ECONOMIC PERFORMANCE AND SOCIAL CONFLICTS IN CHINESE HISTORY

by

Cong Liu

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DEDICATION

To my grandfather Fu Liu (1925-2014), who first arouse my interest in Chinese history.

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Abstract

This thesis consists of four chapters on economic performance and social conflicts in Chinese history. The first chapter examines the impact of a major tax reform on protests in the eighteenth century in China. The *de jure* effect of this reform was to increase the tax burden on the gentry and decrease the tax burden on commoners, yet the *de facto* effect is under debate. I combine multiple databases into an annual panel dataset from 1700 to 1750 and use detailed information on protest to identify income shocks and tax incidence. The regression results after controlling for provincial fixed effects and national shocks show that the tax reform increased local protests by 0.3 incidents per year, which equals to half a standard deviation before the reform started. Further examination suggests that the *de facto* effects of the reform hurt commoners rather than the gentry. First, it increased protests by commoners but had no effects on protests by the gentry. Second, provinces with more gentry landlords also had larger increases in the frequency of protests. These results support that the gentry managed to pass the increased tax burdens on to the commoners. This analysis provides quantitative evidence that links social standing and tax burdens in pre-modern society.

The second chapter studies the effect of income shocks on different types of conflicts. I consider two types of conflicts: protests, such as grain crises, that requested actions by the government, and revolutionary activities that aimed to overthrow the central government. From 1902 to 1911, China experienced both types of conflicts. I use a detailed record of local conflicts to identify the causes and leaders of each conflict. Combining this information with exogenous price shocks from the international agricultural market, I find that negative income shocks coming from drops in the export price of tea and the increases in the import price of cotton tended to increase the overall frequency of conflicts in general and protests that requested actions from the government. However, the same negative income shocks sometimes reduced revolutionary activities, which was probably caused by the shortage of resources in organizing these activities. These findings suggest an “income effect” on conflicts, probably due to the resources needed to organize the activities.

The third chapter examines the impact of civil wars on the local economy using newly documented information about civil wars across regions in early-twentieth century China. During this period, China was *de facto* divided into several regions. Each region was controlled by different warlords or political groups. Warlords fought with each other for a larger territory. I first quantitatively document the scale, timing, and location of these civil wars. Around sixty violent civil wars took place from 1911 to 1934 and 25% of the Chinese counties in my sample were involved in at least one battle. I then examine the impact of civil wars on local economic activities. I find that civil wars overall caused a small negative impact on international trade flows and a 12.1% drop in rural land values. When the results are separated into wars by political groups, the wars involving weak political groups led to 1.7% to 3.8% drop in international trade flows, while the ones by strong political groups had small positive impact on trade flows. Similarly, wars conducted by the powerful incumbent had no negative impact on land values, while the ones between the KMT and the CCP led to a 30% drop in land values. Combined with narrative evidence, the results suggest that incumbent or political groups might have *protected* trade or reduced harm to the local economy if they relied on tariff or land taxes to finance themselves.

The fourth chapter examines the impact of World War I on the Chinese economy. The war largely increased the freight rates in international trade and decreased China's imports of manufactured products from the European countries. I combine data from multiple sources to quantify the development of China's industrial sector and changes in agricultural input prices during and after the war. The firm-level information from the textile industries shows that the textile firms expanded during the war, and the trend continued even after. Using John Buck's survey on land values and labor wages across China, I find that the growing industrial sector also raised agricultural input prices by increasing demand for raw cotton and rural laborers. However, the benefits were small and the impact was clustered around the ports.

Introduction

The Great Divergence literature seeks to explain Europe's take off relative to China's stagnation (e.g., Pomeranz, 2000). According to the literature, one contrast between China and Europe is that Europe was divided into multiple countries since the collapse of the Roman Empire and experienced constant fighting until the eighteenth century, while China was always able to reunite as a whole nation (Rosenthal and Wong, 2011; Ko, Koyama, and Sng, 2014). Constant warfare hurt Europe's economic development for a century, yet motivated the Europeans to adopt gun powder and to develop a broad range of munitions (Hoffman, 2015).

In this picture, China is described as a relatively peaceful and united country. However, as Tilly (1990) noticed, China became the great land of rebellions and civil war.¹ Being a united country for most of the time, conflicts between the Chinese and other ethnic groups took place frequently (Bai and Kung, 2010; Ma, 2011). About once two to four hundred years. China was divided into several small nations controlled by warlords. China's transition to a modern economy was still featured by nationwide revolutions and peasants revolt. The revolutionaries started several uprisings before overthrowing the Qing government, and the Chinese Communist Party became successful by persuading peasants to fight with landlords. Early leaders of the CCP studied features of local peasant union and peasant revolts (P'eng, 1927[1984]; Mao, 1927[1960]). In addition, when the country was united, large-scale peasant revolts usually broke out when a dynasty was in decline. Even when the country was enjoying steady growth, small-scale conflicts, such as local protests that against local government, took place constantly (Wong, 1997; Wu, 2010). Under the veil of peace, China experienced regional chaos frequently.

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¹There is a large literature about conflicts in economics and other disciplines, especially political science, sociology, and history. For example, Europe's experience of constant conflicts attracted many scholars' attentions. Charles Tilly (1990) has a series of studies about contention in Europe. He points out how the preparation of wars formed European states (Tilly, 1990). His other studies focus on social movements in Europe and the United States since the nineteenth century (Tilly, 2004). In Besley and Persson (2011)'s framework, civil wars are closely related to the state's decisions to invest for legal capacity and state capacity.

Many historians have noticed the importance of violence in Chinese history and have conducted regional studies to understand the causes and features of these collective violent actions. For example, Perry (1980) focuses on long-term conflicts in North China. She studies features of conflicts in different periods and attributed the constant outbreak of regional revolts in North Huai River to unfavorable geographic conditions. Similarly, Rowe (2010) also studies the experiences of a particular chaotic county close to the middle of the Yangzi River. Naquin (1976, 1981) emphasizes the importance of secret parties and religion in the organization of conflicts. Bernhardt (1992) focuses on violent tax resistance in the Lower Yangzi region in the nineteenth century. These studies provide first-hand analysis based on archives and features of different conflicts, yet the literature lacks a systematic nationwide description of conflicts, except for Yang (1981) who conducted statistical analysis on mass actions in the nineteenth century based on official archives, but did not use the modern methods of identification that can help determine causality.

The economic literature recently started to study the impact of historical events in China on social conflicts. The events include rain fall (Bai and Kung, 2011), the introduction of New World crops (Jia, 2014), culture (Kung and Ma, 2014), and the abolition of the historical elite recruitment system (Bai and Jia, 2016).² However, most of these studies consider large-scale revolts. None of these studies separate conflicts by their aims, leaders, or scale despite a rich historical literature.

This dissertation studies the economic factors involved in social conflicts and warfare that China experienced from the eighteenth century to early twentieth century. I examine four types of conflicts.

First, I focus on the most frequent and small-scale protests that drew the government's attention, often due to food crises and resistance to tax policies. These protests were usually local, small scale, and not aimed at overthrowing the central government. Protests in most cases requested actions from the government, such as relief. In historical societies that lacked legal channels for government officials to hear from the people, protests can be viewed as an extreme form of voice (Rosenthal and Wong, 2011).

The second type of conflicts is revolts or revolutions. Different from protests, the goal of participants in revolts was to overthrow the central government. Revolts occurred more frequently when a dynasty was in its middle age and started to collapse. This

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²The relationship between income shocks and conflicts has received increasing attention in the economics literature, both theoretical and empirical (Blattman and Miguel, 2010; Garfinkel and Skaperdas, 2007). A major development in recent conflicts literature is to exploit identification by using economic shocks as quasi-experiments as identification strategy, such as rainfall (Miguel, Satyanath, and Sergenti, 2004) or trade shocks (Bruckner and Ciccone, 2010; Dube and Vargas, 2013). I borrow this identification strategy, using external economic shocks combined with exogenous geographic conditions as source of identification in my study.

is the period when people were more dissatisfied with the government. In most cases, revolts were led by farmers or secret groups, some of which were political or religious. Revolts also accelerated the collapse of an old dynasty.

The revolts or revolutions at the end of the Qing dynasty, however, were different from those in earlier periods. Besides the traditional revolts, the influence of western ideology also motivated intellectuals to participate in revolutions. As a result, some of the revolutions not only aimed to overthrow the Qing dynasty, but also sought to transform political institutions, such as abandoning the monarchy and building a republic. The third type of conflicts was civil war. Different from protests that appeared frequently and revolts that always took place at the end of a dynasty, civil wars happened when China was divided into pieces and occupied by several warlords or political parties. Each party was able to occupy and rule part of China for a long time, but none were strong enough to unite the whole nation. This situation usually took place every two to four hundred years in Chinese history, often after a major dynasty collapsed and its old generals used control over the army to rule their own territory. The same situation happened after the Qing dynasty and at the early years of the Republic of China. After the former Northern Warlords and strong dictator President Yuan died in 1916, the country was divided into pieces and ruled by warlords and different political parties. Although it was re-united nominally again in 1927, the *de facto* situation stayed the same before the Second Sino-Japanese War in 1937, and was not resolved until the CCP took over in 1949. I study the period from 1911 to 1934, when there were multiple political groups with different accessibility to resources and ideology. The major players were the Northern Warlords, the Southern Warlords, the KMT, and the CCP.

The fourth type of conflicts is external conflicts, i.e., war took place mainly in other countries. In this dissertation, I study the impact of World War I (WWI). Although the WWI did not have a direct destructive impact on the Chinese economy, globalization made it possible for external conflicts to affect China through other mechanisms, such as international trade.

This dissertation examines two issues related to these four types of conflicts. First, what were the economic factors that drove protests and revolts? I consider two major forces that have been emphasized in studies of other countries: fiscal policies and trade shocks. As Ponticelli and Voth (2011) find, austerity causes social unrest in modern European countries. Historians also suggest that tax resistance was also a major type of small-scale conflicts in historical China (Wong, 1997). After China was gradually connected to the world market in the nineteenth century, international trade became an important source of income. Due to the lack of modern credit market, small farmers

were likely to suffer the risks from fluctuations in international commodity market (Gradella, 1994).

Second, what were the impacts of large-scale conflicts, such as civil wars and external warfare, on the Chinese economy? Wars are destructive and likely to cause chaos, but they may also provide opportunities for certain types of industries. I examine the impact of these shocks on local economic activities and rural income. To predict the impact of conflicts, I consider a classic contest model, but with one ruler and a peasant. I focus on the peasant's choice. This model has been introduced in (Garfinkel and Skaperdas (2007) and Grossman (1991). In this framework, the peasant aims to maximize his utility from wage earning and violence. If the peasant was a revolutionary, he would spend his income on conflicts, such as purchasing weapons; but he would not if he was only an ordinary farmer.

The study of conflicts and economic activity at the local level spans a long history that could not be covered in one dissertation. Therefore, I focus on several major episodes in Chinese history. I explore the rich details of conflicts to reveal the deeper causes of social unrest and its consequences in the Chinese economy. In the first chapter, I study the impact of a major fiscal policy on local protests in the eighteenth century. The fiscal reform aimed to increase tax burdens on the gentry and lower the burden on commoners. Using well-documented information of local protests, I find that the reform increased the total number of urban protests. However, in analysis of protests by the type of leader, I find that the reform increased protests by commoners rather than the gentry. These results combined with historical evidence from the period leads me to believe that the gentry likely passed on the tax burdens on to the commoners, through increased rent if the gentry was a landlord or surcharge if the gentry collected taxes for the local government. This study also helped to understand social structure in Chinese history and the rules the gentry played.

In the second chapter, I examine difference between local protests and revolutionary activities, using records of conflicts from 1902 to 1911. The key difference is that protesters usually requested government's policy changes and were not aimed at overthrowing the government, while revolutionaries intended to fight against the central government. Using price fluctuation in international commodity market, I find that higher export price for agricultural commodities decreased protests but increased revolutionary activities. A possible explanation is that positive income shocks served as an increase in budget constraint, which increased potential funds available for revolutionaries to invest conflicts.

The third and fourth chapters study the impact of conflicts. In the third chapter, I study the economic impact of civil wars from 1911 to 1934 and political groups' access

to mobilize funds.³ China was *de facto* divided into several pieces that were controlled by different warlords. Using newly documented information about civil wars, I find that these fights negatively affected China's international trade and rural land values. When the analysis focuses on the fights by particular groups, the results show that wars by the Northern Warlords were relatively least harmful to the economy. I propose an explanation. During the early twentieth century, some taxes, such as tariff revenue, went to the central government. As the strongest political group, the Northern Warlords were powerful and controlled the central government before 1927. Since they relied on income from tariff revenue, they had incentives to protect trade activities.

In the fourth chapter, I examine the impact of World War I on the Chinese economy. The war was not mainly fought on Chinese soil, so its impact would have come through changes in international trade.⁴ Recent studies suggest that high tariff during war time might have protected domestic industries (Irwin, 2000; Juhász, 2014). Contemporary scholars usually viewed WWI as an opportunity for China's domestic industries to develop. I investigate the actual impact on textile industry and rural input prices. I find that the textile industry was booming during the war. This shock also increased land values in areas suitable for cotton production and might have driven rural labor to urban sectors. But the effect was small and was only felt close to ports.

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³In the economic history literature, understanding the economic factors in wars, including mobilization, causes, and consequences, is a main focus. Ransom (2001) provides a comprehensive discussion about the costs of the civil war and whether it was a Second American Revolution. However, few quantitative studies cover civil wars in Chinese history.

⁴Other studies have investigated the impact of world wars on the European countries and the US. For example, Broadberry and Harrison (2005) study the mobilization and causes of WWI. Fishback and Jaworski (2014) review the US economics performance during the World War II.

Chapter 1

Tax Reform, Protests, and the Incidence of Taxes in the Eighteenth Century

1.1 Introduction

From the streets of Cairo to Taipei, the world witnesses protests every year. Protesters, usually represent the commoners, form a group and express their requests for changes. The participants usually have anticipated some reforms to resolve the issues. Meanwhile, many countries at various times conduct reforms that *de jure* appear meant to help the poor. Yet, in many cases, the reforms fail to meet people's expectations. For example, the Xinhai Revolution of China in 1911 and the replacement of Ferdinand Marcos in the Philippine in 1986 aimed to provide non-elites more rights, yet neither of them succeeded. The revolution in China led to a chaotic period with fighting between the warlords, while the replacement of the dictator in the Philippine did not change the fact that elites still held most of the resources in the country (North, Wallis, Webb and Weingast, 2013). Instead of suppressing chaos, reforms may often lead to more protests.

In this paper, I study a major tax reform and its impact on urban protests. The tax reform took place in the prosperous and relatively stable "High Qing" period in the early 1700s. The tax reform removed head taxes on commoners and raised the land taxes on landholders to compensate the loss of the *de jure* amount of the head tax. Since the government had difficulty in collecting the head tax before, this reform stabilized the tax base and allowed the government to collect higher tax revenue. As previous studies suggest, an increase in taxes or a decrease in budgets should lead to more

urban protests (Ponticelli and Voth, 2011). In addition, since the *de jure* tax reform imposed these overall higher taxes on the gentry, we would anticipate that the gentry would be the primary people protesting. However, the gentry might have been able to pass the burden of the tax increase on to the commoners, through cheating in the tax collection process and/or increases in rent in the land rental market. Historians based on narrative evidence or limited quantitative information do not agree on the reform's *de facto* effects. Some believe that the reform was effective and successful at impairing the landlords' power (Wang, 1971; Shih, 1990; Shi, 1999). Others argue that the reform failed to simplify the tax collection process (Guo, 2010), or the distributional effects deviated from the *de jure* aim because landlords could pass the higher tax burdens on to tenant farmers (Hsiao, 1967; Shitega, 1971; He, 1998).

I use quantitative evidence to show that the tax reform led to more social conflicts. Due to the lack of precise information on tax collection and rents during this period, I cannot trace the exact changes in public revenue and tax payment in China, or precisely who bore the burden of the tax. However, I combine data on local protests and particularly the incidence of the protests with multiple databases to set up a panel dataset from 1700 to 1750 in eighteen provinces. I then use variations in the timing and intensity of the reform across provinces to perform a difference-in-differences analysis on the impact of the reform on the number of protests and the identify of the protesters. The results suggest that, after controlling for time-invariant unobservable provincial factors and provincial time trends, the reform increased the number of protests by 0.3 per year, which is about half of a standard deviation and half of the average frequency of protests in most provinces before the reform.

In addition, the results also show that protest activities rose among the commoners and not the gentry. The tax reform in the 1720s aimed at stabilizing the tax base by canceling the head tax on commoners and increasing the land tax. *De jure*, it lowered the tax burden on the poor while increasing the burden on landowners, of whom a large portion was the local gentry. Thus, we might have expected the gentry to be the leaders of the protests. The findings that the commoners were the protestors suggests that the gentry found ways to pass the taxes on to the commoners. The Chinese gentry had higher social status than commoners and were often in charge of local affairs (Chang, 1955), such tax collection. This arrangement left space for the gentry to manipulate the enforcement of fiscal policies (Ch'ü, 1962; Hsiao, 1967; Wang, 1973). If the local gentry were always honest in implementing tax policies, one should expect a negative income shock on the wealthier gentry but not on poorer commoners. However, multiple sets of evidence suggest that commoners experienced negative income shocks due to the taxes passed on to them by landowners. First, I find that commoners led most of the

protests rather than the local gentry. Second, provinces with more gentry tended to experience larger increases in the frequency of protests by commoners, which implies that the actions of the gentry played a role in increasing the number of protests. This conclusion is consistent with the experience of other pre-modern societies. For example, the Ottoman Empire also relied on intermediaries for tax collection in the early modern era. The intermediaries largely determined the size and incidence of the tax burden (Karaman and Pamuk, 2010).

The results of this paper also suggest that the incidence of taxes sometimes differs from their original target; tax burdens can be determined by different groups' social standing or political power. As previous research has acknowledged, groups with more political power may use their privileges to extract resources from commoners (Acemoglu, Johnson and Robinson, 2005; North, Wallis, Webb, and Weingast, 2012). In the case of tax incidence, elites sometimes also pass tax burdens on to commoners, especially when they are also in charge of tax collection (Karaman and Pamuk, 2010). This paper provides quantitative evidence that directly link tax burdens with social standing.

This paper also relates to the literature on social conflicts. The European countries used to be involved in frequent wars, which led to a waste of resources and a lag in economic development for hundreds of years (Rosenthal and Wong, 2011). The constant civil wars in Africa and the developing world also have attracted research on the causes of consequences of civil wars (see surveys by Justino, 2007, 2009; Blattman and Miguel, 2010). Unlike European countries that were involved in frequent wars, historical China mostly experienced small conflicts within each dynasty (Rosenthal and Wong, 2011). Recent empirical studies on Chinese history build on the assumption that negative income shocks are correlated with conflicts and use conflicts as an indicator for changes in income distribution. Most of these papers follow previous empirical studies (Miguel, Satyanath, and Sergenti, 2004) and examine various shocks on revolt or civil wars, such as weather conditions (Bai and Kung, 2011), the introduction of New World crops (Jia, 2014), culture (Kung and Ma, 2014), and the abolition of historical elite recruitment system (Bai and Jia, 2016). This paper also treats conflicts as an indicator for income shocks but considers the impact of fiscal policies on small scale urban protests. The rich descriptive evidence for the protests allows me to identify the role of intermediaries.

Study of the policy shock raises concerns about endogeneity. Demographic and community factors might have affected the number of protests (DiPasquale and Glaeser, 1998). In my study, provincial unobservable characteristics, such as governors' attitudes and economic conditions, might have been correlated with the adoption of the policy as well as the frequency of protests. To address this concern, I control for provincial time invariant characteristics and provincial time trends in the main regression. In robustness

checks I also run a placebo test using another contemporary fiscal reform that was correlated with economic conditions and governors' attitudes but unlikely to stimulate local conflicts. The results of the placebo test suggest that economic conditions and the attitude of governors could not explain the increase in local conflicts.

1.2 Background

1.2.1 Tax Collection and Intermediaries in Qing China

In the eighteenth century, the sources of the government's fiscal revenue included taxes, contributions, rents and interests, and profits from public enterprises. In 1735, the land tax contributed to 73.5% of the national tax revenue (Wang, 1971). Local officials were responsible for tax collection, yet due to large jurisdictions and high information costs, they had to rely on intermediaries to collect taxes.¹ They usually relied on two groups of people: the local gentry and the clerks and runners. In this paper, I focus on the local gentry.

In historical China the gentry were a group of people who passed the lowest level of the Imperial Examination. They had higher social status than commoners and the same standing as local officials. The difference in status led to different legal rights and economic privileges for the gentry. For example, the gentry were exempted from paying head taxes. They also paid lower land tax rates than the commoners. If the local officials wanted to increase the gentry tax rate, they had to negotiate with the gentry first (Wang, 1973). Most of the gentry were literate, relatively rich, and owned land (Chang, 1962). Many of them were also in charge of some local affairs, such as the community granary, tax collection, and poor relief. Unlike the gentry in historical Europe, their title could not be inherited.² Most local gazetteers and records praised the efforts of the gentry (Chang, 1955, 1962), yet other people also pointed out that some gentry abused their privileges and took advantage of poor commoners (Hsiao, 1967; Ch'ü, 1962).

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¹In the Qing dynasty, county magistrates had quota to hire less than 100 helpers, but they usually covered 100 to 1000 thousand people. In addition, the regulation that aimed at reducing nepotism and corruption required the local officials to be assigned to places at least 250 kilometers away from their hometown province. As a result, many of the local officials were not familiar with their jurisdictions before they started their job (Ch'ü, 1962).

²The central government allowed commoners to purchase a gentry title, especially when the government experienced a shortage in public funds. Yet the central government was cautious about purchasing, because the one who purchased titles were usually less able and interested in money returns. As a result, purchased titles were not popular in the eighteenth century when the central government usually had enough funds and fought against corruption (Luo, 1936).

1.2.2 The Tax Reform in 1720s

The tax reform belonged to a series of fiscal reforms that aimed to solve difficulties in tax collection and to increase tax revenue. In 1723 the new Emperor Yongzheng started several fiscal reforms that included a combination of policies: reducing deficits, eliminating bribes, formalizing some of the informal taxes, and combining the head tax into the land tax. These reforms simplified tax collection procedures and increased public revenues.

This paper examines the last policy that canceled the head tax (known as the *ding* tax) and increased the land tax (“*tan ding ru mu*”). The increased amount of the land tax was designed to be equal to the *de jure* amount of the head tax, which was about 11 percent of the original amount of the land tax (Guo, 2010). The primary aim of the reform was to enhance efficiency in tax collection and increased the *de facto* tax revenue collected. Before the tax reform, local governments were never able to fully collect the head tax. As a tax based on people, the head tax in fact required local officials to trace individual taxpayers’ migrations, which was very costly. In some counties, only 10-20% of the head tax could be collected (He, 1998). By relying on the land tax instead of the head tax, the reform largely simplified the tax procedure and stabilized tax bases. Although records on actual tax revenue was not available around the reform, narrative evidence suggests that the central government collected more tax revenue after the tax reform (Shi, 1999). In addition, a side-effect of the reform was to shift tax burdens from the poor to the rich. Before the reform, the head tax was regressive because poor commoners had to pay it while the richer gentry did not.³ The reform corrected the regressive tax rate by taxing people based on the amount of land they owned. Discussions by the emperor and ministers revealed that the central government viewed the tax-shifting effect as a benefit of the reform, yet the main concern was to fully collect revenue from the original head tax (Shih, 1990).

Different provinces adopted this policy gradually according to their distinct local conditions. Several factors were likely to affect the actual adoption time in each province: first, provinces located closer to the capital usually followed the central government earlier. Second, the ones with more gentry tended to adopt the policy later. Table 1.1 displays the time of adoption in each province.⁴ Most provinces adopted the reform by 1730. Since the timing was correlated with local conditions, I address concerns about endogeneity in the discussion section.

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³Scholars aware that the *ding* tax was not a real reflection on population, but a tax unit and gradually become fixed over time (Ho, 1959). Still, it was burdensome for the local government to track migration patterns and split *ding* tax between remaining households.

⁴Qin Ding Da Qing Hui Dian Shi Li (Collected statutes of the Qing dynasty: precedents), vol. 157.

Table 1.1: Summary of the Fiscal Reform (Combine the *Ding* Tax into the Land Tax)

Province	Year	The Rate of <i>Ding</i> tax
Guangdong	1716	16.4
Zhili	1723	27
Fujian	1724	18.2
Shandong	1725	11.5
Henan	1726	10.9
Zhejiang	1726	14.5
Shaanxi	1726	15.3
Gansu	1726	1.6, 15.9
Sichuan	1726	
Yunnan	1726	
Jiangsu	1727	
Anhui	1727	
Jiangxi	1727	15.6
Hunan	1728	
Guangxi	1728	13.6
Hubei	1729	12.9
Shanxi	1745	2, 23.8
Guizhou	1777	

Source: *Qin Ding Da Qing Hui Dian Shi Li* (Collected statutes of the Qing dynasty: precedents), vol.157. The rate of ding tax shows the ratio of the original ding tax on the land tax. In Gansu and Shanxi, the ratio was different inside the province.

1.2.3 Urban Protest

Due to the lack of direct measures on income and tax collections from each group, I use urban protests to capture the income shocks. Small scale protests were common in Chinese history. For example, from 1645 to 1796, around three hundred small scale urban protests took place (Wu, 2011). Although these protests happened in city centers, they often involved people from both urban and rural areas. As Zhou (2013) summarizes, it was common in the eighteenth century that rural residents gathered in urban areas to protest against tax policies. For example, in Anfu county, Jiangxi province in 1730, the magistrate Jingtang Xia went to the countryside and pushed rural residents to pay the due taxes. Several days later, a group of rural residents gathered around the office of the county government and fought against the magistrate Mr. Xia. They claimed that Mr. Xia hired clerks with criminal records and collected taxes before the harvest season. This is a typical example that shows how rural residents protested in urban areas for rural affairs.⁵ In fact, since the urbanization rate in the Qing China was very low, most protests took place in cities were led by rural residents.⁶

Rural migration to cities might also have worsened living conditions of city residents by leading to lower wages and putting more pressure on urban facilities which in turn would have led to more protests.⁷ As a result, it is appropriate to consider urban protests as “protests that happened in urban areas” rather than “protests led by urban residents,” and these protests might have responded to policy changes in the countryside.

Protesters did not aim to overthrow the central government. Instead, they protested with the belief that the local government was fooled by wrong messages that led to improper policies. The protesters felt they were responsible for conveying the correct message by speaking out. Some common reasons for the protests included dissatisfactions with government policy or local governors, famine, or misbehaviors of a certain group of people (managers, landlords, or the rich). Organizers used posters and jingles to attract followers. Before protests participants sometimes gathered together in a temple outside the city and performed rituals. This helped protestors to convince themselves that their behaviors were of public interest. In many cases, the protests led to local riots. Protesters closed shops or stimulated disturbances in local government offices. Sometimes, when the protest or conflict was too extreme, some people died.

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⁵Yongzheng chao hanwen zhupi zouzhe huibian (A collection of memorials in the reign of Yongzheng), vol.18 page 988, cited from Zhou, 2013, page 36.

⁶According to the newest estimation by Xu, van Leeuwen, and van Zanden (2015), in 1776, the urbanization rate in China was around 7%.

⁷In the eighteenth century, there was a large increase in urban population in China (see, for example, Li, 2000)

A protest usually attracted local officers' attentions immediately because local stability was a primary determinant of a local officer's performance evaluation. However, the government also often hesitated to listen to protesters' requests because they did not want to signal that the protesters could acquire anything as long as they protested. As a result, the central government discouraged protests. The law clearly stated that the leader of improper protests should be beheaded immediately, the followers be detained for strangling, and people who were forced to participate be beaten one hundred times with a heavy bamboo stick.⁸ The local governors, who were closer to the participants, tended to listen to the protesters more and sometimes adopted their requests. As a results, despite the harsh punishments, protests still took place relatively often. Both the gentry and commoners might have lead protests.⁹ Table 1.2 list the number of protests led by commoners and the gentry.

1.3 Conceptual Framework

This section describes how the reform led to more protests through income changes, and how social standing determined an individual's tax burden under the reform. The *de jure* form of the reform was to eliminate the head tax on commoners and raise taxes on the gentry landowners to offset the loss in head tax revenue. However, the incidence might have been different if the gentry could use their political power and control over land to raise rents and pass a large share of the tax on to the commoners. The shift in the burden alone would have increased the likelihood of protest by commoners. Additional fuel for protest was likely to be added because of the commoners' expectations that they would be free of the burden of taxation under the new reform were disappointed by the gentry's shift of the burden to them.

I then consider how social status affects the individual's decisions in protesting. Based on the historical scenario, I assume there are two groups with different social standing in the economy: members of the gentry and the commoners. Social status affects the individual's ability to obtain revenue. Since the gentry typically had higher actual income than the commoner, the commoner is more likely to reach lower levels of income that would induce more protest.

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⁸*Qin Ding Da Qing Hui Dian Shi Li* (Collected statues of the Qing dynasty: precedents), cited from Wu (2011), page 120.

⁹The gentry was more connect to the local government and express their requests via other way rather than starting a protest. Yet, the lower-level gentry sometimes did not have direct connections with local governors. For this reason, they still had incentives to start protests and impose pressure on local officials. Most of the protests by the gentry were led by the lower-level gentry.

Table 1.2: Distribution of Protests' Targets and Leaders

	Leaders		Commoners		The gentry		Targets	
	number	percentage	number	percentage	number	percentage	number	percentage
1700-1709	3	27.27	2	18.18	5	41.67	3	25
1710-1719	7	43.75	5	31.25	18	90	0	0
1720-1729	8	20.51	17	43.59	37	75	3	6.12
1730-1739	9	28.13	11	34.38	26	57.78	5	11.11
1740-1749	16	32	27	54	38	58.46	3	4.62

Source: Wu (2011), pages 338-388.

Besides the main mechanism that assumes the role of the gentry in revenue distribution, I also discuss other forces likely to play a role. The first one is market forces in the rental market. An increase in land tax and reduction in commoners' head tax burden would push up the rent and lead to more protests by commoners. More gentry landlords mean a higher share of landowners would have been able to pass the tax burden on to commoners, which would have increased the probability of protest by commoners. Besides the mechanisms discussed in detail, some psychological factors might also have played a role. For example, additional fuel for protest was likely to be added because the commoners' expectations that the reform would make them better off were disappointed when the gentry passed a share of the new tax burden on to them.

1.3.1 Tax Collection

Setup

Suppose there are two types of land. One is owned by a gentry landlord (G) and rented to a commoner tenant (A). The other is owned by a commoner landlord (C^l) and rented to a commoner tenant (B).¹⁰

The total output from each year is Y . Landlords receive a constant income R . In reality, R can be a fixed annual rent. Commoner tenants receive the rest of product $Y - R$.

Before the reform there were two types of taxes. The first tax is on land. Suppose the *de jure* tax rate per area of land is T . The *de jure* land tax burden is on the landlords. Commoners also have to pay head tax T_h . The *de jure* after-tax incomes of the various groups before the reform are shown in the first row of Table 1.3.

I use the number of urban protests as an indicator for negative income shocks. The conflicts literature emphasizes two impacts of income on conflict: decreased income may either increase conflicts due to reduced opportunity cost, or reduce conflicts due to less resources available (Blattman and Miguel, 2010). In this paper, the conflicts examined are urban protests that are mostly responses to decreased income, famine, and harmed interests. So I treat the conflicts as a monotonic function of income shocks, that is, greater income loss leads to more conflicts. I later validate this assumption by showing that most of the increased protests were due to weather shocks.

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¹⁰This is a simplified assumption. Assume the gentry owns more land would not affect my results.

Tax Transfer

The *de facto* tax burden before the reform was likely to differ from the *de jure* burden in two ways. First, if the gentry landlords were able to pass the full burden of taxation on to commoners and the commoner landlords could not, the *de facto* after tax income changes to the values in Row 2 of Table 1.3. At the extreme, assume a gentry landlord could completely transfer its tax burden while a commoner landlord could not transfer the tax burden at all. As a result, the actual income for the gentry is R and for the commoner landlord is $R - T$. The income for the commoner tenant who works for the gentry is $W - T$, for the commoner tenant who works for commoner landlord it is W .

Second, the government was only able to collect a portion of the head tax. Assume the portion is θ , with $0 < \theta < 1$. The second row of Table 1.3 displays the *de facto* tax burden.

1.3.2 The Tax Reform

The tax reform eliminated the head tax T_h and increased the total tax to be collected on land from T to T' . The increase in the land tax was to increase the total land taxes by the old *de jure* amount of the head tax. Thus the new land tax paid by each landlord would be $T + f(T_h)$ where the f is a function that is determined by the ratio of landlords to tenants and the amount of land to be taxed. The third row of Table 1.3 displays the *de jure* tax burden after the reform. The tax burdens increased for the gentry and commoner landlord. In reality, the gentry could pass the increased tax burden to its tenant. So the *de facto* tax burden again is different from the *de jure* one. Row 4 of Table 1.3 show the *de jure* tax burden.

Now consider the impact of the tax reform on protests.

If the gentry was not able to pass the burden of the taxes on to commoners, the move to the tax reform would have been from the incomes in row 1 of Table 1.3 to the incomes in row 3 of Table 1.3. Without the tax pass through, the income of members of the gentry would have fallen from $R - T$ to $R - T - f(T_h)$ and they would have been inclined to protest after the change. Whether commoner landlords protested was determined by the change in income from $R - (T - T_h)$ to $R - (T - f(T_h))$, or the difference between the head tax paid before the reform (T_h) and the commoner landlord's increase in land tax ($f(T_h)$). Since the number of landlords (commoner and gentry) was a much smaller number than the total number of commoners, the total *de jure* head tax would have been spread among a much smaller number of people when that amount was added to the total land tax; therefore, $f(T_h)$ would have been larger than T_h and so the commoner landlords would be more likely to protest after

Table 1.3: Income Change before and after the Tax Reform

Row	Scenario	Gentry landlord	Commoner landlord	Commoner tenant (work for a gentry)	Commoner tenant (work for a commoner)
1	<i>De jure</i> tax burden before the reform	$R - T$	$R - (T + T_h)$	$Y - R - T_h$	$Y - R - T_h$
2	<i>De facto</i> tax burden before the reform	R	$R - (T + \theta T_h)$	$Y - R - (T + \theta T_h)$	$Y - R - \theta T_h$
3	<i>De jure</i> tax burden after the reform (<i>Protest decisions</i>)	$R - (T + f(T_h))$ Y	$R - (T + f(T_h))$ Y	$Y - R$ N	$Y - R$ N
4	<i>De facto</i> tax burden after the reform (<i>Protest decisions</i>)	R N	$R - (T + f(T_h))$ Y	$Y - R - (T + f(T_h))$ Y	$Y - R$ N

the reform. Commoner tenants who rented from the gentry would have seen a rise in income from $Y - R - T_h$ to $Y - R$ and thus would have been less likely to protest the reform because they now longer paid the head tax. Commoner tenants who rented from commoner landlords would have seen the same change in incomes because they also stopped paying the land tax and so they would be less likely to protest.

The impact of the reform on protest changes a great deal in comparisons of the *de facto* situations in which the landlord passes the full tax burden on to commoners and the commoners typically paid only θT_h instead of T_h before the reform. The reform then involves a shift from the incomes in row 2 to the incomes in row 4 of Table 2. In this case the gentry landlord experiences no change in his after-tax income R because he fully passes the tax on to the commoners both before and after the reform. He therefore, has no reason to protest. The commoner landlord now has more reason to protest because his income falls from $R - T - \theta T_h$ to $R - T - f(T_h)$. We have already shown that $f(T_h)$ is larger than T_h , so it is clear that $f(T_h)$ must be larger than θT_h . The commoner who rents from the gentry also has more reason to protest. His income falls from $Y - R - T - \theta T_h$ to $Y - R - T - f(T_h)$. Since $f(T_h)$ was bigger than θT_h , he has more reason to protest. Finally the commoner who rented from the commoner landlord would be less likely to protest because his income actually rose from $Y - R - \theta T_h$ to $Y - R$ because he no longer had to pay the head tax and his commoner landlord was not able to pass the tax on to him.

Prediction 1

Other things being equal, the tax reform increased urban protests because the total taxes collected rose.

Prediction 2

Had the *de facto* tax collections matched the *de jure* tax collections and the gentry landlords were not able to pass the burden of land taxes to others, protests by gentry landlords and commoner landlords would have increased, and there would have been no increase in protests by the commoners who were not landlords.

Prediction 3

Had the gentry landlords been able to fully pass the burden of land taxes to others and had the *de facto* head tax collections prior to the reform been lower than the *de jure* tax collections, the reform would have caused no increase in protests by gentry landlords, an increase in protest by commoner landlords, an increase in protests by commoner tenants renting from the gentry, and no increase in protests by tenants renting from commoners.

Prediction 4

This is an additional prediction based on the ability of the gentry to pass along the tax burden and the inability of commoner landlords to pass the burden along. In areas where the share of gentry among landlords was higher, we might expect even more protests from commoner tenants because a larger share of the commoner tenants would have had the tax burden passed on to them by the gentry.

1.3.3 Discussion

It is reasonable to assume that commoners choose to protest against the local government instead of the gentry. There are two reasons. First, the local government was responsible for poor relief. Local people might have protested because they had become poorer (due to the negative income shock). Second, if tax transfer was a common practice, people might have believed that the increased tax transferred was due to the new policy but not the transfer itself. In this case, local people would have blamed the local government instead of the local gentry.

In reality, the choice of protest was an extreme case. Some commoners also chose to exit and move to other places in response to negative income shocks. When escaping, the commoners were likely to go to the cities, where cities were relatively open to migrants and had more job opportunities (Yang, 1945; Spence, 1979). In this case, these refugees would increase the city population, putting more pressure on the city's scarce resources, leading to lower incomes and more protests. In other words, although some of the urban protests were not led by rural people, the influx of rural migrants due to the tax reform was likely to help cause them.

1.3.4 Tax Transfer under Market Forces

Even if the local government officials were able to collect tax themselves and trace the taxpayers, the commoners were also likely to bear a share of the burden of the increased tax. Market forces would also push the rent up when the land tax is higher. The intuition lays behind a simple supply and demand model of the rental market. Although the total amount of rent is likely to be fixed, landowners could choose to rent their land out or manage it themselves. This created an upward sloping land supply curve. The increased tax burden imposed a higher cost on the supply side and thus shifted land supply to the left. In this way, a higher land tax reduced the land supply to the rental market and increased the equilibrium price of rented land. Although I cannot test the impact of this channel directly, it provides a potential channel of tax transfer.

Consider the supply $S(r)$ and demand $D(r)$ in the rental market. For simplicity, assume that the gentry supply the land and commoners rent land from the gentry. The rise in the land tax raised the cost of renting land. Meanwhile the elimination of the head tax increases the commoners' income and thus increases demand. To show the impact assume

$$\begin{aligned} S(r) &= a_1 + a_2 r - a_3 t \\ D(r) &= b_1 - b_2 r + b_3(I - h) \end{aligned} \tag{1.1}$$

where r is the rent. On the supply side, t is the tax rate. On the demand side, I is the income and h is the head tax. All the parameters are greater than zero.

The market clears when the quantity of land supplied is equal to the quantity of land demanded

$$D(r) = S(r) \tag{1.2}$$

at $r = r^*$. One can then solve the equilibrium rent r^* using the parameters given

$$r^* = \frac{b_1 - a_1}{a_2 + b_2} + \frac{a_3 T}{a_2 + b_2} + \frac{b_3(I - h)}{a_2 + b_2}. \tag{1.3}$$

The comparative statics show that

$$\begin{aligned} \frac{dr^*}{dT} &= \frac{a_3}{a_2 + b_2} > 0, \\ \frac{dr^*}{dh} &= \frac{b_3}{a_2 + b_2} < 0. \end{aligned} \tag{1.4}$$

Both sides of the tax reform led to an increase in rent per unit. As seen in equation 1.4, the increased land tax (t) directly raised the rent, while the reduction in the head tax, raised income, which in turn raised the rent.

The increase in rent is larger when the demand for land is very inelastic (i.e., b_2 is smaller), the supply is more elastic to tax change (b_3 is larger), the income elasticity of demand (a_3) is larger, and the labor-land ratio is high. In other words, even without assumptions on the political economic conditions, market forces would have led to increases in rent that shifted the burden back to commoners. Facing a higher rent, commoners would be more likely to seek for relief from the local government by starting a protest. Note that if market forces are the only factor that drives the change in rent, all landlords (both commoner and gentry) would pass the cost on to the commoner tenants. The more of the burden the landlords could pass on to the commoner tenants,

the lower would be the probability of protests by landowners and the higher would be the probability of protests by commoner tenants.

There is some evidence of tax transfer through higher rents. Although the rent seemed to be settled and fixed in many areas in historical China, the actual rent paid was adjusted according to different shocks, such as harvest shocks and taxes (Gao, 2005). When a negative harvest shock hit, the government cut the tax but also “advised” the gentry to reduce their rent (Guo, 1991; Shih, 1990). Similarly, when negative shocks came on the gentry’s side, it was natural for landlords to pass part of the tax burden to tenants. Guo (1983) recorded that when an increase in the tax rate took place in the seventeenth century, the gentry passed part of, or even all of the increased tax onto the commoner in Songjiang County, Jiangsu province. For the tax reform I examine, a record of the Zhejiang province suggests similar intentions. After the policy was announced in Zhejiang province, the local government agreed that in Qiantang county and Renhe county, “the rent paid by tenant farmers should be increased by two liters of rice or two cents of silver to help landlords cover the additional tax expenditures.”¹¹

1.4 Data

This section presents data for the empirical analysis. To examine the impact of this reform on protests, I develop a new panel dataset covering 1700 to 1750. The outcome variable is urban protests, which the model implies would have responded to the tax reform.

In the empirical analysis I consider the eighteen inner provinces that form the core areas of pre-modern China. These eighteen provinces have dense populations and extensive commercial activities. Figure 1.1 describes the area of the eighteen provinces. Since the reform took place mostly from 1723 to 1730, the years I examine range from 1700 to 1750.¹²

1.4.1 Protests

For protests’ data, one of the most detailed collection was conducted by historians from the Institute of Qing History at Renmin University, published as *Archives for Revolts by Urban and Rural Citizens from Kangxi to Qianlong’s Reign* in 1979. This

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¹¹ *Zhejiang Tongzhi* (Provincial gazetteer of Zhejiang Province), vol. 71. *Sheng* is a volume unit with 10 *sheng* = 1 *shi*. The output per *mu* is around 3 *shi* in Zhejiang area in the eighteenth century. There were debates about whether this local agreement was effective or not (Shih, 1990), but these records suggest that increasing rent to cover increased tax burden might have been a common practice in some areas in China.

¹² I do not include protests for Taiwan because its land policy was different from other parts in Fujian.

Figure 1.1: The Eighteen Inner Provinces and the Frequency of Protests

book mostly relies on official archives from the First Historical Archives in Beijing and reflects officials' records about protests. In this paper, I use a newly updated data collected by Jen-shu Wu (2011) from multiple archival sources. His work utilizes previous historians' work, memorials in official records, as well as private records about handicrafts. Wu's original dataset has detailed information for protests from 1484 to 1796, including location at the county level, year, category, object, identity of leaders and targets.

There are several issues about the data. First, handicraft records may over-representative the Yangzi delta, which was the central of handicrafts since the eighteenth century. Second, some protests are just among urban workers and did not against government's policies. For example, in 1700, only one case of protest happened nationwide. It took place in Suzhou city, Suzhou prefecture in Jiangsu province. The category was "workers against the foreman". The reason was "the foreman cut pay to the workers". The protest was led by a worker named Ruzhen Liu. Although income shocks were likely to affect poor people's living conditions and lead to more conflicts in other aspects as well, including other types of protests may contaminate the mechanism by allowing other potential explanations. To address these two concerns, I dropped Jiangsu

in the robustness check. I also restricted the sample to protests that only related to government's policies.

From 1700 to 1750, there were 206 cases of protests taking place in 18 provinces. Table 1.4 presents the descriptive statistics of the protest data in the eighteen provinces. The raw statistics suggest the existence of provincial level heterogeneity. Most provinces had fewer than 10 cases of protests, while Fujian, Jiangxi and Zhejiang had around 20 cases in around 50 years, and Jiangsu had 65 cases. Heterogeneity among provinces indicates that there are provincial unobservable characteristics that led to more protests. For example, more populous provinces tended to have more protests. Provinces with mountains and less developed traffic conditions had higher costs in organizing protests and thus fewer protests. During the period I examine, I use provincial fixed effects to control for time-invariant characteristics and provincial time trends to capture linear trends in the frequency of protests. As robustness checks, I run two placebo tests to address the time-variant heterogeneity and potential endogeneity.

The panel has 918 observations in total; 87.5% of the observations have the value zero. Since this distribution may be problematic under the assumption of normally distributed error term, I also consider other possible estimation strategies as a robustness check.

It is worth noting that only 38 protests in the data are due to fiscal policies. The most common reason for protests is the shortage of food that lead to 79 protests. However, I find the total number of protests is more likely to capture the real impact of the tax reform. First, protests due to the shortage of food or under other names were more likely to receive positive response from the local government than the ones directly against government policies. Since both famine relief and tax collection were local officials' tasks, a rational and capable local official would choose to pay for famine relief as well as fully collect the tax revenue. Second, the tax reform served as a negative income shock due to its increased *de facto* tax burden. This would make people, especially the poor, more likely to experience famine during weather shocks. This fact also helps me to identify the real incidence of the tax reform. In the empirical analysis, I add interaction terms of the reform and weather shocks to examine whether the reform affected people's sensibility to bad weather. If the tax burden fell on the poor, bad weather should have led to more protests after the reform.

Table 1.2 provides the distribution of social status of protests' targets and leaders. There was a large increase in the number of protests targeting local officials and of protests led by commoners from 1720 to 1730, when the reform took place in most provinces.

Table 1.4: Summary Statistics of Protests

province	mean	sd	No. of Protests	No. of Obs
Anhui	0.08	0.44	4	51
Fujian	0.41	1.25	21	51
Guangdong	0.12	0.52	6	51
Gansu	0.04	0.2	2	51
Guangxi	0	0	0	51
Guizhou	0.12	0.43	6	51
Henan	0.16	0.42	8	51
Hubei	0.12	0.52	6	51
Hunan	0.18	0.56	9	51
Jiangsu	1.27	2.04	65	51
Jiangxi	0.47	1.72	24	51
Sichuan	0.1	0.3	5	51
Shandong	0.08	0.27	4	51
Shaanxi	0.02	0.14	1	51
Shanxi	0.27	0.7	14	51
Yunnan	0.04	0.2	2	51
Zhejiang	0.39	0.98	20	51
Zhili	0.18	0.48	9	51

Source: Wu (2011), pages 338-388. The original dataset have protests from 1484 to 1796. Here I include the years 1700 to 1750.

1.4.2 The Tax Reform

As Table 1.1 shows, the reforms happened successively from 1716 to 1777. Since only one province adopted the reform after 1745, I consider reforms before 1745 in my analysis.¹³ The timing of the reform provides provincial level variation and enables me to conduct a difference-in-differences analysis. On the other hand, since the timing was influenced by some factors that also affected the number of protests, say, characteristics of local governors and local conditions, this raises endogeneity concerns. Although I have already controlled for provincial fixed effects, these factors might have varied across time within provinces. I discuss this issue in detail in the robustness check where I use a placebo test to show that the endogeneity issue do not affect my results.

I also allow for heterogenous reform intensity, measured by the head tax payers (i.e., the number of *ding*) from the official records. Places with a higher original head tax and a higher farmland ratio would have received a greater increase in the land tax after the reform. The provincial ratio is reported in 1661, 1685, 1724, and the 19th century, collected by Liang (1981). I use the ratio in 1685. Table 1.9 displays the recorded head tax payers, areas of farmland, and land tax from the official document.¹⁴

Figure 1.2 displays the total number of protests before and after the reform in each year. I set the reform time as a benchmark ($t = 0$), then sum up the number of protests in all provinces for the years before and after the date of the reform. The figure shows a clear trend that the average level of protests increased after the reform.

1.4.3 Proxies for the Group Size of Gentry Landlords

Following the theoretical predictions, provinces with a higher share of the gentry landlord had a larger increase in protests by commoners (tenants). To address this prediction, I collect population in 1787 and the number of *jìn-shi* in each province from 1661 to 1722. In the Qing dynasty, literate people who passed a certain level of the Imperial Exam would receive a corresponding gentry title. Among all the titles, *jìn-shi* was the highest title of literacy reached by people. If I assume the percentage of *jìn-shi* over the total gentry class is the same over each province, the two numbers should be

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¹³Historical records of the last province that finished the reform (Guizhou) suggested that most places in the province already finished the reform long before the recorded year, so the year 1777 is not a clear indicator for the adoption of the reform. Most historians only consider the previous 17 provinces when describing the reform. For the province Shanxi, there are two records of the time of reform, specifically, 1745 (QDDQHDSL, vol.157) or 1731 (Chuang, 1985). I use the record of 1745 and do a robustness check using the year 1731. The results are almost the same.

¹⁴There are intensive discussions on the accuracy of official records. The official numbers are usually only proxy measures for the real situation (for example, see Ho, 1959). Given this concern, the intensity measure may have the issue of measurement error. As a result, I mainly use variations in the timing of reform in my analysis later.

Table 1.5: The Number of Head Taxpayers and Farmland in 1685

Province	Number of <i>Ding</i>	Farmland Area (mu)	Land Tax in Silver (taels)	Land Tax in Grain (<i>shi</i>)
anhui	1314431	35427433	1441325	166427
fujian	1395102	11199548	762706	104829
gansu	273292	10308767	153520	47617
guangdong	1109400	30239255	2027793	30643
guangxi	179454	7802451	293604	221718
guizhou	13697	959711	53512	59482
henan	1432376	57210620	2606004	
hubei	443040	54241816	923288	138197
hunan	303812	13892381	517092	65366
jiangsu	2657750	67515399	3680192	365570
jiangxi	2126407	45161071	1743245	925423
shaanxi	2241714	29114906	1315012	170922
shandong	2110973	92526840	2818019	506965
shanxi	1649666	44522136	2368831	59737
sichuan	18509	1726118	32211	1215
yunnan	158557	6481766	99182	203360
zhejiang	2750175	44856576	2618416	1345772
zhili	3196866	54343448	1824191	19591

Source: Liang (1981), originally from *Qing Chao Wen Xian Tong Kao* vol.2 and vol.19.

Figure 1.2: Total Number of Protests before and after the Tax Reform

perfectly correlated. In this way, I can use the number of *jin-shi* as an approximation to the number of gentry in each province.

Table 1.6 presents the number of *jin-shi* per one million people. The share varies from 2.72 to 26.13. Jiangsu and Zhejiang had the highest share of *jin-shi*, while Hunan and Guangxi had the lowest share of *jin-shi*.

1.4.4 Control Variables

I also control for other conditions that are likely to have affected the number of protest, including weather conditions and emperors' reign.

Bai and Kung (2011) and Jia (2014) find a causal relationship between weather conditions and conflicts in historical China. In a traditional agricultural society, weather shocks may lead to poor harvests and affect both farmers' incomes and living costs. To control for weather conditions, I use records of weather events from The State Meteorological Society (1981). Shiue (2002), Shiue and Keller (2007), and Jia (2014) also used this information in their studies. The original data report the weather events in 120 prefectures for 500 years, and each province has several observations for a given year. Weather events are classified in five categories: exceptional flood, limited flood, normal weather, limited drought, and exceptional drought. In Table 1.7, I show the shares of each type of weather events in a given province over the 51 years level.

The Qing dynasty before the nineteenth century was the one of most centralized governments in Chinese history (Qian, 2001), so the emperor's personality and capabil-

Table 1.6: Total Number of *Jin-shi* from 1661 to 1722

Province	Number of <i>Jin-shi</i>	Population in 1787(million)	Share of <i>Jin-shi</i> in million people
Anhui	142	28.9	4.91
Fujian	178	12.0	14.83
Guangdong	91	16.0	5.69
Gansu	122	15.2	8.03
Guangxi	28	6.4	4.38
Guizhou	31	5.2	5.96
Henan	311	21.0	14.81
Hubei	191	19.0	10.05
Hunan	44	16.2	2.72
Jiangsu	666	31.4	21.21
Jiangxi	200	19.2	10.42
Sichuan	61	8.6	7.09
Shandong	429	22.6	19.5
Shaanxi	68	8.4	8.1
Shanxi	268	13.2	20.3
Yunnan	46	3.5	13.14
Zhejiang	567	21.7	26.13
Zhili	498	23.0	21.65

Source: Population is the official number of population in 1787, from Ho (1967), page 223. The number of *jīn-shi* is from Ho (1967), page 229. The *jīn-shi* information is the total number of *jīn-shi* from 1661 to 1722 in each province. Since there is only the total number of *jīn-shi* in Gansu and Shaanxi the original dataset, I separate them based on population in these two provinces.

Table 1.7: Summary of Weather Conditions from 1700 to 1750

Province	Exceptional flood	Limited flood	Normal weather	Limited drought	Exceptional drought	year
Anhui	0.110 (0.166)	0.322 (0.256)	0.333 (0.273)	0.180 (0.241)	0.055 (0.127)	51
Fujian	0.133 (0.199)	0.184 (0.191)	0.133 (0.148)	0.133 (0.195)	0.086 (0.140)	51
Guangdong	0.047 (0.103)	0.263 (0.238)	0.031 (0.084)	0.184 (0.219)	0.031 (0.084)	51
Gansu	0.031 (0.084)	0.137 (0.167)	0.396 (0.261)	0.204 (0.242)	0.059 (0.115)	51
Guangxi	0.039 (0.113)	0.161 (0.179)	0.412 (0.257)	0.094 (0.152)	0.020 (0.060)	51
Guizhou	0.015 (0.059)	0.078 (0.137)	0.495 (0.352)	0.069 (0.174)	0.020 (0.068)	51
Henan	0.086 (0.156)	0.255 (0.223)	0.341 (0.248)	0.145 (0.184)	0.078 (0.184)	51
Hubei	0.088 (0.149)	0.216 (0.212)	0.554 (0.344)	0.078 (0.162)	0.015 (0.078)	51
Hunan	0.055 (0.114)	0.137 (0.198)	0.514 (0.305)	0.114 (0.197)	0.016 (0.054)	51
Jiangsu	0.075 (0.126)	0.235 (0.218)	0.388 (0.228)	0.176 (0.210)	0.055 (0.133)	51
Jiangxi	0.067 (0.148)	0.275 (0.253)	0.373 (0.226)	0.133 (0.163)	0.024 (0.076)	51
Sichuan	0.023 (0.075)	0.046 (0.089)	0.059 (0.104)	0.016 (0.076)	0.003 (0.023)	51
Shandong	0.208 (0.294)	0.208 (0.233)	0.333 (0.309)	0.161 (0.212)	0.090 (0.201)	51
Shaanxi	0.078 (0.150)	0.227 (0.299)	0.435 (0.370)	0.192 (0.256)	0.067 (0.195)	51
Shanxi	0.049 (0.123)	0.279 (0.311)	0.377 (0.375)	0.221 (0.286)	0.074 (0.182)	51
Yunnan	0.012 (0.048)	0.078 (0.121)	0.157 (0.151)	0.012 (0.048)	0.016 (0.054)	51
Zhejiang	0.069 (0.133)	0.167 (0.198)	0.373 (0.262)	0.123 (0.145)	0.069 (0.194)	51
Zhili	0.064 (0.138)	0.235 (0.232)	0.434 (0.234)	0.210 (0.199)	0.056 (0.162)	51

Source: Weather information comes from The State Meteorological Society (1981). The original data reports prefecture-level weather events in 120 prefectures. Each province has three to seven reported prefectures.

ity played a dominant role in the direction of public policy. The Emperor Yongzheng, known as “a tough and pragmatic man” (Zelin, 1984, preface), was the leader of the reform. In fact, some scholars believe that the adoption and conduct of the new tax policies were closely related to the personality of Emperor Yongzheng (e.g. Wang, 1961). His strict attitude towards the gentry also caused some protests against him. Emperors before and after Yongzheng were considered to be relatively generous. For this reason, I also include year fixed effects in the analysis to capture the impact of the reigns of different emperors and other nationwide change.

1.5 The Impact of Reform on Urban Protests

In the analysis I suggest that the reform was aimed at raising the tax burden on the landlords, but the powerful landlords—mostly the local gentry—might have reacted by passing the impact to other groups of people. In the empirical analysis, I first run a regression to examine the impact of the reform on the general frequency of protests. Then, I investigate the mechanism for increased frequency of protests using the insights from the theoretical framework. First, I add an interaction term of the proxy of the gentry and the reform to the baseline regression to examine whether provinces with more *jin-shi* tended to have a larger increase in the frequency of protests after the reform. Second, I use the information on protests’ leaders and targets to specify which groups’ protests were influenced by the reforms. I expect that the group that bore more of the burden of the reform would have a larger increase in the frequency of protests.

1.5.1 Empirical Strategy

The baseline regression is

$$Protests_{it} = \alpha + \beta_0 Reform_{it} + Z_{it}\gamma + \mu_t + \sigma_i + \epsilon_{it} \quad (1.5)$$

where $Protests_{it}$ is the number of protests in province i in time t , and $Reform_{it}$ is an indicator function with value 1 after the reform was introduced and zero before. I also replace it with a standardized measure of reform intensity as a robustness check. If province i experienced reform in time t , $Reform_{it}=1$ in that year and in following years. Z_{it} denotes control variables, including weather information to control for changes in living condition. μ_t and σ_i are dummies variables controlling for the time and provincial fixed effects. The parameter of interest is β_0 . If the reform caused an increase in the number of protests, I expect $\beta_0 > 0$.

1.5.2 Results

Table 1.8 presents results from the OLS regression. The coefficient of the reform measure indicates that the policy change was associated with an average increase of 0.162 to 0.351 in the annual frequency of protests, and the results are statistically significant. On average, the policy raised the frequency of protests by about a half of a standard deviation.

Table 1.9 presents results using standardized reform intensity. The independent variable is the ratio of head-tax payers to recorded farmland. The results suggest that a one standard deviation increase in the ratio would have led to a 0.09 to 0.18 increase in the frequency of protests.

The increase is large compared with the frequency of protests. For example, the frequency was zero in four provinces, from 0 to 0.05 in seven provinces, and from 0.05 to 0.2 in five provinces. Only Jiangsu and Zhejiang had frequencies before the reform more than 0.2.

Among weather events, the coefficients of the limited drought shares are positive and statistically significant, indicating that drought was correlated with more protests. In terms of agricultural production, drought was more harmful than flood (Jia, 2014). The coefficients of exceptional drought are not statistically significant and close to zero. This lack of an effect may be due to the fewer cases of exceptional drought. It is also possible that when exceptional drought hit, people were likely to experience serious famine and unable to protest (Wu, 2011).

1.6 Tax Incidence

The previous section suggests that the reform increased the frequency of protests. This section provides suggestive evidence on the incidence of taxes. Due to the lack of direct nationwide evidence on rent, actual tax revenue, or the extra fee charged by the gentry, providing direct quantitative evidence to support the channel is very difficult. However, the records on the protest leaders and the number the *jin-shi* allows me to provide suggestive evidence on the tax-transfer channel.

1.6.1 Empirical Strategy

I first consider different protests led by different groups of people by changing the left-hand-side variable in the baseline equation to *Protest_by_gentry_{it}* and *Protests_by_commoner_{it}*. Then I can observe the group that was mostly influenced by the reform by comparing the coefficients β_{gentry} and $\beta_{commoner}$.

Table 1.8: The Impact of Reform on Number of Protests

VARIABLES	(1) protest	(2) protest	(3) protest	(4) protest	(5) protest	(6) no jiangsu	(7) no jiangsu
reform	0.236*** (0.0609)	0.228*** (0.0599)	0.255*** (0.0604)	0.260** (0.123)	0.351** (0.174)	0.163*** (0.0506)	0.258 (0.166)
exceptional flood		0.0433 (0.158)	0.0329 (0.158)	0.122 (0.144)	0.157 (0.150)		0.0480 (0.142)
limited flood		0.238* (0.137)	0.180 (0.143)	0.108 (0.125)	0.0666 (0.116)		0.0910 (0.107)
limited drought		0.459** (0.205)	0.427** (0.212)	0.436** (0.197)	0.392** (0.186)		0.393** (0.160)
exceptional drought		0.00869 (0.162)	-0.0337 (0.166)	-0.147 (0.218)	-0.109 (0.215)		0.0182 (0.207)
Constant	0.119*** (0.0205)	0.0100 (0.0434)	-0.178 (0.110)	-0.204* (0.107)	21.83** (10.83)	0.0898*** (0.0161)	14.32 (9.666)
Observations	918	918	918	918	918	867	867
R-squared	0.019	0.031	0.141	0.235	0.256	0.014	0.184
Prov FE			Y	Y	Y		Y
Year FE				Y	Y		Y
Prov*i.year					Y		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Reform is a dummy variable that is equal to 1 when a province adopted the reform. Weather controls are the share of each type of weather in a province in a given year. Columns (1) to (6) include the full sample. Columns (7) and (8) drop Jiangsu province.

Table 1.9: The Impact of Reform Intensity on Number of Protests

VARIABLES	(1) protest	(2) protest	(3) protest	(4) protest	(5) protest	(6) no jiangsu	(7) no jiangsu
reform(intensity)	0.183*** (0.0497)	0.171*** (0.0487)	0.171*** (0.0490)	0.127** (0.0565)	0.209** (0.104)	0.0886** (0.0386)	0.152** (0.0614)
exceptional flood		-0.0202 (0.169)	0.0237 (0.159)	0.109 (0.144)	0.137 (0.152)		0.0118 (0.156)
limited flood		0.166 (0.128)	0.179 (0.141)	0.0904 (0.127)	0.0598 (0.118)		0.160 (0.121)
limited drought		0.370* (0.199)	0.414** (0.211)	0.418** (0.195)	0.399** (0.185)		0.383** (0.171)
exceptional drought		-0.0238 (0.168)	-0.00351 (0.167)	-0.125 (0.220)	-0.0866 (0.215)		0.139 (0.149)
Constant	0.126*** (0.0224)	0.0520 (0.0362)	-0.156 (0.109)	-0.195* (0.106)	18.38* (10.17)	0.118*** (0.0203)	5.950 (6.156)
Observations	918	918	918	918	918	867	867
R-squared	0.037	0.045	0.143	0.237	0.257	0.013	0.084
Prov FE			Y	Y	Y		Y
Year FE				Y	Y		Y
Prov FE*year					Y		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Reform(intensity) is a standardized measure of reform intensity, measured using head tax quota in 1685. It is equal to zero if a province had not adopted the reform. Weather controls are the share of each type of weather in a province in a given year. Columns (1) to (6) include the full sample. Columns (7) and (8) drop Jiangsu province.

I then examine the role of the gentry in increasing social unrest using a proxy for the group size of the gentry. If the gentry played a role in passing on the tax burden, I would expect a higher increase in the number of conflicts at provinces with more gentry. To identify the roles the gentry played in the protests, I test the frequency of protests in response to more *jin-shi* in the population in each province. The regression function is

$$Protest_{it} = \alpha + \beta_0 Reform_{it} + \beta_1 Reform_{it} \times Gentry_i + \gamma Z_{it} + \mu_t + \sigma_i + \epsilon_{it} \quad (1.6)$$

where $Protest_{it}$, $Reform_{it}$ and Z_{it} had the same definitions as before. $Gentry_i$ is a proxy of the gentry's power in each province. The proxy variables available are time invariant. The proxy is the number of *jin-shi* in each province. Since this proxy is time invariant, the fixed effects are collinear with them and therefore the proxy is not included in the model as separate regressors.

I also provide suggestive evidence by adding interaction terms between the reform and weather shocks. Since commoners had lower income than the gentry and were more vulnerable to negative income shocks, the tax transfer channel should lead to more protests due to living crises. That is, there would be more protests due to disastrous weather conditions. Instead, if the gentry did not pass on the tax burdens, I should observe more protests directly against the local government, but not because of negative weather shocks. As a result, if the interaction terms between the reform and bad weather are positive and statistically significant, it will be consistent with the tax transfer story.

1.6.2 Results

Table 1.10 reports the results for protests grouped by leaders. The regression results show that the policy was associated with 0.09 to 0.1 increases in the frequency of protests led by commoners, which is about 0.25 of the standard deviation for the sample. The results are statistically significant. Meanwhile, the coefficients of the equation for protests led by the gentry are much smaller and not statistically significant.

The results in Table 1.11 further identify the channel by adding different proxies of *jin-shi* in each province. I use the interaction term of the proxies and the reform to examine whether provinces with more gentry tended to have a larger increase in the total frequency of protests. If the coefficient of the interaction term is positive, it would suggest the prediction that more gentry led to more protests. In Table 1.11, the coefficients of the timing of the reform is not statistically significant, while the interaction term are positively and statistically significant in all regressions. It show

Table 1.10: The Impact of Reform on Number of Protests (Separated by Leader)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	gentry	commoner	gentry	commoner	gentry	commoner	gentry	commoner
reform	0.0278 (0.0196)	0.0890*** (0.0287)	0.0326 (0.0215)	0.0980*** (0.0297)	-0.00474 (0.0476)	0.125* (0.0676)	0.0000192 (0.0754)	0.168** (0.0721)
exceptional flood	-0.00142 (0.0603)	-0.00363 (0.0967)	-0.000112 (0.0627)	-0.0128 (0.102)	0.0484 (0.0664)	-0.00754 (0.105)	0.0561 (0.0621)	-0.00521 (0.0769)
limited flood	0.0295 (0.0436)	0.0855 (0.0655)	0.000115 (0.0552)	0.0600 (0.0714)	-0.00136 (0.0446)	0.0227 (0.0736)	-0.00962 (0.0418)	0.0102 (0.0589)
limited drought	0.0682 (0.0679)	0.225*** (0.0726)	0.0441 (0.0735)	0.214*** (0.0780)	0.0191 (0.0745)	0.216*** (0.0808)	0.0154 (0.0683)	0.202** (0.0856)
exceptional drought	-0.0318 (0.0557)	-0.00426 (0.110)	-0.0503 (0.0607)	-0.0185 (0.112)	-0.0593 (0.0696)	-0.128 (0.122)	-0.0453 (0.0671)	-0.108 (0.107)
Constant	0.0188 (0.0204)	-0.0104 (0.0268)	-0.000964 (0.0399)	-0.0623 (0.0697)	-0.0310 (0.0348)	-0.0766 (0.117)	0.285 (3.592)	10.08** (5.135)
Observations	918	918	918	918	918	918	918	918
R-squared	0.005	0.022	0.062	0.062	0.127	0.143	0.134	0.154
Prov FE			Y	Y	Y	Y	Y	Y
Year FE					Y	Y	Y	Y
Provincial trend							Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Odd columns include protests led by local gentry. Even columns include protests led by commoners. Reform is a dummy variable which is equal to 1 if a province adopted the tax reform. Weather controls are the share of each type of weather in a province in a given year.

Table 1.11: The Impact of Gentry on the Increase in the Number of Protests

VARIABLES	(1) protest	(2) protest	(3) protest	(4) protest	(5) protest
reform (intensity)	-0.153 (0.102)	-0.177* (0.0997)	-0.0647 (0.104)	-0.0818 (0.0980)	-0.0850 (0.191)
reform×jinshi	0.00199*** (0.000632)	0.00205*** (0.000630)	0.00135** (0.000654)	0.00129** (0.000643)	0.00174 (0.00135)
exceptional flood		-0.0529 (0.167)	0.0441 (0.158)	0.134 (0.145)	0.127 (0.154)
limited flood		0.207* (0.125)	0.190 (0.141)	0.112 (0.125)	0.0777 (0.116)
limited drought		0.408** (0.193)	0.416** (0.208)	0.422** (0.193)	0.390** (0.184)
exceptional drought		-0.00146 (0.162)	0.0326 (0.164)	-0.0803 (0.220)	-0.0774 (0.216)
Constant	0.103*** (0.0230)	0.0179 (0.0368)	-0.117 (0.109)	-0.150 (0.105)	12.11 (9.900)
Observations	918	918	918	918	918
R-squared	0.073	0.083	0.151	0.245	0.261
Prov FE			Y	Y	Y
Year FE				Y	Y
Prov FE*year					Y

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Jinshi is the share of jinshi in the whole population from 1661 to 1722. *Jinshi* is the total number of *jin-shi* from 1661 to 1722 in each province. Reform is a dummy variable which is equal to 1 if a province adopted the tax reform. Weather controls are the share of each type of weather in a province in a given year.

that provinces with one more gentry would lead to a 0.00129 increase in the frequency of protests after the reform.

Table 1.12 regresses protests led by different groups on the number of *jin-shi*. As the results in Table 1.10, the coefficients of the interaction term of *jin-shi* and the reform are not statistically significant for protest led by the gentry after controlling for fixed effects, while the ones for protest led by commoners stay positive and statistically significant. The results show that when the number of *jin-shi* increased by one standard deviation, it would have led to a 0.1 increase in the number of protests, which is about half of the frequency of protests in the full sample before the reform. Meanwhile, the reform itself did not affect the levels of urban protest any more.

Table 1.12: The Impact of Reform on Number of Protests (Separated by Leader)

VARIABLES	(1) gentry	(2) commoner	(3) gentry	(4) commoner	(5) gentry	(6) commoner	(7) gentry	(8) commoner
reform(intensity)	-0.0241 (0.0198)	-0.0514 (0.0500)	-0.0312 (0.0213)	-0.0659 (0.0498)	0.0116 (0.0301)	-0.0392 (0.0518)	-0.000882 (0.0267)	-0.0413 (0.0492)
reform $\times$ jinshi	0.0593* (0.0333)	0.132** (0.0660)	0.0625* (0.0342)	0.139** (0.0665)	0.00555 (0.0482)	0.111* (0.0668)	0.000661 (0.0486)	0.111 (0.0677)
share(exceptional flood)			0.00694 (0.0722)	-0.0123 (0.0894)	0.0190 (0.0650)	0.0925 (0.0940)	0.0580 (0.0716)	0.0746 (0.0927)
share(limited flood)			0.0433 (0.0384)	0.0970* (0.0532)	0.0192 (0.0573)	0.155* (0.0833)	0.00781 (0.0513)	0.0951 (0.0780)
share(normal weather)			0.0378 (0.0255)	0.0353 (0.0371)	0.0224 (0.0349)	0.118* (0.0616)	0.0109 (0.0414)	0.0902 (0.0653)
share(limited drought)			0.0798 (0.0594)	0.226*** (0.0827)	0.0599 (0.0693)	0.300*** (0.106)	0.0280 (0.0704)	0.279*** (0.0999)
share(exceptional drought)			-0.0103 (0.0556)	0.0114 (0.0869)	-0.0301 (0.0692)	0.100 (0.0912)	-0.0497 (0.0741)	-0.0260 (0.111)
Constant	0.0262** (0.0103)	0.0341*** (0.0110)	-0.00385 (0.0128)	-0.0233 (0.0191)	-0.0140 (0.0417)	-0.135* (0.0743)	-0.0394 (0.0416)	-0.119* (0.0701)
Observations	918	918	918	918	918	918	918	918
R-squared	0.015	0.035	0.018	0.045	0.061	0.071	0.127	0.150
Prov FE					Y	Y	Y	Y
Year FE					Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Odd columns include protests led by local gentry. Even columns include protests led by commoners. Reform is a dummy variable which is equal to 1 if a province adopted the tax reform. Weather controls are the share of each type of weather in a province in a given year.

If the tax reform increased protests through the channel of tax transfer, it should have led to more protests due to bad weather shocks instead of the ones against government policies. This is because poor people bore more tax burdens and were more vulnerable to negative income shocks. In this case, the interaction terms with bad weather should be positive and statistically significant. Table 1.13 displays results after controlling for the interaction terms of weather and the tax reform. The coefficients for weather shocks are not statistically significant anymore, yet the interaction term between drought and the reform suggests that after the reform, the same drought would have led to around one extra protest in one province per year. It is consistent with the tax transfer channel.

1.7 Discussion

1.7.1 Endogeneity

Sources of Endogeneity

Although the fixed effects eliminate time-invariant heterogeneity in each province such as geographic factors, there are several other potential sources of endogeneity.

First, if province i adopted the reform at year t in response to increased protests, my results would reflect the impact of protests on the adoption of the new policy. Yet in reality, the reform did not include intentions to suppress local violence. On the contrary, the policy makers had concerns about the potential opposition and resulting protests (by the gentry) when they implemented the reform (He, 1998). Besides, descriptive statistics and baseline regressions already show that the average level of protests was significantly higher after the reform. If the reform had been caused by an increase in the number of protests, the trend would have been lower after the reform took place.

Second, some other factors might have had impact on the timing of reform and the number of protests simultaneously. For example, it is possible that provinces were required to adjust the timing of adoption to minimize the negative shocks. In addition, provinces with a capable governor might have been more likely to start the reform, and the capable governors might have been able to limit protest. In this case, fewer protests would be correlated with earlier implementation of reform, which will bias my results downward. If this was the case, my estimate of the impact of the reform can be viewed as a lower bound of the real effect.

Third, anticipation of the reform may also bias my results. If the gentry learned about the reform, they might have started local protests. Local officials might have felt pressures from the local gentry and postponed the actual adoption of this policy. I also

Table 1.13: The Impact of Reform on Protests due to Food Crises

VARIABLES	(1) protest	(2) protest	(3) protest	(4) protest	(5) protest	(6) protest
reform	0.0984 (0.0759)	0.0825 (0.112)	0.188 (0.157)	0.0355 (0.0727)	0.0382 (0.117)	0.0692 (0.194)
reform(intensity)				0.0802 (0.0696)	0.0680 (0.0686)	0.123 (0.149)
reform×exceptional flood	-0.215 (0.291)	0.0119 (0.294)	-0.0600 (0.330)	-0.270 (0.306)	-0.0412 (0.314)	-0.0903 (0.344)
reform×flood	0.193 (0.265)	0.222 (0.236)	0.211 (0.237)	0.118 (0.263)	0.151 (0.231)	0.167 (0.245)
reform×drought	1.016** (0.451)	1.110*** (0.423)	1.083** (0.434)	0.926** (0.468)	1.027** (0.443)	1.041** (0.448)
reform×exceptional drought	-0.111 (0.385)	-0.577 (0.513)	-0.662 (0.506)	-0.175 (0.401)	-0.643 (0.538)	-0.729 (0.529)
exceptional flood	0.158 (0.206)	0.118 (0.208)	0.192 (0.209)	0.180 (0.204)	0.140 (0.209)	0.196 (0.210)
limited flood	0.109 (0.120)	0.0230 (0.114)	-0.0163 (0.117)	0.135 (0.125)	0.0506 (0.116)	0.00457 (0.118)
limited drought	0.0332 (0.131)	-8.20e-05 (0.131)	-0.0292 (0.133)	0.0621 (0.134)	0.0254 (0.132)	-0.00795 (0.135)
exceptional drought	0.0367 (0.173)	0.114 (0.172)	0.187 (0.164)	0.0764 (0.177)	0.155 (0.174)	0.228 (0.170)
Constant	-0.0986 (0.0967)	-0.116 (0.103)	25.07** (12.25)	-0.111 (0.0986)	-0.126 (0.103)	25.13** (12.19)
Observations	918	918	918	918	918	918
R-squared	0.154	0.250	0.270	0.156	0.251	0.271
Prov FE	Y	Y	Y	Y	Y	Y
Year FE		Y	Y		Y	Y
Prov*i.year			Y			Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Reform(intensity) is a standardized measure of reform intensity, measured using head tax quota in 1685. It is equal to zero if a province had not adopted the reform. Weather controls are the share of each type of weather in a province in a given year. Columns (1) to (6) include the full sample. Columns (7) and (8) drop Jiangsu province.

Figure 1.3: The Impact of Reform on Urban Protests

observe several cases of such protests in the data. Again, this concern would bias my results downward.

Robustness Checks

To address the endogeneity issues, I carry out several robustness checks. The first uses an event study approach that documents the frequency of protests before and after the reform year. The regression equation is

$$Protests_{it} = \alpha + \sum \theta_{\tau} R_{it} + Z_{it}\gamma + \mu_t + \sigma_i + \epsilon_{it} \quad (1.7)$$

where R_{ij} is event-time fixed effects, which is year but normalized to zero when the province adopted this reform. This test addresses concerns on reverse causality. If the reform led to more protest rather than the other way around, I expect the coefficient θ_{τ} to be greater than zero for the years $\tau \geq 0$, but equal to zero for the years $\tau < 0$.

Figure 1.3 to Figure 1.5 present the results for the event study approach. I control for weather shocks, provincial time invariant characteristics, and national shocks. The coefficients for the years before the reform are close to zero, and they experienced a jump for the year $\tau = 2$. It suggests that there were no differentiated existing trend for different provinces. In addition, people might have needed some time to realize the real impact of the reform and protest.

I address the other two sources of endogeneity using two protests tests. In the first placebo test, I artificially move the time of the reform forward in each province by 1, 2

Figure 1.4: The Impact of Reform on Urban Protests (Event Approach, Separated by Leader)

Figure 1.5: The Impact of Reform on Urban Protests (Event Approach, Separated by Target)

and 3 years. If the decision of reform was correlated with unobservable heterogeneity that increased protests before the reform, the coefficients of reform in the placebo tests would also be positive and statistically significant. Table 1.14 presents the results of the placebo regression. After controlling for time fixed effects, the imaginary reform was not correlated with increases in the frequency of protests. This result supports the story that more frequent protests followed by the reform rather than serving as a cause of reforms. It also shows that there was no anticipation effect.

The second placebo test examines the impact of another fiscal reform that was conducted at the same period. This reform also aimed to reduce informal taxes on commoners by increasing formal taxes and eliminating informal sources of public revenue (“*huo hao gui gong*”). The two reforms had independent contents, as the “*huo hao gui gong*” reform was revenue-neutral and was not supposed to increase the number of protests. Meanwhile, local governors’ ability and their connections to the central government were likely to influence the timing of both reforms. The correlation of the two reforms is 0.8095, consistent with historical evidence that both reforms were adopted early in provinces where governors were capable and politically active. If the previous results were driven by this factor, I would expect the coefficients of this placebo re-

gression to be different from zero. Table 1.15 displays the effects of this reform on the frequency of protests. In the specifications with time fixed effects, the adoption of the “*huo hao gui gong*” reform did not have any impact on protests. This result suggests that although provincial governors’ characteristics influenced the timing of the reform, they did not increase the protests.

1.7.2 Eliminate Jiangsu Province

As one of the most prosperous and populated areas in China, Jiangsu province had significantly more frequent protests than other provinces. This raises the concern that Jiangsu province might have driven my previous results. To address this issue, I drop Jiangsu province and rerun the baseline specifications. Columns (7) and (8) of Table 1.8 display these results. The coefficients of reform are smaller but still positive. Due to the lack of overall number of protests, it becomes statistically insignificant in Column (8). This result show that the average level of protests was partially driven by larger increase in Jiangsu province, yet the reform also might have led to more frequent protests in other provinces.

1.7.3 Results using a Negative Binomial Regression

One feature of the data is that the dependent variable is count data for which 87.5% observations have the value zero. Thus, the classic hypothesis of normal distribution in OLS regression would be problematic. I use a negative binomial model to check the robustness of my results.¹⁵

Table 1.16 reports estimation results using the negative binomial model. Holding other variables constant, the coefficient of reform measures the difference in the expected logged number of protests after the policy was adopted. The results show that the reform was associated with a rise of 1.89 protests, or 89.06% compared with the original protest level.¹⁶ This is consistent with results from the panel data regression.

1.7.4 Population Increase

Some scholars notice that people were freer to move after the reform, because the elimination of the head tax literally “relaxing controls on local people” (see, for example, Cao, 1997; Shi, 1999; Wu, 2011). There are no county-level urban population data in China around the period I examine, yet many records suggest that there was an increase

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¹⁵I also run Poisson regressions, but the overdispersion test fails. Thus I turn to the more flexible negative binomial specification.

¹⁶ $e^{0.637} = 1.89$.

Table 1.14: Placebo Regressions ($\Delta t = 1, 2, 3$)

VARIABLES	(1) Protest	(2) Protest	(3) Protest
forward $\Delta t=1$	0.115 (0.112)		
forward $\Delta t=2$		0.104 (0.0852)	
forward $\Delta t=3$			0.0727 (0.0815)
exceptional flood	0.123 (0.151)	0.111 (0.158)	0.136 (0.155)
limited flood	0.0961 (0.129)	0.0892 (0.133)	0.0599 (0.133)
limited drought	0.422** (0.200)	0.420** (0.200)	0.311* (0.173)
exceptional drought	-0.165 (0.218)	-0.165 (0.219)	-0.149 (0.224)
Constant	-0.198* (0.109)	-0.198* (0.110)	-0.159 (0.105)
Observations	900	882	864
R-squared	0.233	0.234	0.226
Prov FE	Y	Y	Y
Year FE	Y	Y	Y

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Forward $\Delta t=1, 2, 3$ are imaginary reforms that take place 1, 2, 3 years earlier than the original reform. Weather controls are the share of each type of weather in a province in a given year.

Table 1.15: Placebo Regressions: The Impact of the "Huo Hao Gui Gong" Reform on Protests

VARIABLES	(1) protest	(2) protest	(3) protest	(4) protest
huohao	0.191*** (0.0567)	0.204*** (0.0552)	-0.150 (0.279)	-0.145 (0.281)
Constant	0.130*** (0.0265)	-0.00971 (0.0635)	-0.100 (0.0842)	6.241 (12.55)
Observations	918	918	918	918
R-squared	0.012	0.126	0.224	0.246
weather controls	Y	Y	Y	Y
Prov FE		Y	Y	Y
Year FE			Y	Y
Provincial trend				Y

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors are in parentheses. The dependent variable is the frequency of protest in each province. Huohao is a dummy variable which is equal to 1 if a province adopted the "huo hao gui gong" reform. Weather controls are the share of each type of weather in a province in a given year.

in urban population. Other evidence on the number of urban residents is also consistent with this trend. For example, Shih (1985) examined the percentage of a certain type of gentries (*ju-ren*) living in the urban area in Tongcheng county, Anhui province. He found that from 1704 to 1726, 43% of the *ju-ren* were in urban areas, while from 1727 to 1752, this number increased to 78% and continued increasing in successive years. Li (2010) pointed out there was an increase in the population in the Yangzi Delta in the early eighteenth century. Wu (2011) used local gazetteers (*difang zhi*) in Wujiang county to show that more people lived in the urban area in the Qianlong period (1735-1796) than in the preceding Kangxi period (1661-1722).

Despite individual evidence on population increase in the long run, my study focuses on the short-term and medium-term effects from 1700 to 1750. The results of the event-study approach from Figure 1.3 suggest that the effects appeared right after the reform and faded away in the long run. In addition, according to Xu, van Leeuwen, and van Zanden (2015)'s estimation, the provincial urbanization rate is quite flat from 1644 to 1851. As a result, urban population growth is not likely to explain nationwide increase in urban protests.

Table 1.16: Results using Negative Binomial Regression

VARIABLES	(1) nbreg	(2) nbreg
reform	1.002*** (0.227)	0.637* (0.270)
exceptional drought	0.720 (0.664)	0.764 (0.636)
limited drought	1.153** (0.538)	1.120** (0.583)
limited flood	1.412*** (0.487)	1.777*** (0.526)
exceptional flood	0.593 (0.728)	0.270 (0.650)
emperor=Yongzheng		1.019*** (0.336)
emperor=Qianlong		0.255 (0.373)
Constant	-2.651*** (0.289)	-2.934*** (0.354)
$\ln \alpha$	1.706*** (0.199)	1.591*** (0.231)
Observations	918	918

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors are in parentheses. Reform is a dummy variable which is equal to 1 if a province adopted the tax reform.

1.8 Conclusion

The level of the real tax rate is a puzzle in Chinese history. Anecdotal evidence from the literature shows that commoners suffered from high taxes. The Great Divergence literature finds that the tax rate was low in China compared with in Europe (Rosenthal and Wong, 201). Estimates on tax burdens also show that despite persistent efforts to increase its total tax revenue, China had a relatively low tax rate from the fifteenth century to the nineteenth century (Wang, 1973; Huang, 1974; Iwai, 2011). Meanwhile, the government had difficulties in raising enough funds. Perkins (1967) claims that central tax revenue was insufficient when the central government searched for funds for state industrialization in the late nineteenth century.

To explain the puzzle on tax burdens, previous studies attribute the problem to the principle-agent issue between the central and local government. Due to high monitoring costs, the central government had to keep the *de jure* tax rate at a low level (Ma, 2011; Sng, 2014; Sng and Moriguchi, 2014) to keep a reasonable *de facto* tax burden. This paper offers an alternative potential explanation: the intermediaries between local government and commoners, especially the local gentry, passed tax burdens along to commoners and increased the actual tax burdens on them. As a result, while the *de jure* tax on commoners remained low, the *de facto* tax rate on commoners was high.

In this paper, I use variations in the timing of the reform across provinces to examine whether the reform increased the frequency of protests. Baseline regressions controlling for provincial fixed effects, national shocks, and provincial time trends show that, the implementation of the reform increased urban protests by about half a standard deviation. The empirical results controlling for gentry density also lead to the conclusion that despite the goal to redistribute the tax burden, the tax policy might have increased the tax burden on the poor. Although the tax reform stabilized the tax base, the government still relied on intermediaries for tax collection. Intermediaries, as a result, still played an important role in determined the real size and incidence of tax burdens. Combined with Sng (2014)'s study, this paper suggests that the problem of insufficient funds and high actual tax burden in historical China would be difficult to resolve without innovations that efficient lower tax collection costs.

Historical protests also echo recent social problems in modern China: the increase in the number of riots and social disorder. As the Institute of Sociology in Chinese Academy of Social Sciences has incompletely recorded, the number of these riots has tripled from 77 cases in 2008 to 230 cases in 2012. Many of these protests happen in urban areas, but most of the participants are migrants from rural areas. Some reports point out that reduced real income in countryside have pushed people to migrate to

cities, which decrease average resources and led to chaos. This paper illustrates how a policy change in rural areas also induced negative shocks in urban areas. It suggests that one solution for social riots in China today is to improve rural living conditions.

Chapter 2

Commodity Price Shocks and Local Conflicts from 1902 to 1911

2.1 Introduction

Conflicts are costly to the economy, so it is important to understand how and why they take place. Since conflicts require collective action, theoretically they should be expensive to organize (Olson, 1965). Yet, the recent thorough empirical investigations mainly focuses on individuals' choice, that is, how income shocks affect the opportunity cost and expected income of individual's decisions to participate in a conflict (Dube and Vargas, 2013). There are a limited numbers of empirical studies considering the cost of organizing conflicts. For example, whether negative income shocks would reduce the resources contributed to conflicts and lower the frequency of conflicts?

This paper provides empirical evidence of “income effect” mechanism. I focus on China's experience from 1902 to 1911. This is the last ten years of the Imperial Period in Chinese history, in which there were dramatic economic and political changes as well as frequent social conflicts. Starting from the mid-nineteenth century, the Chinese central government gradually failed to maintain its original function of national defense and public goods provision. This caused more frequent grain crises and local protests as civilians requested relief from the government. Meanwhile, the spread of Western ideology and the loss of most wars with foreigners highlighted the advantage of western economic and political institutions. This encouraged groups of intellectuals to study the West. While they first counted on the Imperial family and the Emperor for reforms (i.e., the “Hundred Days' Reform” in 1898), this path soon failed due to conservatives' obstruction. The intellectuals later formed into revolutionary groups and aimed to overthrow the Imperial government. After two further defeats by foreign power in

1895 and 1900, more intellectuals lost faith in the monarchy and chose to join the revolutionaries. The government’s efforts to reform in 1905 (i.e., the “New Policies”) failed to regain trust from these revolutionaries; on the contrary, it hurt the interests of the original gentry class and worsened the situation (Bai and Jia, 2016). As a result, during the last ten years of the Qing dynasty, the years 1902 to 1911, there were both protests led by hungry farmers and revolts led by revolutionaries. While protesters requested famine relief, tax reduction, and other reforms from the Qing government, revolutionaries aimed to overthrow the government.

These two types of conflicts tended to respond differently to an income shock. If a negative income shock took place, protests due to grain crises would increase for two reasons. First, civilians used protest to request relief to raise their incomes. Second, the opportunity cost of protest was reduced because of lower current income. In contrast, organized revolutionary activities probably responded differently. When there were negative shocks of incomes, more people would be willing to participate in revolts. However, since revolutionaries aimed to overthrow the government, the goal was not to pursue increased help from the existing government. On the contrary, the revolutionaries expected temporary losses of income while they organized revolts. To succeed, the revolutionaries often needed resources to purchase weapons and organize the populace printing posters; therefore negative shocks to income made it more difficult for them to succeed in taking over the government. If the latter effect is strong enough, a negative income shock might have decreased revolutionary activities.

The period I examine has rich resources describing both types of conflicts. I use detailed records on conflicts from 1902 to 1911 to capture different types of conflicts. The original data were collected by historians from eleven newspapers and four archives, covering the eighteen core provinces of China. These data contain information on the reasons, the leaders, the demands and issues of most conflicts, which allows me to disentangle different protests.

Following Dube and Vargas’s (2013) study on international trade and conflicts in Colombia, the income shocks come from the international commodity market. Since local conflicts were likely to affect local trade as well (Decennial Reports, 1912), I use national trade prices from Hsiao (1974)’s calculations based on the records from the China Maritime Customs. I consider two major agricultural commodities of China, tea and cotton. To address concerns that protests in major markets might also have driven price changes, I instrument the price series using the wholesale price of tea in India. I do not instrument for cotton because China was a small trade in the world cotton market.

Besides controlling for county fixed effects and national shocks, I also consider local geographic conditions to conduct a difference-in-differences analysis. I collect information of local production conditions, access to trade, and grain prices. For production conditions, I use records of soil suitability from the Global Agro-Ecological Zones (GAEZ), collected by the Food and Agricultural Organizations (FAO). to capture the production suitability of land for China's important agricultural products. As measure based on average soil quality from 1960 to 2000 and remained the same over time, this is a measure that aims to capture baseline geographic conditions rather than farmers' actual production decisions. The assumption here is that regions more suitable for a certain types of crop should be more responsive to price changes of this crop. The access to international trade is constructed by calculating distance to the closest port using latitude and longitude information from the China Historical Geographic Information System (CHGIS). Since local food prices were sometimes the direct cause of protests, I control for prefecture-level grain prices from 1902 to 1911, collected by Yeh-Ching Wang.

The results show that, first, with lower international prices of agricultural commodity prices, especially tea, people in cash crop suitable regions were likely to start more all types of conflicts. Specifically, a rise of one *Haikwan* Taels in tea price, in an area that the suitability for tea production increased by one standard deviation more tea production suitability would lead to 0.0716 decrease in the frequency of conflicts, which is about 0.3 of a standard deviation. This effect is even larger when only considering conflicts led by farmers with the impact on protest was 0.5 of a standard deviation, which is consistent with historians' observations that farmers were very sensitive to income shocks from international trade (Gardella, 1994). On the contrary, the impact of a higher international price on conflicts led by the gentry, soldiers, or revolutionaries are close to zero or negative.

In addition, after disentangling conflicts by reason, a differentiated effect appears. A drop in tea prices was likely to increase the frequency of grain protests in tea producing regions by 0.0463, which is 0.4 of a standard deviation, but had only a slight positive impact on revolutionary activities or conflicts led by the gentry. In addition, an increase in the international cotton price increased the frequency of revolutionary activities by 0.0184, or 0.25 of a standard deviation. The 2SLS results are similar as the ones of the fixed-effects models.

My results show that positive income shocks are likely to decrease protests that request for relief or policy changes from the government, while increase revolutionary activities that aimed to overthrow the government. I refer the second effect as an "income effect". Since none of the commodities examined here are natural resources,

this is unlikely to be the rapacity story that has been emphasized by the literature, that is, higher expected income from participating conflicts would lead to civil wars. My explanation is that, income shocks affected revolutionary activities not only by affecting individuals' choices in participating revolutions, but also by affecting the resources available for the revolt. Most of the political parties between 1902 and 1911 requested membership fees from participants. If a negative income shock international trade took place, more farmers were likely to participate in conflicts, both the ones requesting actions from the government or revolutionary actions, but it also reduced the resources revolutionaries had available to organize their conflicts. As a result, while a negative income shock was very likely to increase conflicts that requested actions from the government, the impact on revolutionary actions could have gone either way.

This paper contributes to the growing empirical studies about conflicts. By identifying conflicts by its reason and leader, I separate revolutionary activities that aim to overthrow the central government from protests that simply request actions from the central government. I show that the difference in their aims lead to different responses when income shocks take place. Since previous empirical work mostly focus on the total number of conflicts, this study provides new empirical evidence about how goals may affect participants' responses to the same income shocks.

This paper also contributes to the Chinese economic history literature. I consider the last ten years of the Qing dynasty. This is a special period in which many conflicts took place. Many historians and political scientists already studied this period. The small conflicts, especially the ones by the revolutionaries, contributed to the big republic revolutions in 1912. Thus, understanding the small conflicts before 1912 would also help us to explore the form of China's political changes.

Previous studies that explain this revolution focus on the introduction of western technology and ideology (Hsü, 1995) and the harm of interests of previous interest groups (Bai and Jia, forthcoming). Little is known about the roles economic factors played. It is important to study the economic factors though, because theoretical literature and empirical studies in other context suggested that these factors are likely to play a fundamental role in the forming and outbreak of conflicts (e.g., Blattman and Migule, 2010; Brückner and Ciccone, 2010). In addition, the results of this study suggest that the traditional "relief-seeking" conflicts were very different from the revolutionary actions.

2.2 Background: Conflicts from 1902 to 1911

Historical China experienced numerous conflicts. While “conflicts” is used as a general name for violent activities between groups or between people and the government, it could be separated into different categories based on participants’ requests. A major group of conflicts are the ones that attracted government’s attention and asked for a policy change or a relief. I refer this type of conflicts as “protests”. Protesters’ goal was not to overthrow the central government but to attract government’s attention. The government in some cases listened to protesters’ requests and adjust its policy accordingly. In contrast, another type of conflicts aimed at overthrowing the central government. I call them “revolts” or “revolutions”, and their participants are “revolutionaries”. Note that in my context, “revolts” or a “revolutions” are defined by their aims not their scale. A revolt might be a small incident but against the central government. There were also periodically conflicts between different groups, such as conflicts between soldiers and citizens, or conflicts between different ethnic groups. This paper studies the difference between “protests” and “revolutions”.

Conflicts in the last ten years of the Imperial China, 1902 to 1911, share many features of conflicts in previous dynasties. In addition, the introduction of western ideology and the belief in building a Republic also led to a new form of conflicts, in the form of revolutionary activates.

The overall statistics suggest that the years 1902 to 1911 had more frequent conflicts than in most years, excepting during the Taiping and Nian Rebellion. Yang (1976) identifies 6643 mass actions recorded in *Da Qing Huangdi Shilu* (Veritable records of the Qing emperors) from 1796 to 1911.¹ Figure 2.1 plots the frequency from his source. Except for the years when China experienced nationwide rebellions, the average frequency of conflicts in the late imperial period is higher than the frequency in the early nineteenth century.

2.2.1 Protests: Conflicts Requesting Actions from Government

The most frequent conflicts that targeted the government were protests due to grain crises, famine, or tax resistance. The number of participants varied from several to thousands, while in most cases there were around a hundred. They often had clear requests from the government and still supported central government (Wong, 1997).

Historical records suggest that it was common for people to protest during bad harvests, especially if there were grain crises (Rowe, 2007; Wu, 2011). When such

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¹Yang’s original work shows the total number of incidents is 6643. After adding his report for every ten years, the total number of conflicts is 6,553.

Figure 2.1: Frequency of Conflicts Recorded by *Qing Shilu*

Source: Yang (1976)

crises took place, people sometimes gathered to request famine relief from the local government. Sometimes, if they worried about rising food prices, they joined protests to prevent local grain from being transported to other places. The protests about tax resistance were usually due to improper collection of the tax, unequal distribution of the tax burden, or insufficient tax exemptions during bad harvest (Wong, 1997).

General economic conditions were also likely to affect the frequency of food crises and other types of conflicts. In their case studies of long-term conflicts on the North Huai-River and in Macheng County, Perry (1980) and Rowe (2007) show that unfavorable ecological conditions tended to cause more local violence. Econometric studies also suggest that weather conditions were likely to impact the total number of protests (Chen, 2014). Jia (2013) finds that the introduction of sweet potatoes, a crop that provided more protein and was more suitable to negative weather shocks, reduced large-scale peasant revolts. In this paper, I first examine the impact of international commodity prices on all conflicts, and then consider the effect on food crises.

Even though small-scale conflicts in most cases were not aimed at overthrowing the government, they were still destructive. Protesters closed shops or stimulated disturbances to attract local government official' attention. Sometimes extreme small-scale conflicts caused casualties. Most small-scale conflicts were suppressed or quelled by local officials. In some cases, however, small-scale conflicts might have turned into larger

riots with the leaders aimed to overthrow the government (Bianco, 2001; Rowe, 2007). As a result, the central government also tried to reduce the possibility of local conflicts using institutional arrangements to trace individuals' behavior and monitor villagers. It set up the granary system for famine relief. Regular moral education that persuaded villagers to be timid was part of the arrangement (Hsiao, 1974). One task for local troops ("*Luying*") in the Qing dynasty was to monitor local conditions and suppress conflicts if necessary (Luo, 1984).

After 1900 China witnessed more conflicts due to the collapse of its original controlling system. More corruption gradually reduced revenue from public finance. The reduced tax revenue failed to support the original famine relief system or even military control. These changes led to several consequences. First, conflicts and revolts were more frequent since the central government was unable to fully respond to negative weather shocks and people's requests. Second, the central government suppression efforts were not as effective as it had been in the eighteenth century.

In addition, in 1895, the Treaty of Shimonoseki allowed the establishment of foreign firms in Chinese ports and stimulated the development of coastal regions. Hsü (1995) summarizes the cultural and social consequences due to this shock. The competition from international trade and foreign firms worsened average living conditions in rural China. When negative economic shocks happened, people were no longer able to rely on relatives or clans for support. Instead, more people moved to the emerging cities to look for employment opportunities in the newly growing industrial sector. This factor created more uncertainties and increased the possibilities of unrest in society.

2.2.2 Revolts: Conflicts that Aimed to Overthrow the Government

Wong (1997) noticed that small-scale conflicts had new features during the 19th century, with more conflicts led by secret groups that aimed to overthrow the government. In fact, revolts, conflicts that directly disagreed with the rule of government, in other words, uprisings, were very likely to take place when a dynasty was declining and faced both economic and social challenges. The uprisings usually involved furious fights, weapons, or even military troops. Most political groups were later suppressed by the central government, yet a few survived to lead large scale revolutions.

It is worth noting that some revolts during the late nineteenth century and early twentieth century had different demands from previous ones. These revolts were led by the intellectuals and aimed to build a new Republic in China. After China was defeated by the western countries in the mid-nineteenth century, some intellectuals realized the advantage of western institutions and started to form groups and advocate Western

knowledge. These efforts started in science and technology, and later spread to culture and institutions. The early political groups still counted on the Qing dynasty to start political reforms. Yet, the government constantly failed to respond to the reformers' advocates. In 1894 Sun Yat-sen and his followers founded the first political party that aimed to overthrow the monarchy, the Revive China Society ("Xingzhonghui"), in Honolulu. Their goal was to "Expel Manchus, revive Zhonghua, and establish a unified government." They sought to achieve this goal by starting revolts in China. Based on Zhang's (1982) summary, from 1894 to 1905 there were at least 66 new political groups with similar aims founded.

Bai and Jia (2016) also find that the gentry were also likely to play a role in the uprisings. From 1901, partially to save the country after the Boxer uprising, the Qing government started to conduct a series of new policies, including abolishing the Imperial Civil Examination system in 1905 and building a constitutional monarchy in 1908. For centuries the original aim of most literate people had been to pass the Civil Exams and become an official member of the government. The policy change therefore blocked an essential path for many poor literates to improve their social status. As a result, some chose to support the revolutionaries.

Revolutionaries needed resources to start uprisings. Many revolutionaries quit their jobs to work for political parties. Uprisings themselves needed enough funds to purchase weapons, distribute their message, and organize participants. They relied on money from several sources, including overseas contributions, revolution bonds and membership fees (Zhang, 1983). Except for money from overseas, most sources of funds depended on local economic conditions, and negative income shocks tended to reduce local funds. It is worth noting that sometimes farmers chose to participate in uprisings for free food and subsidies, especially when they had difficulties in making a living themselves (Wang, 2010). This force in turn was likely to increase uprisings during negative economic shocks. As a result, it is not clear how a combination of these two forces would affect the level of uprisings.

2.2.3 Trade as a Source of Income Shock

This section examines the impact of trade on peasants' income. Although the value of international trade was only 9% of China's total GDP value in 1933, historians suggest that trade benefited peasants in counties that produced exports, although the peasants faced more risk and uncertainty due to fluctuations in the world market (Gardella, 1994). In the early twentieth century, China mostly exported agricultural products and imported manufactured products. Among all products, tea, silk, and later cotton were

the major products that China exported. Case studies conducted by historians suggest that the prices of these commodities were likely to affect peasants' income.

Tea and silk were China's leading exports after the mid-nineteenth century but total exports gradually declined due to world competition. Most of the historians' studies focus on the overall impact on the Chinese economy, yet several investigations based on micro-level evidence suggest that during the booming years peasants benefited from the international trade. For example, Faure (1989), Bell (1999), and Fei (1939) find that income from silk served as an important source for household income in Jiangsu. The decline of the silk trade later caused difficulties in villages in the Yangzi Delta. Gardella (1994) finds that tea producing regions in Fujian expanded during the booming years in the mid-nineteenth century. Some rice-producing regions and wasteland were even shifted into tea production. The impact of the declining tea trade later was so serious that the local government started a revival plan to save the tea trade. Myers (1970) also finds that farmers in the north also tended to produce more cash crops, such as cotton, than they did grain in the 1930s.

Li (1981) and Bell (1999) find that local producers tended to react in a timely fashion to price fluctuations in the world market, and sometimes even over-reacted (Gardella, 1994). This may have been due to the fact that, despite heterogeneity in organization and sources of capital, rural production before the 1930s tended to be market-oriented with many small farmers competing with each other. Government also played a minor role in promoting or guiding production methods. Since tariffs were controlled by foreigners, the Chinese government could not increase its own tariff. The lack of funds also prevented them from protecting domestic production against foreign competition. A common practice of the government was to build experiment stations in tea or silk producing regions, yet farmers often failed to accept advice or achievements from the experiment stations (Decennial Reports; Gardella, 1994).

Not all regions were affected by world price fluctuations directly in the short-run. Tea and sericulture industries were very sensitive to locations. Tea was mostly produced in some provinces in the southern part of China, while silk was mostly popular in the Yangzi delta. Bell (1999) found that local production conditions played a major role in determining the location of sericulture. This is the case that will be studied in this paper. Of course, in the long run, farmers might have moved to regions that were suitable for cash-crop producing from other counties (Gardella, 1994).

2.3 Theoretical Framework

This section presents a theoretical framework that motivates the empirical analysis. This model considers how a representative individual divides his time among working and organizing conflicts. The individual earns a certain amount of income from working with wage rate w . If organizing a conflict, the individual will have probably q to earn a revenue R when the conflict is successful. The individual's utility is determined by his expected income from conflicts and his expenditures on sustainable goods.

Whether this individual is an ordinary farmer or a revolutionary is captured by whether this individual spends his income on investing in conflicts. The individual would not spend his income on conflicts, such as purchasing weapons, if he is only interested in requesting relief from the government. He would invest more heavily on conflicts, however, if he is a revolutionary. The budget constraints of making investments depends on the earnings from work and other expenditures on sustainable goods (s). In the first case, a positive income shock (e.g., a higher w) would increase the opportunity cost of this individual to participate in conflicts (or, in this case, protests). In the second case, the same income shock would increase the total budgets and thus the number of revolutionary activities, which he would invest.

2.3.1 Setup

Consider a representative individual in this economy. This individual aims to maximize his utility function, which is determined by the money he spends on purchasing sustainable goods and his expected income from conflicts. That is

$$U = f(s) + g(qR), \quad (2.1)$$

where s is expenditures on food. R is the expected revenue from a successful conflict, with the probably of a conflict to be successful is q . $g(\cdot)$ and $f(\cdot)$ are concave and monotonic increasing functions.

The individual maximizes his utility function under constrains on labor and budget. He has $\bar{L}$ total amount of labor. He chooses to allocate his labor between working (L_w) and organizing conflicts (L_c). In addition, he also has to make his expenditure decisions. His total expenditure is subject to his earnings from work, determined by wage rate w and the labor he inputs L_w .

Thus the constraints are

$$\begin{aligned} L_w + L_c &= \bar{L} \\ wL_w &= p_s s + p_c C \end{aligned} \tag{2.2}$$

where p_c is the price of consumption goods and s is the amount of goods purchased. p_c is the price of weapon, as an example of investing conflicts. C is the amount of weapons purchased. For simplicity, I normalize $p_s = 1$ in future analysis.

Now consider the difference between an ordinary farmer and a revolutionary. If this individual is a farmer and his aim of participating in a conflict is to request actions from the government, he would not purchase weapon. His probability of winning the conflict is totally determined by the labor involved. For simplicity, assume the probability of success is $q = L_c$ if this individual is a farmer. On the contrary, for a revolutionary, the probability of a successful conflict is determined by the labor L_c and the investment C . For simplicity, assume the probability of a conflict to success is $q = L_c C$ if this individual is a revolutionary.

The intuition of this setting is that protests requesting actions from the central government does not aim to overthrow the government. As a result, their actions are relatively peaceful. The revolutionary activities, however, aim to occupy major cities and need weapons. Note that adding the costs of conflicts would not change my results.

2.3.2 Case 1: An Ordinary Farmer

Now consider the impact of a negative income shock on a farmer. I use subscript f to denote the farmer's problem. The farmer would like to maximize his utility $U^f = f(s) + g(qR)$,
subject to

$$\begin{aligned} L_w^f + L_c^f &= \bar{L} \\ wL_w^f &= s \\ q &= L_c^f \end{aligned} \tag{2.3}$$

plug in and one has

$$\begin{aligned} U^f &= f(wL_w^f) + g(L_c^f R) \\ U &= f(w(\bar{L} - L_c^f)) + g(L_c^f R) \end{aligned} \tag{2.4}$$

The first order condition is

$$f'(w(\bar{L} - L_c^{f*}))w = g'(L_c^{f*}R)R \quad (2.5)$$

That is, the marginal benefit from participating work is the same as the benefit from organizing a conflict.

Now, consider the case when the wage rate w is lower due to a trade shock. Intuitively, a farmer would allocate more labor in conflicts due to a lower opportunity cost from working. The calculations also suggest this conclusion. For simplicity, assume $R = 1$.

Take derivatives with respect to the wage rate w and one will have

$$(g''(L_c^{f*}) + f''(B)w^2) \frac{\partial L_c^{f*}}{\partial w} = f'(B) + f''(B)w(\bar{L} - L_c^{f*}) \quad (2.6)$$

where $B = w(\bar{L} - L_c^{f*})$.

Since the utility functions $g(\cdot)$ and $f(\cdot)$ are increasing and concave, one would have $g'(\cdot) > 0$, $f'(\cdot) > 0$, $g''(\cdot) < 0$, and $f''(\cdot) < 0$. The equation also has its economic meanings. The first term on the left hand side $g''(L_c^{f*})$ indicates the concave utility function for additional labor in conflicts. The second term $f''(B)w^2$ is the substitution effect. Both of the two terms are negative. The right hand side $f'(B) + f''(B)B$ denotes the additional utility increase if the extra money is spent on food.

$f'(B) + f''(B)B > 0$ is likely to hold for most utility functions. For example, if $f(x) = x^{\frac{1}{2}}$, $f'(B) + f''(B)B > 0$.²

Thus, under most utility functions,

$$\frac{\partial L_c^{f*}}{\partial w} < 0, \quad (2.7)$$

i.e., the individual is less likely to start a conflict.

Prediction 1 If an individual is not a revolutionary and receives negative (positive) income shocks, he is likely to start more (less) conflicts.

2.3.3 Case 2: A Revolutionary

Now consider the case if the individual is a revolutionary. In this case, the individual invests in conflicts by purchasing weapons C with the price p_c . The individual utility

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² $f'(B) + f''(B)B > 0$ is the same as $(xf'(x))' > 0$ at $x = B$, i.e., $xf'(x)$ is increasing at $x = B$. This condition holds as long as the order of $f'(x)$ is greater than -1.

maximization problem is

$$U^r = f(s) + g(qR) \quad (2.8)$$

subject to

$$\begin{aligned} L_w^r + L_c^r &= \bar{L} \\ wL_w^r &= s + p_c C^r \\ q &= L_c^r C^r. \end{aligned} \quad (2.9)$$

where subscript r denotes this is a revolutionary. The individual chooses the optimal levels of L_c^r and C^r , that is, his labor and monetary expenditures on conflicts to maximize his utility.

The first order conditions are

$$\begin{aligned} g'(L_c^{r*} C^{r*}) L_c^{r*} - p_c f'(w(L - L_c^{r*}) - p_c C^{r*}) &= 0 \\ g'(L_c^{r*} C^{r*}) C^{r*} - w f'(w(L - L_c^{r*}) - p_c C^{r*}) &= 0. \end{aligned} \quad (2.10)$$

The effect of interest is $\frac{\partial(L_c^{r*} C^{r*})}{\partial w}$, i.e., how the total input to conflicts changed along with income w .

The first order conditions give

$$L_c^{r*} w = C^{r*} p_c, \quad (2.11)$$

The marginal cost on labor and on weapon is equal.

So $L_c^{r*} C^{r*} = (L_c^{r*})^2 \frac{w}{p_c}$. Plug in the original utility function. Now the problem is to maximize the following utility function by choosing L_c^{r*}

$$f(w(\bar{L} - 2L_c^{r*})) + g(E) \quad (2.12)$$

where $E = L_c^{r*} C^{r*} = (L_c^{r*})^2 \frac{w}{p_c}$.

Take derivative with respect to L_c^{r*} . The new first order condition is

$$f'(w(\bar{L} - 2L_c^{r*}))w = g'(E) \frac{\partial E}{\partial L_c^{r*}}. \quad (2.13)$$

Take derivative with respect to w and rearrange, one would have

$$\begin{aligned} g'(E) \frac{\partial E^2}{\partial L_c^{r*} w} + g''(E) \frac{\partial E}{\partial L_c^{r*}} \frac{\partial E}{\partial w} + 2w^2 f''(B) \frac{\partial L_c}{\partial w} &= f'(B) + f''(B) \\ (g'(E) \frac{w}{p_c} + g''(E) \frac{2wL_c}{p_c^2} + 2w^2 f''(B)) \frac{\partial L_c^{r*}}{\partial w} &= f'(B) + f''(B) - A \end{aligned} \quad (2.14)$$

where $A = g'(E)\frac{2L_c^{r*}}{p_c} + g''(E)\frac{w(L_c^{r*})^3}{p_c^2}$.

In this equation, the first term $g'(E)\frac{w}{p_c} > 0$ is the income effect, indicating the utility increase due to additional expenditure under the original marginal utility. The second term $g''(E)\frac{2wL_c}{p_c^2} < 0$ demonstrates the concave utility function. More investment would decrease the marginal utility from conflicts. The third term $2w^2f''(B) < 0$ captures the substitution effect between food and conflicts. The righthand side of the equation $f'(B) + f''(B) - A = f'(B) + f''(B) - g'(E)\frac{2L_c^{r*}}{p_c} - g''(E)\frac{w(L_c^{r*})^3}{p_c^2}$ is the increased marginal cost of participating conflicts, coming from one put the extra money into food expenditure. The sign of this part is indeterminate.

As a result, it is not clear about the sign of $\frac{\partial L_c^{r*}}{\partial w}$ and $\frac{\partial L_c^{r*}C^{r*}}{\partial w}$. If the income effect is big enough and the right hand side is greater than zero, $\frac{\partial L_c^{r*}}{\partial w}$ would be greater than zero.

Prediction 2 If an individual is a revolutionary and receives negative income shocks, he did not necessarily start more conflicts. Under certain conditions, if the marginal effect from food expenditure and conflict is both positive, the individual is likely to start less conflicts when facing negative income shocks.

2.4 Data

2.4.1 Conflicts

The civil conflicts data are collected by historians Zhenhe Zhang and Yuanying Ding (1982). They picked the period 1902 to Oct 9, 1911 to document the socioeconomic shocks in China before the Republic Revolution (Xinhai Revolution) in Oct 10, 1911. Most of the conflicts are from eleven major newspapers that covered the eighteen core provinces as well as the frontiers. In case the newspaper records only covered the relatively developed regions, Ding and Zhang also include records from official and personal diaries. Despite historians' work, it is possible that the record does not completely reflect the impact of conflicts. If the missing report issue is consistent in certain areas over time, this would be controlled by fixed effects. If, however, the missing report varied as more areas got access to news stations, the estimations might have overstated the increase in the number of conflicts. In the future, I plan to consider the concerns of missing reports by only considering cities that had major connections with railroads or rivers, where presumably should have similar access to major cities and newspapers.

Most records have detailed descriptions of each incident, including information about the reason, the leader, and the target. This is the key information that allows me to identify whether a protest is due to grain crises, organized by revolutionaries, or due to

other reasons. Among the total of 1059 incidents that took place in the core eighteen provinces, 678 of them list the reasons of a particular conflict. Within these conflicts, 205 are protests due to grain crises, 49 are uprisings against the Qing government, and 362 are non-revolutionary protests against government fiscal policies. The conflicts were led by a diverse array of people, 568 protests were led by farmers, 204 by merchants, 154 by revolutionaries, 27 by students, 30 by soldiers, and 22 by the gentry. Table 2.1 reports the summary statistics of conflict and different types of conflict. Note that I measure each conflict by county-year. That is, if an incident took place in two counties at a given year, both counties would be defined as having a conflict.

It is worth noting that the closest war between China and foreign countries (the one with the Eight-Nation Alliance) was settled in 1901. Thus, the years from 1902 to 1911 involved no external conflicts with other countries or wide ranging civil wars. There were only more localized protests or revolts.

Table 2.1: Summary of Conflicts

Variable	Mean	Std. Dev.	N
conflict	0.065	0.248	16990
leader(farmer)	0.033	0.179	16990
leader(worker)	0.004	0.062	16990
leader(merchant)	0.012	0.109	16990
leader(gentry)	0.001	0.036	16990
leader(soldier)	0.002	0.041	16990
leader(revolutionaries)	0.007	0.085	16990
reason(unsatisfying with policies)	0.021	0.154	16990
reason(grain crises)	0.012	0.109	16990
reason(revolutionary activities)	0.003	0.054	16990

2.4.2 Trade

The records of international commodity prices come from the annual reports of the China Maritime Customs, which was a government agency operated by British officers. Its main task was to collect tax revenues from China's international trade. For every year it published detailed records on the foreign trade of China, including the quantity and value of each traded commodity, tax revenue, and descriptions and socioeconomic characteristics at each port. The aggregate level information is widely used in studies of Chinese history. Recently, a group of researchers have started to use sub-national information in quantitative analysis, such as the total trade flows of each port (Keller, Li and Shiue, 2011, 2012, 2013) or national commodity-level trade flows (Yan, 2008; Mitchener and Yan, 2014), but no one has used the most detailed records in economic

Figure 2.2: International Prices of Agricultural Commodities

Source: Chinese numbers are from Hsiao (1970). Indian numbers are from Statistical Abstract relating to British India

analysis: commodity-level trade flows of each port. In this paper, I use aggregate data of major commodities calculated by Hsiao (1970). Figure 2.2 plots prices changes of tea and cotton from 1902 to 1911.

2.4.3 Soil Suitability

The cross-sectional variation comes from soil suitability for tea and cotton production. This information comes from the Global Agro-Ecological Zones (GAEZ) database from Food and Agriculture Organizations (FAO). This database divides the entire globe into 2.2 million grid cells. Each cell covers around 50 kilometers $\times$ 50 kilometers. The data provides information on the potential yields of 154 crops on each zone, calculated based on the average condition from 1960 to 2000. I pick “intermediate” input level to measure the average level and “rain-fed” level for water supply to exclude the impact of artificial water projects after from 1960 to 2000. In my sample, the average number of cells covered by each county in China is 40. Most counties cover 6 to 98 cells.

The potential yields are measured using eight classes, ranging from “very high” to “not suitable.” I use integers ranging from eight for “very high” to zero for “not suitable” digit numbers to denote each class. Then I take the mean of each county as a measure of average soil suitability for crop production.

Figures 2.3 and 2.4 illustrate the suitability for crop production. The production zones are classified into eight zones. Darker areas indicates higher production suitability. White areas are fully unsuitable for production or unassessed.³ Regions suitable for tea production in Figure 2.3 are located along the southeast coast and southwest mountainous areas. As Figure 2.4 shows, regions suitable for tea production are bigger. Most provinces in my sample are suitable for tea production, with northern provinces have greater average suitability than southern provinces. Table 2.2 reports the summa-

³Only three cells are unassessed in my sample.

Figure 2.3: Potential yields for tea production

Source: Global Agro-Ecological Zone database, Food and Agricultural Organization)

ry statistics. The average suitability for cotton is about twice as the suitability for tea.

2.4.4 Access to Trade

The access to international trade is likely to affect the intensity of treatment. I use distance from each county to its closest port as a measure of the access to international trade for each county. The distance is calculated based on information from the China Historical Geographic Information System (CHGIS). This database provides county-level longitude and latitude information on the years 1820, 1911, and 1990. I use the information in 1911 to calculate distance of each county to its closest port. The average distance from a county to a port is 150 kilometers (see Table 2.2).

2.4.5 Grain Prices

Grain prices were likely to affect conflicts. When bad weather took place, high grain prices often caused grain crises and collective actions by local residents. As a result, I control for prefecture-level grain prices in the analysis. The grain price series are monthly reports from the prefecture-level government to the central government. This information is collected by Yeh-Ching Wang. Wang started this project in 1977. He

Figure 2.4: Potential yields for cotton production

Source: Global Agro-Ecological Zone database, Food and Agricultural Organization)

collected and digitized original sources from the First Historical Archives. The full datasets include nearly 40 types of grain, covering all prefectures of China, yet for most prefectures at a given year, only less than ten types of grain crops are reported. Among all the crops, rice and wheat were the major two crops reported in most regions; bean, corn, and kaoliang were sometimes reported, as well. As a result, I use the monthly grain prices for rice to capture the impact of grain prices on conflicts and use wheat to run a robustness check. Table 2.2 list the summary statistics of the average price of rice. The average price of rice is 2.60 *liang/cangshi*. The standard deviation is 0.27 *liang/cangshi*, suggesting a relatively stable rice price series in the examined period.

Table 2.2: Summary of Independent Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
Standardized Suitability for Tea	0.801	1	0	3.656	16490
Standardized Cotton	1.687	1	0	6.071	16500
Dist	150.04	116.285	0.723	1001.755	16500
Tea Export Price (<i>Haikwan</i> taels)	22.571	3.738	17.537	29.157	16500
Indian Tea Export Price (pounds)	5.625	1.131	4	7.25	16500
Cotton Export Price (<i>Haikwan</i> taels)	18.877	3.177	15.105	24.378	16500
Rice Price (<i>fen/cangshi</i>)	260.823	27.217	224.503	302.025	15360

2.5 Empirical Strategy

In the empirical analysis, I first examine how changes in international commodity prices affected the levels of local conflicts. The estimation equation is

$$y_{ikt} = \beta_0 + \sum \beta_j Price_{jt} \times Soil_{ikj} + \sum \gamma_j Price_{jt} \times Soil_{ikj} \times Dist_i + \sum \eta_j Price_{jt} \times Dist_{ij} + \mu_t GrainPrice_{kt} + \sigma_i + \epsilon_{ikt}, \quad (2.15)$$

for county i , prefecture k at time t , and $j = Cotton, Tea$. In this equation, y_{it} is the number of conflicts. I run several regressions for measure of several types of protests. *Cotton* and *Tea* stand for county-level soil and climate suitability for production, gathered from the FAO GAEZ data set. $Price_{jt}$ is the natural log of the export price of major agricultural commodities. $Dist_i$ is the distance from county i to its closest port. $GrainPrice_{kt}$ is prefecture-level grain prices. μ_t and σ_i control for time dummies and county fixed-effects. All standard errors are clustered at prefecture level.

The coefficient of the interaction terms $Price_{jt} \times Soil_{ikj}$ and $Price_{jt} \times Soil_{ikj} \times Dist_i$ are of interest. For protests to the government, I expect β_j for $Price_{jt} \times Soil_{ikj}$ will be negative, that is, lower price of export agriculture commodities are negative income shocks and will lead to more protests. The coefficient γ_j should be positive, because the effect of international commodity market is expected to be weaker because areas farther from the ports are less likely to be dependent on international trade.

For most of the population, the effect of price changes in tea and cotton should be similar. A higher price of tea or cotton means higher income. The only groups that might have been hurt by higher prices of tea or cotton are urban firm owners or urban residents. The price change in rice, on the contrary, is likely to negatively affect most of the groups except for rice producing farmers. As a result, I expect a higher price of tea or cotton, or a lower price of rice would reduce protests due to grain crises. Yet a higher price of tea or cotton, or a lower price of rice would probably increase protests led by revolutionaries.

The identification comes from variations across times within counties with suitability for that type of production. There are no problems with endogeneity of these prices if the county's share of international products is small and thus world prices were not likely driven by the counties' activities. By using potential production conditions, I also eliminate endogeneity concerns raised from the choice of crops in response to international market conditions. I also control for national shocks using year fixed effects and county-level time-invariant characteristics using county fixed effects. However,

Figure 2.5: Total Number of Conflicts

Source: see text)

part of the concerns remained if local conflicts in major agricultural regions would directly affect national prices. Though this is practically unlikely given the large areas of producing regions, I address this concern by using Indian tea prices in the 2SLS analysis.

2.6 Results

The total number of conflicts, protests, and revolutions are plotted on Figures 2.5 and 2.6. The total number of conflicts was quite flat before 1905, when about 70 counties experienced local conflicts. It increased dramatically in 1906 to more than 150 counties, then decreased again to 80 counties in 1908. In 1910, the total number of conflicts reached another peak, with more than 200 counties experienced local conflicts. The number dropped to 110 in the first ten months of 1911.

When separately plotting the trend for grain crises and revolutionary actions, the total number of grain crises has a similar trend as the total number of conflicts. It suggests that other types of conflicts are probably also affected by living crises. The total number of revolutionary actions is smaller and reaches peaks at 1906 and 1910.

Figures 2.7 and 2.8 plot conflicts together with price series of international commodities. Surprisingly, grain crises moves in the opposite direction of the international

Figure 2.6: Number of Food Crises and Revolts

Source: see text)

price of rice. A possible explanation is that both trends might have been affected by common shocks. In addition, world rice prices are more likely to affect coastal conflicts because inland farmers might have consumed rice that they produced locally. Revolutionary activities seem not to have been correlated with the price of black tea, yet they are also negatively correlated with the price of rice. An empirical analysis that teases out the impact of local characteristics and national trends is necessary.

Table 3.7 reports regression results from fixed-effects model. The baseline regression shows how international price changes affected the levels of all conflicts from 1902 to

Figure 2.7: Food Crises and Commodity Prices

Source: see text

Figure 2.8: Revolts and Commodity Prices

Source: see text

1911 in China. The impact is clearly bigger for counties close to ports. In almost all specifications, the coefficient $Tea \times TeaPrice$ is negative and statistically significant, suggesting that higher tea price decreased conflicts more effectively in tea producing areas. In specification 4, the coefficient of -0.0716 for tea price interacted with tea soil suggests that right next to the ports, a lower tea price leads to more conflicts in regions one standard deviation more suitable for tea production. The coefficient 0.000433 suggests that this effect is fading away as a county is moving away from the port. As distance increased by 100 kilometers, the effect was decreased by 0.0433. As a result, for counties 165 kilometers from ports, the negative effect would be fully canceled. The coefficients of $Tea \times TeaPrice$ is 0.000833, suggesting that the effect faded away for areas not suitable for tea production. TAs distance between counties and ports increased by 100 kilometers, a high price of tea decreased the frequency of protests in these counties by -0.0833.

The total effect of cotton trade is not statistically different from zero. It may due to the minor role cotton played in international trade. In addition, the positive coefficient of the rice prices 0.00143 suggest that, as the rice price increased by one standard deviation, the frequency of conflicts increased by 0.03861. I also use wheat price in replace of rice price. The results are almost identical.

I then separate conflicts by their types of leaders and their stated reason, aiming to clearly identify results led by revolutionaries from the protests requesting government's attention. With the leader information, I can observe whether this is an incident led by a revolutionary or an ordinary farmer. In some cases, however, revolutionaries might have taken advantage of people's dissatisfaction with government and participated in protests anonymously as well. If protesters were deeply dissatisfied with the government, revolutionaries might have used this opportunity to advocate their own messages

Table 2.3: The Impact of Commodity Prices on Conflicts

VARIABLES	(1) Total Conflict	(2) Total Conflict	(3) Total Conflict	(4) Total Conflict
Tea×TeaPrice	0.000157 (0.0151)	-0.0590** (0.0298)	-0.0711** (0.0299)	-0.0716** (0.0324)
Tea×TeaPrice×Dist		0.000362** (0.000176)	0.000409** (0.000173)	0.000433** (0.000181)
TeaPrice×Dist		-0.000633*** (0.000186)	-0.00101*** (0.000249)	-0.000833*** (0.000243)
Cotton×CottonPrice			-0.0335 (0.0300)	-0.0349 (0.0309)
Cotton×CottonPrice×Dist			-0.0000663 (0.000106)	-0.0000681 (0.000108)
CottonPrice×Dist			0.000434** (0.000212)	0.000285 (0.000204)
grainprice(rice)				0.00143*** (0.000489)
Constant	0.0395 (0.0337)	0.359*** (0.106)	0.559*** (0.199)	0.236** (0.116)
Observations	16,310	16,310	16,310	15,190
R-squared	0.017	0.019	0.021	0.018
Number of Counties	1,631	1,631	1,631	1,519
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

and encourage participants to overthrow the government. If this is the case, identifying revolutions by their leader would give me a lower bound of the number of revolutions.

Then I use the reason information to capture the lowest bound of the number of protests. This variable provides direct causes of each conflict. The most common causes for protests were dissatisfaction with government policies or food crises. While revolutionaries might have participated in the first type of protest and advocated their message, they were unlikely to join the second one where participants demanded food rather than political changes. In this way, conflicts due to food crises can be viewed as a clear set of protests.

Table 2.4 reports the impact on conflicts by merchants and farmers. Since revolutionary activities at the end of the Qing dynasty were led by intellectuals or secret groups, conflicts by merchants and farmers were more likely to have been due to economics reasons and related to changes in international commodity markets. The results are consistent with previous predictions. Specification 1 and 2 display the results for merchants. The coefficients are not statistically significant but have the expected signs. This lack of statistical significance may have been due to the fact that there were not many protests led by merchants. The results suggest that a higher tea price lowered the frequency of protests by merchants more in coastal tea producing regions, but the effect gradually decreased for inland tea producing counties.

In specifications 3 and 4, the coefficients have the same signs as in specification 1 and 2, but become statistically significant and much larger. This is consistent with the fact that farmers were one of the main groups that started protests. They were also likely to be affected by changes in commodity prices. The coefficient -0.0889 in specification 4 suggests that one unit increase in the export price of tea decreased farmer protests in coastal tea producing regions by -0.0889 more than other coastal counties. In addition, the coefficient of the $Tea \times TeaPrice \times Dist$ is 0.000328, indicating that the effect would be completely wiped out when distance to port increased to 270 kilometers.

Table 2.5 examines the impact on revolutionary actions. I consider the groups that were likely to be leaders in revolutions, that is, the revolutionaries and the gentry. Soldiers are incorporated because they also participated in revolutions periodically, but most of their conflicts were in fact not related to revolutions. Because revolts were more costly than protests to the government, the effect of trade changes on protests could be positive or negative.

In specifications (2) and (6), the coefficients of $Tea \times TeaPrice$ become positive, suggesting that a higher price of tea tended to increase revolutionary activities, although the effect is not statistically significant. In addition, the coefficients of $Cotton \times CottonPrice$ is also become positive and statistically significant. When the

Table 2.4: The Impact of Commodity Prices on Conflicts (by Merchants and Farmers)

VARIABLES	(1) Merchant	(2) Merchant	(3) Farmer	(4) Farmer
Tea×TeaPrice	-0.0211 (0.0131)	-0.0214 (0.0138)	-0.0780*** (0.0247)	-0.0889*** (0.0253)
Tea×TeaPrice×Dist	0.000104 (0.0000693)	0.0000885 (0.0000728)	0.000291** (0.000133)	0.000328** (0.000131)
TeaPrice×Dist	-0.0000318 (0.0000644)	-0.0000699 (0.0000714)	-0.000611*** (0.000179)	-0.000752*** (0.000194)
Cotton×CottonPrice		-0.0305*** (0.00969)		-0.0338 (0.0307)
Cotton×CottonPrice×Dist		0.000119*** (0.0000412)		-0.0000234 (0.000106)
CottonPrice×Dist		-0.0000943 (0.0000650)		0.0000967 (0.000166)
grainprice(rice)	0.000107 (0.000120)	0.000335** (0.000160)	0.00123*** (0.000313)	0.00163*** (0.000479)
Constant	0.0220 (0.0195)	0.101** (0.0390)	0.115** (0.0460)	0.241** (0.116)
Observations	15,190	15,190	15,190	15,190
R-squared	0.001	0.002	0.025	0.027
Number of Counties	1,519	1,519	1,519	1,519
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level.
The dependent variable is the frequency of conflict in each county. Tea and cotton are
standardized measures of soil suitability. Distance is in kilometers.

price of cotton increased, cotton producing coastal regions would experience 0.00273 and 0.0184 more revolutionary activities by gentry and revolutionaries. The results suggest that a higher agricultural price were associated with more revolutionary activities, and the effect faded away for counties far from ports. The impact of tea and cotton prices on conflicts led by soldier were much smaller and not statistically significant from zero.

These results suggest that, while farmers responded timely to negative income shocks by starting protests, revolutionaries tended not to follow this pattern. They even started more revolts during positive income shocks rather than negative ones. This is not likely due to the possibility that revolutionaries had higher income. A higher household income may explain why these people were less responsive to income shocks than farmers, but cannot explain why they started more conflicts when facing positive income shocks. I contribute this result to the “income effect” hypothesis.

Table 2.6 reports the impact of income shocks on food crises and other types of conflicts that targeted government policies. The coefficient of $tea \times Price$ is -0.0464 and is statistically significant for food crises, indicating that an one unit increase in tea price decreased the frequency of protests due to food crises in coastal tea producing regions by 0.0464 more than in inland areas. The coefficient of the $Tea \times TeaPrice \times Dist$ term is 0.000153 and statistically significant, suggesting that the impact gradually decreased as distance from counties to ports increased among the tea producing regions. The effect would be fully canceled out when the distance to port is 303 kilometers. The coefficient related to cotton prices close to zero and not statistically significant.

Since China was a big exporter of tea, the international price of tea was likely to be driven by local economic conditions. I re-run all regressions by using Indian wholesale prices of tea to instrument for Chinese tea prices. The regression results are shown in Tables 2.7 to 2.10. The results stay similar.

2.7 Conclusion

This paper studies two major types of conflicts in Chinese history in the last years of the Qing dynasty: protests and revolutions. Protesters’ goal was to request government’s actions. Revolutionaries, on the contrary, were dissatisfied with the current government and aimed to overthrow it. Using a theoretical framework, I argue that these two types of conflicts potentially led to differences in investment decisions and responses to income shocks.

I focus on the last ten years of the Qing dynasty when both of the two types of conflicts were frequently observed. I use changes in international commodity prices

Table 2.5: The Impact of Commodity Prices on Conflicts (by Gentry, Soldier, and Revolutionaries)

VARIABLES	(1) Gentry	(2) Gentry	(3) Military	(4) Military	(5) Revolutionary	(6) Revolutionary
Tea×TeaPrice	0.00358 (0.00294)	0.00341 (0.00255)	-0.00325 (0.00459)	-0.00334 (0.00471)	0.00612 (0.00551)	0.00533 (0.00565)
Tea×TeaPrice×Dist	0.0000105 (0.00000714)	0.0000129 (0.00000845)	0.0000104 (0.0000325)	0.00000900 (0.0000328)	-0.00000166 (0.0000382)	0.0000126 (0.0000386)
TeaPrice×Dist	-0.0000142 (0.0000128)	-0.0000140 (0.0000251)	-0.0000211 (0.0000188)	-0.0000428* (0.0000231)	-0.00000729 (0.0000396)	-0.000103* (0.0000526)
Cotton×CottonPrice		0.00273* (0.00161)		-0.00335 (0.00374)		0.0184** (0.00868)
Cotton×CottonPrice×Dist		-0.0000137 (0.00000843)		0.0000123 (0.0000125)		-0.0000867** (0.0000363)
CottonPrice×Dist		0.0000139 (0.0000225)		0.0000124 (0.0000247)		0.000216*** (0.0000596)
grainprice (rice)	-0.000103 (0.0000749)	-0.000121* (0.0000701)	0.0000321 (0.0000390)	0.0000593 (0.0000594)	-0.0000146 (0.0000668)	-0.000129 (0.0000861)
Constant	0.0261 (0.0158)	0.0195 (0.0170)	0.00765 (0.00529)	0.0142 (0.0155)	-0.00364 (0.0114)	-0.0627** (0.0262)
Observations	15,190	15,190	15,190	15,190	15,190	15,190
R-squared	0.005	0.005	0.003	0.003	0.004	0.005
Number of Counties	1,519	1,519	1,519	1,519	1,519	1,519
County FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

Table 2.6: The Impact of Trade on Types of Conflicts (Separated by Reason)

VARIABLES	(1) Against Gov Policy	(2) Against Gov Policy	(3) Food Crises	(4) Food Crises
Tea×TeaPrice	-0.0144 (0.0187)	-0.0182 (0.0196)	-0.0463*** (0.0130)	-0.0464*** (0.0138)
Tea×TeaPrice×Dist	0.000182* (0.000109)	0.000180 (0.000113)	0.000145*** (0.0000556)	0.000153*** (0.0000577)
TeaPrice×Dist	-0.0000734 (0.0000852)	-0.000116 (0.000125)	-0.000324*** (0.0000865)	-0.000409*** (0.000102)
Cotton×CottonPrice		-0.0381** (0.0186)		0.0129 (0.0156)
Cotton×CottonPrice×Dist		0.0000984 (0.0000721)		-0.0000547 (0.0000536)
CottonPrice×Dist		-0.0000991 (0.000132)		0.000171* (0.0000929)
grainprice (rice)	-0.0000392 (0.000161)	0.000291 (0.000251)	0.000703*** (0.000179)	0.000619** (0.000247)
Constant	0.0527 (0.0328)	0.169** (0.0746)	0.0581*** (0.0217)	0.0125 (0.0485)
Observations	15,190	15,190	15,190	15,190
R-squared	0.001	0.002	0.019	0.019
Number of Counties	1,519	1,519	1,519	1,519
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

Table 2.7: The Impact of Commodity Prices on Conflicts (IV Results)

VARIABLES	(1) Total Conflict (OLS)	(2) Total Conflict (OLS)	(3) Total Conflict (IV)	(4) Total Conflict (IV)
Tea×TeaPrice	-0.0574* (0.0320)	-0.0716** (0.0324)	-0.0243 (0.0411)	-0.0400 (0.0422)
Tea×TeaPrice×Dist	0.000379** (0.000184)	0.000433** (0.000181)	0.000181 (0.000249)	0.000240 (0.000249)
TeaPrice×Dist	-0.000559*** (0.000192)	-0.000833*** (0.000243)	-0.000364* (0.000188)	-0.000498 (0.000335)
Cotton×CottonPrice		-0.0349 (0.0309)		-0.0343 (0.0307)
Cotton×CottonPrice×Dist		-0.0000681 (0.000108)		-0.0000585 (0.000106)
CottonPrice×Dist		0.000285 (0.000204)		0.0000770 (0.000296)
grainprice (rice)	0.000959*** (0.000339)	0.00143*** (0.000489)	0.000704** (0.000342)	0.00117*** (0.000498)
Constant	0.109** (0.0540)	0.236** (0.116)		
Observations	15,190	15,190	15,190	15,190
R-squared	0.017	0.018	0.016	0.018
Number of Counties	1,519	1,519	1,519	1,519
Cragg-Donald Wald F stat		4997.475		1104.340
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

Table 2.8: The Impact of Commodity Prices on Conflicts (by Merchant and Farmers, IV Results)

VARIABLES	(1) Merchant (OLS)	(2) Merchant (FE)	(3) Farmer (OLS)	(4) Farmer (FE)
Tea×TeaPrice	-0.0214 (0.0138)	-0.00999 (0.0201)	-0.0889*** (0.0253)	-0.0747*** (0.0276)
Tea×TeaPrice×Dist	0.0000885 (0.0000728)	-0.00000469 (0.0000931)	0.000328** (0.000131)	0.000224 (0.000164)
TeaPrice×Dist	-0.0000699 (0.0000714)	-0.000225 (0.000189)	-0.000752*** (0.000194)	-0.000535** (0.000232)
Cotton×CottonPrice	-0.0305*** (0.00969)	-0.0311*** (0.00987)	-0.0338 (0.0307)	-0.0341 (0.0306)
Cotton×CottonPrice×Dist	0.000119*** (0.0000412)	0.000125*** (0.0000410)	-0.0000234 (0.000106)	-0.0000171 (0.000106)
CottonPrice×Dist	-0.0000943 (0.0650)	0.0000407 (0.000124)	0.0000966 (0.000166)	-0.0000508 (0.000230)
grainprice (rice)	0.000335** (0.000160)	0.000385* (0.000234)	0.00163*** (0.000479)	0.00150*** (0.000464)
Constant	0.101** (0.0390)		0.241** (0.116)	
Observations	15,190	15,190	15,190	15,190
R-squared	0.002	0.002	0.027	0.026
Number of Counties	1,519	1,519	1,519	1,519
Cragg-Donald Wald F stat		1104.340		1104.340
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

Table 2.9: The Impact of Commodity Prices on Conflicts (by Gentry, Soldiers, and Revolutionaries, IV Results)

VARIABLES	(1) Gentry (OLS)	(2) Gentry (FE)	(3) Military (OLS)	(4) Military (FE)	(5) Revolutionary (OLS)	(6) Revolutionary (FE)
Tea×TeaPrice	0.00341 (0.00255)	0.00325 (0.00286)	-0.00334 (0.00471)	0.000141 (0.00694)	0.00533 (0.00565)	0.0157 (0.0118)
Tea×TeaPrice×Dist	0.0000129 (0.00000845)	0.0000209* (0.0000109)	0.00000900 (0.0000328)	-0.0000105 (0.0000374)	0.0000126 (0.0000386)	-0.0000326 (0.0000702)
TeaPrice×Dist	-0.00000140 (0.0000251)	-0.00000356 (0.0000392)	-0.00000428* (0.0000231)	-0.00000462 (0.0000454)	-0.0000103* (0.0000526)	-0.00000716 (0.000111)
Cotton×CottonPrice	0.00273* (0.00161)	0.00298* (0.00175)	-0.00335 (0.00374)	-0.00321 (0.00379)	0.0184** (0.00868)	0.0193** (0.00912)
Cotton×CottonPrice×Dist	-0.00000137 (0.00000843)	-0.00000145* (0.00000846)	0.0000123 (0.0000125)	0.0000132 (0.0000128)	-0.00000867** (0.0000363)	-0.00000856** (0.0000370)
CottonPrice×Dist	0.0000139 (0.0000225)	0.0000316 (0.0000333)	0.0000124 (0.0000247)	0.0000211 (0.0000362)	0.000216*** (0.0000596)	0.000212*** (0.0000874)
grainprice (rice)	-0.000121* (0.0000701)	-0.000116* (0.0000678)	0.0000593 (0.0000594)	0.0000475 (0.0000736)	-0.000129 (0.0000861)	-0.000194 (0.000136)
Constant	0.0195 (0.0170)		0.0142 (0.0155)		-0.0627** (0.0262)	
Observations	15,190	15,190	15,190	15,190	15,190	15,190
R-squared	0.005	0.005	0.003	0.003	0.005	0.005
Number of Counties	1,519	1,519	1,519	1,519	1,519	1,519
Cragg-Donald Wald F stat		1104.340		1104.340		1104.340
County FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

Table 2.10: The Impact of Commodity Prices on Conflicts (Separated by Reason, IV Results)

VARIABLES	(1) Against Gov Policy (OLS)	(2) Against Gov Policy (FE)	(3) Food Crises (OLS)	(4) Food Crises (FE)
Tea×TeaPrice	-0.0182 (0.0196)	0.0110 (0.0247)	-0.0464*** (0.0138)	-0.0355** (0.0138)
Tea×TeaPrice×Dist	0.000180 (0.000113)	0.0000245 (0.000123)	0.000153*** (0.0000577)	0.000123** (0.0000567)
TeaPrice×Dist	-0.000116 (0.000125)	0.000270 (0.000239)	-0.000409*** (0.000102)	-0.000371*** (0.000116)
Cotton×CottonPrice	-0.0381** (0.0000186)	-0.0367* (0.0000191)	0.0129 (0.0000156)	0.0144 (0.0000156)
Cotton×CottonPrice×Dist	0.0000984 (0.0000721)	0.000105 (0.0000727)	-0.0000547 (0.0000536)	-0.0000556 (0.0000534)
CottonPrice×Dis	-0.0000991 (0.000132)	-0.000346* (0.000205)	0.000171* (0.0000929)	0.000167 (0.000111)
grainprice(rice)	0.000291 (0.000251)	-0.0000000579 (0.000303)	0.000619** (0.000247)	0.000534** (0.000242)
Constant	0.169** (0.0746)		0.0125 (0.0485)	
Observations	15,190	15,190	15,190	15,190
R-squared	0.002	0.001	0.019	0.019
Number of Counties	1,519	1,519	1,519	1,519
Cragg-Donald Wald F stat		1104.340		1104.340
County FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at prefecture level. The dependent variable is the frequency of conflict in each county. Tea and cotton are standardized measures of soil suitability. Distance is in kilometers.

as income shocks to identify income shocks. To measure the intensity of treatment, I control for access to trade and local production conditions. I find that a positive income shocks tended to decrease protests, which is consistent with previous literature. However, the same shock decreased or had no effect on revolts or revolutions. This result is robust after I use Indian tea to instrument for China's tea price.

This paper provides new quantitative evidence about the impact of income on conflicts. The results suggest that increased income may also provide more resources for revolutionaries and thus would increase the number of conflicts. This work could be improved in the future with detailed records about revolutionaries' funds. With this information, I would be able to explore their funding source, income, and expenditures using micro data.

Chapter 3

Political Groups and the Impact of Civil Wars on Local Economy in Early Twentieth-Century China

3.1 Introduction

Civil wars are destructive. They destroy goods and infrastructure and take resources from producing consumption goods. In most cases, civil wars often lead to a large and negative impact on the economy (e.g., Blattman and Migule, 2010)

The early-twentieth century was one of the most chaotic periods in Chinese history. From 1911 to 1934, more than sixty civil wars took place within the country. Warlords divided the country into pieces and fought for larger territories. Hundreds of people and soldiers died or were wounded. Meanwhile, despite the constant political violence, the Chinese economy was booming. According to Rawski (1989), the GDP per capita increased by 1.8-2.0%. China's international trade grew by 90% from 1911 to 1936 (Hsiao, 1974). Closer examination and new quantitative evidence are needed to reconcile these two seemingly opposite facts.

In this paper, I provide the first quantitative evidence of the scale and the local impact of civil wars from 1911 to 1934. Combining records of battles from multiple sources, I digitize the county-level location of major battles in 59 civil wars from 1911 to 1934 in China proper. Within the 1699 counties in my sample, 424, or 25% of the counties experienced a battle. From 1912 to 1925, most fights were at the regional level. The number of the counties that experienced wars increased after major military actions between the Kuomintang and the Warlords in 1926.

This newly digitized information also allows me to examine the impact of civil wars on economic activities. Using panel data technics and port-level trade flows from China Maritime Customs as the outcome variable, I find that civil wars had negative but not statistically significant impact on international trade flows. The coefficient suggests a two million *Haikwan* taels drop in international trade in counties nearby, which is about 4.8% of the average trade values. However, further investigations disentangling total fights by fighting pairs show that not all of the civil wars equally affected trade flows. Within the five fighting pairs (North-North, North-South, North-Kuomintang, South-Kuomintang, Kuomintang-CCP), only the battles involving weak opposition, the Southern Warlords and the CCP, had a negative impact on international trade flows. The effect is about 1.7% to 3.8% drop in the yearly average trade values.

I attribute the difference to the power of each political group. Stronger incumbents had access to customs revenue and were able to protect the trade flows during the fights. They could then use the customs revenue to finance the war. In contrast, weak opposition could not rely on income from customs revenue. The institutional details support this hypothesis. First, the customs revenue was one of the most reliable funds during the examined period. Government and warlords used this revenue as collateral for issuing government bonds. Second, managed by British officials, the customs were relatively independent from local controls. The customs officials turned over revenue to the central government.

To test this hypothesis, I use the event that the Kuomintang took over the central government in 1927 and examine changes in the impact of wars involving these two groups. The results show that wars involving the Northern Warlords had positive and statistically significant impact on international trade flows before 1927, but the effect turned negative after the Kuomintang became powerful and controlled the central government. Similarly, I observe the impact of wars involving the Kuomintang changed from negative to positive.

I also examine the impact on local labor wages and land values in rural areas, using a survey compiled by John Buck (1937). This survey provides labor wages and land values, covering around 100 counties from 1901 through 1933. Civil wars were likely to lower local land values by reducing crops. Meanwhile, Northern Warlords relied on local land taxes, while other political groups, especially the CCP, relied on income from other sources. Given this situation, I should observe that wars involving by the Northern Warlords were less harmful. The regression results suggest that wars conducted by Northern Warlords had no impact on land values, while the ones by Kuomintang, Southern Warlords, and the CCP reduced local land values from 10% to 30%.

The timing of the civil wars were largely exogenous because most of them were due to political disputes and unlikely to be correlated with fluctuations in international trade flows from the period. I also control for national shocks that might have affected both civil wars and international trade, such as the May Fourth Movement. To take into account concerns about endogeneity in the location of battles, I plan to construct an instrumental variable that use the border counties of each political group’s territory as hypothetical fighting regions. In this way, I exclude the possible impact of trade flows on the location of battles.

There is a large literature about the economics of wars. For example, for wars in the twentieth century, Broadberry and Harrison (2005) examine the outcome and long-term impact of World War I. Fishback and Jaworski (2014) review the US economics performance and World War II. For domestic warfare, Ransom (2001) provides a comprehensive discussion about the costs of the civil war and whether it was a “Second American Revolution”. As major events in human history, most of the wars studied were deadly. They were costly to mobilize and led to substantial damages to the participated country. Although China experienced major warfare for the first half of the early twentieth century, few studies in economic history has focused on the real cost of these wars. Among the whole period, the warlord era and warfare before the World War II received the least attention. This paper focuses on this period. Different from civil wars in other period in China or in other country, the wars I study were relatively small-scale but took place more frequently. There were also multiple political groups. This feature not only allows me to assess the economic impact of the civil wars, but also to compare the effect of war across different political groups.

3.2 Background

China’s history involved extensive civil wars between different political groups 1912 and 1936. I study the fights between different political groups, including Northern (“Beiyang”) Warlords, Southern Warlords, other smaller warlords, the Kuomintang, and the Chinese Communist Party from 1912 to 1936. In most years, there were more than one political authority and several political parties in China. Political groups occupied one or several provinces, collecting most tax revenue, and investing for military or local construction. The central government and its corresponding officials existed in name only. Local rulers at times did not accept orders from the central government. In fact, after 1916, the presidents changed periodically and usually was determined by who took over the capital city. These political parties or local rulers fought to control

more regions to extract resources. The long-term goal was to take over the central government in Beijing and later unite the nation (Ch'i, 1976).

China was divided into several regions in history as well. When a long-lasting dynasty collapsed, it usually lacked a strong new leader to unite the nation. Instead, the country was divided into several groups and each group occupied a certain area (e.g., East Zhou dynasty in 770 BC-255 BC, Three Kingdoms period, 220-280 AD, Northern and Southern dynasties, 420-589 AD, Five Dynasties and Ten Kingdoms period, 907-979 AD). As a result, the chaotic period after the Qing dynasty was not unprecedented. However, the influence of western culture and ideology affected the background of warlords and their armies in the early twentieth century. For example, for most of the period there were no emperors. Most warlords supported the republic rather than the monarchy. Besides the land tax, revenue from international trade and local trade also served as an important source of income.

Warlords stepped into the foundation of the Republic of China from the very beginning. Although Sun Yat-sen and his Chinese United League ("Tongmenghui", later Kuomintang) were early advocates of democracy and revolution played a major role in starting revolutions, the forces that started the Wuchang uprising in Oct 10, 1911 were the "New Armies", which were the warlords corps. After the revolution succeeded, the revolutionaries lacked the military power to rule the country and had to give the presidency of the ROC to Yuan Shikai, who was the most powerful general in the Qing dynasty and the leader of the Northern ("Beiyang") Warlords. Mr. Yuan then persuaded the emperor's family to abdicate and ended the Qing dynasty. Sun Yat-sen and his Kuomintang (KMT) members were driven from the decision making process. After his presidency, however, Mr. Yuan gradually showed his ambition to be dictator. His betrayal of the Republic created tensions between the KMT and Yuan's supporters (the "Beiyang Warlords" or the "Northern Warlords"). The KMT's supporters (the "Southern Warlords") started two civil wars (the "Second Revolution" in 1913 and the "National Protection War" in 1916), and later founded another government in Guangzhou. Yuan's army was defeated in the second one and he died in 1916.

After Yuan's death, the country was controlled by three groups: Yuan's allies (the "Northern Warlords"), the KMT's allies or "Southern Warlords", and other small warlords. Within each group, there were also subgroups that also fought with each other. None of these groups were strong enough to unite the whole country. Before 1925, the KMT was constantly defeated by the Northern Warlords, and they sometimes lost to the Southern Warlords. After training its own armies, the KMT soon united its base provinces and started the Northern Expedition in 1926. The government from the south took over and united the nation in name. However, since most of the Northern

provinces were still under the warlords' control, the KMT later fought with warlords from 1928 to 1931. Meanwhile, the KMT was also fighting with the CCP, a young party that was also aimed to control the country.

The *History of Military in the Republic of China* shows that there were more than sixty major civil wars from 1912 to 1934. Most of the wars were regional.

3.2.1 Warlords and the KMT

Warlords originated from the Qing government's constant efforts to train modern corps and nurture modern officers for the army. Since 1840, the constant defeat by foreign armies caused the Qing government to train modern armies under the western system. In 1885, the then most powerful minister Li Hongzhang, who had been making efforts to introduce western knowledge and institutions to China, founded the Tianjin Military School (Tianjin Wubei Xuetang).¹ This military school followed the German system to train military officers. The majority of the Northern Warlords later received education there. Many other warlords or military officials were trained in other similar schools.

The corps themselves, the "New Armies", were the result of the Qing government's last efforts to modernize the military. Built in the 1894, the New Armies were trained under the German system. Soldiers were strictly selected with clear restrictions about their age, height, and education levels. In 1907, the Qing government set a plan to train thirty-six *zhens* of the "New Armies". Even *Zhen* was a unit with each of it had 12,521 soldiers. In 1911, fourteen *zhens* were finished. Yuan Shikai, as the most powerful minister in the Qing after 1901, controlled six *zhens* of armies with the best equipment in and around the capital in North China.

The fact that both military officers and soldiers received a modern education largely benefited the Republican Revolution. From 1894 to 1911, nearly 200 political parties were organized by intellectuals who aimed to overthrow the monarchy and build a new republic. Among all these groups, Sun Yat-sen was one of the most active leaders. He founded the first such political group, the *Xingzhonghui* (the Revive China Society) in 1895 in Honolulu. It later became the *Tongmenghui* (the Chinese United League) and the Kuomintang. Before the Xinhai Revolution and Wuchang uprising in 1911, the revolutionaries had already started a series of uprisings from 1895 to 1910, yet all of these uprisings failed due to lack of military power. The revolutionaries then effectively advocated their ideology to the young and educated soldiers. The idea of revolution was soon spread among the New Armies in the south. Some warlords, especially the ones

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¹Li Hongzhang was the Vicery of Zhili (the capital province) and Minister of Beiyang (foreign issues in northern China) in 1885.

around Guangdong, Sun Yat-sen's home town, were even revolutionaries and supporters of Sun Yat-sen themselves. The successful Wuchang uprising in Oct 10, 1911, the prelude of the later Xinhai Revolution that finally overthrew the monarchy, was started by soldiers in the New Armies. Many southern military officers also supported this revolution after the fights in Wuchang and pushed the revolution to become nationwide. This was the result of the revolutionaries' efforts to incorporate soldiers as in their political parties.

When the Qing military failed to suppress the uprisings, the Qing government asked Yuan Shikai, the leader of Northern New Armies (Now the Beiyang Armies), for help. Controlling the well-equipped New Armies in the north, his attitude was a key determinant in the Revolution. The Emperor's family and the revolutionaries acknowledged this fact. Mr. Yuan used his power to gain large benefits. He promised to help the revolutionaries and southern warlords to build the republic under the conditions that he become the president. With the revolutionaries' consensus, he then persuaded the Qing family to abdicate. He took over the control of the ROC and established Beijing, where he was fully in control, as his capital. Mr. Yuan controlled most of the northern provinces while the southern provinces were still in hands of the revolutionaries or warlords who support revolutionaries.

The difference between Northern and Southern warlords was clear. The Northern Warlords were close supporters of Yuan, stationed around the capital. While the southern ones were around Guangdong and supported Sun Yat-sen.²

Despite his promises to the revolutionaries, Yuan's actions soon demonstrated that he was interested in holding the power himself rather than building a republic. Despite opposition from many revolutionaries, the Constitution was revised to support Yuan's dictatorship. In 1913 one of the leaders of the KMT, Song Jiaoren, was assassinated. Sun Yat-sen was irritated by Yuan's behavior. He and his followers started several uprisings, the "Second Revolution" in 1913 and the "National Protection War" in 1916, but both failed even before becoming national.

After he defeated the revolutionaries several times, Yuan's ambition was inflated. His goal was to be the king of this country even after he already had revised the constitution to enable him to be a *de facto* dictator. In 1916, he proclaimed himself to be Emperor of China. This time, however, even many of his supporters did not agree with him. Figure 3.1 presents the counties involved in military actions against Yuan in 1916. Yuan recalled his plan as the Emperor and died due to uremia.

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²The south and north warlords were not strictly geographic locations. North includes: Three provinces in Northwestern China, Zhili, Henan, Shandong, Jiangsu, Zhejiang, Anhui, part of Shanxi, part of Hubei, Part

Figure 3.1: Counties Involved in Civil Wars in 1916

Source: see text

Yuan's death not only left the country with a power vacuum that the Northern Warlords, KMT and Southern Warlords, and other small warlords tried to fill, but it also divided the Northern Warlords group as well. There were also at least three or four major leaders. Each leader ruled different regions but was not strong enough to fully take Yuan's place. All of these warlords were interested in ruling the whole nation. Between 1916 and 1928, seventeen civil wars were fought between the Northern Warlords and other small warlords, while another seven matched the Northern Warlords and the KMT (or KMT's allies).

While warlords in the north were fighting with each other, revolutionaries in the south aimed at regaining control over the country. Their efforts before 1916 were easily defeated by Yuan. In 1916, they defeated part of Yuan's army, yet still failed to claim control over the central government. In 1917, Sun Yat-sen established a self-proclaimed military government in Guangzhou and was elected Grand Marshal. He mostly relied on the Southern Warlords, who sometimes did not fully follow his orders. In 1922, Sun had a major dispute with one of his important allies, Chen Jiongming. A series of similar incidents motivated Sun to build his own army.

In 1924, Sun Yat-sen found the Huangpu Military School, which became the birthplace of many senior generals of the KMT. He also restructured the KMT followed the Communist Party of the Soviet Union, aiming to enhance controls over the KMT members (Wang, 2003).

In 1925, Sun Yat-sen and Chiang Kai-shek started the Eastern Expedition. They defeated Southern Warlords and united provinces around Guangdong. On May 1926, after Sun's death, the KMT started the Northern Expedition. This time, the newly trained troops defeated major groups in the Northern Warlords along the Yangzi River. By 1927, the KMT controlled most provinces in the south of the Yangzi River, including the prosperous Yangzi delta. They gained support from Northern Warlords. In 1928, the country was nominally united by the KMT and the newly selected president Chiang Kai-shek. The capital was moved to Nanjing, a city then controlled by the KMT. Figure 3.2 displays the counties involved in civil wars during this period. The counties involved in war display how the KMT gradually controlled more counties. The fighting counties start in the base provinces of the KMT in the southern part of China and gradually extend to the Yangzi delta. It is also clear from the map that most of the Northern counties did not experience major fights and were still under the warlords' control.

To further consolidate his leading position, Chiang Kai-shek started several battles against the original warlords and other potential leaders in the KMT from 1928 to 1931.

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of Jiangxi, and part of Fujian. South includes: Yunnan, Guizhou, Guangxi. Shanxi is an isolated province in the north, while Guangdong in the south has several groups of political powers (Chen, 1980)

Figure 3.2: Counties Involved in Civil Wars in 1926

Source: see text

Figure 3.3: Counties Involved in Civil Wars in 1930

Source: see text

In one of the largest fights, the “Central Plains War” in 1930 lasted for six months, involved with 1.3 million troops and caused 300,000 casualties. Figure 3.3 displays the areas involved in fights in 1930. Most of the fights took place in the central areas of China.

3.2.2 The CCP

The CCP was first founded in 1921 in Shanghai. Following the Marxist theory and the Soviet Union’s model, they aimed at starting uprisings and labor strikes in major cities. In 1924, when Sun Yat-sen asked the Soviet Union Communist Party for help to restructure the KMT, the CCP was also treated as friends by the KMT, and the CCP members were allowed to join the KMT. They soon took key positions in several

important KMT's departments, and played an important role in training military and awakening people (Wang, 2003). Yet, until 1927, the CCP only controlled a limited number of troops in the KMT army.

In April 1927, however, with increasing concerns about the CCP overthrowing the KMT, Chiang Kai-shek began to purge the CCP members and violently suppressed CCP's activities, such as labor unrest and strikes (known as the "Shanghai massacre of 1927"). The CCP leaders ran from big cities, revolted, and started to train their own armies in several southern provinces, namely Guangdong, Fujian, Jiangxi, Hubei, and Hunan. They gradually built pieces of territories in rural areas in these provinces. From 1929 to 1934, the KMT led five "Encirclement Campaigns" into CCP's territories. Only the last one was successful. The CCP troops were forced to take the Long March in 1935.

3.2.3 Fighting Areas

Most of the civil wars were regional. Figure 3.4 presents the number of total years when each county was involved in wars. The darker areas experienced more fights from 1911 to 1934. The fighting areas are mostly clustered in the central part of China, the areas around Beijing (in the north), and the base provinces of the KMT. The counties occupied by the CCP after 1927 also experienced more fights than other counties.

Chen (2008) provides a reasoning for the distribution of the fighting areas. Warlords mostly fought in three types of regions. First, before 1927, Northern Warlords aimed to control the capital (Beijing), so they could gain control over the central government. As a result, there were fights around the capital (Beijing). Second, Northern Warlords also fought around the rich areas, such as central Yangzi river (Wuhan) and the Yangzi Delta, to acquire more resources. Similarly, Southern Warlords fought around the Pearl River Delta for the same reason. Third, if the Northern and Southern groups were strong enough to control the whole country, they had to fight in the central part of China, usually within Henan province and the mountainous areas close to the boundaries of their territory (Chen, 1980).³

The wars did not last for long either. As a nominally nationwide action, the Second Revolution in 1913 only took place in several cities in the southern provinces. In many cases the fights were along the rail line or around the borders of warlords' territory. The wars among warlords often lasted for less than two months. In an extreme case,

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³During the examined period, there are "over 400 battles took place in Sichuan" between the warlords there, aiming to get control over the whole province (Jiang, 2009). Due to the abnormal frequency of the fights and the concentration on location, I do not consider these fights in my analysis. I drop Sichuan later as a robustness check.

Figure 3.4: Frequency and Location of Counties Involved in Civil Wars

Source: see text

the first Zhili-Fengtian war only lasted for six days. If one side lost, the leader might resign or recede from part of his territory. But after a while, the resigned leader usually could easily gain support from his old troops and become powerful again.

However, as Chen (2008) and Ch'i (1987) have pointed out, the scale of the wars later increased, as warlords had more time and used more resources to train their own army. From 1916 to 1920, the warlords secretly built their armies and limited fighting took place. After 1920 when the military building was almost finished, the Northern Warlords started the first round of fights. During this period, fights between warlords were still local and short. Most fights lasted for less than two months. The wars ended not because resources were used up, but usually due to the betrayal of parts of the corps from one side. After 1924, due to the gradually increased inputs to the wars, the scale of the war increased. Fights also were longer and covered greater areas as warlords controlled more military power (Ch'i, 1976). For example, as one the first fights among the Northern Warlords, "the First Zhili-Fengtian War" in 1922 had about 240,000 soldiers involved. The war lasted for only six days. The defeated group, Fengtian Warlord led by Zhang Zuolin, did not lose control of most of military power. As a comparison, "the Second Zhili-Fengtian War" in 1924 had nearly 400,000 soldiers involved. This war in 1924 lasted around six weeks (Jiang, 2009). The defeated group, Zhili Warlord Wu Peifu, lost most of his troops.

Most of the fights among the warlords or between the warlords and the KMT aimed at occupying or defending a big city. The ones involved with CCP had different aims. Due to lack of military corps and resources, the CCP was incapable of occupying big cities. Instead, they had to hide in countryside where the government control was relatively weak. When fighting with the KMT, their aim was to reserve their current power. They enlarged their territory when the KMT armies retreated. As a result, the economic implications are also likely to be different.

3.2.4 Economic Factors

Intuitively, civil wars should have negative effects on local economic activities. In addition, sources of funds might have also affected warlords' incentives to fight and choices of the intensity of fighting.

Wars can be very costly. Warlords need funds to recruit and train soldiers. They also had to invest for new weapons. For example, Zhang Zuolin, the ruler of three provinces in Northeastern China, equipped his armies with imported weapons from Japan. Thus, warlords needed local resources to finance themselves.

The most reliable source of funds in the Republic was revenue from the Maritime Customs. Managed by the British officers, the Maritime Customs provided reliable funds every year. The revenues served as collateral for foreign loans and investments. However, only the controller of the central government had the right to use the funds. The British officers used an independent system to guarantee that funds would be received by the central government (Chen, 2002). As a result, local warlords mostly relied on land taxes, internal commercial tax, contribution from financial groups, or foreign support. Narratives also suggest that county-level government depended on income from commercial activities or international trade for local construction products (Bell, 1999). The KMT had similar funding structures as the local warlords, but depended more on financial groups in the Yangzi Delta after 1928.

The situation for the CCP, however, was very different. As a small party with limited territories, the CCP before 1927 was unable to charge local taxes. Instead, they relied on the Soviet Union Communist Party and member fees (Huang, 2011). After being suppressed by the KMT in 1927 the CCP's active locations shifted from urban to rural areas. During this time the CCP members had to start uprisings and organize troops themselves with limited communication between the central committee and local committees (Wang, 2008). Many of the local CCP committees then had no choice but to rely on local revenue. While confiscating wealth from rich farmers provided the main source of funds, the CCP members sometimes also robbed local farmers in Guangdong (Wang, 2008). After the CCP built the territory, their routine policy was to confiscate wealth from the rich and start land reform by redistributing lands. During 1933 and 1934, when the territory experienced financial difficulties due to the KMTs "Encirclement Campaigns", the CCP tended to enlarge the confiscated group that included not only the rich but the ordinary farmers as well. These actions by the CCP should have had greater negative impact on local rural economy and rural land values.

3.3 Data

3.3.1 Civil Wars

To document the civil wars, I digitize information mostly from descriptions in the *Military History in the Republic of China*. This book describes the time, location, parties involved and leaders in the army battles for major civil wars from 1911 to 1949. To address concerns that some battles may not be recorded in this description, I then compare this information with records from other sources, namely the *Historical Atlas*

in *China's Modern History* (Zhang, 1984) and the *Historical Atlas of China's New Democratic Revolutions* (Guo, 1993). In my current analysis, I only consider battles from the Xinhai Revolution in 1911 to the Fifth Encirclement Campaigns in 1934. I have not included the Long March from 1935 to 1936 and the wars after this period. There are 59 recorded civil wars in my current sample.

I then manually match county-level battle locations with county information from the China Historical Geographic Information System (CHGIS) and *Historical Atlas of China* (Tan, 1987). Among the 1699 counties recorded in the China proper areas in CHGIS, 424 counties were once involved in civil war. I then group the samples based on the year a war took place and create the war variable dummy variable that measures whether a civil war took place in a given county at year t . In other words, the interpretation of the impact of war on trade is “if a war took place in a county at a given year, what would be the impact on the local economy?”

3.3.2 Trade Flows and Access to Trade

Civil wars in general cause death and wealth losses and can interrupt intended trade flows into and out of China (Blattman and Miguel, 2010). To provide information about the impact of war on trade flows in early twentieth-century China, I use well-recorded information of international trade from the China Maritime Customs. Managed under the British bureaucratic system, the annual and decennial reports of China Maritime Customs deliberately recorded both national and port-level information about trade flows, tariffs, and traded commodities. In this preliminary analysis, I use port-level information about trade flows from the annual reports of China Maritime Customs from 1911 to 1930 as the outcome variable.

The use of international trade flows instead of domestic trade also reduces concerns about endogeneity. Domestic trade might have been driven by both economic and institutional shocks. If one uses domestic trade, it would be difficult to predict changes in the directions of trade or to disentangle the net effects. As a small open economy in the early twentieth century, most of China's international trade is determined by fluctuations in the world market instead of domestic conditions. Thus, it is more likely that changes in international trade reflects changes in supporting institutions due to the war shocks. In the future, I also plan to examine the composition of trade changed during war time, i.e., whether the war suppressed a certain industry while support another industry.

I also calculate distance from each county to each port as a measure of access to trade. I use the county-level longitude and latitude information from the CHGIS. For

each location, I match its name with the record in 1911 and take the longitude and latitude information. For locations that changed their names from 1820 to 1910, I search and match with their historical names. Since the frontier areas experienced dramatic changes in their boundary and administration system, I exclude these areas in my analysis. Thus, the dataset includes 1699 counties in 1820 and covers about half of the ROC's territory and more than 90% of its population.

3.3.3 Rural Income

To examine the impact of the war on the local economy, I also use rural labor wages and rural land values as an outcome variable. These data come from a nationwide survey by John Buck, who was a professor in the Department of Agricultural Economics at Nanking University from the 1920s to the 1940s. He started a field survey project to examine multiple aspects of Chinese society in the 1920s, asking his students to conduct surveys near their hometowns during their vacations. By 1933, he and his students had already completed a nationwide dataset involving 16,786 farms and 38,256 farm families in 22 provinces, which covered most of the populated area. The survey includes many variables describing climate, population, agriculture, health, farm labor and other variables related to farm production (Buck, 1937). The original survey was at the household level, but only the county level statistics were published and are still available.

The land value indices and labor wage indices were collected from recalled information.⁴ In the published data the value in each county was normalized relative to the value in 1926. In the regression analysis, I take logs and use county-level fixed-effects to take account of the impact of normalization in each county.⁵

3.4 Patterns of Civil Wars

The summary statistics associated with the narrative on civil wars are presented in Tables 3.1 to 3.6, based on participating group: Qing, Warlords (North), Warlords (South), KMT, CCP, and Japan. Each battle theoretically has at least two parties involved, but if some battles are within one group and among subgroups, the party involved was only the Northern Warlords.

Table 3.1 reports the summary statistics of the war variables. Among the 25 years for around 1600 counties, there are 675 county-year combination that experienced a

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⁴For two counties (Gaolan in Gansu and Tonglu in Zhejiang), there are two observations for each year.

⁵One limitation of the data is that there are some missing values in their report. Since all the missing values are missed continuously, it minimizes the impact of this problem.

civil war. The large value of the mean indicates that the party either was involved in wars over time, or participated in large-scale wars. The KMT were involved in more than 80% of the county-year combinations that ever experienced a war. The CCP and the Northern Warlords were also involved in about 40% to 50% of the county-year combinations. Wars in which by the Qing government or Japan participated were the least frequent in my sample, which only covers the last year of the Qing dynasty and did not consider the Northeastern part of China.

Table 3.1: Summary Statistics: Frequency of Civil Wars

Variable	Mean	Std. Dev.	Min.	Max.	N
All	0.0154	0.1233	0	1	43862
Qing	0.0003	0.0185	0	1	43862
Northern Warlord	0.0069	0.0828	0	1	43862
Southern Warlord	0.0018	0.0429	0	1	43862
KMT	0.0123	0.1103	0	1	43862
CCP	0.0076	0.0871	0	1	43862
Japan	0.0003	0.0179	0	1	43862

Table 3.2 reports the correlation among the political parties to provide a rough picture of the regular fighting enemies. The wars by the KMT and the CCP have a correlation of 0.767. In fact, the majority of wars involving the CCP in my sample were the fights during the “Encirclement Campaigns” started by the KMT. The next relatively correlated groups are the KMT and the Northern Warlords, with the correlation is 0.464.

Table 3.2: Cross-correlation of the Fighting Groups

Variables	Qing	Northern Warlord	Southern Warlord	KMT	CCP	Japan
Qing	1.000					
Northern Warlord	0.058	1.000				
Southern Warlord	0.057	0.246	1.000			
KMT	0.020	0.440	0.275	1.000		
CCP	-0.002	-0.004	0.045	0.767	1.000	
Japan	-0.000	0.214	-0.001	0.010	-0.002	1.000

Since this study examines the impact of wars on trade, Tables 3.3 and Table 3.4 present the number of counties involved in wars around 300 kilometers and 100 kilometers within treaty ports. The average number of counties in wars that were within 300 kilometers of a treaty port was 3.16, and the number decreased to 0.451 when the range decreased to 100 kilometers. The number of counties involved in wars by the KMT within 300 kilometers of a port was 2.617, with 12.6% of them within 100 kilome-

ters. The number of wars by the Northern Warlords and within 300 kilometers of a port was 1.469, with 13.4% within 100 kilometers. The numbers of wars involving the CCP was 1.331 and 12.6%. There was no clear pattern that wars involving the Northern warlords located closer to or further from ports. The potential different impact of civil wars by different groups was not due to difference in location.

Tables 3.5 and Table 3.6 count the number of wars close to ports by considering both of the participating sides. There was 1.252 wars between the KMT and the CCP that occurred within 300 kilometers of a port. The number of wars between Northern Warlords and the KMT was 1.05. When the range shrinks to 100 kilometers, the two average fall to 0.134 and 0.132. These two tables further suggest that the wars involving Northern Warlords, the KMT, and the CCP had no clear difference in terms of distance to ports.

Figures 3.5 to 3.7 then depict the total number of counties involved in civil wars and the number separated by political party. The trend in the total number of counties involved was quite flat until 1925. The peaks in 1913 and 1916 mainly capture conflicts between the KMT and Mr. Yuan, while fights after 1916 were mainly within the Northern Warlords. Most of the fights were on a small scale. The dramatic increase in counties involved from 1925 was mainly due to military activities by the KMT. The fights with Southern Warlords first then started the Northern Expedition to fight with the Northern Warlords. After 1927, about half of fights were between northern warlords and the KMT, while the other half were between the KMT and the CCP. In 1930, the areas involved in war reached a peak due to the simultaneous fights of the Central Plains war, between the KMT and two warlords, and the first Encirclement Campaign between the KMT and the CCP.

The counties involved in wars with the Qing and Japan were quite limited. This is due to two reasons. First, the examined period only includes the last year of the Qing dynasty. Second, most of the counties invaded by Japan are in the northeastern part of China and are excluded from the current sample. I plan to expand my analysis to these counties in the future.

I then examine the location of fights, measured using distance to ports. Figure 3.8 depicts kernel densities of counties that ever experienced one fight versus counties that did not experienced any fights. Counties ever experiencing wars located relatively closer to ports than the comparison group.

Table 3.3: Number of Counties within 300 km of Civil Wars

Variable	Mean	Std. Dev.	Min.	Max.	N
# Counties in wars within 300 km	3.16	7.605	0	78	1029
# Counties in wars involved Qing within 300 km	0.104	0.788	0	9	1029
# Counties in wars involved Northern Warlords Within 300 km	1.469	4.345	0	46	1029
# Counties in wars involved Southern Warlords Within 300 km	0.631	2.625	0	27	1029
# Counties in wars involved the KMT Within 300 km	2.617	7.305	0	78	1029
# Counties in wars involved the CPP Within 300 km	1.331	4.928	0	36	1029
# Counties in wars involved Japan Within 300 km	0	0	0	0	1029

Table 3.4: Number of Counties within 100 km of Civil Wars

Variable	Mean	Std. Dev.	Min.	Max.	N
# Counties in Wars Within 100 km	0.451	1.466	0	13	1029
# Counties in Wars Involved Qing Within 100 km	0.027	0.271	0	4	1029
# Counties in Wars Involved Northern Warlords Within 100 km	0.198	0.819	0	9	1029
# Counties in Wars Involved Southern Warlords Within 100 km	0.14	0.786	0	13	1029
# Counties in Wars Involved the KMT Within 100 km	0.33	1.33	0	13	1029
# Counties in Wars Involved the CCP Within 100 km	0.169	1.009	0	11	1029
# Counties in Wars Involved with Japan Within 100 km	0	0	0	0	1029

Table 3.5: Number of Counties within 300 km of Civil Wars (Separated by Fighting Pairs)

	Variable	Mean	Std. Dev.	Min.	Max.	N
#	Counties in North-North Wars Within 300 km	0.354	1.318	0	10	1029
#	Counties in North-South Wars Within 300 km	0.238	1.031	0	9	1029
#	Counties in North-KMT Wars Within 300 km	1.05	4.066	0	46	1029
#	Counties in South-KMT Wars Within 300 km	0.476	2.493	0	27	1029
#	Counties in KMT-CCP Wars Within 300 km	1.252	4.716	0	36	1029

Table 3.6: Number of Counties within 100 km of Civil Wars (Separated by Fighting Pairs)

Variable		Mean	Std. Dev.	Min.	Max.	N
# Counties in North-North Wars	Within 100 km	0.054	0.378	0	6	1029
# Counties in North-South Wars	Within 100 km	0.04	0.292	0	5	1029
# Counties in North-KMT Wars	Within 100 km	0.132	0.714	0	9	1029
# Counties in South-KMT Wars	Within 100 km	0.091	0.648	0	13	1029
# Counties in KMT-CCP Wars	Within 100 km	0.134	0.917	0	11	1029

Figure 3.5: Number of Counties Involved in Civil Wars Led by Warlords, 1911-1934

Source: see text

Figure 3.6: Number of Counties Involved in Civil Wars Led by Kuomintang and CCP, 1911-1934

Source: see text

Figure 3.7: Number of Counties Involved in Civil Wars Led by Qing Government and Japan, 1911-1934

Source: see text

Figure 3.8: Kernel Density of Distance

Source: see text

3.5 The Impact on Trade Flows

This section provides results on the impact of civil wars on trade flows. Total international trade flows serve as a measure trade activities. I first provide overall evidence on this issue, then examine the differentiated effect due to different group leaders.

3.5.1 Overall Effects

I use a reduced-form equation with port-level fixed effects to control for time-invariant features of the ports as well as year fixed effects to control for national shocks. The regression equation is

$$Trade_{it} = \beta_0 + \beta_1 CivilWar_{it} + \sigma_i + \theta_t + \epsilon_{it}, \quad (3.1)$$

for port i at year t . $Trade_{it}$ is the sum of export value and import value in port i at year t , $CivilWar_{it}$ is a measure of civil wars around port i at year t . σ_i captures port-level fixed effects. θ_t captures national shocks for each port.

Intuitively, if a fight was closer to a port, the fight would be more likely to affect trade activities in the port. I use multiple measures for the number of civil wars around ports. The first two measures consider all civil wars in the nation, but weight the appearance of war by distance and distance squared from the fighting county to the port. This measure uses the most information, but likely over-weights counties far from ports. The last three measures only consider civil wars within a certain range of a port. In constructing these three measures, I count the number of counties in wars within 500, 300, and 100 kilometers to ports, separately. The effect for these three measures on trade flows should be gradually increasing.

Table 3.7 reports the regression results using different measures of civil wars. Columns (1) and (2) report the results using the distance weighted measure. Columns (3) and (4) use civil wars within 500 kilometers. Columns (5) and (6) further restrict the sample to civil wars within 300 kilometers and 100 kilometers to ports.

The overall effect of civil wars on trade was negative. As the sample is restricted to wars within 300 kilometers or 100 kilometers of a port, the effect is bigger and the coefficient becomes statistically significant. It suggests that battles that took place around ports tended to have greater impact on trade values rather than battles far away. The coefficient of wars within 300 kilometers to ports in specification 5 indicates that, if one more county within 300 kilometers of ports was involved in war, trade values would have dropped by 0.759 million Haikwan taels. However, if one county within 100

kilometers to ports was involved in war, the effect was 2.289 million Haikwan taels, which is about 4.8% of the mean of the total trade values.

In this study, since I only consider major civil wars instead of local unrest, I assume local trade flows were unlikely to directly drive the decision to start a war. Most civil wars were determined by political disputes, instead of local economic conditions; and the timing of each war was exogenous to local trade flows. To address potential concerns about the location of civil wars, I plan to use an instrumental variable approach in the future. Instead of the actual counties that experienced fights, I use the counties along the initial border of two warlords' territories as hypothetical fighting regions. Then I time this variable with the actual time when the war takes place. The assumption is that warlords were more likely to fight in their border counties when a war took place. To ensure this new measure is not being driven by fluctuations in trade flows later, I use the initial borders rather than the borders that changed over time. I also need to check whether there is any systematic differences in preconditions of these border counties (i.e., population density and tax income) compared with other counties.

3.5.2 Differentiated Effects

This section further disentangles the effect based on political groups. I separate wars by considering both sides of the fighting parties. In this way, I can differentiate the impact of wars that involved the same political groups but different opposition. This set of results are particularly informative for the fights by the KMT, because the KMT fought with the Northern Warlords, the Southern Warlords, and the CCP separately. The five groups I include in the regressions are fights within Northern Warlords, fights between the Northern and the Southern Warlords, fights between the Northern and the KMT, fights between the Southern Warlords and the KMT, and fights between the KMT and the CCP.

Tables 3.8 to 3.10 report the results. Specification (1) controls for port-level fixed effects. Specification (2) controls for port-level fixed-effects and year shocks. The changes in coefficients from specification (1) to specification (2) suggest that national shocks were likely to affect trade values as well. Consistent with previous results, the absolute values of coefficients in Table 3.8 are similar or smaller than the ones in Table 3.9, suggesting that wars closer to ports had greater impact on international trade. When considering the number of wars within 100 kilometers to ports, the coefficients are exceptionally large, indicating the possible lack of variations.

In all three different measures, the wars between Northern Warlords had positive but not statistically significant impact on international trade flows. The effect changed

Table 3.7: The Impact of Civil Wars on Trade Flows

VARIABLES	(1) Trade values	(2) Trade values	(3) Trade values	(4) Trade values	(5) Trade values
# Counties in Wars weighted by distance	-21.93 (19.16)				
# Counties in Wars weighted by distance ²		-6.421 (6.010)			
# Counties in Wars Within 500 km			-0.0460 (0.226)		
# Counties in Wars Within 300 km				-0.759 (0.560)	
# Counties in Wars Within 100 km					-2.289 (1.641)
Constant	25.47*** (8.569)	24.21** (9.397)	24.43** (9.822)	25.93*** (8.250)	25.58*** (8.480)
Observations	982	982	982	982	982
R-squared	0.123	0.122	0.122	0.128	0.124
Number of port_id	49	49	49	49	49
Port	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*) in each port. The independent variables are dummy variables, indicating whether a county involved in a war at a given year.

from 1.058 million *Haikwan* taels to 7.3 million *Haikwan* taels. In contrast, the wars between the Southern Warlords and the KMT had negative and statistically significant impact on international trade flows. If the number of fights by the Southern Warlords and the KMT within 500 kilometers to ports increased by one, international trade flows would decrease by 0.826 million *Haikwan* taels, which is equal to 1.7% of yearly average international trade flows in the examined period. The size of the effect increases - 0.969 million *Haikwan* taels, or a drop 2% of the yearly average, when considering the fights that took place within 300 kilometers to ports. It further increases to a drop of 1.819 million *Haikwan* taels, or 3.8% of the yearly average, when the fights were within 100 kilometers to ports. The fights between the KMT and the CCP also had negative impact on international trade. One increase in the number of fights within 500 kilometers to ports decreased international trade flows by 0.956 million *Haikwan* taels, which is equal to 2% of the yearly average. The coefficients for other distance measures are negative but not statistically significant. The fights between the Northern and Southern warlords and the ones between the Northern Warlords and the KMT had limited impact on international trade.

3.5.3 Explanations

The regression results suggest that the civil wars overall had negative impact on international trade, though the coefficients are not statistically significant. Further examinations that separate wars by participating groups suggest differentiated effects across political groups. Specifically, the ones by the Northern Warlords were not harmful to international trade at all, while the ones between the KMT and the Southern Warlords, as well as the ones between the KMT and the CCP had negative impact on international trade flows.

I propose a hypothesis to explain this result. Wars involving the incumbent, or the strong opposition, did not bother (or even protected) international trade because they relied on income from trade. On the contrary, weak opposition for the whole period could not extract income from international trade and thus made sure it was protected. In other words, different incentive structure led to different response of political parties to international trade.

The China Maritime Customs (CMC) was the department that managing China's international trade. Since the mid-nineteenth century, it was managed by British officials and known for its efficiency and guarantee of revenue income. Thanks to its management, tariff revenue became the most reliable income for the Qing dynasty and the ROC. The government used the tariff as a collateral for government bonds and

Table 3.8: The Impact of Different Civil Wars on Trade Flows in Counties nearby (500 km)

VARIABLES	(1) Full Sample	(2) Full Sample
# Counties in North-North Wars Within 500 km	2.111** (0.990)	1.572* (0.932)
# Counties in North-South Wars Within 500 km	-2.660*** (0.933)	0.305 (0.594)
# Counties in North-KMT Wars Within 500 km	0.957* (0.500)	0.696 (0.455)
# Counties in South-KMT Wars Within 500 km	0.626** (0.264)	-0.826* (0.433)
# Counties in KMT-CCP Wars Within 500 km	0.269 (0.216)	-0.956* (0.501)
Constant	42.73*** (2.719)	22.22** (10.35)
Observations	982	982
R-squared	0.050	0.139
Number of ports	49	49
Port	Y	Y
Year		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 500 kilometers of ports.

Table 3.9: The Impact of Different Civil Wars on Trade Flows in Counties nearby (300 km)

VARIABLES	(1) Full Sample	(2) Full Sample
# Counties in North-North Wars Within 300 km	2.462* (1.360)	1.058 (0.963)
# Counties in North-South Wars Within 300 km	-3.693** (1.460)	0.330 (0.865)
# Counties in North-KMT Wars Within 300 km	1.435* (0.722)	0.381 (0.428)
# Counties in South-KMT Wars Within 300 km	0.351 (0.267)	-0.969* (0.529)
# Counties in KMT-CCP Wars Within 300 km	0.233 (0.187)	-1.604 (1.017)
Constant	45.80*** (0.853)	23.68** (9.636)
Observations	982	982
R-squared	0.018	0.134
Number of ports	49	49
Port	Y	Y
Year		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 300 kilometers of ports.

Table 3.10: The Impact of Different Civil Wars on Trade Flows in Counties nearby (100 km)

VARIABLES	(1) Full Sample	(2) Full Sample
# Counties in North-North Wars Within 100 km	11.01* (5.818)	7.346 (5.043)
# Counties in North-South Wars Within 100 km	-15.83 (10.75)	-4.811 (7.586)
# Counties in North-KMT Wars Within 100 km	5.959 (3.957)	0.523 (2.317)
# Counties in South-KMT Wars Within 100 km	1.133 (0.830)	-1.819* (1.066)
# Counties in KMT-CCP Wars Within 100 km	1.695* (0.929)	-3.110 (2.668)
Constant	46.72*** (0.463)	23.70** (9.683)
Observations	982	982
R-squared	0.015	0.127
Number of ports	49	49
Port	Y	Y
Year		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 100 kilometers of ports.

foreign loans. Being relatively independent from local government, the CMC had its own authority on trade and related issues. It mainly listened to the central government rather than local rulers.

As a result, before 1927, as the rulers of ROC government were among the northern warlords, the CMC in fact turned over revenue to the warlords, instead of other political parties or the revolutionaries. A famous incident to illustrate this relationship is a struggle over resources between Sun Yat-sen and the local Guangzhou Maritime Custom's officers in 1917. Sun Yat-sen and his supporters had occupied Guangzhou for several years. When he requested part of the tariff income from the Guangzhou Maritime Customs, however, he was rejected by local officials. This incident also created a panic among bankers in Shanghai, because they lent the government loans with the CMC tariff as a pledge. This incident suggests that the CMC officials tended to turn over their funds to the nominally ruler of China. In contrast, when the KMT defeated the warlords and occupied Shanghai in 1927, the local CMC officials understood that the KMT was about to unite the country. They welcomed Chiang Kai-shek warmly (Chen, 1999).

The transition of central government from the Northern Warlords to the KMT allows me to test the validity of this hypothesis. If this hypothesis is true, I should observe wars by northern warlords were not harmful to international trade activities before 1927 but led to drops in trade values after 1927. In contrast, the wars by the KMT should have had negative impact on international trade flows before 1927 but no effect after it took over the central government. To capture the effect of each political group, I re-divide the sample solely based on political groups.

Tables 3.11 to 3.13 reports the effects separated by political groups for the whole period, before 1927, and after 1927. When considering wars within 100 kilometers to ports, the coefficients become exceptional large and not statistically significant due to the lack of variation. As a result, I mainly focus on the first two tables. First, the results by political parties confirm previous results. In both Tables 3.11 and 3.12, the impact of wars by the Northern Warlords had positive or no effects on international trade flows, while the ones by the Southern Warlords and the CCP had negative effects. When considering wars within 300 kilometers to ports, the wars by the Southern Warlords caused a 1.086 million *Haikwan* taels drop in the value of international trade flows, which is equal to 2.28% of the yearly average. The wars by the CCP led to a even bigger drop of 1.607 million *Haikwan* taels, which is 3.37% of the average trade flows.

In addition, the results before and after 1927 suggest that the impact of wars by the Northern Warlords and the wars by the KMT changed dramatically. For example, in Table 3.11, the effect of wars by the Northern Warlords on international trade flows

decreased from a positive 1.076 million *Haikwan* taels before 1927 to a negative 1.435 million *Haikwan* taels after 1927. Meanwhile, the effect of wars by the KMT increased from statistically insignificant -0.908 million *Haikwan* taels to 1.056 million *Haikwan* taels. This result is consistent with the explanation that, after the KMT took over the central government, the incentives to protect international trade reversed between the Northern Warlords and the KMT.

In the future, I also plan to use quantitative evidence directly measuring benefits from international trade by considering the number of ports in each political party's control, based on their political territory.

3.6 Impact on Rural Wage and Land Values

Previous results suggest that civil wars had negative impact on international trading activity, especially in places where local governors could not extract income from trade. I then examine how civil wars affected rural labor wages and rural land values to assess the impact of civil wars on the local economy.

At first glimpse, civil wars were likely to lower land values since fights would affect yields and destroy free market institutions. Yet, during this period, the land tax belonged to provincial government (Jia, 1928). If the previous hypothesis is true, it is likely that wars conducted by Northern warlords still had smaller harm on land values. The ones involving the CCP should have been most destructive to land values because these fights were mostly in rural areas. Meanwhile, the impact on labor wages is not clear. Since wars might have led to shortage of rural labor, wages would probably go up. Labor wages might have also gone down since drops land values reduced the marginal product value of labor.

The labor wages and rural land values come from John Buck's survey. It includes land values and labor wages for around 100 counties in major provinces in China from 1901 to 1933. I use logged values as the outcome variable. The regression equation is

$$y_{jt} = \beta_0 + \beta_1 CivilWar_{jt} + \eta_j + \theta_t + \epsilon_{jt}, \quad (3.2)$$

where $CivilWar_{jt}$ and θ_t have the same definition as before. The outcome variable y_{jt} is labor wages or land values in natural log form. η_j is county-level fixed effects.

Tables 3.14 and 3.16 list results for rural labor wages and land values. After controlling for fixed effects and national shocks, the total impact of civil wars on land values is negative and statistically significant. The coefficient shows that one fight in a county

Table 3.11: The Impact of Different Civil Wars on Trade Flows in Counties nearby (500 km)

VARIABLES	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	Before 1927	After 1927
# Counties in Northern Warlords Wars Within 500 km	0.653 (0.454)	1.031* (0.565)	1.076* (0.563)	-1.435** (0.590)
# Counties in Southern Warlords Wars Within 500 km	-0.401 (0.348)	-0.849 (0.584)	-0.363 (0.553)	0.589 (0.641)
# Counties in KMT Wars Within 500 km	0.303 (0.293)	-0.296 (0.261)	-0.908 (0.565)	1.056** (0.484)
# Counties in CCP Wars Within 500 km	0.104 (0.140)	-0.682* (0.371)	1.833 (3.817)	-0.564 (0.440)
Constant	42.99*** (2.398)	23.74** (9.572)	24.51*** (6.725)	68.15*** (9.478)
Observations	982	982	795	187
R-squared	0.038	0.140	0.143	0.129
Number of port_id	49	49	49	47
Port	Y	Y	Y	Y
Year		Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 500 kilometers of ports.

Table 3.12: The Impact of Different Civil Wars on Trade Flows in Counties nearby (300 km)

VARIABLES	(1)		(2)		(3)		(4)	
	Full Sample		Full Sample		Before 1927		After 1927	
# Counties in Northern Warlords Wars Within 300 km	0.819	(0.704)	0.465	(0.530)	1.524	(1.002)	-1.946	(1.543)
# Counties in Southern Warlords Wars Within 300 km	-0.709	(0.430)	-1.086*	(0.599)	-0.0292	(0.780)	0.422	(1.853)
# Counties in KMT Wars Within 300 km	0.602*	(0.331)	-0.0187	(0.346)	-1.302	(1.091)	1.003	(1.587)
# Counties in CCP Wars Within 300 km	-0.209	(0.291)	-1.607*	(0.885)	13.64	(12.85)	-0.935	(1.758)
Constant	45.72***	(0.902)	24.18**	(9.366)	24.45***	(6.754)	70.99***	(5.421)
Observations	982		982		795		187	
R-squared	0.013		0.136		0.141		0.127	
Number of ports	49		49		49		47	
Port	Y		Y		Y		Y	
Year			Y		Y		Y	

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 300 kilometers of ports.

Table 3.13: The Impact of Different Civil Wars on Trade Flows in Counties nearby (100 km)

VARIABLES	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	Before 1927	After 1927
# Counties in Northern Wars Within 100 km	4.331 (3.045)	1.883 (2.283)	4.873 (3.452)	10.41 (6.927)
# Counties in Southern Wars Within 100 km	-2.302 (1.921)	-2.963 (2.148)	-0.552 (2.778)	-13.35 (8.398)
# Counties in KMT Wars Within 100 km	0.963 (0.960)	-0.821 (1.049)	-4.142 (3.054)	-13.87 (8.986)
# Counties in CCP Wars Within 100 km	1.623** (0.747)	-2.462 (2.170)	8.947 (8.555)	12.68 (8.509)
Constant	46.67*** (0.560)	24.25** (9.407)	24.64*** (6.607)	69.50*** (2.262)
Observations	982	982	795	187
R-squared	0.007	0.127	0.139	0.087
Number of port_id	49	49	49	47
Port	Y	Y	Y	Y
Year		Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*). Counties selected are within 100 kilometers of ports.

Table 3.14: The Impact of Civil Wars by Different Groups on Wage and Land Values

VARIABLES	(1) Wage	(2) Land	(3) Wage	(4) Land
conflict (all)	0.179*** (0.0615)	0.0748 (0.0554)	-0.00589 (0.0489)	-0.121** (0.0517)
Constant	4.129*** (0.103)	3.967*** (0.152)	3.741*** (0.0664)	3.551*** (0.119)
Observations	1,875	1,995	1,875	1,995
R-squared	0.321	0.299	0.659	0.569
County FE	Y	Y	Y	Y
Year FE	N	N	Y	Y

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. wage and land values are in natural log form.

at a given year would lower land values by 12.1%. The impact on labor wages is not statistically significant from zero.

Table 3.15 presents the results after separating the war by fighting parties. For labor wages, the fights between the Northern Warlords and the Southern Warlords had the largest impact. These fights decreased wages by 19.2% . The fights between the Northern Warlords and the KMT after 1927 increased labor wages by a moderate 4.12%. For land values, the fights by the KMT and the CCP led to a dramatic decrease of 30.8% in rural land values. The fights between the Northern Warlords and the KMT also led to a 13.2% drop in land values.

After separating conflicts by political groups, it seems clear that civil wars conducted by the warlords did not have much impact on labor wages or land values. Table 3.16 reports the regression results. For Northern Warlords, the coefficients are small and not statistically significant from zero. In contrast, the wars by the Kuomintang and the CCP reduced land values. The wars by the KMT before 1927 decreased land values by 16% and the effect of wars by the CCP after 1927 is -24.2%. This result is consistent with the fact that most of the conflicts involving the CCP took place in rural areas and likely were particularly harmful to local land values.

3.7 Conclusion

This paper provides a quantitative measure about the scale of civil wars in China from 1911 to 1934. The effort to document the war shocks is the first step to quantifying

Table 3.15: The Impact of Different Civil Wars on Trade Flows in Counties

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Wage		Wage		Wage		Wage		Land		Land		Land		Land	
	Full Sample		Full Sample		Before 1927		After 1927		Full Sample		Full Sample		Before 1927		After 1927	
war_warlordbeiyang	0.154 (0.113)		-0.118 (0.109)		-0.161 (0.123)		0.00536 (0.0425)		0.249** (0.105)		0.0715 (0.0959)		0.149 (0.167)		0.0382 (0.0521)	
war_warlordbeiyang_south	-0.408*** (0.0971)		-0.192* (0.114)		-0.0646 (0.0788)				-0.427*** (0.0635)		-0.0458 (0.0829)		-0.00311 (0.0729)			
war_warlordbeiyang_kmt	0.203*** (0.0310)		0.0352 (0.0307)		0.0674 (0.0431)		0.0412* (0.0236)		0.126** (0.0495)		-0.132** (0.0602)		-0.0944 (0.0957)		0.0912 (0.0842)	
war_south_kmt	-0.148 (0.0964)		-0.107 (0.118)		-0.186** (0.0884)				0.146*** (0.0461)		-0.0535 (0.0842)		-0.0776 (0.0770)			
war_kmt_ccp	0.418*** (0.129)		0.130 (0.104)				-0.00776 (0.0552)		-0.0257 (0.113)		-0.308*** (0.114)				-0.189*** (0.0711)	
Constant	4.129*** (0.103)		3.741*** (0.0666)		3.706*** (0.0678)		4.653*** (0.0154)		3.967*** (0.152)		3.549*** (0.119)		3.469*** (0.135)		4.587*** (0.0512)	
Observations	1,898		1,898		1,414		484		1,995		1,995		1,487		508	
R-squared	0.334		0.665		0.775		0.617		0.302		0.571		0.742		0.725	
County FE	Y		Y		Y		Y		Y		Y		Y		Y	
Year FE			Y		Y		Y				Y		Y		Y	

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parentheses. The dependent variable is the total value of trade (in million *Haikwan Taels*) counties selected are around 100 kilometers of ports.

Table 3.16: The Impact of Civil Wars by Different Groups on Wage and Land Values

VARIABLES	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	Wage	Land	Wage	Land	Wage	Land	Wage	Land	Wage	Land	Full Sample	Land	Before 1927	Land	Before 1927	After 1927
conflict_warlordbeiyang	0.185* (0.103)		-0.103 (0.0955)		-0.107 (0.0931)		0.00536 (0.0425)		0.173* (0.0941)		0.0383 (0.0738)		0.0767 (0.103)		0.0382 (0.0521)	
conflict_kmt	-0.0114 (0.105)		0.124 (0.0878)		0.154* (0.0885)		0.0358 (0.0480)		-0.0295 (0.115)		-0.163** (0.0747)		-0.160* (0.0949)		0.0531 (0.1000)	
conflict_warlordsouth	-0.572*** (0.113)		-0.150 (0.123)		-0.0410 (0.124)				-0.229 (0.165)		-0.0533 (0.0662)		-0.0490 (0.0731)			
conflict_ccp	0.429*** (0.164)		0.00664 (0.134)				-0.0436 (0.0737)		0.00179 (0.160)		-0.147 (0.134)				-0.242** (0.114)	
Constant	4.129*** (0.103)		3.739*** (0.0665)		3.704*** (0.0678)		4.653*** (0.0154)		3.967*** (0.152)		3.551*** (0.119)		3.471*** (0.135)		4.587*** (0.0512)	
Observations	1,898		1,898		1,414		484		1,995		1,995		1,487		508	
R-squared	0.334		0.664		0.775		0.617		0.301		0.571		0.742		0.725	
County FE	Y		Y		Y		Y		Y		Y		Y		Y	
Year FE			Y		Y		Y				Y		Y		Y	

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. wage and land values are in natural log form.

the real impact of civil wars on the Chinese economy. Meanwhile, the decentralized political structure and disputes among different political parties also provide potential opportunities to test the effect of civil wars on economic activities.

In this paper, I first document patterns of civil wars from 1911 to 1934. The number of counties experiencing civil wars was small before 1925. After 1925, large-scale fights between the KMT and the Northern Warlords, among the warlords, and between the KMT and the CCP boosted the scale of counties in war. After separating fights by participants, the KMT, the Northern Warlords, and the CCP involved the most civil wars.

The regression results on measures of economic activities suggest that civil wars negatively affected international trade. With one more civil war took place within 100 kilometers to ports, the international trade flows dropped by 4.8% of the average trade flows. In addition, the impact varied with wars by different political groups. The wars involving Northern Warlords had little effect on international trade, while the ones between the KMT and the CCP were the most destructive to international trading activities. I also find similar effects after using county-level labor wages and land values as the outcome variable.

Based on these results, I propose an explanation. If a political group could acquire funds from economic activities, the wars by this group had smaller or even no impact on the economy. For example, if a group relied on tariff or land tax, it would have had less incentive to destroy international trade or rural production. On the contrary, if a group could not extract funds from local economy activities, the wars participated by this group would have been more destructive.

This paper only examines relative changes of trade values and rural income. This is not welfare analysis that compares China with the counterfactual scenario with no fights. It is very likely that China would have been better off if it did not experience the political violence at all. In the future, it would also be interesting to study the long-run impact of these wars on the Chinese economy.

Chapter 4

The World War I Trade Shock and Its Impact on the Chinese Economy

4.1 Introduction

There is an expanding literature about the impact of war shocks on economic development. Besides its direct destructive consequences, a common observation during and after the war is that countries experience higher tariffs. For example, during the civil war, the US imposed a high tariff on imports and this prevented potential increase of imports (Irwin, 2000). Similarly, the Napoleonic Wars created trade blockade that even might have helped foster domestic industries and facilitate technological adoption under certain conditions (Juhász, 2014).

Historians in China also believe that the First World War was beneficial to China's industrialization. Entering the war in August, 1917, China mostly nominally participated the war. The war's impact on the Chinese economy was mostly through the world market. WWI dramatically increased the barriers in international trade and ended the first wave of globalization. Producers in the textile industry shifted from European countries to the US and Japan. But there is little economic literature that has examined the impact on the Chinese economy. The experience of China is of interest because, different from Japan and the US, China was predominantly an agricultural economy. It had limited industrial sectors and experienced shortages of capital. Examining the experience of China provides useful lessons on the impact of trade shocks on an agrarian economy and preconditions for industrial development.

Prior to the war, China was a small open economy with a GDP accounting for less than 9% of the world in 1913 (Maddison, 2007). Its trade patterns were relatively stable and tariff remained at a low level until the late 1920s. In the world market, China

was a price taker and sensitive to price shocks from the world market. Manufactured products accounted for 70% of China's imports in 1902 (Hamashita, 1989). Since a large portion of China's trading partners were the European countries, the trade shocks due to WWI led to a decrease in the imports of foreign manufactured products. It was similar to imposing an exogenous high trade barrier on China's imports. Contemporary economists believe that China's domestic industry seized this opportunity to develop, especially the cotton textile industries (Fang, 1934; Liu, 1940). But domestic industries in China were small before WWII, and it is not clear to what extent a growing industrial sector would benefit China during WWI.

In this paper, I examine the impact of WWI on the Chinese economy and provide a quantitative description of the performance of the industrial and agricultural sectors. I first study the industrial sector, especially the textile industry. Combined with aggregated data from official records and firm-level information of textile firms, I find that China's textile industry was expanding during the war. The trend continued even afterwards.

Even though the industrial sector was booming, the impact on the majority of the population was not clear since they mostly lived in rural areas. To quantify the impact on the majority's welfare, I then examine the impact of the war on rural agricultural input prices near port cities and in China's interior. Theoretically, this trade shock could potentially affect rural land values through several channels. It might have raised agricultural prices, increased demand for agricultural products, or stimulated mass migration from the countryside to the cities. I combine county- and port-level information from multiple sources to form a panel dataset for 97 counties from 1901 to 1933. The outcome variables are agricultural land values and labor wages, measured using county-level indices from 1901 to 1933 from a nationwide survey compiled by John Buck. I find that the war was associated with lower land values in counties close to ports, but not further away. To disentangle the potential impacts, I then use soil suitability for different agricultural products from the Global Agro-Ecological Zones (GAEZ) dataset of Food and Agricultural Organizations (FAO) to investigate the patterns of input prices for counties with different production conditions. After controlling for soil suitability, the war increased labor wages in coastal areas slightly compared to inland areas. The most significant effect was on land values. The war decreased land values for land suitable for grain production while increasing the values for land suitable for cotton production. This effect suggests that a booming textile industry might have caused farmers to switch from producing grains to cash crops, such as cotton. However, the size of the effect was limited and mostly restricted to counties close to ports.

4.2 Literature

There are intensive studies that discuss the impact of trade shocks on industrialization, technology adoption, and welfare in developing countries. Goldberg and Pavnick (2007) review the literature about the distributional effects of globalization in developing countries. Harrison (2007) and Williamson (2010) examine the impact of trade on poverty from modern and historical perspectives.

Several recent studies particularly focus on trade shocks due to warfare in other countries. Hanlon (2014) finds that the US civil war changed the relative cotton prices and this affected the direction of invention in Britain. Juhász (2014) tests the infant industry argument using the context of a trade blockade due to the Napoleonic War.

For literature about Chinese history, contemporary scholars mostly find WWI promoted the development of China's manufacturing industries. The evidence provided is a combination of narratives and surveys, as well as records on China's international trade. Most of the studies make their argument using evidence from the textile industry, which was China's leading industry and mostly affected by the war. Fang (1940) collected firsthand detailed records on the textile firms and pointed out that the war stimulated the expansion of the textile industries. Later work by historians around the 1950s also confirms this finding. Narratives from gazetteers, Customs' reports, and scholars dairies recorded development of light industries in China and modernized handicraft industries (Peng, 1957). Grove (2006) traced how Gaoyang county, which used to be the industrial sector in historical China, revived in the early twentieth century and during WWI.

It is worth noting that historians recognized that China's industrial sector experienced several major shocks during the time period. The first major shock was the Treaty of Shimonoseki in 1895. Later, the "New Policies" of the Qing in the early twentieth century, the establishment of the Republic of China (ROC), and the patriotic boycott of Japanese products were all considered critical for the development of domestic industries (Jiangsu Shiyeting, 1919).¹ Liu (1940) also pointed out that domestic firms needed preconditions to seize the opportunities brought by the war shock, which was domestic demand for manufactured products.

Modern studies estimate the impact of access to trade on domestic trade, consumption, and benefits from trade (Keller, Li and Shiue, 2011, 2012; Keller, Santiago and Shiue, 2016), but do not emphasize the importance of WWI except for Mitchener and

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¹Liu (1940) summarizes several major period from multiple sources of studies and historians also regard the prosperous industries during WWI as part of the boom during the first ten years of the ROC.

Yan (2014). In their study, Mitchener and Yan (2014) find the war boosted exports in unskilled sectors, with the skill premium in China declined during and after the war.

Studies on the agricultural sector did not explicitly emphasize the role of WWI. Most historical studies focused on the development of agricultural markets and found that in response to the trade shocks, farmers tended to grow more cash crops (see, for example, Gardella, 1994; Daure, 1989). Brandt (1989) lists the national-level prices for agricultural products and shows that WWI led to a dramatic drop in the terms of trade. The price of nonagricultural products increased dramatically during the war, while prices for the agricultural products were relatively flat. The domestic and international rice market were not integrated. Myers (1970) used a Manchuria survey and finds that farmers around the railroad lines were likely to switch to cash crops. His calculations also show that the wheat price in the northern part of China was quite flat from 1913 to 1916, increased in 1917, fell back in 1918, and increased again in 1920. A price index of farm products overall increased by 40% from 1913 to 1938. The cotton acreage increased thanks to booming domestic textile industries.

4.3 Background

4.3.1 China's International Trade

Despite the forces of globalization in the nineteenth century, China was a relatively closed economy with highly restrictive trade policies. In 1840, the dissatisfaction with this current customs systems stimulated conflicts between foreign merchants and local Chinese officials, which led to the outbreak of the Opium War in 1840. After losing the war, the Qing government was forced to sign the Treaty of Nanking in 1842 and open five ports to foreign trade, which finally started the globalization process in China. Later, more treaties were signed, establishing more opened ports, a foreign-governed Maritime Customs, and a flat low tariff rate (the 1858 Treaty of Tientsin). By the beginning of the twentieth century, 43 ports were opened to trade and international trade flows increased at the same time. Figure 4.1 depicts the imports and exported values from 1864 to 1932. China's total trade value rose from 94,137 *Haikwan taels* in 1864 to 364,592 *Haikwan taels* in 1900. In the first three decades of the twentieth century, trade flows further expanded by more than five times and reached 2.2 million *Haikwan taels* in 1930 (Hsiao, 1974). During this time, China was a small open economy in the world market.

When foreign goods first came to the local markets, foreign commodities did not have much influence on ordinary Chinese life. Chinese consumers reluctantly accepted

Figure 4.1: Trade Expansion of China (in *Haikwan Tael*), 1864 to 1932

Source: Hsiao (1974), pages 22-24, 117-119

foreign products. The major import good was opium and the major export goods were silk and tea. Along with the globalization process, however, China started to trade according to its comparative advantage. By the end of the nineteenth century, the Chinese imported large amounts of manufactured goods, including kerosene oil, cotton products, and paper products. China exported silk and tea, as well as beans, coal, cotton, and even cotton goods (Hsiao, 1974). Imported manufactured products, such as cloth, match, and soap were being consumed by many ordinary Chinese.

According to Rawski (1989), the size of international trade was only 8.5% of China's total GDP. As a result, international trade only had “moderate impact” on the Chinese economy. However, the actual impact of the import sector was greater than the size of trade implies, because the imported products were concentrated on the manufacturing sector. Fang (1940) found that 64% of cotton yarn consumed in China came from foreign countries. Narrative evidence also suggests that China imported most of its matches consumed.

4.3.2 The Impact of WWI on China's International Trade

WWI began in July, 28, 1914 and lasted until the end of 1918. Although the war mainly happened in Europe, it largely affected other countries by sharply reducing

the number of ships for trading purposes and increasing the risk of long-distance trade. International freight rates rose dramatically, especially between Europe and other parts of the world, including China. It also drew resources away from peacetime manufactured goods. According to the Decennial Reports (1912-1921) from China Maritime Customs, starting from 1914, all major ports experienced a decrease in the number of ships, an increase in freight rates, and a drop in imports from Europe. For example, as the largest port in North China, Tianjin observed “the falling off since the termination of the War in grey and white cotton piece goods and yarn, accompanied by a steady increase in price...metals and sundries continued a normal increase till 1915, dropped away for the years 1916-1918”.² This experience is not unique to Tianjing. Figure 4.2 shows the national average import price of shirtings and sheetings from 1901 to 1921. The import prices increased in most years, and especially during the war years.

The Drop in Manufactured Products

Figure 4.3 depicts the share of manufactured products and cotton products in total imports. Before WWI, the share of manufactured products ranged from 65% to 70%. The percentage stayed stable during the war and increased to about 78% in 1919. For cotton products, the impact of the war is clearly negative. The percentage of cotton products in total imports dropped from 35% to 28% from 1915 to 1916, and recovered to the original level when the war ended in 1919.

However, the postwar rebound effect for both manufactured products and cotton products did not last for long. Manufactured products dropped to less than 65% of total imports in 1923. Cotton products also dropped to below 25%. The changes suggest that the war mostly cut import of cotton products and probably triggered structural changes in domestic industrial sectors.

The more expensive manufactured products due to the war provided incentives for domestic firms to enter into the market of manufactured products. From 1912 to 1921, most major ports observed an increase in the number of firms and in the varieties of manufactured products offered by domestic firms. For example, the decreased imports of cotton products in Tianjin were “largely filled by increasing importations of native grey goods and by the local production of cotton yarn and cloth.”³ Similarly, in Shanghai, originally the expansion of domestic industries “need time and patience”, but “a great and unlooked-for impetus was given to the movement by the Great War. The World’s trouble was China’s opportunity.”⁴ Contemporary scholars referred to WWI

²China Maritime Customs. Decennial Report 1912-1921, vol.1, page 141-142.

³China Maritime Customs. Decennial Report 1912-1921, vol.1, page 141.

⁴China Maritime Customs. Decennial Report 1912-1921, vol.2, page 26.

Figure 4.2: Import Price of Shirtings and Sheetings, 1901 to 1921

Source: Hamashita (1989).

Figure 4.3: Share of Manufactured Products in Total Import, 1901 to 1932

Source: Hamashita (1989).

and the inter-war period as the first boom of China's domestic industries (Liu, 1940). These industries included cotton textiles, rubber, cigarettes, and matches. Although the whole sector was still small and less than 3 percent of the total GDP (Rawski, 1989, chapter 6), the domestic products acquired a considerable share in the domestic market. In 1913, 35.84% of the consumed yarn was produced domestically in China. By 1930 the number increased to nearly 100% (Fang, 1934, page 287). China even started to export its manufactured products, especially cotton products, during WWI.

Price Increase of Cash Crops

The war was likely to increase the price of cash crops, especially domestic raw cotton. Originally, the Chinese cotton was short-staple and not suitable for manufacturing production. Foreign domestic firms chose to import long staple cotton from the US and Egypt later. However, domestic textile firms mixed the Chinese cotton and the US cotton to lower their cost.

In this case, since the booming domestic industries tended to use domestic raw cotton, the war increased demand for the Chinese cotton. The price information from China Maritime Customs supported this claim. Figure 4.4 shows that the price of raw cotton gradually increased during WWI, from less than 20 *Haikwan* taels to nearly 30 *Haikwan* taels.

Meanwhile, the price of tea and silk also experienced price fluctuation during the war. It is reasonable to expect their price might have increased as well due to a shortage created by the war, but none of the silk or tea price increased as raw cotton price.

Limited Change in Price of Grain

A possible impact of the war shock would be the direct impact on grain prices. Although China was not a major importer of rice during this period, since the war created a nationwide shortage, it is possible that the shortage of food affected the world grain price and increased grain prices in China. However, studies on China's import prices and agricultural prices suggested that this channel was not likely to play a major role. China was not a major importer of rice or wheat. Brandt (1989) shows that during WWI, China's terms of trade decreased rapidly. The price of agricultural products was quite flat, while the prices of nonagricultural products rose dramatically. Figure 4.7 plots the import price of rice and export price of wheat. During the war years, except for a jump from 2 to 2.6 *Haikwan* Taels for wheat price, the international prices of grain were stable.

Figure 4.4: Export Price of Cotton (in *Haikwan* Tael), 1901-1932

Source: Hsiao (1974), pages 22-24, 117-119

Figure 4.5: Export Price of Black Tea (in *Haikwan* Tael), 1901-1932

Source: Hsiao (1974), pages 22-24, 117-119

Figure 4.6: Export Price of Silk (in *Haikwan* Tael), 1901-1932

Source: Hsiao (1974), pages 22-24, 117-119

Figure 4.7: Trade Price of Rice and Wheat (in *Haikwan* Tael), 1901-1932

Source: Hsiao (1974), pages 22-24, 117-119

Fig. 5 Shanghai rice prices (1911–1937)

Explanation: These were rice prices of secondary grade polished round-grained rice. The price unit of 1911–1935 was “yinyuan/shishi”, and the unit of 1936–1937 was “yuanfabi/shishi”. For details of changes of monetary unit and adjustment of rice prices into unified monetary unit, see Chapter 3.

Figure 4.8: Local Rice Price in Shanghai, 1911-1937

Source: Lu and Peng (2006).

The lack of nationwide price levels makes it difficult to provide a nationwide trend of grain prices, but local price series suggest that grain prices were relatively stable. For example, in Shanghai, China’s largest port, “the rice price was lower in 1913 [compared to 1912] because of good harvest. It ranges from 6.42 to 7.40 yuan/shi for the next six years. Stable and toward a lower trend.” This trend was broken in 1920, when “drought happened in the riverside of the Yellow river and flood happened in the Yangzi River next year...price increased to 9.61 yuan/shi to 9.68 yuan/shi.” (Shanghai Liangshi Zhi, 1995, Chapter 5.2.1) Similarly, the counties around Shanghai, such as Suzhou, Wuxi, and Changhai, also witnessed a relatively flat rice series between 5 yuan/shi to 7 yuan/shi before 1919 (Jiangsu Liangshi Zhi, 1993). The fact that counties around Shanghai had lower grain prices than Shanghai also suggests that the Yangzi Delta did not rely on imported rice from other countries.

Lu and Peng (2006) collected the rice price data from Monthly Bank Report, collected by the Shanghai Bureau of Social Affairs. In their data, the rice price rose from lower than 6 yuan/shi to 8 yuan/shi in 1915, then went down to around 7 yuan/shi until the sudden rise in 1920. The rice price does not experience a sudden jump during the war.

Figure 4.9 plots the price ratio of cash crops (tea and cotton) over grains (rice and wheat). Based on previous analysis, it is clear that the price ratio of cash crops and grains increased during the war years, especially the ones involving cotton. This might have created incentives for farmers to switch from growing grains to cash crops.

Figure 4.9: Price Ratios

Source: Hsiao (1974), pages 22-24, 117-119

4.3.3 WWI and the Chinese Economy: Narrative Evidence

Impact on the Industrial Sector

Since imports mainly affected the manufacturing sector, changes in trade flows also connected to domestic manufacturing employment. China's domestic industries started to develop along with its globalization process. Official efforts to stimulate industrialization started in the mid-nineteenth century, yet most efforts failed due to shortages of funds, low productivity, and inefficient management (Perkins, 1967). The treaty of Shimonoseki in 1895 allowed foreigners to set up factories in China's ports. This brought in foreign capital, banks, and the first rapid expansion in the industrial sectors. Most of the factories were foreign-owned and also introduced advanced technology and modern management skills. In 1891, the number of foreign firms in the ports was 547. The number increased to 1102 in 1901, 2863 in 1911, and 9511 in 1921.⁵ The establishment of the Republic of China (ROC) in 1912 further encouraged the form of domestic modern firms.

Industries were not evenly distributed in China. Instead, ports and coastal counties were likely to have more industries for several reasons. First, ports have better pre-

⁵China Maritime Customs. Decennial Report, 1882-1891, 1892-1901, 1902-1911, 1912-1921, Appendix, Population Table; published in 1893, 1906, 1913, 1924.

conditions than inland counties. For example, they had better access to foreign firms, because the Treaty of Shimonoseki in 1895 allowed foreigners to set up firms in ports. As a result, ports were more likely to generate positive spillover of technology to the domestic firms. Ports also had better access to transportation. Besides water shipping, rail lines also picked ports as their stations. Some scholars also argue that the legal system and the protection of property rights were also better in the foreign settlements in ports (So and Myers, 2011).

Second, ports also tended to experience greater price shocks as a percentage of the long run price. The price of manufactured products was usually lower in ports than in inland areas, because of the internal shipping costs percentage from the ports to inland. Then when trade shocks increased the price of manufactured products, coastal regions also tended to experience greater percentage changes in price. Firms in ports thus faced higher price increases and received more profits. Potential entrants were also more likely to enter in the ports.

The Cotton Textile Industry

Among all the industries in China, the cotton textile industry was the leading one. In 1933, it contributed 36% of the total industrial output in China (Rawski, 1989, page 85). This industry boomed during WWI for several reasons. First, cotton products were a major component of China's imports. Before WWI 28.87% of China's imports were cotton products. This number is much higher than other leading imports, such as opium (7.2%) and sugar (5.63%).⁶ In addition, China mostly imported its shirtings (grey and white) from Great Britain. Thus, this is the industry most likely to receive the most severe supply shock and was likely to have the highest increase in local market prices. From 1913 to 1918 the import of cotton yarn dropped by 20 million Haikwan taels, which was nearly 30% of its original level of 71 million Haikwan taels, and the shirtings (grey and white) dropped by 12.4 million Haikwan taels, 37.5% of its original level of 33 Haikwan taels.

Second, there was a large market for cotton products, especially cotton yarn. Many of the rural residents in China used to purchase cotton yarn and weave cloth themselves. During the nineteenth century, inflows of foreign textile products undermined the traditional handicraft industry and forced many craftsmen to gave up spinning. Yet handicraft weaving was still popular in China because the cost of producing handicraft cloth was comparable with the cost of purchasing manufactured cloth. In 1913, 97.31% of the yarn consumed in China was by craftsmen. Only 2.69% was by modern factories.

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⁶Annual Reports of China Maritime Customs

The numbers changed to 78.46% and 21.54%, with the absolute value both increased by 200 million pounds (Fang, 1934).

Third, on the production side, cotton industries required a large input of labor, for which China had a clear advantage. The spillover of production technology from foreign countries and foreign firms helped to provide skilled labor and technology. Many of the domestic engineers in the cotton textile industries were trained in Tokyo Higher Technical School (Tomizawa, 2015). The increased price margin also made it profitable for firms to enter the industry. In March 1918, the Shanghai General Commercial Organization, on behalf of the Agriculture and Commerce Department, required textile factories to submit their detailed information. In their official letter, the General Commercial Organization stated that “since the outbreak of the European War, there was an increasing demand for cotton products. Cotton textile factories mostly earned remarkable profits.”⁷

The Impact on Rural Income

Although the impact on international trade was most severe in treaty ports, it might have affected rural regions as well. The first channel is through migration and rural factories. Many workers in factories in ports came from rural areas. For example, a large portion of workers in factories in Shanghai, which was located in South Jiangsu Province, originated from rural areas nearby, such as North Jiangsu, Anhui, Shandong, and Hubei (Perry, 1993). Starting from 1895, the industrialization and the rise of factories led to more population concentration in new industrial centers, the scale of migration to urban centers reached 3.5 million in lower Yangzi, 3.5 million in North China, and 1 million in upper Yangzi, where many of the migrants came from rural areas nearby. Many of the new industrial centers soon became large cities thanks to this migration and accompanying urbanization process (Cao, 1997).⁸ Note that unlike in modern countries, migration in the 1910s in China was largely restricted by transportation and information flows. The areas of the affected rural counties were very limited. People usually migrated to urban areas nearby.

In addition, rural handicrafts and factories also emerged in China in the early twentieth century. Grove (2006) documents the experience of Gaoyang, a county in North China famous for its rural textile industries. Rural families bought manufactured yarn to produce handicraft cloth (“nankeens”). Fang (1940) estimates the portion of modern

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⁷*Shen Bao*(Shanghai News), *Liyong mianye zhenxing zhi shiji* (Take advantage of the timing of a booming textile industry), March 3, 1918, pages 3-10.

⁸Northeastern China also experienced 4 million of migrants. This number is particularly large due to the industrial development in Northeastern China and its original closed migration policies. Most of the migrants come from other provinces rather than local rural regions.

industries and handicrafts in the textile industry given constant consumer preference. Rural handicrafts contributed more domestic consumption of cloth than domestic modern industries.

4.4 A Conceptual Framework

In this section, I present a simple theoretical framework that explains the potential mechanisms through which a higher price of textile affected the Chinese economy. The baseline framework of this analysis is a specific-factor trade model with two regions (rural or urban), two factors (labor or land), and three goods (manufactured goods, grain, or cash crops). The production of manufactured products takes place only in urban areas and requires only labor. I present the model then explain how each possible change would affected labor wages and land values in rural areas.

4.4.1 Setup

Consider a small open economy with two regions ($i = rural, urban$). Each region has two factors: labor (L) and land (T). The initial factor endowment of each region is $\bar{L}^i$ and $\bar{T}^i$. The two regions use these two factors to produce manufactured goods (m), grain (rice or wheat, denoted using g), or cash crops (cotton c).

Assume the production of manufactured goods has constant returns of scale and only uses labor. The production of agricultural products has a Cobb-Douglas form and takes place in rural areas only. This gives the production function for the rural region ($i = r$)

$$\begin{aligned} y_g &= (L_g)^\alpha (T_g)^{(1-\alpha)}, \\ y_c &= (L_c)^\beta (T_c)^{(1-\beta)}, \end{aligned} \tag{4.1}$$

where y_k ($k = g, c$) denotes the production of m in the rural region. L_k and T_k are inputs for sector k .

In addition, the input market is clear. The total amount of labor is the sum of labor used in manufactures, grain or cash crop production. Similarly, all land is used in grain or cash crop production.

$$\begin{aligned} \bar{L} &= L_m + L_g + L_c, \\ \bar{T} &= T_g + T_c. \end{aligned} \tag{4.2}$$

Since I consider yearly change, land is not likely to adjust to trade shocks timely. As a result, $T_g = \bar{T}_g$ and $T_c = \bar{T}_c^r$. That is, the only mobile factor in rural area is labor.

The urban sector produces textiles using labor and raw cotton from rural areas. The production function is

$$y_m = A(L_m)^k y_c, \quad (4.3)$$

where A measures technology for the urban manufacturing sector.

Below I discuss different scenarios that present different channels through which the trade shock might have affected the Chinese economy.

In perfectly competitive factor markets, the wage equals labor's value of marginal product and rent equals land's value of marginal product

$$\begin{aligned} w_m &= p_m y_m = p_m A k L_m^{k-1} y_c \\ w_g &= p_g y_g L = p_g \alpha (L_g)^{\alpha-1} (\bar{T}_g)^{1-\alpha} \\ w_c &= p_c y_{cL} = p_c \beta (L_c)^{\beta-1} (\bar{T}_c)^{1-\beta} \\ r_g &= p_g y_{gT} = p_g (1 - \alpha) (L_g)^\alpha (\bar{T}_g)^{-\alpha} \\ r_c &= p_c y_{cT} = p_c (1 - \beta) (L_c)^\beta (\bar{T}_c)^{-\beta} \end{aligned} \quad (4.4)$$

These equations imply

$$\begin{aligned} \Delta w_m &= \Delta p_m - (1 - k) \Delta L_m^u + \Delta y_c \\ \Delta w_c &= \Delta p_c - (1 - \beta) \Delta L_c \\ \Delta r_c &= \Delta p_c + \beta \Delta L_c \\ \Delta w_g &= \Delta p_g - (1 - \alpha) \Delta L_g \\ \Delta r_g &= \Delta p_g + \alpha \Delta L_g. \end{aligned} \quad (4.5)$$

where $\Delta x = \frac{dx}{x}$. The change in cotton production is also determined by changes in cotton inputs $\Delta y_c = \beta \Delta L_c$.

Similarly, the price of raw cotton is equal to its marginal value product. That is, $p_c = p_m y_c = p_m A k L_m^{k-1} y_c$. Take the log and differentiate, and

$$\Delta p_c = \Delta p_m + \Delta L_m. \quad (4.6)$$

As a result, the price of cotton is set by the international price of manufactured products. Wages and rents in cotton producing areas are in fact determined by world prices of manufacturing products.

I further assume that agricultural wages are the same in grain and cotton sectors ($w_g = w_c$). That is, labor moves freely in rural sectors to find a job. The rents for grain and cotton land, however, are not necessarily the same because land is not mobile. The equation gives

$$p_g \alpha (L_g)^{\alpha-1} (\bar{T}_g)^{1-\alpha} = p_c \beta (L_c)^{\beta-1} (\bar{T}_c)^{1-\beta}. \quad (4.7)$$

Take the log and differentiate, one will have

$$\Delta p_c - \Delta p_g = (1 - \beta) \Delta L_c - (1 - \alpha) \Delta L_g. \quad (4.8)$$

This is a partial equilibrium framework with no assumptions on consumers' preference. The price of manufactured products (p_m) and agricultural products (p_g) are exogenous. The only endogenously set price is the price of cotton p_c .

The trade shocks increase the price of manufactured products ($\Delta p_m > 0$) with no impact on the price of grain ($\Delta p_g = 0$).

In historical China, the migration cost between rural and urban China was relatively high. Although anecdotal evidence suggests that labor migration existed in counties around Tianjin and Shanghai (Taylor, 1928), the size should still be small. As a result, below I consider two extreme scenarios. First, labor is not mobile at all across rural and urban areas. Second, labor is fully mobile across rural and urban areas. I will show that both scenarios lead to similar conclusions in comparative static analysis.

4.4.2 Scenario 1: No Labor Migration from Rural to Urban Areas

The first scenario allows no labor migration from agricultural to urban areas. In this case, $\Delta L_g = -\frac{L_c}{L_g} \Delta L_c$. Substitute from 4.8, and the amount of labor used in cotton producing land is determined by p_c

$$\Delta p_c = (1 - \beta) \Delta L_c + (1 - \alpha) \frac{L_c}{L_g} \Delta L_c \quad (4.9)$$

Since $\Delta L_m = 0$ and equation 4.7 gives $\Delta p_c > 0$, then $\Delta L_c > 0$. Thus, increase in manufactured products increased the price of raw cotton and labor used in cotton production increased.

This result also suggests that $\Delta L_g < 0$, the labor used in grain production decreased. With the information above, one would have

$$\begin{aligned}\Delta w_c = w_g &= -(1 - \alpha)\Delta L_g > 0 \\ \Delta r_g &= \alpha\Delta L_g < 0 \\ \Delta r_c &= \Delta p_c + \beta\Delta L_c > 0\end{aligned}\tag{4.10}$$

The increase in the price of raw cotton attracted labor from grain production to cotton production. This increased the marginal value of land (i.e. rent) in cotton producing sectors but decreased the marginal value of land (i.e., rent) in grain producing sectors. Although more labor worked in cotton land, their marginal value was still greater than before, which increased labor wages in rural areas. Cotton production increases as well.

4.4.3 Scenario 2: Allow Labor Migration from Rural to Urban Areas

Consider the second scenario where labor is fully mobile across rural and urban areas. In this case $w = w_m = w_c = w_g$. The trade shock increased price in manufactured sector ($\Delta p_m > 0$).

Combine equation 4.7 and 4.8, one gets

$$\Delta p_m + k\Delta L_m = (1 - \beta)\Delta L_c - (1 - \alpha)\Delta L_g.\tag{4.11}$$

Use the condition that $\Delta w_m = \Delta w_c$, one can also get

$$\Delta p_m - (1 - k)\Delta L_m + \beta\Delta L_c = -(1 - \alpha)\Delta L_g.\tag{4.12}$$

As a result, $\Delta L_c = \Delta L_m$.

In addition, $\Delta L_g = -\frac{(1-\alpha)(L_c\Delta L_c + L_m\Delta L_m)}{L_g}$. Substitute from 4.12, and

$$\Delta p_m = \left(1 - k - \beta + \frac{(1 - \alpha)(L_c + L_m)}{L_g}\right)\Delta L_m\tag{4.13}$$

Only when $k + \beta > 1 + (1 - \alpha)\frac{L_c + L_m}{L_g}$, the scale term is less than zero. If this condition holds, it requires that labor is the determinant factor in manufacturing and cotton production. In addition, the total labor used in these two sectors are very small so $\frac{L_c + L_m}{L_g}$ is small. Considering China's reality, this is an extreme condition that is unlikely to hold. In fact, since $k + \beta$ are both output elasticities in the Cobb-Douglas production function for labor, both k and β are likely to be smaller than 0.5.

As a result, $\Delta L_m > 0$ and $\Delta L_c > 0$. A higher price of manufactured products attracted labor into the manufacturing and cotton producing sector. This also increased rent in the cotton producing sector ($\Delta r_c > 0$). Meanwhile, the grain sector loses labor ($\Delta L_g > 0$) and rent in this sector decreased ($\Delta r_g < 0$).

Since marginal product value of labor in the grain producing sector increased, the overall wage level increased as well.

4.4.4 Predictions

Given previous analysis, An increase in the price of textiles expands the textile sector and increases demand for raw cotton and rural wages. These results hold no matter whether labor is mobile or not.

Prediction 1 Rural labor wages in both cotton producing and grain producing areas increased, due to the expansion of cotton producing region and increased demand for labor from urban industries.

Prediction 2 Rural land values increased in cotton producing areas.

Prediction 3 Rural land values decreased in grain producing areas.

4.5 Data

4.5.1 Textile Firms

To illustrate the rise of domestic manufacturing industries with limited data, I use both firm-level information of textile firms and detailed trade records. The firm-level information comes from the Reports of Statistics on Agriculture and Commerce Starting from 1912, the Ministry of Industry and Commerce of the National Government required all magistrates to report statistics on local industries and commerce. After 1913, investigation started to cover information on agriculture, forestry, fishery, and pasturage. The ministry received data from county-level government and compiled the information into one volume. The reports have ten volumes in total and cover the years 1912 to 1921.

This dataset contains rich information on agricultural production, industrial sectors, and indicators for commercial activities. For example, for agricultural production and forestry, it covers overall arable land, crop types, provincial-level output and production area for major crops. For industrial sectors the report includes number of factories opened each year, input and output information for each type of industries in each province, number of corporations and charters. It also has a detailed description for

the financial sector, such as balance sheet for banks, insurance companies (county-level), credit unions (county-level), and pawn shops (county-level).

Despite its large coverage, these data are seldom used in rigorous quantitative analyzes because scholars are fully aware of several drawbacks. First, in the published version, most reported information is aggregated to the provincial level. There is little county-level data on specific types of agricultural products or specific industries. Second, after 1916, since the southern western provinces rose against the central government, they refused to report their local information. In the last issue in 1921, only six provinces (Henan, Shanxi, Jiangsu, Anhui, Shaanxi, and Chahar) handed in their reports to the central government. Third, given the chaotic situation and decentralized government structure in China during this period, one concern is about the quality of the data. Local government probably did not have enough budget to cover all their jurisdictions. Given these drawbacks, I only use information from this dataset as supportive evidence and deal with the incomplete coverage issue by comparing changes within provinces or counties.

Since the textile industry became increasingly important during WWI, the report covered firm-level information for the textile factories since 1916. For each factory, the survey lists the factory's location (province and county), name, rough address, paid capital, power source, power, coal consumption, number of spindles, number of workers (male and female), maximum and minimum wage for workers, workdays, working hours per day, input (raw cotton, quantity and value), and output (quantity and value). For example, in 1916, the first firm listed is the Sanxin spinning factory. It is located in Yangshupu street, Shanghai, Jiangsu. The paid capital was 2,250,000 *yuan*. It has two steam engines that provided 1500 horsepower. It had 65520 spindles, with 1230 male workers, 3300 female workers, and 60 workers for miscellaneous affairs. It consumed 16000 tons of coal in 1916. The highest wage for male worker is 0.6, for female worker is 0.5; the lowest wage for male worker is 0.2, for female worker is 0.15. The factory ran for 300 days with 22 hours per day. The input quantity was 7,869,000 *jīn* with 2,358,000 *yuan*. The output is missing. I digitize this record from 1916 to 1919, with 136 observations and 63 firms in total. Half of the firms were observed more than once. Table 4.1 reports the number of spindles at firm level and group by county. The average number of spindles in each firm is nearly 20,000, although some firms only have 100 spindles. After grouping by county, the average number of spndles is 14952.06, with the variation is 23970.61.

Table 4.1: Number of Spindles

Variable	Mean	Std. Dev.	Min.	Max.	N
spindle (firm level)	19676.886	17924.2	100	90000	123
spindle (group by county)	14952.06	23970.61	0	90	142

4.5.2 Rural Wages and Land Values

To examine the impact on rural economy, I use the farm rural wage indices and land values indices as the outcome variable. The theoretical model discusses the impact on rent. In the actual analysis, due to lack of rent information, I use land values in the actual analysis. With rent can be viewed as a proxy for marginal returns to land, land values are likely to capture the impact on long-term average returns. The predictions for rent still hold if I change the outcome variable as land values.

The rural wage and land data come from a nationwide survey by John Buck, who was a professor in the Department of Agricultural Economics at Nanking University from the 1920s to the 1940s. He started a field survey project to examine multiple aspects of Chinese society in the 1920s, asking his students to conduct surveys near their hometowns during their vacations. By 1933 he and his students had already completed a nationwide dataset involving 16,786 farms and 38,256 farm families in 22 provinces, which covered most of the populated area. The survey includes many variables describing climate, population, agriculture, health, farm labor and other variables related to farm production (Buck, 1937). The original survey was at the household level, but only the county level statistics were published and are still available. It ranges from 1901 to 1933, covering 104 counties in 18 provinces.

The land value indices and labor wage indices were collected from recalled information.⁹ In the published data, the value in each county was normalized relative to the value in 1926. In the regression analysis, I take logs and use county-level fixed-effects to take account of the impact of normalization in each county.¹⁰

Table 4.2, Table 4.3, and Figure 4.10 report the descriptive statistics of the input prices index. The basic statistics are generally similar across different production areas. However, some areas had larger standard deviations, which suggests the existence of heteroskedasticity in different areas. The general trend shows that both land prices and labor wages increased over time.

The survey is considered to be of high quality and is widely used by other scholars (Myers, 1970; Brandt, 1989). However, it does have some weaknesses in terms of

⁹For two counties (Gaolan in Gansu and Tonglu in Zhejiang), there are two observations for each year.

¹⁰One limitation of the data is that there are some missing values in their report. Since all the missing values are missed continuously, it minimizes the impact of this problem.

representativeness. Since students who were able to go to college in early twentieth-century China came from relatively wealthy families and had better transportation access, the sample groups may be more responsive to trade flows.

Table 4.2: Summary Statistics on Land Price

district	mean	sd	max	min	count
Spring Wheat	77.0732	28.21	150	8	205
Winter Wheat-millet	88.6241	35.7842	321	15	423
Winter Wheat-kaoliang	68.7269	32.2746	199	16	520
Yangzi Rice-wheat	79.3902	37.5098	201	11	387
Rice-tea	84.6073	26.76	192	31	354
Sichuan Rice	74.3621	27.7151	150	17	116
Double Cropping Rice	85.8409	23.7903	157	32	220
Southwestern Rice	97.6	59.7519	353	18	155

Table 4.3: Summary Statistics on Labor Wages

district	mean	sd	max	min	count
Spring Wheat	98.7919	26.7464	175	19	197
Winter Wheat_millet	88.9148	42.7346	661	25	399
Winter Wheat_kaoliang	83.2075	43.5035	319	17	535
Yangzi Rice-wheat	88.0458	28.5046	193	30	371
Rice-tea	84.1307	26.5611	200	25	352
Sichuan Rice	110.232	51.2833	225	40	69
Double Cropping Rice	84.8015	24.6369	179	32	136
Southwestern Rice	79.3714	37.8907	183	19	175

4.5.3 Distance

Figure 4.11 depicts the location of treaty ports and the examined counties. I use distance from each county to its closest port to measure the access to international trade. The distance is calculated based on information from the China Historical Geographic Information System (CHGIS). This database provides county-level longitude and latitude information on the years 1820, 1911, and 1990. I calculate the distances using data in 1911. Table 4.4 shows the distribution of distance from each county to its nearest port. Nearly half of the examined counties had their closest ports located within 100 kilometers. About twenty percent of the counties were farther than 300 kilometers from their closest ports.

Figure 4.10: Average Input Prices

Source: Input prices come from Buck (1937). Agricultural commodity price index comes from Brandt (1989)

Figure 4.11: Location of Ports and Sampled Counties

Table 4.4: Summary of Distance to Closet Ports (in kilometer)

Distance range	<100	100-200	200-300	300-400	400-500	>500
Number of counties	46	24	19	9	4	4

4.5.4 Trade Records

The records of trade values come from the annual reports of the China Maritime Customs. China Maritime Customs was a government agency that was operated by British officers. Its main task was to collect tax revenues from China's international trade. For every year, it published detailed records on foreign trade of China, including the quantity and value of each traded commodity, tax revenue, and descriptions and socioeconomic characteristics at each port. The aggregate level information is widely used in studies on Chinese history. Recently, a group of researchers start to use sub-national information in quantitative analysis, such as the total trade flows of each port (Keller, Li and Shiue, 2011, 2012, 2013) or national commodity-level trade flows (Yan, 2008; Mitchener and Yan, 2014), but no one has used the most detailed records in economic analysis: commodity-level trade flows of each port.

I use both aggregate data on major commodities calculated by Hsiao (1974) and port-level trade flows on cotton products. Current information on shirtings covers from 1902 to 1931, and on cotton yarn and domestic cloths covers from 1902 to 1922. In the future, I will collect all information from 1902 to 1931.

4.6 The Impact on Textile Industry

There is limited information on manufacturing sectors in China before 1920. I combine data from multiple sources to illustrate the development of manufacturing sectors in China during WWI. The first set of evidence comes from a direct measure of textile firms from the Report of Statistics on Agriculture and Commerce. From 1912 to 1921, the Ministry of Industry and Commerce of the National Government required all magistrates to report information on local industries and commerce every year. Since the textile industry became increasingly important during WWI, the report started to include firm-level information on textile factories since 1916. I use these data to examine expansion of the textile industry within firms and within counties.

Many industries developed during and after WWI. The largest was the cotton textile industry (Rawski, 1989). People were particularly enthusiastic about the cotton industry because “the cotton-spinning industry is the one that appeals strongly to the Chinese imagination as a first step in the industrial development which will make them independent of foreign imports.”¹¹ In the current draft, I use this industry as an example to examine how trade flows changed after WWI, but the analysis will be expanded to other industries in the future.

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¹¹China Maritime Customs. Decennial Report 1912-1921, page 24.

4.6.1 Evidence from Firm-level Information

The survey of textile firms allows me to examine whether textile industries experienced an expansion during and after WWI. According to the survey, both production areas and firms scale expanded during WWI. The number of firms increased gradually from 29 in 1916, to 33 in 1917, 36 in 1918, and 38 in 1919. The number of counties that reported having textile industries stayed the same from 1916 to 1918, but grew by two counties in 1919.

I also find that the expansion took place not only across firms but within firms as well. To examine whether individual firms expanded from 1916 to 1919, I run the following regression

$$y_{kt} = \sum Year_t \beta_t + \gamma_k + \epsilon_{kt}, \quad (4.14)$$

where y_{kt} is the outcome variable, such as output value and number of spindles. $\sum Year_t$ is a set of year dummies. For fixed-effects, I first control for firm fixed-effects to examine changes in the outcome variable within each firm over time. I then replace firm fixed-effects with county fixed-effects to allow for an increase in the number of factories within each county. This regression aims to capture changes in output and input of the textile factories during the war.

Table 4.5 reports the regression results that examines how the output value and the number of spindles changed during the examined period. Columns 1 and 2 suggest that from 1916 to 1919, total output values increased both in firms and in counties. Column 5 and 6 show that the percentage of increase was 84.6% within firms (not statistically significant) and 112.2 % within counties. It indicates that new firms entered the market while old firms were expanding. The coefficients for the number of spindles is positive but not statistically significant. Note that all the products are measured in Chinese currency, which is silver based. Since silver appreciated relative to gold in the examined period, this result could serve as a lower bound for the real increase in output value.

How firms' names changed over time provides additional information. In 1916 and 1917, only two firms were "spinning and weaving" factories, while all other firms were "spinning" factories. In 1919, more than half of the firms referred to themselves as "spinning and weaving" factories. Similarly, in 1916, only one firm referred to itself as a "corporation", while in 1919, the number is ten, and some others were designated as a "limited liability corporation." Since being a corporation required a charter from the central government, these changes suggest that the textile factories enriched their operation types from simply spinning to both spinning and weaving. In general, the scale of textile factory operations were expanding during the war.

Table 4.5: The Growth of Textile Industries

VARIABLES	(1) output value	(2) output value (in dollar)	(3) spindle	(4) log(output)	(5) log(output) (in dollar)	(6) log(spindle)
year=1917	0.700** (0.336)	0.721** (0.321)	909.7 (1,147)	0.458 (0.451)	0.723 (0.451)	-0.0194 (0.0412)
year=1918	0.565* (0.326)	0.899*** (0.308)	1,134 (1,680)	0.382 (0.625)	0.849 (0.625)	-0.0260 (0.0477)
year=1919	1.434*** (0.506)	1.886*** (0.521)	2,369 (1,778)	0.846 (0.549)	1.411** (0.549)	0.0180 (0.0480)
Constant	0.891*** (0.326)	0.308 (0.308)	14,866*** (1,680)	13.81*** (0.625)	-0.661 (0.625)	9.706*** (0.0477)
Observations	120	120	122	119	119	122
R-squared	0.826	0.796	0.980	0.906	0.907	0.997
Firm FE	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parenthesis. Output values are in million *guan* or million dollar.

4.6.2 Evidence from International Trade Flows

Since the firm-level information only reports selected firms, I also use trade flows to measure the development of the manufacturing sector. If new industries developed during WWI, I should observe an increase in net exports of manufactured products (or a decline in net imports). On the other hand, if the War just blocked imports from Europe but then increased trade with Japan and the US to compensate, or did not lead to sectoral changes, I should not observe any increase in the net exports of manufactured goods.

Aggregate Trade Flows

I first examine overall trade flows in the cotton textile industry. Figures 4.12 and 4.13 list changes in imports and exports of manufactured cotton products. Figure 4.12 shows that before WWI, imports of cotton manufactured goods rose steadily, yet after the war, there was a dramatic drop in the imports of cotton manufactured goods: cotton yarn and manufactured cloth. At the end of the examined period, the levels were less than one fourth of the original levels. Meanwhile, as Figure 4.13 shows, exports of cotton manufactured goods increased after the war began. For cotton piece goods, the value started from nearly zero but soon increased to 15,000 *Haikwan* taels. A similar trend happened for cotton yarns. The change in cotton price also supports the claim that cotton industries developed during the war years. Figure 4.14 displays the import price of cotton from 1882 to 1921. During the war years, the price of cotton was low at first, yet it increased rapidly and reached a high level. This is consistent with a rise in demand for cotton, as the ingredients of cotton products, increased in China from 1914 to 1918.

Figure 4.15 provides supportive evidence using trade flows of commodities related to the cotton industry. Besides the expansion in cotton export, there was also an increase in the import of textile machinery, which indicates a higher demand for machines for textile production after the war. Similarly, as an input in cloth production, the import of aniline dyes also expanded. Both facts support the narrative that the cotton industry grew rapidly after WWI in China.

Empirical Evidence using Port-level Information

I then use disaggregate trade information to explore the change in trade patterns in each port before and after WWI. For each commodity, I run the following regression

$$\log(Y_{jt}) = \rho_0 + \rho_1 POSTWWI_t + \rho_2 \times Trend_t \times POSTWWI_t + \rho_3 Trend_t + \delta_j + u_{jt} \quad (4.15)$$

Figure 4.12: Imports of Cotton Products

Figure 4.13: Exports of Cotton Products

Figure 4.14: Import Price of Cotton, 1882 to 1921

Figure 4.15: Imports of Inputs for Cotton Industries

where Y_{jt} is the trade value of a particular commodity. By taking the log, I can examine the percentage change of the traded value. $POSTWWI_t$ is a dummy that is equal to one after 1919. If the war led to a rise in the manufacturing industries in China, I should observe ρ_2 is positive for the export value of cotton products; it will be negative for the import value of cotton products.¹²

Table 4.6 shows regression results for imports of cotton yarn, exports of domestic cloth (“nankeens”), and imports of a major type of foreign cloth (“shirtings, grey, plain”). All regressions control for port-level time-invariant characteristics. Column (1) to Column (3) compare the average trade flows before, during, and after the war. The value of cotton yarn imported and foreign plain shirting imported after the war decreased by 34.8% and 29.0%, separately. In contrast, the value of domestic cloth exported increased by 21% during the war and 61.1% after the war. Column (4) to Column (6) show how the time trends changed before and after WWI. Both imports of foreign cotton yarn and foreign cotton piece goods experienced a dramatic drop in the time trend. The import value of cotton yarn had a moderate 1.49% growth rate per year prior to the war, while it dropped by 7.81% per year during the war, and decreased at a 33.6% annual rate after the war. Imports of cotton piece goods were flat from 1901 to 1913, and stayed flat during the war years and then dropped at an annual rate of 15.2% per year after the war. Domestic cotton production increased over time at an annual growth rate of 4.63% but there was no statistically significant change in the growth rate after the war. These results show that overall major net exports increased dramatically during and after WWI. It suggests that the war led to a trade disruption that had additional impact after the war was over. It supports the hypothesis that the temporary shock led to an expansion of the textile industry.

4.7 The Impact on the Agricultural Sector

The previous section shows that the war shock was likely to stimulate local industries that were located in urban areas. Yet, despite the evidence that the textile industry was expanding during the war, the impact on the rest of the Chinese economy is still unclear. Since the majority of the population lived in rural areas, a booming industrial sector did not imply welfare increase for most of the population. In fact, a booming industry might have affected rural areas nearby in different directions. First, it might have increased rural input prices through increased demand for rural labors or production ingredients.

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¹²Current regression function only considers changes in national shock and estimate how time trends of trade flows for each commodity change. In the future, I plan to include port characteristics in my analysis, such as the nationality of foreign settlement in each port, number of foreign residents, and production. characteristics.

Table 4.6: Changes in Trade Flows

VARIABLES	(1) cotton yarn	(2) domestic cloth	(3) foreign cloth (grey shirtings)	(4) cotton yarn	(5) domestic cloth	(6) foreign cloth (grey shirtings)
POSTWWI	-0.348*** (0.129)	0.611*** (0.156)	-0.290*** (0.0745)	644.3** (289.1)	18.07 (334.9)	292.4*** (39.37)
WWI	0.0128 (0.0744)	0.210* (0.110)	-0.202*** (0.0719)	149.5* (76.42)	112.6 (115.1)	6.758 (70.40)
trend×POSTWWI				-0.336** (0.151)	-0.00939 (0.174)	-0.152*** (0.0205)
trend×WWI				-0.0781* (0.0399)	-0.0589 (0.0601)	-0.00360 (0.0368)
trend				0.0149 (0.0122)	0.0463** (0.0214)	-0.00543 (0.0139)
Constant	13.49*** (0.134)	8.378*** (0.197)	11.88*** (0.129)	-14.94 (23.21)	-79.87* (40.84)	22.23 (26.50)
Observations	720	583	1,030	720	583	1,030
R-squared	0.854	0.831	0.822	0.857	0.832	0.844
Port FE	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in parenthesis. POSTWWI is a dummy variable that is equal to one after 1919. WWI is a dummy variable that is equal to 1 when 1914≤ year ≤ 1919.

Second, it might have had possible crowding-out effects by attracting capital and labor from rural regions to cities.

In this section, I first examine the overall impact of the war on agricultural input prices, then provide suggestive evidence on the potential channels. From the theoretical analysis, the war was likely to increase rural labor wages but the effect depended on urban-rural mobility. Most of the effects would be on land values. It was likely to reduce land values in areas not suitable for cotton production and increase land values in other areas.

4.7.1 Rural Wages and Land Values

To examine the impact of WWI on rural income distribution, I first run the following regression and plot the coefficients.

$$\log(y_{it}) = \sum Year_t \gamma_{1t} + Dist_i \times \sum Year_t \gamma_{2t} + \alpha_i + \epsilon_{it}, \quad (4.16)$$

where $\log(y)$ is the outcome variable, including the labor wage index ($\log(w_{it})$) and the land value index r_{it} . $Dist_i$ is the distance from each county to its closest port. α_i captures county fixed effects. This regression examines whether counties close to ports and far from ports have similar trends.

Figure 4.16 and Figure 4.17 report the coefficients of year dummies when the dependent variable is the labor wage index. Figure 4.18 plots the calculated wage index for two representative counties. Through most of the period, labor wages in rural regions around the ports show a clear increasing trend, with the difference of labor wages across distance remain the same. The results indicate that labor wages were increasing in China overall and the war had little impact on the trend in labor wages.

Figure 4.19 and Figure 4.20 report the coefficients of year dummies when the dependent variable is the land value index. Figure 4.21 plots the calculated land value index for two representative counties with different access to international trade. Different from labor wages, farm land values in counties close to ports experienced several structural changes during the examined period. Before WWI, farm land values were increasing. The increased trend was cut by the war from 1914 to 1919. After the war years, farm land values continued to increase until 1928. Inland farm values were relatively stable. This result suggested that the war was associated with a reduction in inland values in counties close to ports. One possible explanation is the possible crowding-out effect, that is, newly booming urban areas attracted people and capital from rural farm land.

Figure 4.16: Changes in Labor Wages around Ports

Figure 4.17: Changes in Labor Wages Distance Increased by 1%

Figure 4.18: Predicted Trend of Labor Wages

Figure 4.19: Changes in Land Values around Ports

Figure 4.20: Changes in Land Values as Distance Increased by 1%

Figure 4.21: Predicted Trend of Land Values

4.7.2 Disentangling the Effect on the Agricultural Sector

The previous results suggest that, after the war, labor wages increased slightly around the ports while land values in counties close to port decreased. I then use information on agricultural products and soil suitability to disentangle the potential mechanism through which WWI to affect the agricultural sector. Based the theoretical analysis,,

I use two specifications. The first specification uses WWI as time dummies to examine its impact on land values and labor wages of counties with different soil suitability. The timing of the war is exogenous to change in land values and labor wages. However, the results may include many other potential mechanisms that took place with the war at the same time. To address this concern, I control for county-level fixed-effects and national shocks. In the second part the analysis, I also group firm-level information and create a county-level measure of textile firms. I examine how land values and wages responded to changes in the number of spindles in each county. This method may raise concerns about endogeneity. For example, firms might only have located in areas with low cotton prices. If this is the case, the estimation results will be bias against finding effects.

The first specification is

$$\begin{aligned} \log(y_{it}) = & \beta_0 + \sum \beta_j \text{Soil}_{ij} \times \text{WWI} + \sum \gamma_j \text{Soil}_{ij} \times \text{Dist}_i \times \text{WWI} \\ & + \lambda \text{Dist}_i \times \text{WWI} + \alpha_i + \eta_t + \epsilon_{it}, \end{aligned} \quad (4.17)$$

for county i at time t , and $j = \text{Cotton}, \text{Tea}, \text{Rice}, \text{Silk}, \text{Textile}$. In this equation, y is the wage index and the land value index. *Cotton*, *Tea*, and *Rice* stand for soil and climate suitability for production, gathered from the FAO GAEZ data set. *Silk* and *Textile* are dummy variable, capturing historical production centers, collected from Guo (1990). *WWI* is a dummy variable that is equal to 1 after the year 1914. This equation examines whether counties with different soil suitability perform differently after WWI. I expect the coefficient λ to be negative for labor wages, suggesting that counties close to ports have higher wages. The coefficient β_{cotton} is positive and β_{rice} is negative for land values.

Tables 4.7 and 4.8 report the regression results. The coefficients that are not interacted with distance indicate how input prices changes in counties close to ports, while the ones interacted with distance show the difference between counties close to ports and counties faraway.

In Table 4.7, the coefficient of $\text{dis} \times \text{wwi}$ is -0.00163 and statistically significant, indicating that the labor wages were higher in counties close to ports than counties far

from ports. As distance increased by 100 kilometers, wages changed by 0.16%. The coefficients of $cotton \times wwi$ is not statistically significant from zero and the one of $rice \times wwi$ is -0.102 and statistically significant, which suggest a drop in labor wages for 10.2%. Note that the comparison group is counties close to ports but not suitable for cotton or rice production, the results do not suggest an absolute changes. Instead, it suggests that labor wages for counties suitable for rice production tended to be lower than other counties. In other words, farmers on rice lands were relatively worse off. Counties producing other exports, such as tea and silk, did have experience increased labor wages either.

Table 4.8 show that the war might have had greater impact on land values. First, for counties close to ports, both cotton and silk producing regions observed a rise in land values. The coefficient suggests that a county suitable for cotton production would have 20% higher land values than a county not suitable for common crops. The impact on silk producing regions is even more significant, with a 24.8% increase in land values. Since cocoons do not need agricultural land, this may suggest the positive impact on the production of mulberry trees.

The land values in rice producing regions were 16.1% lower after the war. This is consistent with the theoretical prediction that farm workers might have moved to cash crops from subsistence food. In addition, the interaction term between cotton, distance, and the war shock is negative and statistically significant. It indicates that the positive impact on land values diminished as the distance to port increased.

To examine the effect directly due to the expansion of textile firms, I use measures of firm scale to replace the war dummies and run the following regression

$$\begin{aligned} \log(y_{it}) = & \beta_0 + \sum \beta_j Firm_{it} \times Soil_{ij} + \sum \gamma_j Firm_{it} \times Soil_{ij} \times DistTextile_{it} \\ & + \beta_3 Firm_{it} \times Cotton_i \times Rice_i \times DistTextile_{it} + \beta_4 Firm_{it} \times DistTextile_{it} \\ & + \alpha_i + \eta_t + \epsilon_{it}, \end{aligned} \tag{4.18}$$

where j is cotton or rice. $Firm_{it}$ is a measure of firm size, t ranges from 1916 to 1919. I group the firm-level information into county-level and use number of spindles because this variable has better quality and less missing observations in the data. $DistTextile_{it}$ is the distance to a closest textile producing county. The distance changes over time as more counties had textile industries. Other variables have previous definitions. All regression control for county fixed effects and national shocks.

The terms $Firm_{it} \times Cotton_i$ and $Firm_{it} \times Rice_i$ are the ones of interest. As the theoretical predictions suggest, more textile production would increase labor wages in

Table 4.7: Soil Suitability and Agricultural Wages

VARIABLES	(1) logwage	(2) logwage	(3) logwage	(4) logwage
tea×wwi			0.0589** (0.0278)	-0.00741 (0.0198)
cotton×wwi	0.164*** (0.0289)	-0.0445 (0.0275)	0.173*** (0.0294)	-0.0332 (0.0282)
textile×wwi			0.370*** (0.0999)	0.115 (0.0974)
silk×wwi			0.0586 (0.103)	0.0860 (0.0900)
rice×wwi	0.0596** (0.0252)	-0.108*** (0.0258)	0.0302 (0.0300)	-0.102*** (0.0289)
tea×dis×wwi			-0.0000262 (0.000212)	0.000212 (0.000159)
cotton×dis×wwi	-0.000182 (0.000158)	0.000344** (0.000138)	-0.000179 (0.000166)	0.000346** (0.000154)
textile×dis×wwi			-0.000635* (0.000333)	0.000269 (0.000345)
silk×dis×wwi			-0.000144 (0.000403)	-0.000332 (0.000335)
rice×dis×wwi	0.000137 (0.000183)	0.000474*** (0.000157)	0.000142 (0.000224)	0.000414** (0.000200)
dis×wwi	0.000638*** (0.000137)	-0.00150*** (0.000224)	0.000482*** (0.000178)	-0.00163*** (0.000297)
Constant	3.934*** (0.0717)	3.553*** (0.0707)	3.988*** (0.0807)	3.627*** (0.0817)
Observations	2,179	2,179	2,179	2,179
R-squared	0.579	0.748	0.590	0.753
County FE	Y	Y	Y	Y
Year		Y		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parenthesis. Distance is in 1 kilometers. WWI is a dummy variable that equals to one after 1914. *tea*, *cotton*, *rice* are standardized measures.

Table 4.8: Soil Suitability and Agricultural Land Values

VARIABLES	(1) logland	(2) logland	(3) logland	(4) logland
cotton×wwi	0.332*** (0.0304)	0.207*** (0.0295)	0.340*** (0.0339)	0.240*** (0.0338)
tea×wwi			0.0408* (0.0236)	0.00422 (0.0226)
textile×wwi			-0.00431 (0.0925)	-0.0421 (0.0710)
silk×wwi			0.384*** (0.120)	0.248*** (0.0923)
rice×wwi	-0.0723*** (0.0250)	-0.173*** (0.0318)	-0.103*** (0.0333)	-0.161*** (0.0356)
tea×dis×wwi			4.88e-05 (0.000244)	0.000210 (0.000220)
cotton×dis×wwi	-0.000964*** (0.000173)	-0.000737*** (0.000163)	-0.00110*** (0.000209)	-0.000930*** (0.000204)
textile×dis×wwi			-0.000623 (0.000414)	-0.000420 (0.000377)
silk×dis×wwi			0.000235 (0.000611)	0.000624 (0.000499)
rice×dis×wwi	0.000533*** (0.000202)	0.000894*** (0.000209)	0.000560** (0.000266)	0.000761*** (0.000269)
dis×wwi	0.00130*** (0.000185)	0.0000602 (0.000320)	0.00142*** (0.000241)	0.000444 (0.000380)
Constant	3.658*** (0.138)	3.216*** (0.145)	3.635*** (0.147)	3.229*** (0.143)
Observations	2,338	2,338	2,338	2,338
R-squared	0.560	0.672	0.571	0.679
County FE	Y	Y	Y	Y
Year		Y		Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are in parenthesis. Distance is in 1 kilometers. WWI is a dummy variable that equals to one after 1914. *tea*, *cotton*, *rice* are standardized measures.

cotton producing regions and grain producing regions. As a result, the two terms should be positive. The term $Firm_{it} \times Cotton_i \times Rice_i$ capture the effect for a region are suitable for both cotton and rice. The interactions terms with $Dist_i$ capture the effect as counties located farther from ports.

Table 4.9 reports the regression results. With only 123 observations, the estimations are likely to be inaccurate, so I only use them to provide suggestive evidence. The first three columns are the results for rural labor wages and the last three columns are the results for rural land values. For labor wages, the coefficients of $\#spindle \times cotton$ and $\#spindle \times rice$ are positive and statistically significant, suggesting a positive impact on wages in areas purely suitable for cotton production and rice production. If the number of spindles was 10,000, this is about 2% of the rural income. For land values, the coefficients are positive but not statistically significant. The workers benefited more is consistent with the fact that the manufactured sector is labor intensive.

4.8 Conclusions

This paper examines the impact of the First World War on the Chinese economy. As a major event largely exogenous to China's local economic conditions, the war shock largely affected international trade. For China, the shock largely increased China's import prices. Previous historians believe that this shock cut imports of manufactured products and stimulated the development of domestic industries.

Using firm-level information of textile firms, I find that the war benefited the manufacturing sectors in China, especially the cotton textile industry. This is consistent with the recent trend in literature that discuss the impact of war shock on industrial development. The growing trend continued even after the war. However, as narrative evidence suggested, the war shock was only part of the positive shocks that the Chinese industry received in the early twentieth century.

In addition, I also take advantage of variations in access to trade and soil suitability to examine the impact of this war shock on agricultural input prices. A growing industry is likely to have spill-over effects on agricultural areas nearby. The war shock itself might have affected the price of agricultural products as well. I find that, without considering soil suitability, the war was associated with lower agricultural land values in counties close to ports. Further examinations controlling for soil suitability suggest that the war-induced industrialization might have influenced agricultural input prices through multiple mechanisms, especially by increasing demand for labor and raw cotton. However, the impact was small and faded away quickly as counties located further to ports.

Table 4.9: Impact of Textile Firms on Land Values and Labor Wages

VARIABLES	(1) logwage	(2) logwage	(3) logwage	(4) logland	(5) logland	(6) logland
spindle	-0.000684 (0.000855)	-0.00477** (0.00183)	-0.00395** (0.00193)	-0.00169 (0.00121)	-0.00597* (0.00355)	-0.00591 (0.00410)
# spindle $\times$ cotton		0.00209** (0.000848)	0.00381 (0.00365)		0.00310 (0.00190)	0.00549 (0.00597)
# spindle $\times$ rice $\times$ dis			-0.0179 (0.0307)			-0.0249 (0.0433)
# spindle $\times$ rice		0.00262*** (0.000935)	0.000377 (0.00116)	0.00241 (0.00173)		0.00281 (0.00244)
# spindle $\times$ rice $\times$ dis			0.0218** (0.00970)			-0.00929 (0.0210)
# spindle $\times$ cotton $\times$ rice		-0.00119*** (0.000412)	-0.000878 (0.00130)	-0.00141* (0.000822)		-0.00261 (0.00198)
# spindle $\times$ cotton $\times$ rice $\times$ dis			-0.00371 (0.0142)		0.0151 (0.0200)	
Constant	3.978*** (0.0274)	3.979*** (0.0273)	3.979*** (0.0282)	3.507*** (0.0952)	3.504*** (0.0950)	3.504*** (0.0980)
Observations	123	123	123	124	124	124
R-squared	0.972	0.973	0.973	0.926	0.927	0.927
County FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y

*** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used. Spindles and distance are measured in 1000. *rice* and *cotton* are standardized measures.

This paper provides comprehensive quantitative evidence about the impact of WWI on the Chinese economy. Despite limited quantitative evidence, the paper shows that the war brought limited benefits to the Chinese economy and rural welfare. Compared to the experience in other countries, the findings suggest that trade protection by itself is not the sufficient condition for economic development. Other preconditions, such as patents, sufficient funds, and other institutional arrangement are also important.

Conclusion

Throughout its history China has witnessed numerous protests, periodic revolts, civil wars, and external war shocks. Yet, until recently, the economic history literature has largely ignored the violent components in Chinese history. Few careful statistical studies have examined the causes of China's riots and violence. These riots, however, potentially had large impact on economic development.

I study conflicts by separating them into four types: protests that requested relief or policy changes from the government, revolutionary activities that aimed at overthrowing the central government, civil wars that took place when China was divided into areas controlled by warlords, and external war shocks that affected China through international trade. I examine economic factors in these conflicts to understand how income shocks affected protests and revolutionary activities, and how civil wars and a World War fought far away affected the Chinese economy.

Chapters 1 and 2 study protests and revolts. The first chapter examines the impact of a tax reform on local protest in eighteenth-century China. The tax reform cancelled the head tax on peasants and with increased the land tax. The *de jure* purpose was to shift tax burdens from the peasants to elite land holders and stabilize the tax base. An analysis of panel data shows that this reform increased total annual frequency of conflicts by 0.3 protests per year. Although the *de jure* tax was imposed on the gentry, the panel analysis shows that the reform tended to increase protests by commoners rather than by the gentry. This result when combined with narrative accounts from the period implies that the gentry landholders were able to shift the burden of the tax reform to the commoners. The gentry were in a position to do so because many served as agents of the local government in villages and thus had the power to affect local government's decisions. Other records suggest that the gentry passed along the burden of the tax by increasing the rents charged on their lands. Commoners had low enough incomes that they were vulnerable to income shocks, and the shock from the tax burden shift increased the probability that they would protest in response to a variety situations whether connected to the tax reform or not. Chapter 2 studies the differences in

the impact of economic factors on protests for government policy changes and revolutionary activity to overthrow the central government during the last years of the Qing dynasty. One key difference between the two types of conflicts is that the costs to participants of revolutionary conflict were several orders of magnitude larger than the costs to protestors asking the government to change a policy. In this case, economic shocks that lowered income might have led to more protests seeking policy change because the costs of such protest were relatively low. Such shocks had the potential to lead to less revolutionary activity because the leaders could not accumulate enough resources to cover the costs of leading a successful revolt. In a panel data analysis I examine how price shocks in international commodity markets influenced protest and revolutionary activities in the areas where the commodities were produced in China. I find that positive income shocks increased the frequency of protests for government policy change while decreased or had no effect on the frequency of revolutionary activities.

Chapter 3 focuses on the economic impact of civil wars between warlords after the Qing dynasty was replaced by the tumultuous Republic. This was a typical setting during the transitions between major dynasties in Chinese history. China was divided into several regions and each region was controlled by a warlord or a political group. I construct a new dataset, including the location and time of these wars, to examine the impact of the civil war on trade activities and rural wages and land values. The results suggest that warfare in general decreased local trade activities, but the impact of the warfare varied by the power of the combatants. Wars involving groups that were more likely to occupy the capital and had control of the tariff revenue collected by the British had less negative impact on trade activities. Similar effects show up on land values and labor wages. The results suggest that powerful groups that had access to revenue streams were able to fight the civil wars in ways that protected the economic activities that were major sources of revenue for them.

Chapter 4 examines the impact of World War I on the Chinese economy. The war was fought in the rest of the world and did not involve China directly, but was likely to have an impact on China by influencing international trade flows into and out of the country. The War largely increased the freight rates in international trade and decreased China's imports of textiles from the European countries. I combine data from multiple sources to quantify the development of China's industrial sector and changes in agricultural input prices during and after the war. The firm-level information from the textile industries shows that the textile firms expanded during the war, and the trend continued long after the War ended. Using John Buck's survey on land values and labor wages across rural China, I find that the growing industrial sector also raised agricultural input prices by increasing demand for raw cotton and rural

laborers. However, the benefits were small and the impact was confined to the rural areas very close to the ports. The results suggest that the Chinese labor markets were highly fragmented in the early twentieth century in ways that prevented the shocks to international trade from spreading beyond the areas that were directly involved in the trade.

This dissertation is among the first studies that quantitatively examine different types of social conflicts in Chinese history. The evidence would enhance understanding about the Chinese history. Protests and revolts can be treated as *ex post* constraints on the dictator, and efforts to relieve famine were treatments to sooth people's anger. War shocks in the early twentieth century partially determined China's political situations later. In addition, my research also provides useful lessons for developing countries today. According to the Political Stability and Absence of Violence/Terrorism indicator from the World Bank, more than 90 countries today have weak political stability and are likely to have political-motivated violence (Kaufmann, Kraay and Mastruzzi, 2015). Historical China's experience would provide more empirical evidence for researchers that will help them understand the root of conflicts and their potential harms.

There are several aspects of the problem that are worth exploring in the future. For example, this dissertation does not address social control, such as military actions and moralizing, as prevention methods by the government to reduce conflicts. It does not consider potential interactions among conflicts. Protests that were allowed to fester might have led to gradually accumulated anger and finally turned to a revolution. A revolutionary might have also taken advantage of local people's dissatisfaction when they started a revolt. For civil wars the current investigation does not consider endogeneity in the choice of fighting locations and time. In addition, potential spatial effects are omitted as well, say, the diversion of trade from a fighting region to a peaceful region. Answers to these problems would further increase our knowledge for the process, development, and potential spillover of violent mass actions in Chinese history.

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