstrated in responding to both the commands of the central government and market forces. The possibility that the actual

price was determined at the equilibrium of the monopolistic market and that each increase in official price was in effect an indicator of a re-division of profit between the state-owned enterprise and the state point to a new evaluation that nationalization was actually perceived and realized within the market.

APPENDIX. COST OF PRODUCTION

As aforementioned, the section on “extra raw material cost assumed by the brewery” in the daily journals of the Shuzhou Brewery contains information regarding not only the costs assumed by the brewery but also the quantities of three kinds of raw materials, namely rice, yeast, and fuel, provided by the prefectural government. Table 6 shows the typical cost information from the "extra raw material cost undertaken by the brewery" section in the daily journal for one typical day.

[TABLE 6 ABOUT HERE]

From the sample, we see an almost constant relationship among the amount of rice, the amount of yeast, and the amount of matches consumed, indicating a fixed formula for production. For every one *sheng* of rice, 18 *jin* of yeast and 3 *wen* worth of matches and other incidentals will be consumed. It confirms the production formula in the *Usual Practices and Regulations of the Shuzhou Brewery*: “for each 100 *sheng* of rice, we use 18 *jin* of yeast, 5 *jin* of matches, and half *liang* of oil”. Notice that the prices of rice and yeast were fixed at 16 *wen* per *sheng* and 48 *wen* per *jin*, respectively. These prices were derived from the “harmonious purchase” prices paid by the state and state-owned enterprises, which were lower and less volatile than the market prices.¹¹ In sum, for each *sheng* of rice used in production, 27.6 *wen* would be expensed. The last column in Table 6 shows the share paid by the brewery for each kind of material. With very few exceptions, the shares undertaken by the

¹¹ For the practice of “harmonious purchases”, see footnote 3.

brewery for each of the three items were always consistent.¹² The mean of brewery's share is 74%, with a standard deviation within 1%.

¹² Even in four cases where the shares taken by the government in the three items differed, the difference is within 1%. Moreover, in three of these four cases the difference was in the item of "yeast," where the brewery paid more money than claimed from the revenue and had to wait for future reimbursement.

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TABLES

TABLE 1

COMPOSITION OF DAILY TOTAL REVENUES

Items	Sample Average
Daily Total Revenue	166505.3
Revenue from Shuzhou Brewery	101651.0
Revenue from Wine Sales	100280.1
Revenue from Yeast Sales	1370.9
Revenue from the <i>Yaxi</i> Wine Shop	64854.3
Revenue Directly from <i>Yashi</i> Wine Shop	23979.7
Revenue from <i>Huodian</i> Franchised Shop	41843.4

TABLE 2

COMPOSITION OF THE SHUZHOU BREWERY WINE

Items	Sample Average	Percentage
Revenue from Wine Sales of the Shuzhou Brewery	101651.0	100%
Six Daily Levies	69138.8	68%
Subvention to Shuzhou Prefecture	29173.1	29%
Subvention to the Central Government	32579.6	32%
Daily Mangement Cost	5000.0	5%
Subvention to the Circuit Fiscal Commission	1331.8	1%
Subvention to the Circuit Statlization Fund Supervisorate	925.3	1%
Extra Amount to the Prefecture	129.0	0%
Extra Raw Material Cost undertaken by the Brewery	26418.3	26%
Extra Subvention to the Central Government	6562.6	6%
Residuals	-468.7	-0.46%

TABLE 3

REARRANGED COMPOSITIONS OF SHUZHOU BREWERY WINE SALES

Items	Sample Average	Percentage
Revenue from Wine Sales of the Shuzhou Brewery	101651.0	100%
Cost of Production	41259.3	41%
Raw Material Cost paid by the Prefecture	9841.0	10%
Extra Raw Material Cost undertaken by the Brewery	26418.3	26%
Management Cost	5000.0	5%
Net Profit Payable to Government	60860.4	60%
Profit Payable to the Central Government	39142.2	39%
Profit Payable to the Circuit Level Agencies	2257.1	2%
Profit Payable to the Prefecture	19461.1	19%
Residuals	-468.7	-0.46%

TABLE 4

MODELING THE PRICING LIFTING PROCESS

	Official Price	78	100	130	160	195
1	Six Daily Levies demanded	27846	35700	46410	57120	69615
2	Deficit to Make Up	0	7854	18564	29274	41769
3	Rice to Purchase	0	156	368	581	829
4	Share of Brewery Paid Rice	0%	30%	51%	62%	70%
5	the "rough" amount	357	513	725	938	1186
6	the "official" amount	357	400	435	457	474
7	Total Material Cost	9853	14154	20019	25884	32727
8	Total Revenue	27846	40001	56576	73151	92489
9	Profit of Production	17993	25847	36557	47267	59762
10	Six Daily Levies/Total Revenue	100%	89%	82%	78%	75%

Note: The official price is to be lifted from 78 to 100, to 130, to 160, to 195 *wensheng*. The actual selling price keeps at 78 *wensheng*. The prefecture provides 357 *sheng* of rice to the brewery, from which 357 *sheng* of wine is produced. Selling the 357 *sheng* of wine generates revenue of 27,846 *wensheng*. Item 1, "six daily levies" demanded by the state is the theoretical revenue from selling the 375 *sheng* of wine at the official price. The brewery will purchase such an amount of rice (Item 3) so that the revenue from selling this increased amount of wine at the price of 78 will exactly compensate the expenses of this purchase and meet the demand of the "six daily levies". Item 4 indicates the share of raw materials contributed by the brewery, which equals $\text{Item3}/(357+\text{Item 3})$. All the profit was claimed by the state.

TABLE 5

"EXTRA SUBVENTION TO THE CENTER"

		Modeling			Sample Average
		[1]	[2]	[3]	[4]
	Share of Brewery Paid Rice	71%	73%	75%	73%
1	Six Daily Levies demanded	69615	69615	69615	69139
2	Rice to Purchase	874	965	1071	956
3	the "rough" amount	1231	1322	1428	1312
4	the "official" amount	492	529	571	525
5	Total Material Cost	33977	36493	39413	36260
6	Total Revenue	96021	103133	111384	101589
7	Profit of Production	62044	66640	71971	65329
8	Six Daily Levies/Total Revenue	73%	68%	63%	68%
9	Extra Subvention to the Center	2282.34	6878.2	12209.4	6563

Note: Column 1-3 is the modeling with the official price at 195, the amount of rice provided by the prefecture at 375. In all three cases, the amount of six daily levies is thus 195 multiplied by 375, which equals 69,615. In column 1-3, the brewery contribute 71%, 73%, and 75% to the total rice consumed, which are the min, mean, and max from the sample of the daily journals. Item 2, "rice to the purchased" is calculated directly based on the share of brewery paid rice. Item 9 is the profit left after reimbursing the brewery's expense on rice and paying the six levies. It is the extra profit from the further expansion of production, and the amount is claimed by the central state under the name of "extra subvention to the center". The column of "sample average" is not the result of modeling but the means of those items calculated from the daily journals.

TABLE 6

"EXTRA RAW MATERIAL COST" IN THE DAILY JOURNAL OF THE TWENTY-FIRST DAY OF THE TWELFTH MONTH, 1162

Raw Material	Price (wen)	Gov Paid Quantity	Gov Cost (wen)	Brewery Paid Quantity	Brewery Cost (wen)	Total Quantity	Total Cost (wen)	% of Brewery Exp
Rice	16 per <i>sheng</i>	354 <i>sheng</i>	5664	991 <i>sheng</i>	15856	1345 <i>sheng</i>	21520	74%
Yeast	48 per <i>jin</i>	63.5 <i>jin</i>	3048	178 <i>jin</i>	8544	241.5 <i>jin</i>	11592	74%
Matches	N/A	N/A	1065	N/A	2980	N/A	4045	74%
Total			9777		27380		37157	74%

FIGURE

FIGURE 1

