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The Political Economy of Famine Relief in China, 1740–1820

Preindustrial agricultural economies often faced unpredictable and catastrophic risks from crop failures caused by erratic weather patterns, pests, and epidemics. In China, temporary tax exemptions (cancellation of all or a portion of taxes due from a county) and tax postponement had been used in most dynasties to help regions regain their economic equilibrium after a failed harvest. Moreover, during the last imperial dynasty (Qing Dynasty, 1644–1911), the Kangxi emperor (reined, 1662–1722) significantly expanded upon the system of state granaries, permitting an additional means for the empire to forestall or partially curtail the impact of food crises.

The granary system was to become one of the most important institutions of the Qing state and the focus of a substantial share of the state's resources. The call to develop and expand upon grain stocks required the involvement of officials at virtually all levels of the bureaucracy, across the counties and communities of the empire. As a result, there is an abundance of historical data and archival material from the Qing period on granaries and tax-relief policy. The aggregate amount of grain storage in the state-sponsored granaries was significant, but the per capita amount of grain stocks recorded in the eighteenth century was exceptional, even for the Qing period as a whole.

Relatively little is known about how the application of the two types of relief evolved over time across provinces. This article examines the stocking patterns of the civilian granaries and data on tax relief from 1740 to 1820. The findings indicate that the two in-

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struments of famine relief, tax relief and civilian stocks, were substitutes: The relationship between grain stocks and the frequency with which a province received some form of tax relief was generally negative.

This persistent negative correlation might have been the outcome of imperial objectives based on the formal principles of Qing administrative governance. Under this model, governors and governor-generals, the highest-ranking officials of the provincial units, cooperated with each other, and with the subprovincial officials, prefects, and district magistrates, through an unbroken chain of command to implement instructions from the throne. In practice, governance was a much more complicated affair, requiring flexibility, coordination, and communication among thousands of officials. Nonetheless, the analysis of Will, Bin Wong, James Lee, and others showing that famine relief and state granaries went a long way toward stabilizing food supply fluctuations implies that Qing officials succeeded in attaining this ideal, at least for part of the eighteenth century.[1]

The pattern between provincial grain stocks and the frequency of tax relief may also have been a consequence of noncooperative behavior and strategic interaction among intergovernmental units. Indeed, it is possible to find historical evidence of a multitude of local or individual interests in official interactions. Although these accounts may seem to contradict the view of Qing governance as a wholly unified operation, even analyses that emphasize the flexibility of Qing administrative governance acknowledge a blurring of the distinction between administrative flexibility and bureaucratic corruption. The difficulty in reconciling the two concepts may well have something to do with the broad definition of *corruption*—a long litany of actions that departed from official regulation, including the pursuit of personal gain at the expense of public welfare, influence peddling, extortion, dereliction of duties, unauthorized solicitation of extra

1 Pierre-Etienne Will, *Bureaucracy and Famine in Eighteenth Century China* (1990), 188–189; *idem* et al., *Nourish the People* (Ann Arbor, 1991); R. Bin Wong, "Food Riots in the Qing Dynasty," *Journal of Asian Studies,* XLI (1982), 767–709; *idem* and Peter C. Perdue, "Famine's Foes in Ch'ing China," *Harvard Journal of Asiatic Studies,* XLIII (1983), 291–332. The state granary system probably reached its maximum scale and function in the eighteenth century. Will et al., *Nourish the People,* 43, date this period as 1736 to 1780.

funds, collusion with other officials for mutual benefit, bribery, embezzlement, shifting, and misuse of funds.[2]

One major problem of local governance in the Qing was that the regular revenue system provided scant funds for local projects. The failure of local officials to carry out the tasks for which they were responsible could result in impeachment for dereliction of duty, but attempts to devise unauthorized means to fund local projects carried the risk of prosecution for embezzlement and corruption. In addition, the legality of actions was sometimes difficult to assess. The practice of storing funds for relief as cash rather than as grain, for example, involved many layers of legality, not all of them unambiguous or enforceable. Given the rigidity of formal regulations, and the general responsibilities of district magistrates, some policies, although not formally endorsed by the emperor, found wide implementation and informal acceptance among officials in every province. Thus, corresponding to the flexibility in revenue sharing and intergovernmental coordination was the difficulty in tracing financial accountability.[3]

Distinguishing problems of local governance that derived from resource constraints from outright corruption, however, is not always easy. The common accusations of corruption in Qing discourse have served to obscure the reasons why the bureaucracy at times fell short of its ideals. For example, the emperor Yongzheng (reigned 1723 to 1735) viewed governmental deficits (a source of which lay in deficit granary stocks) as a failure in moral conduct: "If one wants to clear up the issue of deficits, there is no better [way] than frugality and upright conduct. If one is frugal there will be no lack of funds for expenses. If one is upright in conduct, one cannot be [drawn into misdoings] by one's superior." The literal and ulterior objectives of official texts are invari-

2 Madeleine Zelin, *The Magistrate's Tael: Rationalizing Fiscal Reform in Eighteenth-Century Ch'ing China* (Berkeley, 1984); Nancy E. Park, "Corruption in Eighteenth Century China," *Journal of Asian Studies,* LVI (1997), 967–1005.

3 On the financial constraints of the lower administrations, see John R. Watt, *The District Magistrate in Late Imperial China,* (New York, 1972). On how provincial authorities could better control the various categories of tax revenue relative to the position of the metropolitan (central) authorities, see E-tu Zen Sun, "The Board of Revenue in Nineteenth Century China," *Harvard Journal of Asiatic Studies,* XXIV (1962/63), 175–228. See also Thomas Metzger, *The Internal Organization of Ch'ing Bureaucracy: Legal, Normative, and Communication Aspects* (Cambridge, Mass., 1973). Will et al., *Nourish the People,* 160; Zelin, *Magistrate's Tael,* 42.

ably open to interpretation, but the implication of this one seems to be that corruption was the main issue, not resource constraints. This association between sound financial conduct and sound moral conduct is also evident in verses attributed to the Shang Dynasty (fourteenth century B.C. to 1025 B.C.). For Chinese scholars and rulers of the Qing, this relationship was by no means remarkable, although what it meant for all practical purposes was certainly debatable.[4]

A model that separates resource constraints from agency problems helps to clarify the conceptual issues involved. Resource constraints may be understood as economic rationality derived from the budget constraint; a unified bureaucracy interested in minimizing costs may have chosen to offer more tax relief to a locale where storage was costly, and vice versa. Principal-agent theory refers to the presence of incomplete or asymmetrical information between economic parties—specifically, between an economically dominant entity, the principal, and one or more individuals, the agents. The principal attempts to devise contractual arrangements with the agents that best serve its interests. Agents, however, have their own interests to consider.[5]

Qing famine-prevention policy suggests the terms of an insurance agreement. In addition the incentives governing the behavior of Qing officials may not have differed significantly from those of self-interested agents. The implicit insurance contract between the provinces (the agents) and Beijing (the principal) was that a region that experienced a normal or better harvest was to pay its taxes in full and that the central government would provide remissions out of its revenues if ruined harvests and high prices prevented a province from paying its taxes or rendering necessary assistance to the populace. A so-called moral-hazard problem accompanies the principal–agent relationship when terms of insur-

4 Zelin, *Magistrate's Tael,* 81–82. *Da Qing lichao shilu* [the veritable records of the Qing dynasty], *juan* 3, YC, 1,1,1; Robert P. Hymes, "Moral Duty and Self-Regulating Process in Southern Sung Views of Famine Relief," in *idem* and Conrad Schirokauer (eds.), *Ordering the World: Approaches to State and Society in Sung Dynasty China* (Berkeley, 1993), 287; Helen Dunstan, *Conflicting Counsels to Confuse the Age: A Documentary Study of Political Economy in Qing China, 1644–1840* (Ann Arbor, 1966).

5 Efficient levels of output of a locally provided public good are likely to vary across administrative regions because of differences in preferences and costs. See Wallace E. Oates, "An Essay on Fiscal Federalism," *Journal of Economic Literature,* XXXVII (1999), 1120–1149, for a survey of the public-finance literature on fiscal federalism.

ance are involved because the actions undertaken by the local administrator can affect the outcome of the insurance contract. In the case of famine prevention, the effort and expense invested by local officials and gentry on local granaries would have reduced the frequency with which tax remissions from the center were needed.[6]

Within this framework, the decision to deviate from officially ascribed duties did not signal any lack of moral uprightness (corruption in the sense of "immorality," or a "lack of morale" in the sense of no motivation for public service). Rather, the terms of famine-relief funding and the command and control structure of Qing governance resulted in the rational incentive of certain administrators to deviate from the objectives of the emperor. The kinds of macroeconomic patterns of storage and relief that are observable in the data may thus be a reflection of how similar incentives, perceived by administrators facing comparable circumstances, led to similar responses.

HISTORICAL BACKGROUND Famine prevention and relief in China presented a challenge because of the size of the empire, which was large not only in terms of geographical space but also population. In the mid-eighteenth century, approximately one-third of the world's population, 200 million people, lived in China, the majority of them engaged in small-scale, producer-cum-consumer agricultural farming. The economic size of the government, however, was not large relative to the economy as a whole, and the amount that the central government could spend on public projects, and famine relief in particular, was likely to have been small relative to GDP. Estimates of the approximate fraction of these revenues relative to total economic output for the period under investigation are low. Nineteenth-century estimates range from 1 to 3 percent of gross national product, and eighteenth-century expenditures were probably even lower because the tax categories were fewer.[7]

The modest resources of the Qing government make it all the

6 See James A. Mirrlees, "The Optimal Structure of Incentives and Authority within an Organization," *Bell Journal of Economics,* VII (1976), 105–131; Stephen Ross, "The Economic Theory of Agency: The Principal's Problem," *American Economic Review,* LXIII (1973), 134–139; Kenneth J. Arrow, *Aspects of the Theory of Risk-Bearing* (Helsinki, 1965).

7 Population counts for China at this time are always approximate. See John D. Durand, "The Population Statistics of China, A.D. 2–1953," *Population Studies,* III (1960), 263; Ho Ping-ti, *Studies on the Population of China, 1368–1953* (Cambridge, Mass., 1967). If Chang's as-

more striking that the government had a significant relief program, the effect of which was to lower its revenues for non-relief expenditures even further. Certainly, since the legitimacy of the rule depended on food security, relief expenditures were made in order to help ensure political security. Nevertheless, the attitude of the state toward relief seems more forthcoming than, for example, that of pre-industrial European states. The relative lack of public stocks in Europe does not imply that private or semi-private granaries could not have been adequate without public stocks, but in China, where this would have been true as well, the issue facing the emperors was not so much about *whether* it was the role of the government to provide relief, but rather *how* to administer that relief.[8]

Government's Approach to Disaster Relief The famine-relief system had two components—tax relief (together with grain tribute transfers or remissions) and disbursals from local granaries. Since tax relief and grain tribute formally belonged to the central government, they required the central government's approval. Local officials and local gentry, however, maintained the local granaries at the county level or village level, under the guidance of provincial authorities and Beijing. The disaster-relief programs implemented under the reign of the Qianlong emperor (1735 to 1796) is exceptional for the amount of relief on record. For example, the Qing government spent as much as 7 percent of government revenues per year on disaster relief.[9]

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sumption that salaries and payments to government personnel alone absorbed nearly 50 million taels (or about 70% of the total governmental expenditure) is correct, the remaining 30%, or about 0.78% of GNP, was available for other public expenditures. See Chung-li Chang, *The Income of the Chinese Gentry* (Seattle, 1962), Table 36, 320. On nineteenth-century estimates of revenue, see Dwight Perkins, "Government as an Obstacle to Industrialization," *Journal of Economic History,* XXVII (1987), 487. According to Chang's calculation of annual gross national product in the 1880's (Table 28, 296), the combined value of central and local government expenditures (using 1885 values from Table 36, 320) was about 2.6% of GNP (73/2781 million taels).

8 On the state's handling of famine and food crises, see Bin Wong, "Food Riots in the Qing Dynasty," *Journal of Asian Studies,* XLI (1982), 767–709; *idem* and Perdue, "Famine's Foes in Ch'ing China," *Harvard Journal of Asiatic Studies,* XLIII (1983), 291–332. For a survey of food policy through history, see Lui Tang Feng, *Zhongguo Lidai Minshi Zhengceshi* (Civilian Food Policy in China's Historical Period) (Beijing, 1993). On English famine policies, see, for example, Cormac Ó'Gráda, *Black '47 and Beyond* (Princeton, 1999), 77–83.

9 In the mid-eighteenth century, from a total of 73.8 million silver taels of government revenue, 13 million came in the form of the grain tribute. See Yeh-chien Wang, *Land Taxation in*

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The local civilian granary system—the "ever-normal," the "community," and the "charity" granaries—came primarily under local administration. According to mandates from the early Qing emperors, the role of the local granaries was to provide the first line of insurance against food shortages by ensuring that a stock of grain would be available immediately. The early financial support from the central government was, by the eighteenth century, partially withdrawn. The exact breakdown of the financial sources that funded the granaries is unknown. The shares from different sources would have varied across regions, but the maintenance and operation of the civilian granaries depended critically on the support of local officials and local gentry, in addition to partial subsidies from the center.[10]

Other famine-relief measures existed as well. In some cases, officials facilitated the transport of grain into a disaster-stricken area, and helped to create temporary "soup kitchens" and "public works" projects to reduce famine-induced migration out of disaster areas. In other cases, the central government acted less directly, encouraging merchant transport, reducing transportation fees for boats carrying grain, or preventing exports of grain from a region. The scope and frequency of these relief measures is not as well documented as tax relief and granary stocks, but these measures, which were not incorporated into the government's routine of disaster relief, would not have been implemented as frequently as the usual relief procedures.

SIZE AND SCOPE OF RELIEF

Assessing the Importance of Local Granaries According to the Qing emperors' mandates, local granaries were to be maintained in the rural as well as urban areas of all counties and provinces. The size of the civilian storage per capita differed across provinces.

Imperial China 1750–1911 (Stanford, 1973); Harold Hinton, *The Grain Tribute System in China 1845–1911* (Cambridge, Mass., 1956). In 1742/43, 1785/86, the amount spent for relief was 10 million taels, about 7% of average annual government tax revenues. See Will, *Bureaucracy,* 298–299. On tax revenues for this period, see Table 4.2 in Wang, *Land Taxation,* Table 4.1, 72.

10 On the influence and status of local gentry, see Joseph W. Esherick and Mary Backus Rankin (eds.), *Chinese Local Elites and Patterns of Dominance* (Berkeley, 1993). For the gentry's role with respect to local granaries, see Rankin, "Managed by the People: Officials, Gentry, and the Foshan Charitable Granary, 1794–1845," *Late Imperial China,* XV (1994), 1–52.

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The original sources of the provincial-level storage data were palace memorials and board of revenue registers, which reported actual storage in the eleventh month of each year. Figure 1 shows the per capita storage levels across the eighteen provinces of China proper for four years in which population data are available: 1748, 1776, 1818, and 1831.[11]

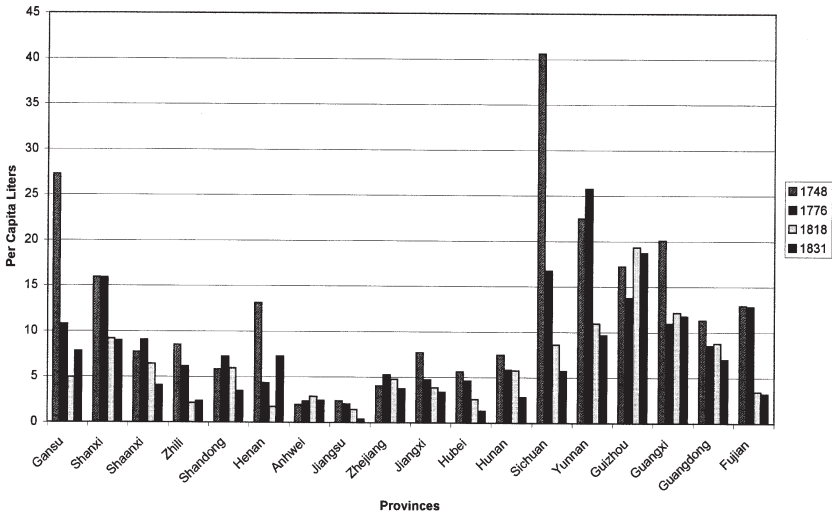
In per capita terms, civilian stocks held in the Qing would have amounted to an average of 7 liters per person, or 3 percent of annual consumption. The public storage of inland provinces like Guizhou and Yunnan was about 8 percent of total consumption per person, which was among the highest public per capita stocks levels in the empire. Liu points out that extra grain stocks within these ranges would not have been sufficient to surmount a prolonged famine.[12]

Indeed, supplementary central-government funding implemented after harvest failures sometimes went much further than local civilian grain stocks—at least in Zhili's famine of 1743/44, which affected counties within 100 miles of Beijing. In total, the central government's grain-relief contributions (from tribute grain, government purchases, and, possibly, contributions solicited from private stocks) were 7.5 times that of local civilian stocks. The total amount of relief extended to those counties for one year was two to seven times what could normally be collected annually in taxes from those areas. In addition to grain, the central government simultaneously granted tax relief: No taxes were levied during the entire crisis period, and all tax obligations and tax arrears against the stricken counties were postponed. Such an extraordinary level of relief would not have been feasible throughout the empire during every crisis; famine expenditures must have been

11 Provincial storage figures are reproduced in Will et al., *Nourish the People,* data appendix, 527–542. Population data are based on tables in Durand, "Population Statistics of China," 351, with the exception of Guangdong Province, the data for which is from Robert B. Marks, "Rice Prices, Food Supply, and Market Structure in Eighteenth-Century South China," *Late Imperial China,* XII (1991), 64–116. Population for Sichuan is likely underrepresented, leading to misleadingly high per capita estimates. See also Ho, *Studies,* about the nature of population data for China.

12 Liu, "A Reappraisal of the Functions of the Granary System in Ch'ing China (1644–1911)," in Gast et al. (eds.), *Les techniques de conservation des grains à long terme, 3, fasc. 1.* (Paris, 1985), 305–321.

Fig. 1 Per Capita Storage across Eighteen Provinces



concentrated on specific regions, rather than equally across all of them.[13]

Central Relief Records on every government action related to famine prevention or relief do not exist, but a few major types of efforts were systematically recorded. Information from court documents gives direct evidence that relief operations initiated by the center exhibited strong geographical patterns among the provinces of the empire. Table 1 displays the categories of disaster for which separately dated reports were recorded in the *Da Qing lichao shilu* [Veritable Records of the Qing]. Because the source generally documents only events that required a motion or decision from the court, other reports of disaster for which no action was taken may lie elsewhere. About 70 percent of the reports relate to drought and flood; other categories of disaster consist of hail, lo-

13 The government sent an additional 1.39 million *shi* (equal in the Qing to to about 103.5 liters or 2.94 bushels) to supplement the grain relief available for distribution from civilian granaries in the twenty-seven districts. See Will, *Bureaucracy,* 170–171. Given that Zhili's granaries held about 1 million shi of grain, and the province had 146 counties during the Qing (according to George M. H. Playfair, *Cities and Towns of China A Geographical Dictionary* [Taipei, 1965]), the stricken counties had around 185,000 shi of grain stocks locally. Will, *Bureaucracy,* suggests that actual storage amounts were around 150,000 shi (155), and that total relief distributions for 1.5 years were three to ten times higher than what could normally be collected annually in taxes (152). *Zhenji,* 6/2a,3a and 1/14a–b, 16a–b; Will, *Bureaucracy,* 247.

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Table 1 Disaster Reports by Categories (1644–1820)

PROVINCE	FLOODS	DROUGHT	LOCUSTS	TYPHOON	HAIL	THUNDER	SNOWSTORM	EARTHQUAKE	EPIDEMICS	OTHER	TOTAL
Zhili	129	64	19	2	52	0	10	26	0	1	303
Gansu	69	66	12	6	75	1	29	6	6	2	272
Jiangsu	141	50	16	15	18	0	1	0	0	0	241
Anhwei	115	52	7	1	10	0	0	1	1	1	188
Shandong	95	44	13	7	17	0	4	1	0	3	184
Shaanxi	44	33	5	2	41	1	15	3	1	3	148
Shanxi	40	28	8	1	37	0	16	8	1	7	146
Henan	82	38	6	3	11	0	1	1	1	2	145
Zhejiang	61	46	8	13	4	0	2	0	1	0	135
Hubei	83	41	2	0	1	0	0	1	0	1	129
Hunan	58	29	2	1	1	0	0	1	0	0	92
Jiangxi	51	36	0	2	2	0	0	0	0	0	91
Fujian	36	23	1	21	1	0	0	2	0	0	84
Guangdong	34	12	4	13	0	0	0	1	0	1	65
Yunnan	29	2	0	0	3	1	0	12	0	0	47
Sichuan	13	2	0	1	2	2	2	15	2	1	40
Guangxi	8	5	1	0	0	0	0	0	0	0	14
Guizhou	7	1	0	0	0	2	0	2	0	1	13
Total	1.095	572	104	88	275	7	80	80	13	23	2,337

SOURCE Zhenhan Chen et al., *Qing shilu jingjishi ziliao* [Economic History Materials from the Veritable Records] (Beijing, 1989), 4v.

Table 2 Number of Disaster and Relief Reports in the Veritable Records, 1644–1819.

PROVINCE	DISASTER REPORTS	RELIEF REPORTS
Zhili	303	477
Jiangsu	241	344
Shangdong	184	288
Gansu	272	258
Anhwei	188	232
Henan	145	205
Hubei	129	158
Shaanxi	148	153
Zhejiang	135	148
Shanxi	148	147
Fujian	84	94
Hunan	92	65
Guangdong	65	64
Sichuan	40	58
Yunnan	47	58
Jiangxi	91	49
Guizhou	13	22
Guangxi	14	10
Total	2,337	2,830

SOURCE Zhenhan Chen et al., *Qing shilu jingjishi ziliao* [Economic History Materials from the Veritable Records] (Beijing, 1989), 4v.

custs, typhoon, snowstorms, earthquake, thunder, and epidemics. Table 2 summarizes the total number of disaster and tax-relief reports from 1644 to 1819. The ranking of available disaster reports and the frequency of relief are closely related. Generally, a disaster report from a locality requesting relief preceded the relief itself, and one or more episodes of tax relief may have been associated with a disaster. Most of the tax relief pertained to disaster, but general tax amnesties were granted on auspicious occasions (ascension to the throne, for example) or for special functions (funding for military campaigns).[14]

The distribution of tax relief was disproportionately skewed toward certain provinces. The scale of the geographical inequality

14 Chen Zhenhan et al., *Qing shilu jingjishi ziliao* (Economic History Materials from the Veritable Records) (Beijing, 1989), II (sections on *ziran zaihai* [natural disasters], 453–675, 693–706; IIIa and IIIb (sections on *juanmian huanzheng* [Tax exemptions and postponement]), 153–588, 1–238, respectively. General remissions were also given on auspicious occasions, such as an emperor's ascension to the throne.

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in tax relief, however, is at best only partly explained by the most obvious associations, such as alternative measures of weather severity, population size, per capita tax burden, or market access, but these factors do not account for the scale of inequality displayed in the frequency of relief reports. The difference in the ratio between the province with the highest and that with the lowest frequency of relief from 1644 to 1819 is a factor of 47.7 (Zhili had 477 entries and Guangxi 10). No independent measure of differences in political influence of the provinces is available, but if it were a significant component, it would not have been a function of specific officials or events. The pattern of provincial relief was persistent, lasting far longer than the tenure of any one person in a particular post.[15]

The Geographical Relationship between Granary Storage and Tax Relief The center issued guidelines for the volume of grain that local managers were supposed to stock. These guidelines were based largely on population. The more populous counties were generally expected to carry more stocks, although the ease of access to grain markets was also a consideration. The targets were lower-bound: stocks that were below target would draw attention, whereas those above target were acceptable. Figure 2 shows the targets and estimated storage levels for sixty-eight of the eighty-eight counties in Hunan province, ranked from highest to lowest. Despite frequent criticisms from the central authorities, low stocks do not appear to have predominated. The figure indicates that the actual distribution of stocks was more variable than targets would have implied, on both the high and the low end. Even at the provincial level of aggregation, actual storage tended to be more variable than the target guidelines would suggest.[16]

Figure 3 plots the data frequency of central aid and local storage for ten provinces between 1740 and 1820. The negative overall relationship shows that the higher the amount of central government aid received, the lower was the level of per capita grain stored locally. In order to limit sources of heterogeneity that might

15 For additional details, see Shiue, "Local Granaries and Central Government Disaster Relief: Moral Hazard and Intergovernmental Finance in Eighteenth and Nineteenth Century China," *Journal of Economic History,* LX (2004), 101–125.

16 The figures are based on the provincial gazetteers of Hunan province, which give stocks on normal grain targets during the mid-eighteenth century. The "actual" reserves are scaled estimates based on early nineteenth-century stocks.

Fig. 2 Distribution of Target Reserves (1) vs. Actual Reserves (2) for Sixty-eight Counties in Hunan Province

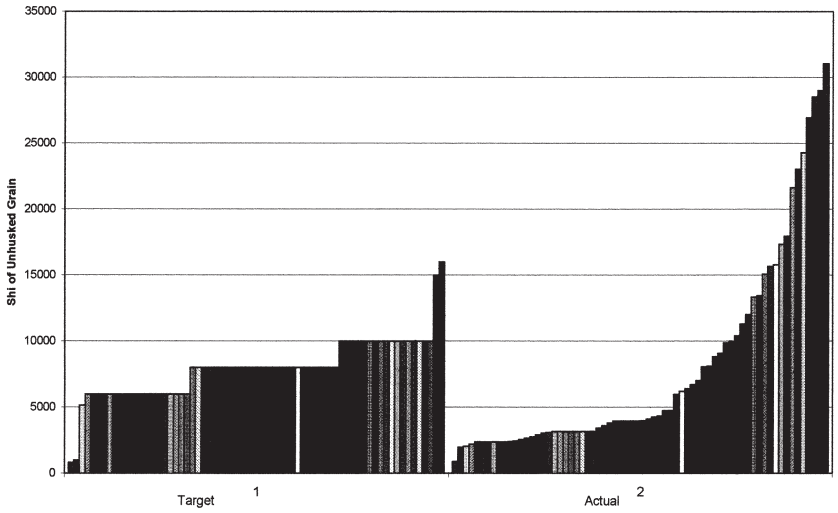
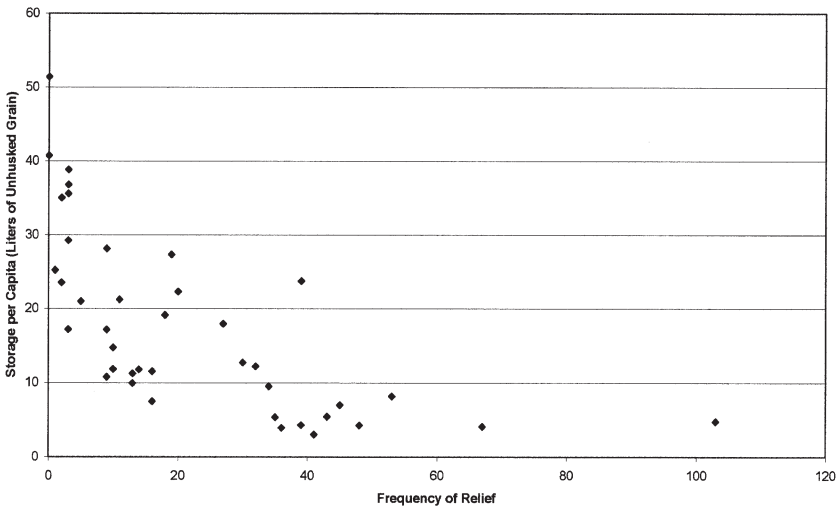


Fig. 3 Public Storage and Relief, 1740–1820, in Ten Provinces, Four Nonoverlapping Twenty-Year Intervals Each



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arise because of differences in grain substitution and storage costs, Figure 4 describes a subsample that was created from the full sample of provinces. The provinces depicted are primarily rice producers (and storers). They are largely representative of the distribution of central relief seen in the full sample (see Table 1). To incorporate temporal trends, the period is further divided into four twenty-year intervals of time, thus creating four points for each province plotted in Figure 4.[17]

Figure 4 shows the name and gives the linear trend of each of the ten provinces associated with the scatter plot in Figure 3. For nine out of ten provinces, storage is negatively related to central aid not only as an overall pattern but within provinces over time as well. The negative relationship between relief given by the center and local storage suggests that local officials gradually adjusted their storage patterns as they learned about the amount of relief that the center was prepared to allocate to their region.

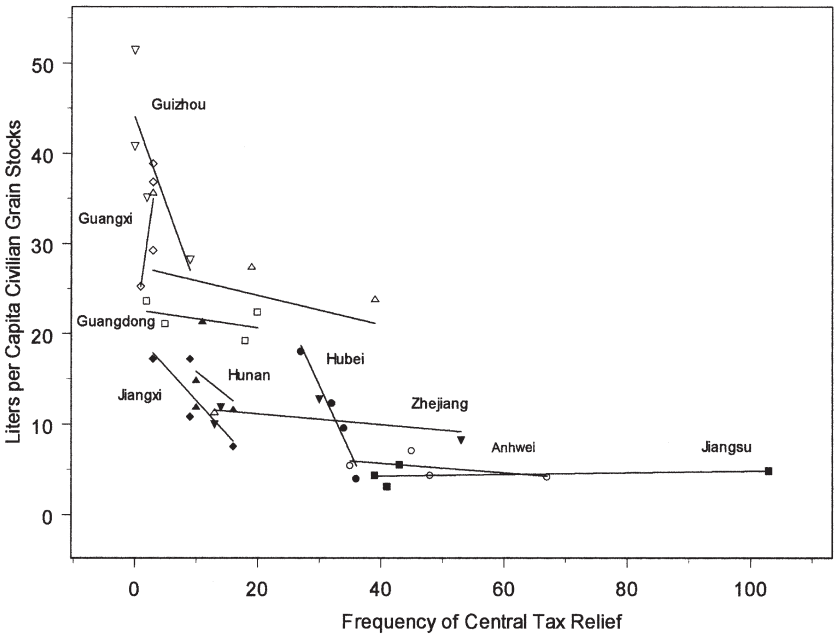
Regions to which the center distributed more tax relief tended to have lower incentives to hold reserve stocks, irrespective of location, political influence, or relative ease of access to external sources of grain through trade. On first glance, that certain regions would have received more tax relief from the central government *and* have held less local funds for the upkeep of their granaries might seem reasonable. For instance, more needy areas might be the recipients of both funds from both sources. More often than not, however, the more commercial regions of the southern and eastern seaboard (for example, Jiangsu and Anhwei), typically regarded as the richest and most politically potent regions, received tax relief most often.[18]

Although the allocation of relief could well have been the consequence of directives from Beijing, it would not have been entirely consistent with the central authority's repeated accusations of under-stocking and mismanagement by local granaries or with its need for tight regulation and control of local officials. The following section explores an alternative perspective that empha-

17 The sample excludes provinces where wheat, barley, or a mixture of rice and these grains predominated.

18 A comparison of the tax burden per capita conditional on income would require information on regional population and income. The poorer northwestern provinces may have had few instances of tax relief, but they also had lower taxes compared to Jiangsu and Anhwei, which were among the most heavily taxed provinces of the empire.

Fig. 4 Civilian Local Storage and Relief, 1740–1820, in Ten Provinces, Four Nonoverlapping Twenty-Year Intervals Each



sizes the potential consequence of intergovernmental dynamics. Over the long run, after repeated interactions, local administrators (provincial and subprovincial) would likely have formed expectations about whether their region would be eligible for central relief after a bad harvest. These expectations might have affected local decisions about how much effort to put into storage activity: successful requests for extralocal funds could have meant that fewer local resources needed to be invested in famine prevention.

HIDDEN ACTION AND INTERGOVERNMENTAL ORGANIZATION Some of the central government's difficulties in ensuring that the counties stocked adequate grain stemmed from the emperor's reliance on administrators outside Beijing, at the provincial and subprovincial level, to carry out imperial policies. Local officials at these levels usually had many general responsibilities, and the center could not fully observe whether local actions were always appropriate. The principal–agent problem arises precisely because a

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principal cannot monitor an agent at all times and lacks information about all of an agent's actions.

Local agents had much better information about local conditions than did ministers in Beijing. Ideally the central government would have wanted local officials and gentry to respond to this information appropriately in its stead. The stocking of local granaries required the kind of flexibility that only intimate knowledge of local information could permit (especially since stocks could come not only from market purchases but also from local contributions and other ad hoc sources).

Since each governing level reported to the next higher authority rather than directly to Beijing, the principal–agent problem could have occurred anywhere along the chain of command. However, the country level may have been an especially weak link. County magistrates (as well as provincial governors) typically were not native to the region that they governed, and because they held office only for a few years, they had little time to develop much knowledge about local conditions. To implement the center's projects and policies, local magistrates had to rely on the knowledge of the clerks who worked in their offices and on the support of the local gentry—many of whom were ex-officials with degrees in the exam system, now residing in their hometowns. The gentry, in particular, would have been in a good position to promote local special interests. Thus, even while the center tried to monitor the actions of local officials, local officials had at once to monitor, and to work with, the local society.

A number of practices were intended generally to align the incentives of appointed officials with those of the center—for example, official monetary supplements to their salaries, *yang-lian* [nourishing virtue] silver, which helped to remove the temptation to make illicit arrangements with local interests for immediate personal gain. The central government also rotated the regional assignments of its officials precisely to prevent them from forming ties that would be detrimental to the central authority.[19]

The emperor could also monitor local conditions through regular reports on weather, harvests, and prices that officials were required to send from the provinces. at regular intervals. Although

19 For more discussion of these funds and their uses, see Zelin, *Magistrate's Tael,* 96, 118–121.

misreporting provided grounds for punishment, these reports were not completely free of monitoring problems either. Nevertheless, information about such verifiable conditions as floods, droughts, and high prices would have been much more difficult to falsify then the amount of grain stored in a county's granaries, which was not readily, or inexpensively, available information. Furthermore, weather conditions and price levels were not connected to the evaluation of local officials in the way that granary stocks were. These reports would have allowed for a more objective assessment of the food supply and its degree of urgency for aid, regardless of the weight that the central government might have attached to the welfare of specific provinces.[20]

The center's main solution for reducing the problems of moral hazard with respect to granaries was better monitoring. Audits of the granary stocks took place periodically. The need for these procedures, however, also underlines significant problems of asymmetrical information. More important, optimal granary storage was not just a question of adequate regulation and control. Even under the best of circumstances, the central government could observe only outcomes, storage volumes; it could not adequately observe the circumstances that led to the decision to store that amount, which is what the principal would have needed to know to determine whether local officials and gentry were taking appropriate actions.

The principal–agent problem, from the principal's point of view, is evident in a directive issued in the name of the Qianlong emperor in 1744:

> If the governors-general and governors have not the ability to give direction to the local authorities, and if the local authorities, for their part, do not concern themselves with fields and farmsteads, domestic animals and trees; if, in years of bad harvests, they only ask permission to release stocks from the granaries and to hold back the tribute grain; if this is assumed to be sound anti-famine strategy for governors-general, governors, and local magistrates, so that the folk are caused to say that there is no need for precaution against flood or drought, and make no plans for living on the fruits of their own toil; and if the point is reached where vagabondage turns into a vogue, and the vital matters of the food and clothes of self and fam-

20 The central government had mechanisms in place to check the accuracy of these reports.

> ily are all entrusted to the state authorities—this is not to benefit the local people, it is actually the way to harm them.

Qing emperors and officials were well aware of agency problems, even if they were not able to resolve them in the long term.[21]

In practice, monitoring was never completely successful. Local officials had numerous opportunities to shift funds from one use to another without detection. In addition, audits were costly; verification and measurement of stocks was difficult; and officials colluded with each other to hide missing stocks. Despite renewed efforts at regulation and control, central accusations of local corruption did not abate. In an edict of 1792, the Qianlong emperor again charged the governors-general and governors with irresponsibility and for the failure to make serious investigations into the state of the granaries. By 1799, the granary system was on the decline; apparently, only 20 to 30 percent of granaries were stocked to their targeted reserves. In 1817, a text stated that, with respect to the granaries, "negligence and loose management are of long standing" and "abuses keep piling up." The irony in this case is that the distribution of relief authorized from Beijing might have been partly responsible for the center's inability to enforce minimal levels of provincial civilian storage.[22]

A SIMPLE MODEL

Local Storage and Central Government Aid under Moral Hazard

To capture the difference between moral hazard and other determinants of the combination of local storage and aid from the central government, and to examine why moral hazard had a negative effect on overall famine prevention, consider a simplified framework in which a "center" and a "local" component interact. The principal is represented by the central government's actions in disaster aid, and the agent is the local officials' actions in local storage.

21 Dunstan, *Conflicting Counsels,* 91; *Shangyu dang* [Archive of Imperial Edicts] QL 9/3/23; QSL/QL, 213:10a–12b.

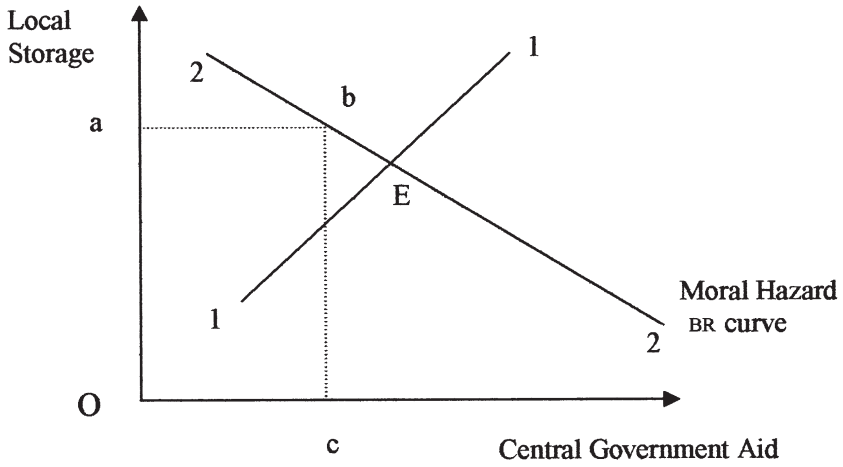
22 For intergovernmental monitoring, annual audits of public grain stocks, which originated in 1698, were performed at every level of the hierarchy by the unit directly superior to the one being audited. *Da Qing hui dian shili* (Precedents and Regulations Supplementing the Collected Statutes of the Great Qing Dynasty), *juan* 189, *hubu, jishu, yubei, cangchu;* Will et al., *Nourish the People,* 203–204; *Qingchao xu wenxian tongkao* (Continuation of the *Wenxian tongkao* Encyclopedia for the Period 1786–1911), 60/8161, 60/8164, *Xichao jizheng,* 4/26a. See also Will, *Bureaucracy,* 276.

The two axes in Figure 5 describe the two ways in which inhabitants of the region can receive insurance from the government against harvest failure and famine—through local granary storage, which is administered by local officials plus gentry, or through aid from the central government. Any point in this quadrant amounts to a certain combination of storage and relief, implying a certain level of insurance for the local population. The degree of insurance increases with distance from the origin in northeast direction: More storage and relief should raise the local population's insurance.

Suppose that differences in weather patterns, for example, require that one region should receive a higher level of insurance than another. What is the best way of raising the amount of insurance? Typically, the answer is a mixture of both more storage and more relief. Relying only on increasing storage or on increasing relief will result in diminishing returns; for example, the local granary has a limited capacity that at some point will be exhausted. The curve that depicts the best way of raising insurance levels in Figure 5 is given by curve 1; it has an upward slope, indicating the efficiency of using both more storage and more relief to raise insurance levels. Drawing the curve at the 45-degree angle illustrates that local and center resources share equally in increasing amounts of insurance, but other angles are possible without affecting the general implications.

Curve 2 in Figure 5, a best-response (BR) equilibrium curve, gives the optimal amount of local storage chosen by local agents for any given amount of aid from the central government. Recall that the central government cannot (fully) observe the actions of the local agents. Given this asymmetry of information, that the local agents act strategically, taking the center's action into account, is a plausible assumption. Thus, if aid of amount c is forthcoming from the center, then local agents' best response is to place an amount, a, of grain in storage. Since storage for insurance purposes has opportunity costs, local officials will only store large amounts for this purpose if they expect the central government to provide little aid. In this case, the best-response curve slopes downward: Larger amounts of aid result in lower local storage, or, central relief substitutes for local storage. Curve 2 is labeled the moral-hazard BR curve. The intersection of the two curves, at point E, gives the equilibrium outcome; it maps a certain level of insurance for the local population.

Fig. 5 Moral Hazard BR Curve and Shared Insurance

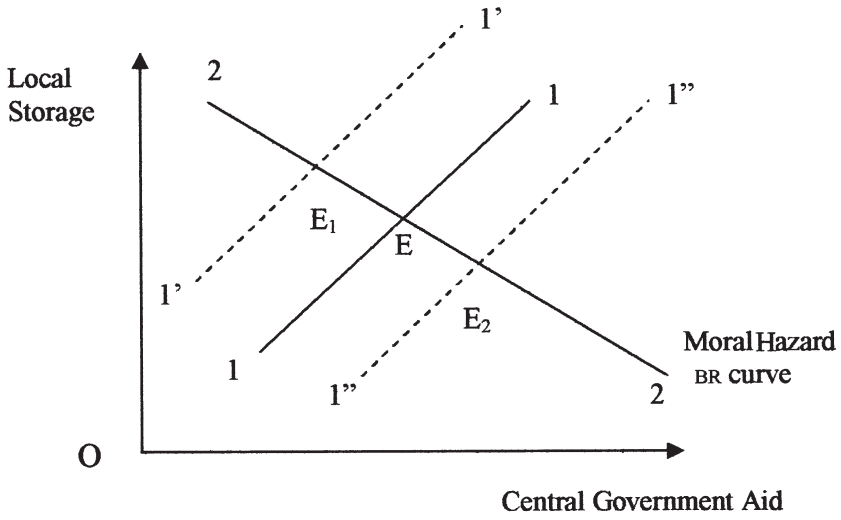


The model demonstrates why there might be differences in local storage across regions. First, suppose that the central government decides to provide less frequent relief to some regions than to others because the former have better access to grain. The implication is that a shift of curve 1 to curve 1' in Figure 6. The new equilibrium point at E_1 indicates that local agents will optimally decide to store more, as central relief is less forthcoming. By contrast, if a number of other regions receive more relief because of strong political influence with the center curve 1 would shift down to curve 1", with a new equilibrium at E_2. Substitutability in instruments of relief implies that an increase in the amount of aid provided by the central government is associated with a decline in local storage, and vice versa. Taking the different equilibria E_1, E, E_2 together shows that the model can explain regional storage differences and the negative relationship of storage and relief found in Figure 3 above.

Note that the level of famine insurance for the local population in cases E_1, E, E_2 could in principle be all the same (famine insurance levels cannot be ranked). For instance, E_1 is associated with a much higher level of granary storage than E_2, but in E_2 there is considerably more central relief than in E_1. What matters is the sum of the two, and given the substitute relationship, the total level of insurance could be identical in the equilibria E_1 and E_2.

1 LINE SHORT
REGULAR
1 LINE LONG

Fig. 6 Equilibrium Outcomes Due To Shifts in Curve 1

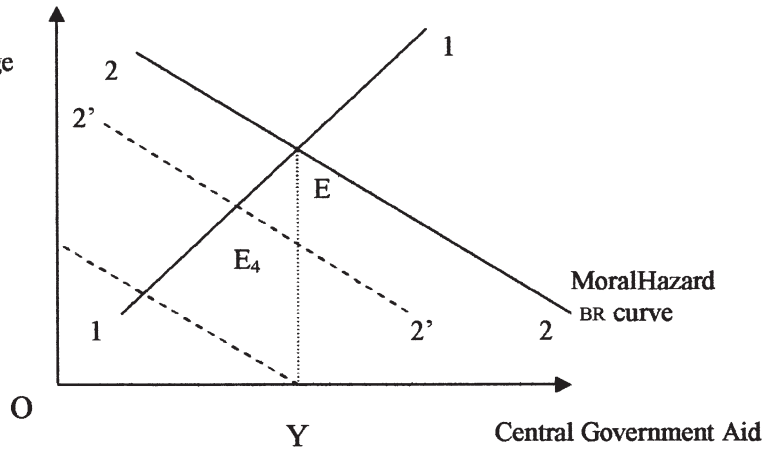


The welfare outcome is different when best-response curve 2 shifts, as in Figure 7, indicating a change in the underlying parameters of political calculation. For instance, if the center has more trouble finding out the true effort level local agents have applied to prevent famine—that is, if asymmetrical-information problem increases, exacerbating moral hazard on the part of the local officials and gentry, curve 2 would shift downward to curve 2', implying that for every level of central aid, the level of local storage declines. The new equilibrium is at E_4, southwest of the old equilibrium at E, indicating that overall insurance has decreased, both local and central components falling. The key point is that the decline is not due to fundamental economic causes but to the effect of higher moral hazard. If the insurance level corresponding to E is the socially desirable one, moral hazard can set the new equilibrium too low. Group insurance with moral hazard can well leave agents in worse condition than they would be if insuring themselves against fluctuating income shocks with no government intervention at all.

Another way of seeing why shifts in the moral-hazard BR curve has major welfare consequences is to consider what happens when the central government does not adjust its aid in accordance with line 1, but the local government does. The crossregional pat-

1 LINE SHORT
REGULAR
1 LINE LONG

Fig. 7 Equilibrium Due To Shifts in the Moral Hazard BR Curve



tern of central aid indicates that certain provinces of China received aid more frequently than others, and that this pattern tended to persist. In this case, central aid, originally at Y, does not move to the implied new equilibrium E_4. Instead, as local officials take the aid as given and make adjustments in local storage, the moral-hazard BR curve may continue to shift downward until local storage is zero, and the central government continues to provide aid of amount OY.

As mentioned above, not all local governments would have had the same incentives to invest in local granaries because of differences in available grain, preferences, and storage costs. Another reason for a varying incentive is that the decision on how much to invest was partially determined by the amount of food relief from the central government. Even if all of the provinces were on an equal footing, the skewed distribution of relief from the center alone would have resulted in differences in local incentives to invest in local granaries.

The problems standing in the way of a highly effective relief policy were multifaceted. This article uses existing estimates of per-capita grain stocks, data from local gazetteers, and secondary sources on central relief to provide new estimates of the scope of the relief program. Empire-wide granary storage exhibits a degree

of empirical regularity that cannot be attributed to idiosyncratic factors alone. Local civilian stocks and central relief appear to be negatively correlated. Although the apparent substitution in the two types of relief funds might be purely a result of resource planning, the evidence suggests that it could be consistent with moral hazard induced by central distribution patterns of relief. Thus, whatever constraints in resources the state faced, intergovernmental fiscal relations could have reduced the local storage for famine relief even further. The underlying incompatibility of incentives that existed across bureaucratic lines likely contributed to the kinds of operational difficulties described in the historical records of the Qing granary system.

The fiscal instruments were not well aligned with the financial responsibilities of local governments during the Qing, and the scope for making changes to intergovernmental revenue-sharing policies through formal channels was limited. Thus, situations that have characteristics of moral hazard may be found not only in the operation of the granary system but also in other contexts related to Qing public finance in which the structural constraints are similar. The kinds of weaknesses demonstrated in this study of Qing China may also be relevant in many other situations, historic and contemporary, in which public policy must be implemented by a government composed of multiple tiers with different incentives.