

Epidemics and Democratization: Historical Evidence from the Establishment of County Councils in China (1900-1949)

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Abstract: This study aimed to investigate the political impact of epidemics on democratic progress. We examined the occurrence of and deaths from epidemics and the subsequent establishment of county councils in China (1900-1949). We found that epidemics significantly promoted democratic change: 37.2% of the counties shocked by epidemics established local councils, among which 58.2% were established within two years following an epidemic outbreak. Meanwhile, only 8.5% of nonshocked counties established councils during 1900–1949. Accordingly, civil participation in local affairs induced by epidemics, substantial increases in political dissent, and the rise of “government by the people” consciousness are the possible mechanisms.

Keywords: epidemics, democratic change, county council, government by the people

JEL Codes: P48, N45, O10

I. Introduction

Various studies have indicated that economic shocks can present a window of opportunity for democratic improvement (Lipset, 1959; Huntington, 1991; Haggard and Kaufmann, 1995; Acemoglu and Robinson, 2006; Burke and Leigh, 2010; Brückner and Ciccone, 2011). Yet, no prior study has empirically demonstrated that democratic reform follows economic shocks. Recently, the COVID-19 epidemic, which broke out in late 2019, has aroused questions about social and political change, along with the recognition of government’s prominent role in managing public health crises.

Currently, there is insufficient systematic data for an empirical investigation of COVID-19’s effect on social and political change. Fortunately, however, historical data can help us see the political effects of epidemics over time. This study identified a positive relationship between epidemics and the establishment of county councils, which are recognized as China’s first attempt at democratic change, using decades of historical records related to epidemics and the establishment of county councils during the period 1900–1949 in China. We provide empirical

evidence showing that democratic improvements did in fact follow great shocks. A total of 37.2% of counties shocked by epidemics established local councils, among which 58.2% were established within two years following the outbreak. Meanwhile, only 8.5% of nonshocked counties established councils during the same period.

A critical concern when using ordinary least squares (OLS) and panel data analysis is endogeneity. Although the county-fixed and year-fixed effects in the above panel data analysis might capture the county-specific characteristics such as economic performance, urbanization and the general lack of ability to provide public goods, we might still worry about unobserved time-varying variables across regions that correlate with both epidemics and county-council establishment. The counterargument might be raised, for example, that epidemics and democratic change were both induced by floods (Lev, 1991; Chaney, 2013) or by China's prodemocratic civil wars during that period (Luo, 1958).¹ Historical treaty ports and historical economic performance might also be correlated with epidemics and democratic change (Lipset, 1959; Przeworski and Limongi, 1997; Barro, 1999; Przeworski et al., 2000; and Epstein et al., 2006; Burke and Leigh, 2010; Brückner and Ciccone, 2011). To address this, we first checked the correlation between epidemics/county-council establishment and the four abovementioned alternative explanations. Correlations were not found between epidemics and the four alternative explanations or between county-council establishment and the alternative explanations. We then used county-pair fixed effects approach, selecting counties shocked by epidemics and nonshocked counties that are geographically adjacent to the former and defining these counties as pairs. Counties in the same pair can be treated as similar in economic performance, transportation, culture, and other unobserved county-specific and time-varying variables such as extreme weather and civil wars. By controlling pair-fixed effects, most of the omitted variables can be absorbed.² Our county-pair

¹ These prodemocratic civil wars include the National Protection War, the Constitutional Protection War, and the fight against warlordism.

² We also used the instrumental variable (IV) approach, instrumenting the plague and cholera (plague and cholera account for 80.3% of the total number of epidemic outbreaks) by plague natural foci and floods during the years of the sixth global cholera pandemic (year 1919–1921, 1927, and 1932). Cholera epidemics in the early twentieth century in China were imported (Wu, 1934). Existing studies suggest that the outbreak of cholera was attributed to contaminated water (Ambrus et al., 2020) and accelerated by floods (Li et al., 1993). Thus, counties experiencing floods during the years of the sixth global cholera pandemic were more likely to suffer from cholera. The IV results confirmed a causal relationship between epidemics and democratic change (results will be provided by

fixed effects results are consistent with the OLS and panel data regression results, demonstrating a significantly positive effect of epidemics on democratic change.

Regarding the possible mechanisms, we gathered additional data and provide evidence that during epidemics, the civil participation rate in local affairs was higher and the incidence of political dissent was greater than during other periods, and an increased awareness of “government by the people” emerged among local people. Scholars have suggested that negative economic shocks can give rise to a window of opportunity for citizens to contest power. Once that window closes, autocratic regimes must make democratic concessions to avoid costly repression (Acemoglu and Robinson, 2001, 2006). This study’s findings are consistent with this conceptual framework by showing that epidemics increased the propensity for democratic participation by citizens.

The present work fits with the literature on economic shocks and democratic change. Many studies have posited a positive link between economic downturn and democracy (Geddes, 1999; Acemoglu and Robinson, 2001; Berger and Spoerer, 2001; Acemoglu and Robinson, 2006; Burke and Leigh, 2010; Brückner and Ciccone, 2011). Others, however, have argued that for much of history, democratization did not follow economic shocks, attributing the resilience of autocratic regimes to religious leaders’ “alliance with social hierarchy and oppressive government” (Lapidus, 1984; Israel, 2006; North, Wallis, and Weingast, 2009; Chaney, 2013). This study adds to this line of inquiry by providing evidence that epidemics can directly induce grassroots democracy by altering the balance of political power at the local level.³ To our knowledge, we provide the first empirical evidence that democratic reform follows great socioeconomic shocks.⁴ Recent work by Acemoglu et al. (2008, 2009) indicates that the relationship between economic shock and democratic improvement was absent when focusing on within-country variation using fixed-effect specifications. Our work differs from this literature in that it employs within-China county-level data to show a positive correlation between epidemics and democratic change and the results hold even using county-fixed-effect specifications.

request).

³ This democratic change was replaced by the socialist movement after 1949.

⁴ Burke and Leigh (2010) and Brückner and Ciccone (2011) found a positive correlation between extreme weather and democratic scores reported in Polity IV2. However, no empirical evidence is presented that democratic revolution or reform follows economic shocks.

Our work is also related to a number of attempts to uncover the endogenous institutional change induced by exogenous shocks. Institutional change can be endogenously or exogenously determined (North, 1990; Acemoglu et al., 2001). The exogenous institutional change is easy to be observed and demonstrated, such as the colonial origin of institutions (David Landes, 1998; La Porta et al., 1998, 1999; North et al., 1998; Acemoglu et al., 2001), and the divergent paths of North and South Korea, or East and West Germany (Ockenfels and Weimann, 1999; Aghion et al., 2010; Brosig-Koch et al., 2011). Regarding the endogenous institutional change, the recent literature focused on the dynamics following environmental changes that are exogenous to the institutions under study. Although scholars have shown some instances of endogenous institutional change induced by exogenous shocks (Hall and Taylor 1996, 1998; Berger and Spoerer, 2001; Greif and Laitin, 2004; Brückner and Ciccone, 2011; Chaney, 2013), there currently exists little data-based empirical research into this argument. Our paper is among the first to empirically demonstrate the democratic change induced by the arguable exogenous epidemics, by exploiting the variation in the timing of establishing county council and the epidemics during the period 1900 to 1949 in China. Additionally, this study examined three possible causal channels, which, to the best of our knowledge, is the first empirical analysis related to the bargaining process between the authorities and civilians during the shocks postulated by previous theories (Acemoglu and Robinson, 2001, 2006; Greif and Laitin, 2004).

The rest of this paper proceeds as follows. Section 2 provides a brief historical overview. Section 3 introduces the data sources and explains how we created the database. Section 4 presents our baseline results and empirically investigates four alternative explanations. Section 5 explores the mechanisms. Section 6 concludes the paper.

II. Background

A. County Councils in the Late Qing and the Republic of China

The county council was a county-elected legislative body. It undertook the legislation and policymaking of a county. Members of the councils were elected through local elections held every 4–5 years. This was viewed as “government by the people” (Chang, 1978, 1985).

County councils first appeared in China in 1909, after the beginning of the constitution

movement.⁵ Among the 676 counties with data available, 357 established county councils within the following six years. In 1915, all county councils were abolished as a result of the interruption of the constitution movement. The constitution movement reemerged in 1916,⁶ and county councils were reestablished in 145 of the 676 counties over the next 34 years (in this paper, we call this the reestablishment of county councils).

The establishment of county council was mainly driven by local elites (Esherick, 1998). Local elites could only enjoy some informal powers in the villages such as regulating disputes and assisting the government in collecting taxes in traditional China,⁷ and they were eager to promote the establishment of county council to turn their original informal power into formal power so as to protect their economic and political interests (Esherick, 1998). Meanwhile, due to the weakening of state capacity and threats of the westerners in the late Qing and the Republic of China, the local elites realized that the state had been unable to protect their hometown and local affairs must be managed by themselves (Wu, 1983; Chang, 1985). Nevertheless, the local government was not keen on or even opposed to the establishment of county council, since the county council has removed the legislative power from the county magistrate who originally had legislative, executive and judicial powers in himself (Ding, 1993; Esherick, 1998). The conflicts between the county council and the county government or even the provincial government to protect the rights of local people were common.⁸

⁵ The constitution movement in China began in 1909 with the promulgation of an edict calling for nine years' preparation leading to the establishment of a constitution. In 1909, provincial assemblies were elected in all provinces. The central government then stipulated that local county governments should start to establish county councils.

⁶ In 1915, Yuan Shikai abolished county councils and reinstated monarchy in China, with himself as the Hongxian Emperor. Yuan's attempt was unsuccessful. He was opposed by revolutionaries and also his subordinate military commanders. Province after province rebelled in what was called the National Protection War. Yuan reigned a total of 83 days. After Yuan's death, Vice President Li Yuanhong assumed the presidency.

⁷ In traditional China, a small number of local elites got the qualification to become bureaucrats through the imperial examination, while a large number of the local elites could only enjoy the above-mentioned informal powers in the villages.

⁸ As is recorded in Ningbo Archives (2012), in 1923, a conflict arose between the Yuyao County Council and Yuyao county government for collecting additional taxes. The magistrate of Yuyao and the provincial department of finance decided to collect an additional tax of 81500 yuan for dredging Caojiang River. Nevertheless, Yuyao County Council refused, believing that the fees had been solicited from the local people. Later Yuyao County Council wrote to the provincial government to deny the collection of additional tax.

The county level variations in whether and when the county council was established were great. This study focused on the reestablished county councils since the observations before 1916 are concentrated in 1911 and 1912, when the Imperial Qing was overthrown and the Republic of China was established through a constitutional revolution.⁹ Figure 1 shows the spatial distribution of the counties that reestablished county councils, and Figure 2 depicts the timing of the reestablishment of county councils, indicating a great variation in cross-county variation in the establishment of county councils over time.

B. Epidemics in China, 1900–1949

There were as many as 126 hugely destructive and deadly epidemics in China from 1900 to 1949 (Li and Zhou, 1991; Li et al., 1993), killing an estimated 3–10 million people (Zhang, 2006), which is even higher than deaths from flooding (Xia, 2000). We collected the times of and number of deaths from epidemics during 1900 to 1949 for 676 counties,¹⁰ which account for 33.5% of the total number of counties in the Republic of China (1912–1949) and about 70% of the total population during the sample period.¹¹ Among the 676 counties in our sample, 43.8% suffered from these epidemics (see Figure 3), with a minimum of 600 deaths and an average of 7434 deaths for each epidemic in one county. A total of 20.0% of the epidemics in our sample were plagues, and 35.6% were cholera; 24.7% did not record a specific type, but descriptions of the symptoms suggest cholera (Li and Zhou, 1991; Li et al., 1993). See Figure 4 for more details about the types of epidemics in our sample.

Almost all of the plague epidemics in our sample occurred in the 57 plague-natural-foci counties or their neighbors, concentrated highly in 1911, 1918, 1931, and 1946 (Cao and Li, 2006).¹² The cholera epidemic in China was imported from the Philippines. The Philippines

⁹ The revolution is the Xinhai Revolution, also known as the Chinese Revolution or the Revolution of 1911.

¹⁰ The information of the establishment of county councils is available for only these 676 counties.

¹¹ Regarding the 21 provinces included here (Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Sichuan, Xikang, Fujian, Guangdong, Guangxi, Yunnan, Guizhou, Hebei, Shandong, Henan, Shanxi, Shaanxi, Gansu, Ningxia, and Hainan), they account for 39.8% of the total 1697 counties and about 75% of the total population.

¹² China is a plague natural foci due to its climate and vegetation (Zhang et al., 2007; Xu et al., 2011; Ben-Ari et al., 2012). As of 2008, 11 plague foci had been confirmed in China. Focus A: *Marmota caudate* Plague Focus of the Pamirs Plateau; Focus B: *Marmota baibacina-Spermophilus undulates* Plague Focus of the Tianshan Mountains; Focus C: *Marmota himalayana* Plague Focus of the Qinghai-Gansu-Tibet Grassland; Focus D: *Apodemus chevrieri-Eothenomys miletus* Plague Focus of the highland of Northwestern Yunnan Province; Focus E: *Rattus flavipectus* Plague Focus of the Yunnan-Guangdong-Fujian provinces; Focus F: *Spermophilus dauricus* Plague

suffered from three cholera epidemic waves during the world cholera pandemic of the early twentieth century. The first two peaked in 1919 and 1925, and the third started in 1930. Cholera invaded China via Filipino migrant laborers and peaked in 1919–1921, 1927, and 1932 (Wu, 1934; Nettleman, 1991). Figure 5 presents the times of epidemics each year in early twentieth-century China. As shown, this fluctuation can be strongly explained by fluctuations in cholera and plague epidemics.

Due to the weak state capacity during the late Qing and the Republic of China before 1949, local government acted poorly in preventing and controlling the epidemics, attributed to the shortage of funding and medicine and the lack of formal epidemic prevention institutions, which made the role of civil participation in epidemic relatively prominent (Ke, 1984; Fujian Provincial Archives, 1995; Li, Xia and Zhu, 2010). The comparison in the attention to epidemics between private and official newspapers in the late Qing and the Republic of China before 1949 indicated that the amount of news disclosing epidemic progress, promoting medical knowledge and criticizing the government published in private newspapers was 26.5 times that found in official newspapers.¹³ The passive actions of the government increased the social dissatisfaction with authority. Criticisms of political leaders and policies published in private newspapers during 1900–1949 indicated that news pieces related to political dissents caused by epidemics took up to 49.2% of the total political dissents.¹⁴

The civil participation in epidemics and the rising of political dissents increased the consciousness of “government by the people” and the probability of establishing county council.

Focus of the Song-Liao Plain; Focus G: *Meriones unguiculatus* Plague Focus of the Inner Mogolian Plateau; Focus H: *Spermophilus dauricus alaschanicus* Plague Focus of the Loess Plateau in Gansu and Ningxia provinces; Focus I: *Microtus brandti* Plague Focus of the Xilin Gol Grassland; Focus J: *Marmota sibirica* Plague Focus of the Hulun Buir Plateau of Inner Mongolia; Focus K: *Rhombomys opimus* Plague Focus of the Junggar Basin of Xinjiang, involving 216 counties in 19 provinces.

¹³ Historical records about local gentries' contributions to epidemic prevention were not scarce. As is recorded in Fujian Provincial Archives (1995), the plague attacked Fuzhou in 1942, the local government was passive and countless people died. Cai Youlan, a local gentry, learned that the plague vaccine of Kunming Pharmaceutical Factory was effective and immediately wired 16000 yuan to buy the vaccine and gave it to all hospitals in the city free of charge, so as to control the plague.

¹⁴ After 1949, the establishment of a giant centralized state apparatus greatly promoted the state capacity and the efficiency of epidemic prevention and control improved. For plague and cholera, known as China's No.1 and No.2 infectious diseases, village level prevention system was established and no large-scale spread of plague and cholera occurred.

As is presented in Figure 2 and Figure 5, the reestablishment of county councils peaked during 1921–1923, 1927–1930, and 1932–1934, mostly one or two years after the occurrence of an epidemic.

III. Data and Empirical Strategy

We created a novel database by manually collecting data from a large number of historical documents during the Republic of China. In this section, we describe how we constructed the database.

A. Occurrence of and Deaths from Epidemics

The year of occurrence and deaths from epidemics used in this study were taken from Li and Zhou (1991) and Li et al. (1993). Li and Zhou (1991) covers 1900–1918 while Li et al. (1993) covers 1919–1949. These are considered the most detailed records of the epidemics of this period to date. Nevertheless, it is unfortunate that data for epidemic-related deaths are available for only a quarter of all epidemics.

B. Establishment of County Councils

Data for the year of establishment of county councils came from the local gazetteers compiled in the Republic of China.¹⁵ These local gazetteers are available from the China Digital Archive Database (*Zhongguo shuzi fangzhiku*), which is considered China's most comprehensive database of historical archives. To date, the information of the establishment of county councils is available for only the 676 counties. For example, the local gazetteer of Kaiyang County in Guizhou Province documented the following:

*"Since the beginning of the Sino-Japanese War of 1894-1895, China had been suffering from the risks of being colonized. People of insight attempted to promote a constitution reform.....In 1912, Kaiyang County Council was voted to be established.....In 1914, Yuan Shikai abolished the congress and reinstated monarchy, and Kaiyang County Council was abrogated.....In 1921, Kaiyang County Council was once again established....."*¹⁶

¹⁵ Information about county councils is available only in local gazetteers compiled in the Republic of China. The local gazetteers compiled in People's Republic of China have no related information recorded.

¹⁶ It would also be clearly indicated in the county gazetteers that "county council had never been established in our

From the above description, we collected the year of establishment of county councils. For 10 of the counties, county-council establishment occurred in the same year as the epidemic. We traced the months of epidemics and county-council establishment to identify whether the county council was established before or after the epidemic.¹⁷

C. Mechanisms

We propose three mechanisms: increased civil participation in local affairs, increased political dissent, and increased awareness of “government by the people,” as induced by epidemics. Comparisons of reports on epidemics between private and official newspapers in China during 1900–1949 were used to measure civil participation. Those reports include civil participation in epidemic relief, comments on epidemic relief by authorities, the disclosure of epidemic progress to the public, and the introduction of medical knowledge. Data came from the Database of the Full-Text Premodern Chinese Newspapers (*Zhongguo jindai baozhi quanwen shujuku*), which includes almost all Chinese newspapers from 1833 to 1949.

We used criticism of political leaders and policies—including the concealment of illness and death, improper policies and inaction related to epidemic relief, the persecution of dissidents, and corruption—published in private newspapers during 1900–1949 as a proxy for political dissent. Data came from the Database of the Full-Text Premodern Chinese Newspapers (*Zhongguo jindai baozhi quanwen shujuku*) by searching for keywords.

Civil participation in local affairs and the rise of political dissent opened a window for local people’s democratic consciousness. We identified the times of the occurrence of the words “government by the people” and “autonomy” in the county gazetteers compiled in the Republic of China. We observed a substantial variation: the occurrences of “government by the people” and “autonomy” were 477% and 30.7% higher, respectively, in counties where epidemics had broken out within two years of the compiling of the county gazetteers.

D. Alternative Explanations

Historical weather data came from the State Meteorological Society (1981), which provides

county”, for reasons such as “local people are lowly educated and have no knowledge about elections and democracy” (Qingshui Gazetteer, 1949; Tianshui Gazetteer, 1939).

¹⁷ Three of the counties, Fengyang County in Anhui, Zaoqiang County in Hebei, and Guangshan County in Henan, lost records of detailed monthly information. We dropped those three counties.

annual information on weather for locations throughout China dating back to 1470. This data source is considered China's most credible source for historical weather and has been widely used in research (e.g., Keller and Shiue, 2007; Jia, 2013). The variable is a discrete indicator ranging from 1 to 5, with 1 for flood, 2 for limited flood, 3 for fair weather, and 4 and 5 for limited drought and drought, respectively.

The data for the year of prodemocratic civil wars came from Luo (1958) and the military volumes of province gazetteers compiled by the People's Republic of China. The prodemocratic civil wars include the National Protection War, the Constitutional Protection War, and the fight against warlordism.

We used two variables to proxy for historical economic performance, the population density and agricultural output index. Population density data came from Cao (2001) and Yin and Tian (2009), the former providing the prefecture-level population density in 1880 and 1910, while the latter compiling the six population censuses during 1912 to 1949 and providing the county-level population density in 1916, 1922, 1928, 1935, 1938 and 1947. The population density of the rest years was calculated as the average value between every two population censuses. The cross-sectional agricultural output index was used as a robustness check and the data came from Buck (1937).

The data for the historical treaty ports came from the treaties signed in 1842-1900s. We also considered additional control variables, such as distance to the authorities, culture and local personality. Table 1 reports the detailed descriptions and summary statistics for the variables used in the empirical analysis.

IV. Results

This section estimates the effect of epidemics on the establishment of county councils. Part A presents the baseline estimation, and part B reports the estimation results using county-pair fixed effects. Part C discusses alternative explanations.

A. Baseline Estimates

We first checked the correlation between the occurrence of and deaths from epidemics and the establishment of county councils using OLS estimations. We then employed county-year panel data to examine whether county-council establishment followed epidemics. In the baseline sample,

we employed only the reestablishments of county councils since 1916. There were 163 county-council reestablishments, involving 145 counties.¹⁸ We dropped the early observations since they concentrated in 1911 and 1912, when the Imperial Qing was overthrown and the Republic of China was established through a constitutional revolution. Instead, we used the establishment of county councils before 1916 as a control since it can capture most of the omitted variables, if the unobservables affected the establishment of county councils both before and after 1916. These early observations are included in the robustness checks.

OLS Estimations. The econometric specification of the OLS estimation is as follows:

$$\text{County Council}_{i,p} = \zeta_p + \beta_0 + \beta_1 \text{Epidemic}_{i,p} + X_{i,p} \beta_2 + \varepsilon_{i,p}, \quad (2)$$

where i indexes county and p indexes province. The outcome variable of interest, *County Council*, represents county-council establishment (yes = 1; otherwise, 0). Epidemic represents either 1) the occurrence of epidemics in county i during 1900–1949 or 2) the number of deaths in epidemics during 1900–1949. $X_{i,p}$ is a vector of county-specific characteristics, and ζ_p denotes provincial fixed effects.

Columns (1)–(10) in Table 2 present the baseline regression results while columns (11) and (12) present the robustness checks for all observations, including county-council establishment before 1916. Overall, we found that counties that suffered hugely destructive and deadly epidemics had a higher likelihood of reestablishing county councils. The point estimate in column (1) indicates that counties that suffered one additional epidemic were associated with a 17.0% increase in the likelihood of county-council reestablishment. The point estimator slightly increases to 18.1% if we include all county-specific controls, including establishment of county council before 1916, historical economic performance,¹⁹ prodemocratic civil wars, extreme weather,²⁰ historical treaty ports, distance to the authority and culture. As for intensity, the results in column (6) suggest that counties that suffered 10,000 more deaths from epidemics were associated with a 13.3% increase in the likelihood of reestablishing county councils. The estimates in columns (11)

¹⁸ For 18 of the counties, county councils were, for the second time, abolished and then reestablished due to the change of warlords.

¹⁹ The population density controlled in the cross-sectional analysis was calculated as the average value of the population density in 1910, 1916, 1922, 1928, 1935, 1938 and 1947.

²⁰ The extreme weather controlled in the cross-sectional analysis was measured as the deviation from the mean, 3.

and (12) show that the results are robust when we include observations before 1916. To address the concern of spatial autocorrelation that a county might be affected by its neighbors, we did the Moran's I test and spatial autocorrelation adjusted analysis using a distance decay function for assigning weights. The P-values of Moran's I tests and the RHO statistics of spatial autocorrelation adjusted regressions presented in columns (7) and (8) are all bigger than 0.1, demonstrating that no spatial autocorrelation exists. Besides, the baseline results of a significantly positive correlation between epidemics and the establishment of county council still holds when we employed the spatial autocorrelation adjusted regression.

For the concern that county councils might be reestablished after the last year we could gather information,²¹ we made a strict unfavorable hypothesis that all counties suffered from epidemics but without a record of reestablishing county councils had never reestablished county council. The dependent variable in columns (9) and (10) was constructed as the year of the reestablishment of county council minus the year of the latest epidemic, with counties without a record of reestablishing county council truncated in year 1949. For those counties never suffered from epidemics, we hypothesized that they suffered from the epidemic shock, employing the year of the latest epidemic of their geographically adjacent neighbor county, and constructed the dependent variable in the same way. The results show that counties suffered one additional epidemic were associated with 5 years less between epidemic and the county-council reestablishment, indicating that the effect of epidemics on the reestablishment of county council holds even when we made a strict hypothesis.

We further created time variables and then examined the variables of interest over time to confirm the correlation between epidemics and county council. We constructed the dependent variable as 1949-the time of reestablishing county council, and independent variable as 1949-the time of epidemic.²² Those never suffered from epidemics and without reestablishing county

²¹ The probability that county councils were reestablished after the last year we could gather information was low. The average year of the compiling of latest local gazetteers was 1946. The years of the compiling of latest local gazetteers of 310 out of the total 676 counties were 1948 and 1949, which can be taken as with no information missed.

²² For a small number of counties experienced more than one times establishment county council during 1916 to 1949, mostly due to the interruption of civil wars, the dependent variable is calculated as the years county council lasted. For those experienced more than one times of epidemics, the independent variable is calculated as 1949-the earliest year the epidemic occurred.

council were truncated in year 1949 and assigned a value of 49. The result presented in column (1) of Table 3 indicates that counties that suffered epidemic one year earlier were associated with a 23.8% increase in the years the county council lasted. The result holds when we included the establishment of county council before 1916, and changed the assigned value for those without epidemics and county council as 100 or 1000.

Panel Data Estimations. To examine whether county-council establishment followed epidemics, we further employed county-year panel data from 1900 to 1949 for analysis. Figure 6 presents the timing of epidemics and the reestablishment of county councils. As presented, 40.5% of county-council reestablishment occurred within two years of the epidemics, 54.0% of which were within five years.

The econometric specification is as follows:

$$County\ Council_{i,t} = \phi_i + \varphi_t + \beta_0 + \beta_1 epidemic_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where i indexes county, and t indexes year. *County Council* represents whether county-council establishment occurred in county i in year t (1 = yes; otherwise, 0). The key explanatory variable, epidemic, is coded as follows: Epidemic = 1 for the epidemic occurring in county i in year t when we strictly hypothesize that the impact of the epidemic lasted for only the current year. Epidemic = 1 for the epidemic occurring in county i in year t , and $t+1$ when we more properly hypothesize that the impact of the epidemic lasted for one year. Epidemic = 1 for the epidemic occurring in county i in year t , and $t+1$ until $t+n$ when we relax the hypothesis that the impact of the epidemic lasted for n years ($n \leq 10$). For deaths during epidemics, we constructed it in the same way. ϕ_i denotes county-fixed effects, which absorb all county-level characteristics invariant across time, and φ_t denotes year-fixed effects.

Panel A in Table 4 reports the panel data estimations for the observations of county-council reestablishment while panel B reports the estimations including those counties establishing councils before 1916. The estimates in column (2) show that counties that suffered epidemics were 4.7% more likely to establish county councils in the following year. As for intensity, counties that suffered 10,000 more deaths from epidemics were 5.8% more likely to establish county councils in the following year. The estimates presented in column (2) show that the coefficients are the largest when we hypothesize that the effect of the epidemic lasted one year, implying that

county-council establishment immediately followed epidemics and faded over time.

B. Endogeneity and Causality Identification

A critical concern when performing the analysis in section A is the endogeneity of the epidemics. Although the county-specific characteristics and common trend were captured by the county-fixed and year-fixed effects in the above panel data analysis, we might worry about unobserved time-varying variables across regions that correlate with both epidemics and county-council establishment. To address this concern, here we utilize county-pair fixed effects to further identify the causal relationship between epidemics and county-council establishment.

We constructed the county pairs as follows: select counties shocked by epidemics, keep nonshocked counties that are geographically adjacent to the former, and define these counties as pairs. We dropped 236 nonshocked counties that are not geographically adjacent to shocked counties. For the remaining 440 counties, a total of 78 pairs were constructed, each involving 5–6 counties. Counties in the same pair can be treated as similar in economic performance, transportation, culture, and other unobserved county-specific and time-varying variables such as extreme weather and civil wars. By controlling pair-fixed effects, most of the omitted variables can be absorbed.

Table 5 presents the empirical results. Panel A reports the cross-sectional regressions, and panel B reports the panel data regressions. Overall, the results with county-pair fixed effects are consistent with the baseline estimates presented in Tables 2 and 4. The estimates in columns (1) and (2) of panel A indicate that counties that suffered an additional epidemic were associated with a 19.4% increase in the likelihood of county-council reestablishment, and counties that suffered 10,000 more deaths during epidemics were associated with a 16.7% increase in the likelihood of county-council reestablishment. The estimates in panel B show that counties that suffered epidemics were 4.5% more likely to establish a county council in the following year, and those that suffered 10,000 more deaths from epidemics were 10.0% more likely to establish a county council the same year.

C. Excluding Alternative Explanations

Although we used panel data regressions with county- and year-fixed effects and county-pair fixed effects to identify causality between epidemics and county-council establishment, here we further address endogeneity by examining the most plausible alternative explanations. Specifically, we

consider four sets of variables: floods, prodemocratic civil wars, historical economic performance and historical treaty ports.

Floods. On the one hand, floods can increase the risk of outbreaks of cholera, typhoid fever, malaria, hepatitis A, and dengue fever (Sobsey, 2002; Morgan, 2004; Steering Committee for Humanitarian Response, 2004; Gayer and Connolly, 2005).²³ On the other hand, floods can induce economic downturns and hence democratic improvement (Lev, 1991; Chaney, 2013). Nevertheless, an opposing view in the literature proposes a link between floods and autocracy since flood response must be coordinated and managed by provincial or state authorities as multiple counties or even provinces can be involved in a flood (Smith, 1776 [1999]; Mill, 1848; Marx, 1853; Wittfogel, 1957; Huang, 1985, 1990). We empirically examined the effect of floods using floods in the study period (1900–1949). As panel A in Table 6 shows, neither county-council establishment nor epidemics had a significant correlation with the flood index.

Prodemocratic Civil Wars. Prodemocratic civil wars included the National Protection War (1915–1916), the Constitutional Protection War (1917–1922), and the fight against warlordism (1926–1928). The National Protection War aimed to resist Yuan Shikai as the Hongxian Emperor to protect constitutionalism. The Constitutional Protection War involved a series of movements led by Sun Yat-sen to resist the Beiyang government and protect the Provisional Constitution of the Republic of China. The fight against warlordism, also known as the Northern Expedition, was a military campaign launched by the Kuomintang (KMT) against the Beiyang government and other regional warlords to build a unified democratic constitutional state. These could have promoted the reestablishment of county councils; meanwhile, they could have also triggered epidemics. If their role was significant, we would expect the effects of prodemocratic civil wars on epidemics and county-council establishment to be significant. Yet, the results shown in panel B in Table 6 indicate no correlation between prodemocratic civil wars and county-council establishment or between prodemocratic wars and epidemics, indicating that prodemocratic civil wars cannot explain our findings.

Historical Economic Performance. On the one hand, democracy is said to be a consequence

²³ No evidence shows a significantly positive correlation between floods and the outbreaks of other epidemics, such as plague, smallpox, meningitis, scarlet fever, dysentery, diphtheria, and measles, which widely existed in early twentieth century China.

of economic modernization (Lipset, 1959); counties with better economic performance might therefore be more likely to establish county councils. On the other hand, epidemics might be more easily spread in regions with better economic performance and higher population density. We used the year-by-year population density during 1900 to 1949 and the cross-sectional agricultural output index in the 1920s as the relevant proxies. As panel C in Table 6 shows, economic performance cannot explain our findings.

Historical Treaty Ports. Treaty ports were opened to foreign trade mainly by treaties between the Qing government and Western powers. Most Western powers were constitutionalist. Constitutional thinking might have thus been introduced, increasing the likelihood of county-council establishment. Meanwhile, the heavy traffic at treaty ports could have facilitated the spread of epidemics. We thus used county-level information to check this alternative explanation. As panel D in Table 6 shows, historical treaty ports appear to have had no significant effect on either county-council establishment or the occurrence of and deaths from epidemics. Taken together, the above results confirm that our baseline findings and causality results are unlikely to be driven by historical events other than epidemics.

V. Mechanisms

In the previous section, we presented results consistent with the historical evidence that epidemics have promoted the establishment of county councils. Here, we investigate the extent to which three of the most plausible interpretations of the results are consistent with the available empirical evidence.

A. Civil Participation during Epidemics

It is possible the empirical results are driven by an epidemic-induced increase in civil participation in local affairs. On the one hand, the authorities must allow for civil participation in epidemic relief since such relief is costly; specifically, relief was thought to have been “impossible” without the aid of nonofficial powers during 1900–1949 when state capacity was weak (Xia, 2000). On the other hand, after epidemics are contained, autocratic regimes must make democratic concessions to avoid costly repression; the weaker the capacity of the autocratic regimes, the greater the extent of the concessions. During the Republic of China period when state capacity was weak, even the political appeal of establishing county councils was fulfilled.

To investigate the extent to which increased civil participation could explain the results, we compared participation in epidemics between private newspapers (mostly controlled by the local gentry) and official newspapers. As shown in Figure 7, the amount of published criticism of the authorities (e.g., for concealing illness/death, improper policymaking or inaction) in private newspapers was 225 times that found in official newspapers. Further, the number of private newspapers disclosing epidemic progress and promoting medical knowledge was 5.4 and 7 times, respectively, that of official newspapers. Nevertheless, the number of private newspapers saying “the epidemic can be contained” and praising the government was 5% and 8%, respectively, compared to official newspapers.

B. Political Dissent during Epidemics

It is possible that epidemics increased dissatisfaction with authority. Epidemic relief by the authorities might not meet people’s expectations. Meanwhile, the authorities were more likely to conceal cases of illness and death and conduct whitewashing, which could increase grassroots dissatisfaction. To examine whether epidemics affected political dissent, we used criticisms of political leaders and policies (concealing illness/death, improper policymaking/inaction, persecution of dissidents, corruption) published in private newspapers during 1900–1949 as a proxy. Presumably, political dissent should appear more often during epidemic periods, and political dissent should have a significantly positive correlation with county-council establishment.

The estimates presented in Table 7 are consistent with our prediction. The results shown in panel A indicate that news pieces related to political dissent were 39 times more likely to appear during epidemic years than during other periods. The results in panel B show a significantly positive correlation between political dissent and county-council establishment.

C. Rise of “Government by the People” Consciousness

An awareness of democracy, specifically, “government by the people”, might arise since epidemics create a window of opportunity for citizens to participate in local affairs and to show political dissent. To examine whether epidemics promoted “government by the people” consciousness, we checked the occurrences of the words “government by the people” and “autonomy” in county gazetteers. Respectively, these two expressions were 477% and 30.7% more likely to be found in counties that suffered epidemics within two years before the

compilation of the county gazetteers.

We might infer that “government by the people” and “autonomy” should appear more often if the time interval between an epidemic and the compilation of the county gazetteer is shorter. Columns (1) and (2) in Table 8 present the impact of epidemics on increases in those expressions, with the key explanatory variable constructed as the year of the compilation of the county gazetteer minus the year of the latest epidemic. As shown, the shorter the time interval between the two, the more times the expressions occurred. The estimates presented in columns (3) and (4) show a positive correlation between the times of those expressions and the reestablishment of county councils.

VI. Conclusion

This study offers the first systematic evidence that democratic reform can immediately follow socioeconomic shocks. We examined this question by studying epidemics and the establishment of county councils in China from 1900 to 1949. We found that counties that suffered epidemics were 4.7% more likely to establish county councils the following year. As for intensity, counties with 10,000 more deaths from epidemics were 5.8% more likely to establish county councils the following year. Regarding the possible mechanisms, we show that civil participation in local affairs, increased political dissent, and increased “government by the people” consciousness induced by epidemics explained the establishment of county councils as grassroots democratic improvements.

Although specific to the late Qing and the Republic of China, our analysis arouses broader considerations. The COVID-19 outbreak of late 2019 has increased the awareness of freedom of speech, freedom of information, and civil participation in epidemic relief among Chinese people. At the same time, the Chinese government has leveraged its centralized power to manage and contain the crisis. In addition to research on economic losses caused by COVID-19, whether this crisis will lead to further social and political change is another potential avenue for future research.

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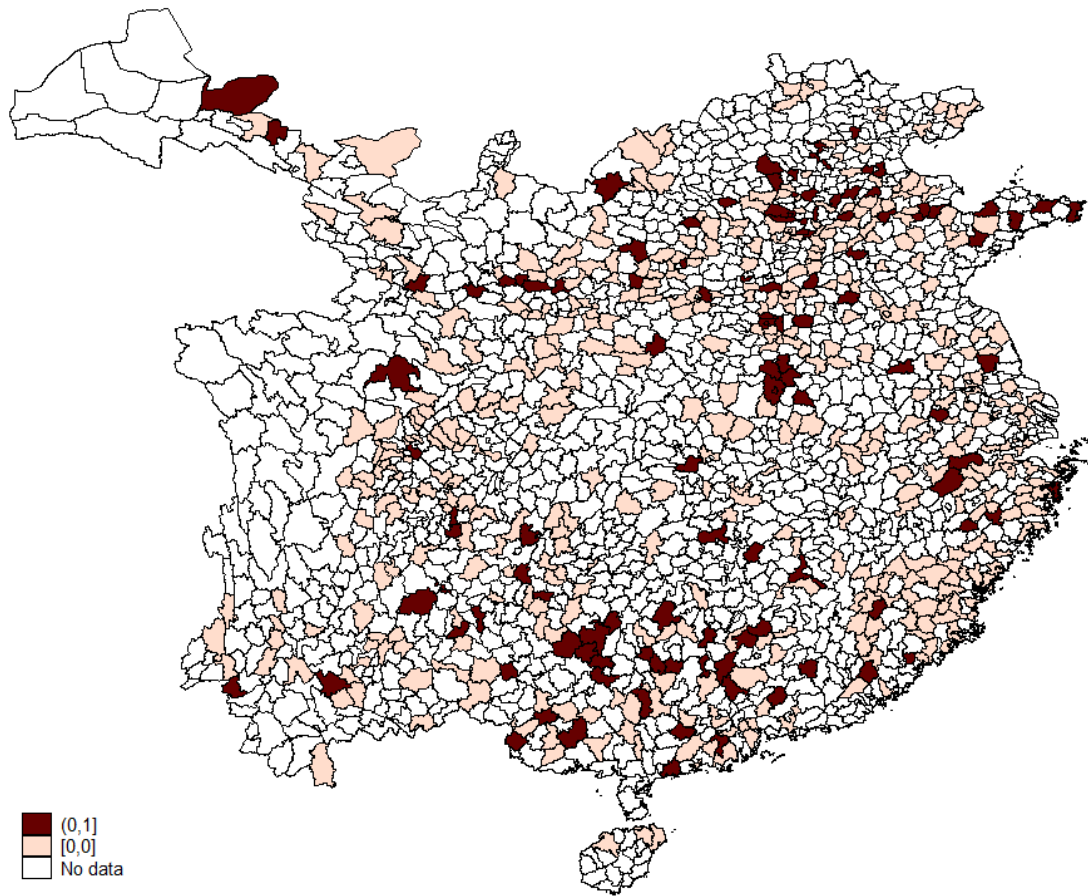


Figure 1 Spatial Distribution of the Reestablishment of County Councils (1916–1949)

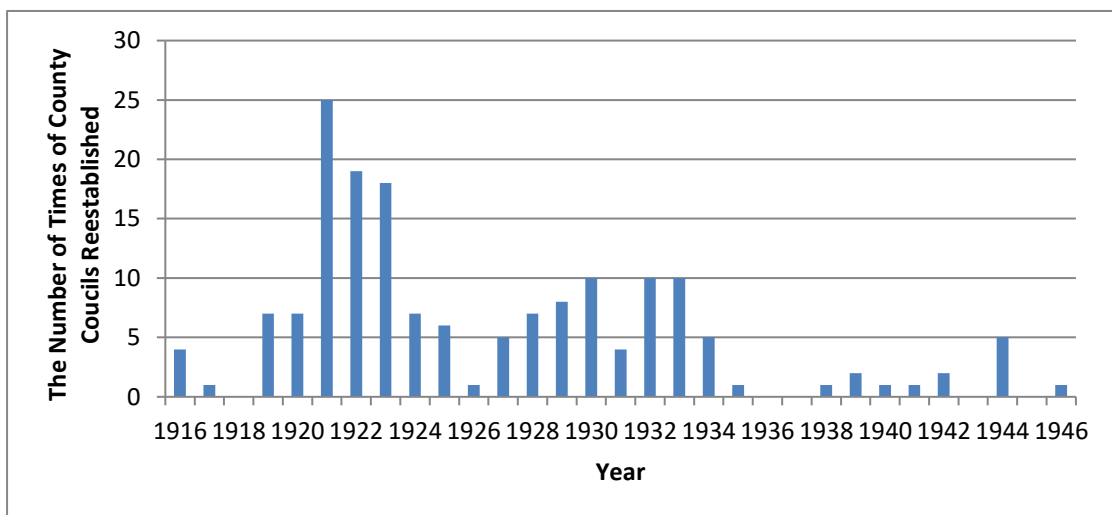


Figure 2 Timing of the Reestablishment of County Councils (1916–1949)

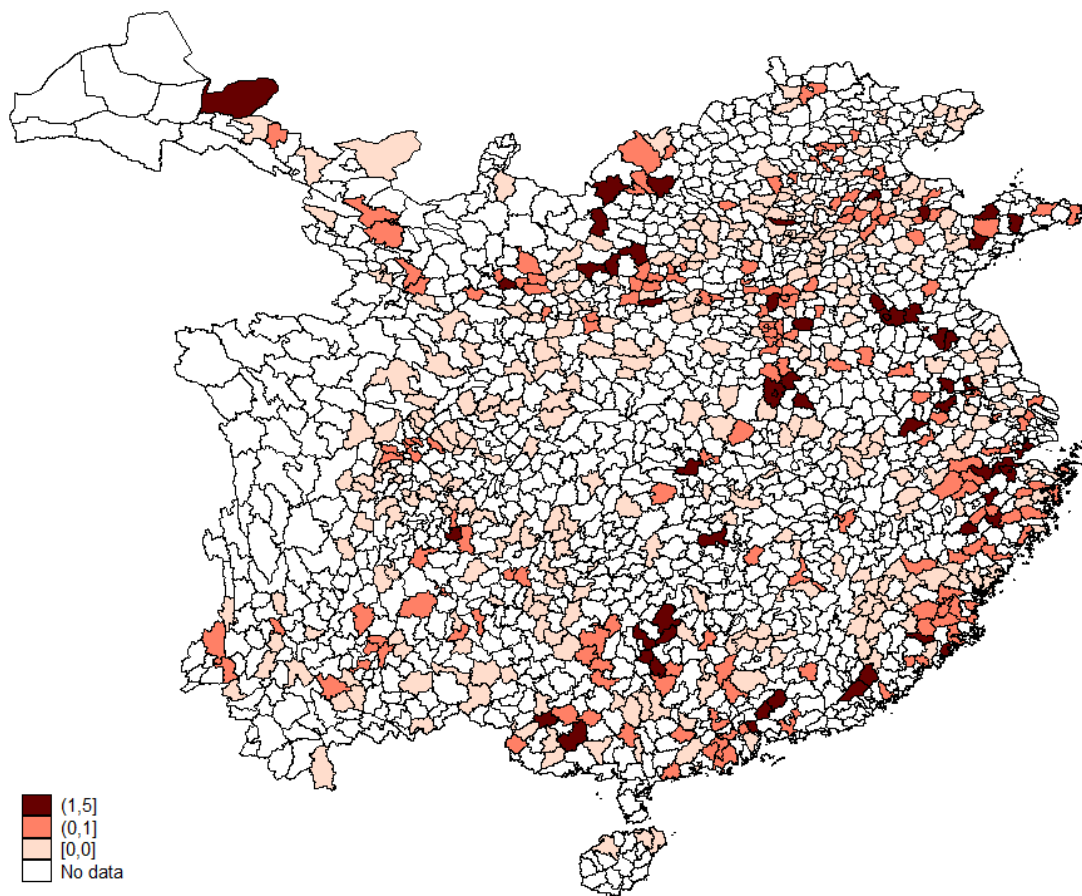


Figure 3 Spatial Distribution of Epidemics from 1900 to 1949

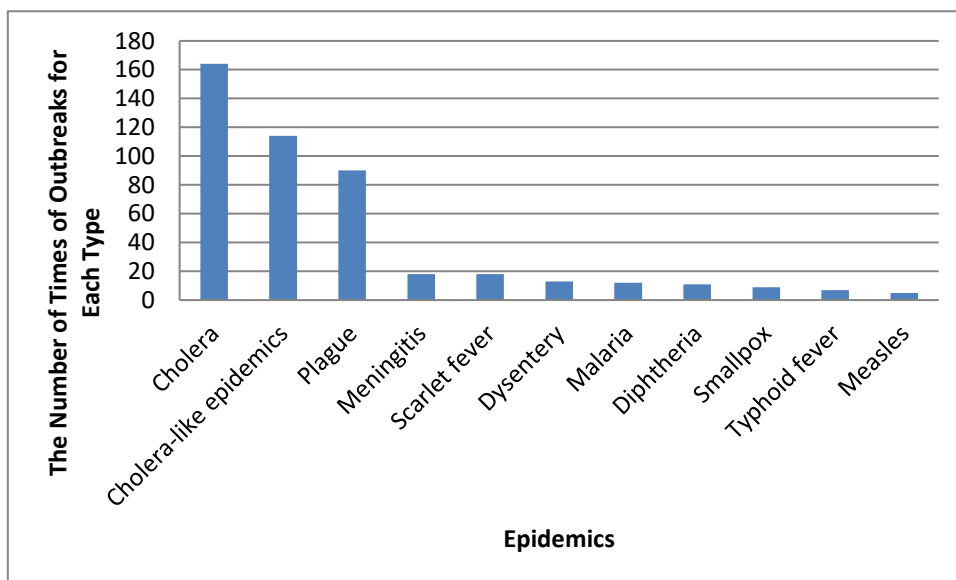


Figure 4 Times of Outbreaks for Each Type of Epidemic

Notes: The Cholera-like epidemics indicates those without a record of a specific type but with descriptions of the symptoms suggesting cholera (Li and Zhou, 1991; Li et al., 1993).

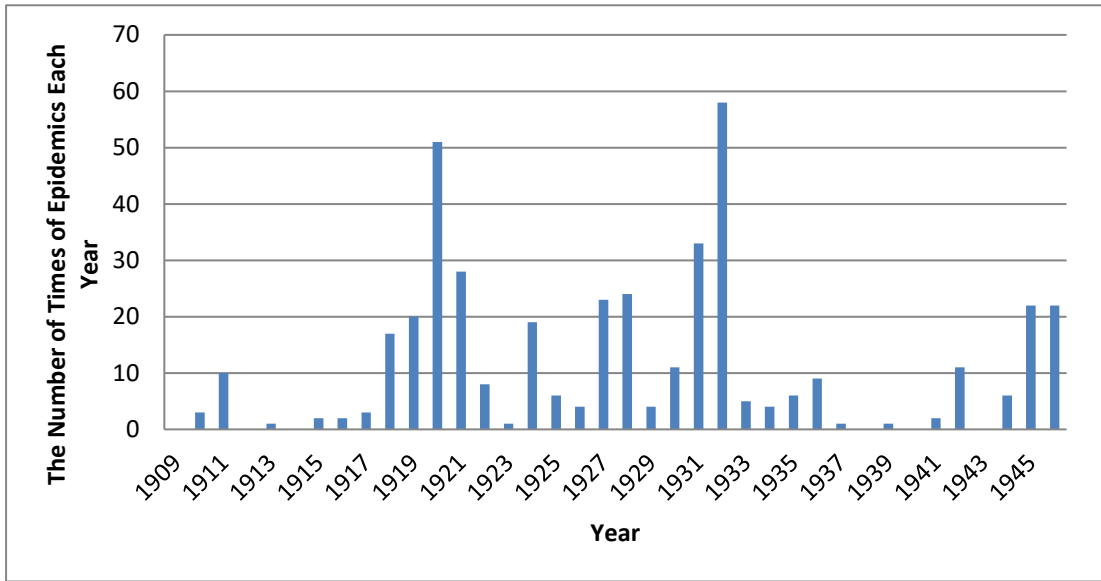


Figure 5 Timing of Epidemics

Table 1 Summary Statistics

| | Obsvs. | Mean | Std. | Min | Max |
|--|--------|----------|---------|-------|--------|
| Panel A: Main Variables | | | | | |
| County Level | | | | | |
| Establishment of County Council (Including the Establishment of County Council before 1916) ¹ | 676 | 0.578 | 0.494 | 0 | 1 |
| Reestablishment of County Council ¹ | 676 | 0.214 | 0.410 | 0 | 1 |
| Occurrence of Epidemic ^{2,3} | 676 | 0.614 | 0.875 | 0 | 5 |
| Deaths in Epidemic (ten thousands) ^{2,3} | 415 | 0.757 | 0.967 | 0.06 | 4.2 |
| County-year | | | | | |
| Establishment of County Council (Including the Establishment of County Council before 1916) ¹ | 32242 | 0.016 | 0.125 | 0 | 1 |
| Reestablishment of County Council ¹ | 32242 | 0.005 | 0.071 | 0 | 1 |
| Occurrence of Epidemic ^{2,3} | 32242 | 0.013 | 0.112 | 0 | 1 |
| Deaths in Epidemic (ten thousands) ^{2,3} | 31904 | 0.001 | 0.039 | 0 | 3 |
| Panel B: Mechanisms | | | | | |
| Private Newspapers' Participation ⁴ | 32242 | 0.007 | 0.118 | 0 | 4 |
| Political Dissent ⁴ | 32242 | 0.014 | 0.266 | 0 | 22 |
| Occurrence of "Government by the People (Minzhi)" ¹ | 475 | 0.971 | 3.914 | 0 | 79 |
| Occurrence of "Autonomy (Zizhi)" ¹ | 475 | 12.136 | 15.330 | 0 | 153 |
| Time Interval between an Epidemic and the Compilation of the County Gazetteer ^{1, 2, 3} | 676 | 39.478 | 16.915 | 0 | 49 |
| Panel C: Alternative Explanations | | | | | |
| Flood ⁵ | 32242 | 3.020 | 1.083 | 1 | 5 |
| Prodemocratic Civil Wars ^{6,7} | 32242 | 0.010 | 0.093 | 0 | 1 |
| Population Density (people per km ²) ^{8,9} | 29405 | 253.87 | 453.907 | 0.25 | 11872 |
| Agricultural Output Index ¹⁰ | 676 | 102.895 | 38.867 | 30.2 | 289.1 |
| Historical Treaty Port ¹¹ | 676 | 0.105 | 0.306 | 0 | 1 |
| Panel D: Control Variables | | | | | |
| County Level | | | | | |
| Establishment of County Council before 1916 ¹ | 676 | 0.528 | 0.499 | 0 | 1 |
| Population Density (people per km ²) ^{8,9} | 676 | 245.294 | 352.543 | 0.433 | 5192.4 |
| Agricultural Output Index ¹⁰ | 676 | 102.895 | 38.867 | 30.2 | 289.1 |
| Prodemocratic Civil Wars ^{6,7} | 676 | 0.415 | 0.788 | 0 | 6 |
| Extreme Weather ⁵ | 676 | 7.503 | 1.447 | 4.795 | 20.566 |
| Distance to the Authority (km) ¹² | 676 | 1121.559 | 588.08 | 49.7 | 2846.4 |
| Number of Confucius Temples ¹³ | 676 | 2.104 | 3.049 | 0 | 32 |
| Strong and Tough Personality ¹⁴ | 676 | 0.284 | 0.451 | 0 | 1 |
| Local People's Resistance to Excess Taxes ¹⁴ | 676 | 0.541 | 0.498 | 0 | 1 |
| County-year | | | | | |
| Flood ⁵ | 32242 | 3.020 | 1.083 | 1 | 5 |
| Prodemocratic Civil Wars ^{6,7} | 32242 | 0.010 | 0.093 | 0 | 1 |
| Population Density (people per km ²) ^{8,9} | 29405 | 253.87 | 453.907 | 0.25 | 11872 |

Data Sources:

- 1: Local gazetteers compiled in Republic of China.
- 2: Li and Zhou (1991). Disasters in Pre-modern China (*Jindai zhongguo zaihuang jinian*)
- 3: Li et al. (1993). Disasters in Pre-modern China, Continuation (*Jindai zhongguo zaihuang jinian xubian*)
- 4: Database of the Full-text Pre-modern Chinese Newspapers (*Zhongguo jindai baozhi quanwen shujuku*).
- 5: State Meteorological Society (1981).
- 6: Luo (1958). Documents on the Revolutionary (*Geming wenxian*).
- 7: The military volumes of province gazetteers compiled in People's Republic of China.
- 8: Cao (2001). Population History of China (*Zhongguo Renkou Shi*) Vol. 5, Qing Period (*Qing shiqi*).
- 9: Yin and Tian (2009). Compilation of Historical Records of Population and Households in the Republic of China (*Minguo renkou huji shiliao huibian*).
- 10: Buck (1937). Land Utilization in China.
- 11: The treaties signed in 1842-1900s.
- 12: Google Map.
- 13: The Imperial Geography of Qing Dynasty (*Jiaqing chongxiu yitongzhi*).
- 14: The Draft History of Qing (*Qingshigao*), Vol. 54–78.

Table 2 The Epidemics and Establishment of County Council -OLS Estimates

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|--|--------------------|---------------------|-------------------|---------------------|---------------------|---------------------|---------------------|---|----------------------|---------------------------------------|---------------------|
| | Only the Reestablishment of County Council | | | | | | | | Including the Establishment of County Council before 1916 | | | |
| | D.V.: Reestablishment of County Council | | | | | | | | D.V.: Time Interval between an Epidemic and the Reestablishment of County Council | | D.V.: Establishment of County Council | |
| Occurrence of Epidemic | 0.170*** (0.016) | | 0.155*** (0.017) | | 0.181*** (0.017) | | 0.181*** (0.017) | | -5.015*** (0.433) | | 0.152*** (0.022) | |
| Deaths in Epidemic | | 0.071** (0.032) | | 0.059* (0.032) | | 0.133*** (0.037) | | 0.133*** (0.036) | | -5.193*** (0.972) | | 0.180*** (0.062) |
| Establishment of County Council before 1916 | | | y | y | y | y | y | y | y | y | | |
| Historical Economic Performance | | | | | y | y | y | y | y | y | y | y |
| Prodemocratic Civil Wars | | | | | y | y | y | y | y | y | y | y |
| Extreme Weather | | | | | y | y | y | y | y | y | y | y |
| Historical Treaty Port | | | | | y | y | y | y | y | y | y | y |
| Distance to the Capital | | | | | y | y | y | y | y | y | y | y |
| Culture | | | | | y | y | y | y | y | y | y | y |
| Provice F.E. | y | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.207 | 0.029 | 0.226 | 0.054 | 0.249 | 0.080 | 0.282 | 0.147 | 0.394 | 0.457 | 0.145 | 0.058 |
| Obvs. | 676 | 415 | 676 | 415 | 676 | 415 | 676 | 415 | 662 | 402 | 676 | 415 |
| P-value of Moran's I | | | | | | | 0.290 | 1.073 | | | | |
| RHO of spatial autocorrelation adjusted regressions | | | | | | | 0.00010 (0.545) | -0.0009 (0.520) | | | | |

Notes: The table illustrates the effect of epidemics on the establishment of county council. The dependent variable in Columns (1) to (8) is a dummy variable equals to 1 for the counties reestablished county council during 1916 to 1949, the dependent variable in Columns (9) and (10) is the time interval between an epidemic and the reestablishment of county council, while the dependent variable in Columns (11) and (12) is a dummy equal to 1 for counties established county council during 1909 to 1949. The main explanatory variables are the number of times of the occurrence of epidemics and the total deaths in epidemics during 1900 to 1949. The numbers in brackets are standard deviations. * * * , * * and * , respectively, represent the significant levels of 1% , 5% and 10% .

Table 3 The Timing of Epidemics and the Years County Council Lasted

| | (1) | (2) | (3) | (4) | (5) | (6) |
|----------------------------|--|---|--|--|---|--|
| | Only the Reestablishment of County Council | | | Including the Establishment of County Council before 1916 | | |
| | Baseline Estimates | Robustness Checks | | Robustness Checks | | |
| | Counties without Epidemics and/or Establishment of County Council Assigned with "49" | Counties without Epidemics and/or Establishment of County Council Assigned with "100" | Counties without Epidemics and/or Establishment of County Council Assigned with "1000" | Counties without Epidemics and/or Establishment of County Council Assigned with "49" | Counties without Epidemics and/or Establishment of County Council Assigned with "100" | Counties without Epidemics and/or Establishment of County Council Assigned with "1000" |
| 1949-the Time of Epidemics | 0.238*** (0.029) | 0.291*** (0.031) | 0.318*** (0.031) | 0.179*** (0.054) | 0.242*** (0.045) | 0.282*** (0.040) |
| County Level Controls | y | y | y | y | y | y |
| Province F.E. | y | y | y | y | y | y |
| Adj. R ² | 0.226 | 0.248 | 0.256 | 0.083 | 0.128 | 0.165 |
| Obvs. | 676 | 676 | 676 | 676 | 676 | 676 |

Notes: The table illustrates the effect of timing of epidemics on the lasting of county council. The dependent variable in Columns (1) to (3) is the years county council lasted for the reestablishment of county council during 1916 to 1949, the dependent variable in Columns (4) to (6) is the years the county council lasted including the observations during 1909 to 1949. The main explanatory variable is 1949 minus the year the epidemic occurred during 1900 to 1949. The numbers in brackets are standard deviations. * * * , * * and*, respectively, represent the significant levels of 1%, 5% and 10%.



Figure 6 The Timing of Epidemics and Reestablishment of County Council

Table 4 Panel Data Regressions with County and Year Fixed Effects

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
|---|--|--|---|---|--|--|---|---|---|--|---|
| | Effect of Epidemic Lasts for the Current Year | Effect of Epidemic Lasts for One Year | Effect of Epidemic Lasts for Two Years | Effect of Epidemic Lasts for Three Years | Effect of Epidemic Lasts for Four Years | Effect of Epidemic Lasts for Five Years | Effect of Epidemic Lasts for Six Years | Effect of Epidemic Lasts for Seven Years | Effect of Epidemic Lasts for Eight Years | Effect of Epidemic Lasts for Nine Years | Effect of Epidemic Lasts for Ten Years |
| Panel A: Only the Reestablishment of County Council | | | | | | | | | | | |
| Occurrence of Epidemic | 0.020*** (0.0038) | 0.047*** (0.0028) | 0.047*** (0.024) | 0.040*** (0.002) | 0.038*** (0.0020) | 0.035*** (0.0019) | 0.031*** (0.0017) | 0.028*** (0.0017) | 0.026*** (0.0017) | 0.026*** (0.0016) | 0.025*** (0.0016) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.014 | 0.023 | 0.027 | 0.025 | 0.026 | 0.025 | 0.023 | 0.023 | 0.022 | 0.022 | 0.022 |
| Obvs. | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 |
| Deaths in Epidemic | 0.112*** (0.011) | 0.058*** (0.007) | 0.037*** (0.005) | 0.029*** (0.004) | 0.023*** (0.0034) | 0.019*** (0.0031) | 0.016*** (0.0029) | 0.014*** (0.0032) | 0.012*** (0.0031) | 0.011*** (0.0028) | 0.009*** (0.0026) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | Y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | Y | y | y | y | y | y | y |
| Adj. R ² | 0.018 | 0.012 | 0.011 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| Obvs. | 28957 | 28674 | 28422 | 28196 | 27988 | 27797 | 27614 | 27429 | 27231 | 27034 | 26842 |
| Panel B: Including the Establishment of County Council before 1916 | | | | | | | | | | | |
| Occurrence of Epidemic | 0.021*** [0.006] | 0.048*** [0.004] | 0.045*** [0.0038] | 0.038*** [0.0034] | 0.036*** [0.0031] | 0.032*** [0.0029] | 0.028*** [0.0028] | 0.025*** [0.0027] | 0.023*** [0.0026] | 0.022*** [0.0026] | 0.021*** (0.0025) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.103 | 0.105 | 0.106 | 0.106 | 0.106 | 0.105 | 0.103 | 0.105 | 0.104 | 0.104 | 0.104 |
| Obvs. | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 | 29263 |
| Deaths in Epidemic | 0.120*** (0.019) | 0.057*** (0.013) | 0.036*** (0.010) | 0.028*** (0.009) | 0.021** (0.0087) | 0.018** (0.008) | 0.015** (0.0074) | 0.012* (0.007) | 0.011* (0.0067) | 0.009 (0.006) | 0.008 (0.006) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.105 | 0.108 | 0.112 | 0.114 | 0.115 | 0.116 | 0.116 | 0.117 | 0.117 | 0.118 | 0.119 |

| | | | | | | | | | | | |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Obs. | 28957 | 28674 | 28422 | 28196 | 27988 | 27797 | 27614 | 27429 | 27231 | 27034 | 26842 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

Notes: The table examines whether the establishment of county council followed epidemics. The dependent variable in Panel A is a dummy variable equals to 1 for the reestablishment of county council occurred in county i in year t , while the dependent variable in Panel B is a dummy equal to 1 for the establishment of county council occurred in county i in year t , including the establishment of county council before 1916. The main explanatory variables in Columns (1) to (11) are constructed as: equal to 1 for the epidemic occurred in county i in year t when we hypothesize the impact of epidemic lasted for the current year in Column (1), and equal to 1 for the epidemic occurred in county i in year t , $t+1$ and until $t+n$ when we relax the hypothesis that the impact of epidemic lasted for n years in Column $n+1$ ($n \leq 10$). The explanatory variables of total deaths in epidemics are constructed in the same way. The numbers in brackets are standard deviations. ***, **, and *, respectively, represent the significant levels of 1%, 5% and 10%.

Table 5 County-Pair Fixed Effect

| Panel A: Cross-sectional Estimations with County-pair Fixed Effects | | | | | | | | | | | |
|---|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | (1) | (2) | | | | | | | | | |
| Occurrence of Epidemic | 0.194*** (0.025) | | | | | | | | | | |
| Deaths in Epidemic | 0.167*** (0.051) | | | | | | | | | | |
| County Level Controls | y | | | | | | | | | | |
| Pair F.E. | y | | | | | | | | | | |
| Adj. R ² | 0.264 | | | | | | | | | | |
| Obvs. | 440 | | | | | | | | | | |
| Panel B: Panel Data Estimations with County and Year Fixed Effects | | | | | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| Occurrence of Epidemic | 0.018*** (0.0043) | 0.045*** (0.0032) | 0.047*** (0.026) | 0.039*** (0.0023) | 0.037*** (0.0022) | 0.035*** (0.0021) | 0.030*** (0.0020) | 0.028*** (0.0019) | 0.026*** (0.0019) | 0.025*** (0.0018) | 0.024*** (0.0018) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.015 | 0.023 | 0.028 | 0.026 | 0.027 | 0.026 | 0.024 | 0.021 | 0.023 | 0.023 | 0.023 |
| Obvs. | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 | 19258 |
| Deaths in Epidemic | 0.100*** (0.011) | 0.050*** (0.007) | 0.033*** (0.005) | 0.024*** (0.004) | 0.019*** (0.0038) | 0.015*** (0.003) | 0.013*** (0.0032) | 0.011*** (0.0029) | 0.010*** (0.0027) | 0.009*** (0.0025) | 0.008*** (0.0024) |
| County-year Controls | y | y | y | y | y | y | y | y | y | y | y |
| County F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Year F.E. | y | y | y | y | y | y | y | y | y | y | y |
| Adj. R ² | 0.018 | 0.012 | 0.011 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| Obvs. | 18948 | 18676 | 18422 | 18187 | 17970 | 17764 | 17552 | 17353 | 17158 | 16962 | 16770 |

Notes: The table illustrates the effect of epidemics on the establishment of county council using county-pair fixed effects, including 440 counties in 78 pairs. The dependent variable in Panel A is a dummy variable equals to 1 for the counties reestablished county council during 1916 to 1949, and the main explanatory variables are the number of times of the occurrence of epidemics and the total deaths in epidemics during 1900 to 1949. The dependent variable in Panel B is a dummy variable equals to 1 for the reestablishment of county council occurred in county i in year t , and the main explanatory variables are constructed as: equal to 1 for the epidemic occurred in county i in year t when we hypothesize the impact of epidemic lasted for the current year in Column (1), and equal to 1 for the epidemic occurred in county i in year t , $t+1$ and until $t+n$ when we relax the hypothesis that the impact of epidemic lasted for n years in Column $n+1$ ($n \leq 10$). The explanatory variables of total deaths in epidemics in Panel B are constructed in the same way. The numbers in brackets are standard deviations. ***, **, and *, respectively, represent the significant levels of 1%, 5% and 10%.

Table 6 Examining Alternative Explanations

| | (1) | (2) | (3) | (4) |
|--|--|--------------------------------------|---------------------------|-----------------------|
| | Establishment of County Council (Including the Establishment of County Council before 1916) | Reestablishment of County Council | Occurrence of Epidemic | Deaths in Epidemic |
| Panel A: Testing Floods as an Alternative Explanation | | | | |
| Flood | -0.0009 (0.0007) | -0.0003 (0.0004) | 0.00004 (0.0007) | 0.00007 (0.0002) |
| Adj. R ² | 0.100 | 0.012 | 0.055 | 0.028 |
| County F.E. | y | y | y | y |
| Year F.E. | y | y | y | y |
| Obvs. | 32002 | 32002 | 32002 | 31663 |
| Panel B: Testing Prodemocratic civil wars as an Alternative Explanation | | | | |
| Prodemocratic Civil Wars | 0.008 (0.014) | 0.009 (0.007) | 0.020 (0.014) | -0.007*** (0.0017) |
| Adj. R ² | 0.121 | 0.035 | 0.092 | 0.049 |
| County F.E. | y | y | y | y |
| Year F.E. | y | y | y | y |
| Obvs. | 32242 | 32242 | 32242 | 31589 |
| Panel C: Testing Historical Economic Performance as an Alternative Explanation | | | | |
| Population Density | -0.000 (0.000) | -0.000 (0.000) | -0.000 (0.000) | -0.000 (0.000) |
| County F.E. | y | y | y | y |
| Year F.E. | y | y | y | y |
| Adj. R ² | 0.102 | 0.013 | 0.031 | 0.028 |
| Obvs. | 29358 | 29358 | 29358 | 29052 |
| Panel C (Continuous): Testing Historical Economic Performance as an Alternative Explanation | | | | |
| Agricultural Output Index | 0.00001 (0.00003) | -0.000005 (0.00005) | -0.00003 (0.0001) | 0.00008 (0.00006) |
| Province F.E. | y | y | y | y |
| Adj. R ² | 0.815 | 0.128 | 0.171 | 0.350 |
| Obvs. | 676 | 676 | 676 | 415 |
| Panel D: Testing Historical Treaty Ports as an Alternative Explanation | | | | |
| Historical Treaty Port | -0.009 (0.065) | -0.004 (0.011) | 0.005 (0.024) | 0.021 (0.013) |
| Province F.E. | y | y | y | y |
| Adj. R ² | 0.815 | 0.128 | 0.171 | 0.350 |
| Obvs. | 676 | 676 | 676 | 415 |

Notes: The table examines the alternative explanations. The observations in Panel A, B and C are county-year, and the observations in Panel C (Continuous) and D are counties. In Panel A, B and C, the dependent variables are a dummy variable equals to 1 for the (re-)establishment of county council occurred in county *i* in year *t* in Columns (1) and (2), and the occurrence and deaths in epidemics in county *i* in year *t* in Columns (3) and (4); and the explanatory variables are the flood, the number of times of civil wars occurred in county *i* in year *t*, and the population density in county *i* in year *t*. In Panel C (Continuous) and D, the dependent variables are dummy variables equal to 1 for the (re-)establishment of county council, and the number of times of epidemics and the total deaths in epidemics during 1900 to 1949; and the explanatory variables are the cross-sectional agricultural output index and whether county *i* was a historical treaty port during 1900 to 1949. The numbers in brackets are standard deviations. * * * , * * and * , respectively, represent the significant levels of 1%, 5% and 10%.

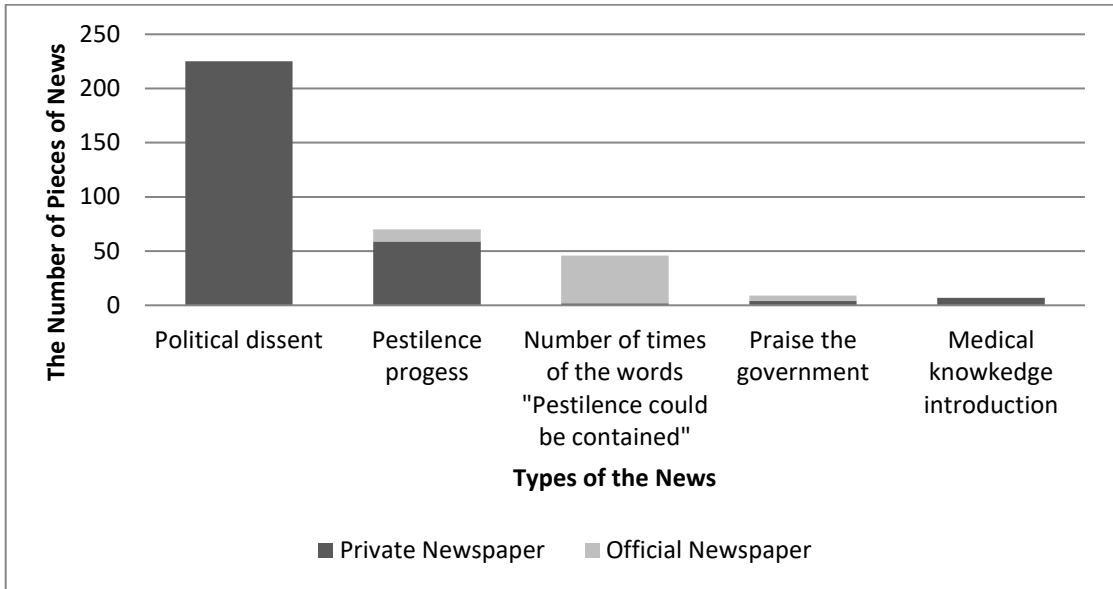


Figure 7 Private Newspapers' Participation in Epidemics

Table 7 Political Dissent during Epidemics

| | (1) | (2) | (3) |
|------------------------|---|---------------------|--|
| | Panel A: Epidemic and Political Dissent | | Panel B: Political Dissent and the Reestablishment of County Council |
| Occurrence of Epidemic | 0.609*** (0.013) | | |
| Deaths in Epidemic | | 0.805*** (0.034) | |
| Political Dissent | | | 0.012*** (0.003) |
| County-year Controls | y | y | y |
| County F.E. | y | y | y |
| Year F.E. | y | y | y |
| Adj. R ² | 0.165 | 0.111 | 0.014 |
| Obsv. | 29263 | 28957 | 29263 |

Notes: The table examines political dissent as a causal channel. The dependent variable in Panel A is the number of pieces of political dissent published in county *i* in year *t*, while the dependent variable in Panel B is a dummy equal to 1 for the reestablishment of county council occurred in county *i* in year *t*. The explanatory variables in Panel A are constructed as: equal to 1 for the epidemic occurred in county *i* in year *t* in Column (1), and equal to the deaths in epidemics occurred in county *i* in year *t* in Column (2). The explanatory variable in Panel B is the number of pieces of political dissent published in county *i* in year *t*. The numbers in brackets are standard deviations. ***, **, * and *, respectively, represent the significant levels of 1%, 5% and 10%.

Table 8 Consciousness of "Government by the People" during Epidemics

| | | (1) | (2) | (3) | (4) |
|---|--|--|----------------------|--|----------------------|
| | | Panel A: Epidemics and the Consciousness of "Government by the people" | | Panel A: The Consciousness of "Government by the people" and Reestablishment of County Council | |
| | | "Government by the People" | "Autonomy" | Reestablishment of County Council | |
| Time Interval between an Epidemic and the Compilation of the County Gazetteer | | -0.024** (0.010) | -0.075** (0.0036) | | |
| "Government by the People" | | | | 0.008* (0.0049) | |
| "Autonomy" | | | | | 0.004*** (0.0014) |
| County Level | | y | y | y | y |
| County Controls | | | | | |
| Province F.E. | | y | y | y | y |
| Adj. R ² | | 0.073 | 0.225 | 0.108 | 0.121 |
| Obsvs. | | 475 | 475 | 475 | 475 |

Notes: The table illustrates the rise of the consciousness of "government by the people" as a causal channel. The dependent variables in Columns (1) and (2) are the number of times of the words "government by the people" and "autonomy"; while the dependent variable in Columns (3) and (4) is a dummy variable equals to 1 for the counties reestablished county council during 1916 to 1949. The explanatory variable in Columns (1) and (2) is constructed as the year of compilation of the county gazetteer minus the year the latest epidemic occurred, while the explanatory variables in Columns (3) and (4) are the number of times of the words "government by the people" and "autonomy" respectively. The numbers in brackets are standard deviations. * * * , * * and*, respectively, represent the significant levels of 1%, 5% and 10%.