Moving to the Right Place at the Right Time: The Economic Consequence of the Manchuria Plague of 1910-11 on Migrants*

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Abstract

Using unique rural household survey data for Manchuria (Northeast China) from the 1930s, we measure the economic return to "luck" of moving to the right place at the right time. Manchuria, which attracted millions of migrants from North China in the first half of the twentieth century, was hit by a devastating pneumonic plague epidemic in 1910-11. Employing a differences-in-differences method, we find that the migrants who moved to plague-hit villages (rather than non-plague-hit villages) right after the plague ended (the 1912-13 cohort vs. later cohorts) prospered most: they owned at least 90% more land than those who failed to do so. Our main results hold after we control for other factors that influence the wealth of migrants and survive various robustness checks. Moreover, no evidence is found that those who made a good move generally "outsmarted" those who did not. Our findings confirm that the economic opportunities in a receiving locality encountered by lucky migrants have long-term welfare implications for them.

Keywords: Migrant, Pneumonic plague, Manchuria, China

JEL Classification: I15, J20, N35, O15

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1. Introduction

Most people are growing up with a belief that one can shape one's own fate through hard working. However, sometimes, forces beyond the control of an individual may also play a role in determining one's life. If we call these forces "luck", to what extent luck may play a role in a person's economic success. Gould, Lavy & Paserman (2011) find, regarding Yemenite children being airlifted to Israel in 1949, girls who were placed in a modern environment were more likely to obtain higher education, marry at an older age, have fewer children, and work longer compared to those being placed in a backward region. They also find a favorable effect on the next generation of the girls who grew up in a modern environment. Their paper implies that the return to luck (being fortunate to be placed in a modern environment) is tremendous and long-lasting.[1] Easterlin (1987) shows that if one is unlucky to be born in a large generation (when national birth rate is high), s/he may be economically, socially, and mentally worse off compared to a lucky one who comes from a small generation. Interestingly, some papers even find empirical supports to the fetal origin hypothesis (Barker, 1992), - the less desirable health and economic conditions of an adult can be traced to the one's misfortune experienced during the course of fetal development including intrauterine exposures to famines and epidemics (Almond, 2006; Ravelli, Stein, and Susser, 1976; Hoek, Brown, and Susser, 1998; St. Clair et al., 2005).[2]

Besides fortunes (or misfortunes) in one's early childhood and prenatal development, "luck" at later stages of life may also influence one's economic achievement. However, to measure the return to luck for an adult is complicated by the endogeneity problem that the "lucky" one may also be the "smart" one. To be precise, we cannot distinguish the return to "luck" from the reward for being "smart" for an adult. For instance, if we regard the migration to a new place as a "rebirth", how different opportunities presented in various destinations or the same destination in different timings may affect the

[1] An incomplete list of literatures on how the fortunes and misfortunes in early childhood environment play a role in an adult's economic achievement includes Chen & Zhou, 2007, Kling, Liebman and Katz (2007), Kling, Ludwig and Katz (2005), Oreopoulos (2003), Goering and Feins (2003), Katz, Kling, and Liebman (2001) and etc.

[2] See Almond and Currie (2011) for details on the literature on the fetal origin hypothesis.

economic welfare of migrants. Stewart and Hyclak (1984), find that entering the U.S. during a period of rapid economic growth has a long-term positive effect on immigrant earnings after controlling for other factors that influence earnings. The possible reason for this finding, they propose, is that during an economic expansionary period, migrant workers are more likely to get on-the-job training than if they move during a recession period. The on-the-job training facilitates the skill transfer and language adaptability of migrants, which has a continuing impact on their earning profile. However, do those lucky ones who migrate to the U.S. at the right time generally "outsmart" or respond to economic stimuli more actively than those who move at the wrong time?[3] To put it in another way, the better earning profiles of the migrants who enter at the right time may be attributed to the unobserved quality of the migrant cohort rather than being lucky to move at the right time.

This paper aims to measure the return to luck of migrants if they move to the right place at the right time when the aforementioned endogeneity problem did not exist (or is unlikely to have existed). We study migration to Manchuria (Northeast China) during the period of the late Qing dynasty and the Republic of China, which is one of the "three main circuits of long-distance migration from 1846 to 1940" (Mckeown, 2004, 155-6). With the arrival of railways at the turn of the twentieth century, Manchuria attracted millions of migrants from the provinces of Shandong and Hebei in North China. The migration process was seriously interrupted when a devastating pneumonic plague epidemic hit Manchuria in 1910-11, which killed more than forty-five thousand people. The severity of the plague was variable, so deaths varied across localities. Hence, villages that experienced a large loss in population likely had relatively higher wages and cheaper land compared to non-plague-hit villages. However, these differences would have soon disappeared if there was an influx of migrants to replenish the population. Our central hypothesis is that migrants who moved to a plague-hit village soon after the plague ended likely accumulated more wealth than those who failed to do so.

Based on unique rural household survey data for Manchuria from the 1930s, we

[3] Historically, large surges in unrestricted immigration to the U.S. match on a one-to-one basis the great booms in the economy (Easterlin,1968, pp, 32 & 44).

employ a differences-in-differences method (DID) to analyze the wealth of the migrants who moved to plague-hit villages rather than non-plague-hit villages right after the plague ended rather than a later period. We find that those who moved to the right place at the right time prospered most: they owned at least 90% more land than those who failed to do so. This result holds after we control for other factors that influence the wealth of migrants and survives various robustness checks.

We believe that our findings are not likely due to migrants who moved to the right place at the right time "outsmarting" those who did not. Conversely, assuming that a migrant's socioeconomic status captures migrants' not only initial wealth upon arrival in a village but also intelligence, education, and information-gathering ability, we find that migrants with a higher initial socioeconomic status seemed to avoid plague-hit villages, particularly during the period right after the plague ended. Moreover, relatives who live in a destination village may have served as an information source for migrants (Munshi, 2003), and accordingly, we find that households with a relative in the destination village seemed to stay away from plague-hit villages. We believe that the superstition of not moving to a place that suffered mass deaths or concerns about any lingering effects of the plague blinded migrants from recognizing the opportunities that were left by those who perished due to the plague. Migrants mainly moved to plague-hit villages rather than non-plague-hit ones because these villages were convenient locations that were near railways and therefore easier and less expensive to move to. Our findings strongly suggest that the economic return to luck by moving to the right place at the right time is tremendous. Our historical setting better facilitates our ability to determine whether the opportunities presented in a receiving locality at the time of entry affect the subsequent economic welfare of migrants compared with a modern setting. In our setting, the initial conditions in one destination uniformly affected all migrants who moved there since they were all homogenous farm laborers. In contrast, in a modern setting, migrants with different skills, whose welfare is subject to sector-specific shocks, may be influenced differently by conditions at the time of entry. For instance, certain initial conditions could be favorable for migrant workers in specific sectors but not migrant workers in other sectors. Therefore, the impact of the initial opportunities presented in destinations on the welfare of migrants can be more accurately measured in our setting than in a modern setting. Moreover, in our setting, the channel through which initial conditions may affect the welfare of migrants is more straightforward than that in a modern setting. In an agrarian economy, the relative conditions of the labor and land markets directly affect migrants' welfare[4]However, in a modern setting, the channels could be very complex and mixed, for example, good economic conditions at the time of entry may imply a favorable labor market for migrants to find a job (low job search costs and potentially better skill matching), more opportunities for on-the-job training (more human capital accumulation), a better investment environment, possibly higher living cost and so forth. Thus, determining which channel will dominate is much more complicated in a modern setting than in our historical setting of an agrarian economy.

Our study is also related to a broader body of literature about the continuing effects of negative shocks or crises. The most well-known example concerns the economic consequences of the Black Death in Europe during thirteenth and fourteenth centuries (North and Thomas, 1973; Voigtlander and Voth, 2009, 2012). Other researchers have studied the economic consequences of World War II in Europe. For example, Olson (1982) argues that WWII destroyed the rent-seeking collations in Europe, which left room for post-war economic growth. Acemoglu, Hassan and Robinson (2011) find that the holocaust of Jews in Russia during WWII has had a continuing impact on the economic and political conditions in Russia today. In contrast, no long-term consequences of the mass deaths in Japan and Vietnam during WWII are found (Davis and Weinstein, 2002; Miguel and Roland, 2008). Our findings suggest that in a vast agrarian country, a collapse in the population in one region may not have any long-term economic consequences for the regional economy because the diminished population can be quickly replaced by an influx of migrants with similar skills. This conclusion is confirmed by the evidence that migrants who moved to plague-hit villages later after the plague ended received no economic advantage over their counterparts who moved to non-plague-hit villages.

[4] For example, in agrarian economy, moving to a land-abundant-and-labor-scarce locality will enable migrants to buy cheaper land when they arrived, and earning higher wages, allowing them to save more for future land purchases.

The paper proceeds as follows. Section 2 provides a historical overview of the migration to Manchuria in the first half of the twentieth century and the pneumonic plague in 1910-1911. Section 3 presents the data. We outline the empirical method in Section 4. Section 5 presents the empirical results, which are followed by several robustness checks. Section 6 discusses whether the "smartness" or "luck" of migrants who moved to the right place at the right time played a major role in our finding. Section 7 concludes.

2. Historical background

2.1 Migration to Manchuria

The Qing dynasty strategically opened up Manchuria, which was originally mainly inhabited by ethnic minorities, to Han Chinese starting in the mid-nineteenth century. With the arrival of railroads in 1890s, Manchuria experienced one of the world's largest population movements in the early twentieth century. According to Gottschange (1987, p.462), from 1880 to 1942, the average annual population flow is estimated to be about half a million, which resulted in a total net population transfer of over 8 million. This migration was comparable in size to the westward movement in the United States between 1880 and 1950 and twice as large as the great nineteenth-century emigration from Ireland.

The majority of these migrants were from the nearby provinces of Hebei and Shandong (North China), which were densely populated and in dire economic conditions. Franklin L. Ho, an economist at Nankai University in Tianjin, wrote in 1931, "Opportunities for employment (in Manchuria) are plentiful and wages are relatively high." He found that in the northern Manchurian provinces of Heilongjiang and Jilin, migrants who worked as assistant farmhands could earn several times the wage for comparable labor in Shandong. Survey results, which were published by the research department of the South Manchuria Railway Company in 1940 and 1941, show that the ratio of total income to necessary expenses was between 30% and 118% higher in Manchuria than in North China in the occupations that were surveyed. (Gottschange, 1987, p. 481).

Given the economic advantages of Manchuria and free entry for migrants, it is surprising to see that after the migration that lasted for more than a half century, there were still persistent wage differences between Manchuria and North China. In theory, wage gaps can be instantaneously closed through migration if there are no entry restrictions, such as visa requirements for international migration, and other controls on internal migration (e.g., Hukou system in today's China). Other obstacles thus must have existed to prevent the wage gap between Manchuria and North China from closing. We believe that high migration costs contributed to the persistent wage gap. Apart from the psychological costs of leaving one's home and fear of the difficulties of the long journey to Manchuria, high migration costs deterred people from moving to Manchuria. The cost of sending a single person to Manchuria was close to a month's income for most families in North China, and the expense of moving an entire household of six or seven people would have required between a third and four-fifths of a household's annual expenditure.[5]

2.2 Pneumonic plague in 1910-11

The Manchuria winter of 1910-11 was one of death and discontent: a pneumonic plague epidemic, the greatest since the Black Death of the fourteenth century, claimed between forty-five thousand and sixty thousand lives. Although there is no consensus on the origin of the plague, the widely accepted theory, proposed by D.K. Zabolotnyi, head of the Russian delegation combating the plague, at the International Plague Conference in Mukden in April 1911, is that the Siberian marmot, locally known as tarbagan, was the carrier of the pneumonic plague (Mark Gamsa, 2006, p.153).[6] After that, the story begins with the statement that the plague first erupted among tarbagan hunters. A sharp rise in the price of tarbagan fur, which, when dyed, bears a striking resemblance to mink fur, in European markets attracted inexperienced trappers from North China. These

[5] Adding up the fares for steamships and railroads along the major migrant routes in the late 1920s, the average transportation expense ranged from 7 to 10 Yuan, depending on the exact location. The opportunity cost of income forgone during the time spent traveling probably averaged at least 1 Yuan. According to a study of rural incomes in China in 1934, the average family earned about 88 Yuan per year in Shandong and about 124 Yuan in Hebei. (Gottschange, 1987, p. 485)

[6] Dr. Zabolotnyi's theory was not universally accepted by the delegates at the conference. Richard Pearson Strong, the chief U.S. delegate, reported at the conference that tarbagans were in fact highly susceptible to experimentally induced plague (Chernin, 1989, p309). Wu Lien-Teh, the chief Chinese delegate, who played a major role in combating the plague, also highly doubted the accuracy of the theory (Wu, 1936).

inexperienced trappers became infected as they ignored precautions taken by Mongols and Buriats to avoid contact with sick animals.

With the onset of cold weather, ten thousand hunters, along with many thousands more migrant agricultural laborers began the annual journey home to the South for the Chinese New Year. Manchuria, with a land mass of about 360,000 square miles, boasted three railways along which most of the coolies had moved. One line was owned and operated by the Russians, a second by the Japanese, and the third by the Chinese; the Russians and Japanese also controlled large "conceded" territories and towns abutting their lines. The epidemic clearly followed the rail routes. Wherever men gathered in low-class railway carriages or rested in overcrowded inns, the plague flourished through droplet infection, and men died frequently a day or two after becoming sick. Terrifyingly, no one who became sick with the plague survived.

Large cities such as Harbin, Changchun, Qiqihar and Shenyang had high population densities and served as commercial centers and transportation junctions in the region. Consequently, they became the centers from where the plague spread to nearby villages. As the Chinese New Year was approaching, according to tradition, villagers visited the closest large city to buy goods for the festival. Some of them caught the plague and returned home (Cao & Li, 2006, p.244). Moreover, in order to avoid being caught by policemen,[7] some urban dwellers who were sick with the plague managed to flee to villages. Because of the lack of anti-plague organizations and the filthy living conditions in villages, the plague spread quickly. It was not uncommon for an entire family to die from the plague, leaving no one to bury their corpses (Jiao, 2006).

Throughout the three Manchurian provinces, 69 counties and cities were reported to have been scourged by the plague, including 29 in Liaoning Province, 24 in Jilin Province, and 16 in Heilongjiang Province (Jiao, 2006; Shibayama Gorosaku, 1957). Before the plague, Harbin, the largest city in Manchuria, had a population of about 70,000, and at least 9,000 are estimated to have perished due to the plague within five months after the first three people were discovered to have died due to the plague on 9 November 1910

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[7] If a man was suspected to being sick with the plague by policeman, he would be caught and thrown into plague hospitals (or quarantine stations), where no patient ever came out.

(Jiao, 2006). The severity of the plague varied across the counties in Manchuria (see Section 3 for details).

3. Data

Our data on migrant households are from a unique rural household survey conducted by the Provisional Industrial Investigation Bureau, which was organized under the auspices of the Ministry of Enterprises of the National Affairs Yuan of Manchukuo in mid-1930s.[8] The survey was conducted in two waves. The first wave was carried out in 19 villages from 16 counties in North Manchuria[9] in February 1935. The second was conducted one year later in 22 villages from 21 counties, 17 of which were located in South Manchuria.

> *Figure 1 about here* <

Information on whether a village was hit by the plague was from a book called *The Situation of the Manchurian Plague in 1910*, which was published in 1957 by Shibayama Gorosaku.[10] The author systematically recorded the death toll for all plague-hit counties (including the county seat and the villages under its administration). Figure 1 shows the severity of the plague for the counties where the villages that were included in the survey were located. The shadowed areas represent the plague-hit counties. The bars, which are presented in four colors, indicate the four levels of severity of mass death in plague-hit counties, with the darkest representing the most severe situations of more than 600 deaths due to the plague and the lightest representing the least severe situations of fewer than 50 deaths. Unfortunately, we do not have the death toll for each village. Thus, we assume that the severity of the plague in villages was the same across a county as a whole.[11,12]

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8 Kung & Li (2011) use the same data to analyze the impact of the commercialization of the soybean trade on the welfare of migrants. Benjamin & Brandt (1997) use the same data to analyze the relation among land, factor markets and inequality in rural Manchuria. A detailed description of the survey data can also be found in Myers (1976).

9 Generally, North Manchuria refers to the area that was served by the Chinese Eastern Railway (the horizontal line in Figure 1 that cuts across Qiqihar and Harbin), and South Manchuria refers to the area that was served by the South Manchurian Railway (the major vertical line connecting Harbin with Changchun and Shenyang).

10 The author was one of the Japanese delegates at the aforementioned International Plague Conference in Mukden in April 1911 and played an active role in combating the plague.

11 We assign a value of 4 for the most severe situations, in which more than 600 people died in a county because of

Another plague epidemic hit Manchuria in 1920-21, but the scale of this plague was much smaller compared with the 1910-11 plague.[13] In order to avoid potential confounding from the effect of the 1920-21 plague, we exclude migrant households that migrated to the studied villages after 1921. Thus, 677 households remain in our analysis. We use the arable land that was owned by a household/person as a measure for economic welfare. In an agrarian economy with a low standard of living, most people tend to invest their savings in land. Their economic welfare and social status are tied to the land that they owned.

According to the literature, some migrant household/personal characteristics are determinant variables for migrants' earning profiles. First, we control for household size and the ratio of males in the household, as we believe that a large family with more males is likely to be more prosperous in an agrarian economy. Next, we control for the age of the household head, since age has a direct effect on wealth accumulation through life-cycle saving. Furthermore, we control for the amount of time that a household lived in a village, because the longer a household lived in a village, the more location-specific information (DaVanzo, 1983) they may obtain and the more investments they may make in a locality, all of which will have a positive effect on their wealth accumulation. In addition, we control for the socioeconomic status of a household before it moved to Manchuria. According to Myers (1976), there were four socioeconomic statuses at the time, including, from the highest to lowest, landlords, owner-cultivators, tenant families, and landless laborers. This covariate can serve as a proxy for the wealth-accumulating ability and wealth endowment of migrant families upon their arrival in Manchuria. For example, households belonging to a higher socioeconomic status were likely better educated, more self-driven, and, of course, had a larger wealth endowment, which enabled them to achieve better economic outcomes in new villages. Finally, following Kung and Li (2011), we control for the ratio of off-farm laborers to the population of a

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the plague, 3 for less severe situations, 2 for moderately severe situations and 1 for the least severe situations. For example, if a county experienced the most severe situation, namely, level 4, the villages under its administration are regarded to have experienced the same level of severity.

12 Because of the lack of information on population size for counties before the plague occurred, we cannot construct a more precise measure for severity, such as the percentage of people who died due to the plague in each county.

13 Taking Harbin as an example, more than 10% of the population perished in the 1910-11 plague, but only about 1% died in the 1920-21 plague. The total death toll in Manchuria in the 1920-21 plague is about 8,500 (Chun, 1923), which is much smaller than the death toll in the 1910-11 plague of between forty-five thousand and sixty thousand lives.

household to capture the possibility that some families took advantage of non-farm opportunities in nearby cities.

Village characteristics are factors that not only attract new migrants but also influence the economic welfare of migrants. For instance, if a village is located near a railway, migrants can easily move to the village and can do so relatively cheaply, which may be a crucial factor in a migrant's decision to move there, particularly in a developing economy with underdeveloped transportation infrastructure. Moreover, proximity to a railway implies better economic opportunities, such as better integration into to the market (local, national, and international), lower transaction costs, and greater availability of information. In order to capture the possible impact of a village's location on migrants' welfare, three variables are employed: distance to the county seat, distance to the nearest major city, and distance to the nearest railway. Next, we control for village population size to capture the possible impact of the scale of the economy on the welfare of migrants. In addition, the village age is added as a proxy to capture possible institutional differences, e.g., an older village may have better governance than a newer village, which provides migrants with better property protection. In contrast, a newer village may be friendlier toward migrants than an older village since all the residents may be relatively new migrants. Finally, a region dummy is included to capture the regional differences between South Manchuria and North Manchuria, such as differences in the industrialization levels and land suitability for soybean cultivation (Kung & Li, 2011).

The summary statistics for the aforementioned variables are shown in Table 1. Panel A presents the summary statistics for the entire sample. Panel B presents the summary statistics for the sub-sample of villages that were scourged by the 1910-11 plague (plague-hit villages) and Panel C presents the summary statistics for their counterparts that luckily avoided the plague (non-plague-hit villages). Comparing Panel B and Panel C, striking differences between plague-hit and non-plague-hit villages are found for two variables: first, the land per household/person in non-plague-hit villages was more than twice that in plague-hit villages, and second, non-plague-hit villages were located farther from their county seat, the nearest major city and railways than plague-hit villages.

> Table 1 about here <

4. Empirical methodology

Our assumption is that the dramatic population decline due to the plague in plague-hit villages decreased the return to capital and increased the return to labor relative to non-plague-hit villages. Thus, the migrants who moved to plague-hit villages capitalized on the economic opportunities that were left by those who perished due to the plague by buying cheaper land when they arrived, and earning higher wages, allowing them to save for future land purchases. However, the increased return to labor related to land would not have lasted long, since given the relatively fixed supply of land, the higher return to labor would have soon disappeared as more migrants moved to the village.[14] Or to put it in another way, only migrants who moved to the plague-hit villages right after the plague ended benefited from the economic opportunities left by those who perished due to the plague, and later comers would simply have missed out on such opportunities.

Figure 2 shows the average amount of land that was owned by households (Figure 2.a) and individuals (Figure 2.b) in 1935-36 by migration cohort. As Figure 2 shows, the cohort that moved to plague-hit villages held more land than those that moved to non-plague-hit villages in the first several years after the plague ended (indicated by the dotted vertical line), particularly during the years right after the plague ended, namely, 1912-13. The cohorts that moved to plague-hit villages long after the plague died out did not seem to have any advantage in land accumulation compared to those that moved to non-plague-hit villages. The research questions that we are interested are as follows: Did households that moved to plague-hit villages have better economic opportunities than those that moved to non-plague-hit villages? Were households that moved to plague-hit

[14] If an economy without a dramatic inflow of migrants is hit by a devastating plague, the relative return to factors of production may change permanently. For example, after the Black Death in England during the 13th and 14th centuries, wages rose permanently because of the lack of labor supply (Bailey, 1998; Clark, 2005; Galor, 2011; Voigtlander and Voth, 2009, 2012). However, the economy conditions are completely different when free entry of migrants is allowed after a devastating plague ends, since the dead can be quickly replaced by migrants with similar skills.

villages soon after the plague ended relatively better off than those that moved later? If yes, to what extent?

> *Figure 2 about here* <

We employed a differences-in differences (DID) method for the empirical analysis. The migrants who moved to the surveyed villages before 1921 were divided into nine cohorts. Those who moved during the period before 1905[15] were categorized as one cohort. The rest of the migrants were divided into eight cohorts based on two-year intervals: two cohorts moved before the plague, one cohort moved during the plague, and five cohorts moved after the plague. The households that moved to plague-hit villages were assigned into the treatment group, and those that moved to non-plague-hit villages belonged to the control group. Any difference between the treatment group and control group can be considered to indicate the effect of the economic conditions that resulted from the plague at the time of entry on the welfare of migrants. Our estimation is specified as follows:

$$y_{itr} = \beta_o + \sum_{t=2}^{t=9} \beta_{1t} mc_{\mathrm{it}} + \beta_2 plague_{ir} + \sum_{t=2}^{t=9} \alpha_t (mc_{\mathrm{it}} \times plague_{ir}) + \lambda X + \varepsilon_{itr} \qquad (1)$$

where y_{itr} is the land possessed by household i who migrated to village r during time period t. mc_{it} is a dummy variable for household i who migrated during time period t, and $plague_{ir}$ is a dummy variable indicating whether a village r where household moved was hit by the plague. The coefficient α_t on the interaction term is the DID estimator, which captures the potential impact of the initial conditions created by the plague on the welfare of the different migrant cohorts. X is a vector of control variables and ε_{itr} is the random error.

5. Empirical results

15 The Russo-Japanese War occurred in South Manchuria in 1904 and ended in 1905 with the Japanese defeating the Russians. The migration process was suspended by the war. After the sign of the Treaty of Portsmouth on 5 Sep 1905, Japan gained a strong hold in Manchuria and obtained the jurisdiction of south part of the China Eastern Railway from Russia. Since then, Japan speeded up the construction of railway in Manchuria. With the expansion of railway system, migrants from North China flooded into Manchuria (Gottchang and Lary, 2000, p.49-53; p.119; Wang, 2005, pp.145-156).

5.1 Baseline estimates

Table 2 shows our baseline results. Columns 1-4 present the results from an OLS estimation. Columns 5-6 present the results for a Tobin model, which fits the data better when some dependent variables are zeros, namely, when some households were landless. Regardless of whether we control for the characteristics of the household and village, and using different econometric specifications, we find that the cohort that moved to plague-hit villages right after the plague ended, the period of 1912-13, were significantly wealthier (obtaining more land ranging from 153% to 98%) in 1935-36 compared to those that moved to non-plague-hit villages during the same period. This result indicates that the economic opportunities in plague-hit villages at the time of entry had a long-lasting impact on the wealth accumulation of migrants. For the 1914-15 migrant cohort, a similar pattern is observed, but the effect is much smaller in magnitude compared to that for the 1912-13 migrant cohort. For the subsequent cohorts, the benefits of moving to plague-hit villages relative to non-plague-hit villages disappeared.

In Table 3, we replace the dummy for plague-hit villages with an indicator of the severity of the plague in these plague-hit villages. As shown in Figure 1, the severity is categorized into four levels, and we assign a value of 4 for the most severe situations in which more than 600 people died in the county, where the studied village was located, due to the plague, 3 for less severe situations, 2 for the moderately severe situations, and 1 for the least severe situations in which less than 50 people died. This categorization allows us to explore, among migrants who moved to the "right" place (namely, plague-hit villages), whether migrants who moved to places that suffered the greatest loss due to the plague had even better economic opportunities than those who moved to places that suffered less loss. The DID estimates for the migration cohort of 1912-13 are all statistically significant. The results show that compared to migrants who moved to non-plague-hit villages during the 1912-13 period, those who moved to plague-hit villages with the least loss acquired about one-quarter to one-third more land, and those who moved to the villages with the greatest loss acquired about 140% to 84% more land.

> Table 2 and Table 3 about here<

The estimates for the household characteristics are consistent with our expectation that the size of a household, age of the household head, number of males in the household and length of time that the household lived in a village all contributed positivity to a household's wealth accumulation. In addition, a higher socioeconomic status in the hometown is associated with greater wealth-accumulating ability. Interestingly, household size also positively influenced the amount of land per person (Columns 4 and 6). This result indicates that the scale of the economy affected migrants in the surveyed villages, which may explains why the household size was generally larger in Manchuria than in other parts of China.[16]

For the village characteristics, only the estimates on the distance to the nearest railway and the region dummy are statistically significant.[17] If a village was 1% closer to a railway, its households and individuals gained 0.11% and 0.09% more land, respectively. Households that moved to North Manchuria accumulated more than 60% more land than households that moved to South Manchuria. This greater land accumulation may have resulted because North Manchuria is more suitable for soybean cultivation than South Manchuria, allowing households that moved to North Manchuria to prosper from the commercialization of the soybean trade (Kung & Li, 2011).

5.2 Robustness checks

Unobserved characteristics of villages may bias our estimates. We used an instrumental variable method to avoid such bias. Since the plague was contagious, if a village's neighbor county was hit by the plague, there was a high probability that the village would also be hit by the plague. Thus, whether a village was hit by the plague is highly correlated with whether the plague hit its neighbor. However, the economic conditions in neighbor counties were unlikely to influence, or at best indirectly influenced, the migrants' wealth accumulation. Therefore, we take "whether the neighbor of a village was hit by the plague" and "the severity of the plague in neighboring villages" as

16 In our sample, the average household size was 7 persons, compared to 4 persons in a representative household in the southeastern Lower Yangzi region and 5 in North China (Huang, 1985, 1990; Myers, 1970).

17 There is obvious co-linearity in the distance variables. For example, if a village was close to a county seat, it was also close to a major city and a railway.

instrument variables.[18] The results are reported in Appendix Table A1. Panel A shows the first-stage results of regressing whether a village was hit by the plague and the severity of the plague on the instruments. The statistically significant estimates indicate that the instruments are valid. In the subsequent panels, the results from the first-stage regression are entered into the second stage of the 2SLS regression. Panels B and C present the second-stage results regarding how economic conditions at the time of entry affect the wealth accumulation of migrants. The results are consistent with the baseline estimates that are presented in Tables 2 and 3.

In order to exclude the possibility that the baseline results are sensitive to our arbitrary periodization, we performed the analysis again with three- and four-year intervals as the analysis period. The results are robust to this analysis and confirm that the migrants who moved to plague-hit villages shortly after the plague ended accumulated greater wealth compared to those who moved to non-plague-hit villages. However, the later comers are not found to obtain any benefit from moving to plague-hit villages versus non-plague-hit villages. Appendix Table A2 shows the results for the 3-year interval estimate.

6. Luck vs. smartness

Although we controlled for household characteristics, a major challenge to our results is whether the households who moved to plague-hit villages soon after the plague ended generally "outsmarted" their counterparts that moved to either non-plague-hit villages or the same villages during later periods. For example, if a household foresaw the opportunities created by the mass deaths in plague-hit villages and intentionally moved to such a village, the favorable conditions at the time of their entry would increase their ability to accumulate wealth. However, were migrants, who could capitalize on economic opportunities, smarter and thus better able to accumulate wealth than those who could not? Or to put it in another way, was the positive impact of the economic opportunity on the welfare of migrants that was found in our study attributed, at least in part, to unobserved characteristics, such as the intelligence of the migrants who were able to

[18] If one of the village's surrounding neighbors was hit by the plague, we consider the neighbors of the village to have been hit by the plague. If the severity of the plague varied across a village's surrounding neighbors, we select the most severe situation as the instrument.

move to the right place at the right time? Namely, was it "smartness" rather than "luck" that contributed to the observed results?

To address this potential issue, we conduct an analysis to identify the "determinants" of a migrant's decision to move to a plague-hit village vs. a non-plague-hit village. A probit model is employed, with the probability of moving to a plague-hit village as the dependent variable. The results are reported in Table 4. In Column 1, regarding household characteristics, we only include the characteristics of migrants before they moved to a village, namely, their social status in their hometown, and whether they had a relative in the destination village before they moved to. Regarding village characteristics, we only control for time-invariant variables, such as village history, a region dummy and the distance to a county seat, major city, and railway. In Column 2, cohort dummies are added to the analysis. In the rest of the columns, we add more household and village characteristics based on the assumption that these household characteristics did not change significantly over time. Our estimates are consistent across various specifications.

We seek to find out whether smarter migrants intentionally chose to move to plague-hit villages, particularly soon after the plague ended. If we believe that migrants who were successful in their hometowns were smarter than their poorer counterparts in discovering opportunities, we will find that households with high social status were more likely to move to plague-hit villages after the plague ended. However, the negative (but not statistically significant) coefficient for social status upon arrival shows that migrants with a high social status were less likely to move to plague-hit villages, particularly right after the plague ended during the 1912-13 period (the interaction term in Column 5). Migrants with a high social status may have waited because that they had more information about the plague and avoided moving to plague-hit villages because of the superstition of moving to a place right after mass deaths or concerns about any lingering effects of the plague that may have increased the risk of catching the plague. In other words, migrants with a high social status avoided plague-hit villages rather than being smart and capitalizing on the economic opportunities that were left by the dead. Moreover, if migrants had a relative in a village, s/he could have served as an information source for migrants (Munshi, 2003). As Table 4 shows, the presence of a relative in the receiving village reduced the likelihood that a migrant moved to a plague-hit village. This result is even observed for the 1912-13 period when the plague had already ended (the interaction term in Column 6). Again, the estimates are not statistically significant.

Based on these evidences, migrants who moved to plague-hit villages likely did not have much information about the plague (or at least did not have a clear understanding of its implications and consequences). They moved to these villages as destination due to two main factors: First, the location of these villages was convenient, and thus, the migration costs were lower, since, as mentioned in Section 2, moving to Manchuria was a tremendous expense for a household. Second, these villages were often newer villages that were likely friendlier toward migrants than older villages, since most of their residents were likely originally migrants. Therefore, the likelihood that migrants who moved to plague-hit villages systematically outsmarted those who moved to non-plague-hit ones is low. We believe that the welfare gain due to moving to the right place at the right time is a return to luck rather a reward for being smart.

> Table 4 about here <

7. Conclusions

This paper measures the economic return to luck in later stages of one's life. We find that the lucky households that happened to move to the right place at the right time were better off compared to those who failed to do so. Migrants who moved to a village right after it experienced a devastating plague accumulated considerably more wealth than their counterparts who missed out on such opportunities. Evidences show that the extra economic benefit of making the right move is mainly a return to luck rather than a reward for being "smart" enough to make the right move. Although we measure the return to luck, the main purpose of the paper is to inform people that there is some "luck" merely left unexplored and being smart to move to "luck" will bring you an unexpected fortune. Finally, we are fully aware that despite our results survived alternative specifications and robustness checks, we still cannot rule out the possibility that some omitted factor might be responsible for the statistical association between the severity of the plague and the long-run economic consequence of the migrants. Thus, the results should be interpreted with caution.

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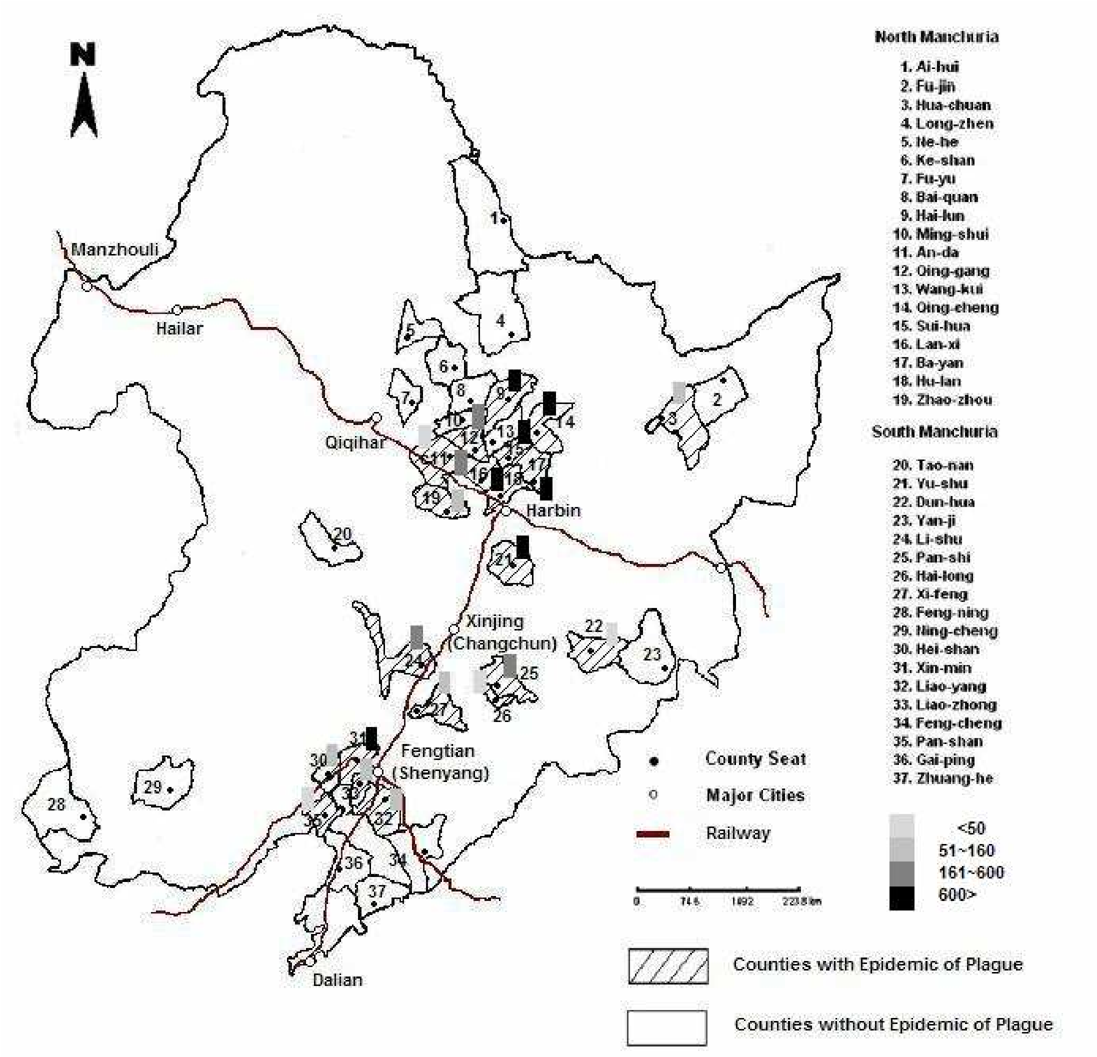
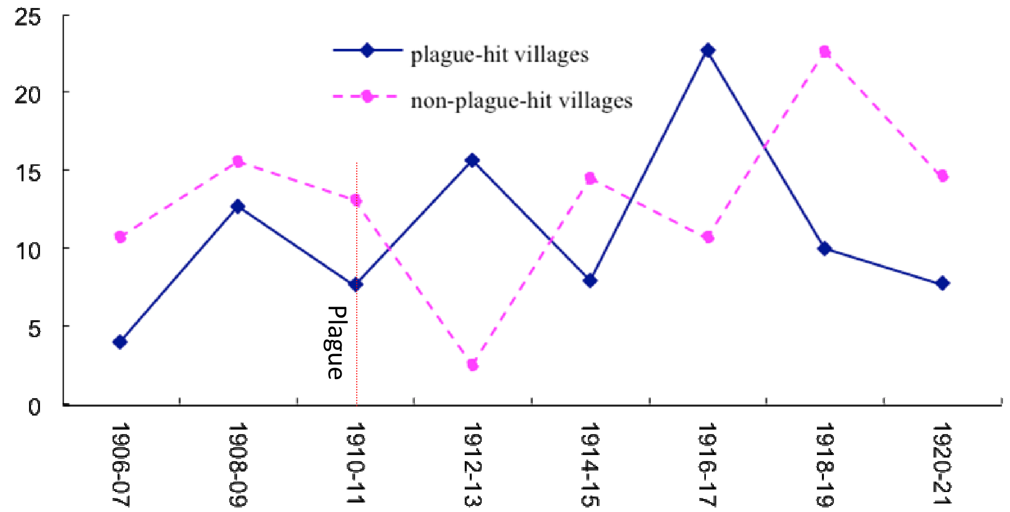
Figure 1

Counties where the villages in the 1935-36 survey were located and the severity of the plague by locality

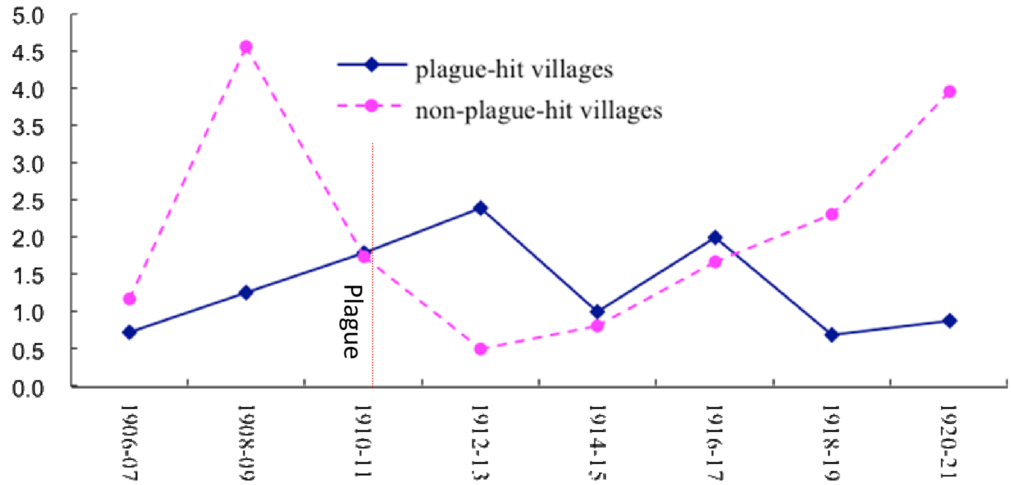


Source: Village locations are taken from *The Manchurian Village Surveys in the 1930s*, and information on the pneumonic plague epidemic in 1910-11 is taken from *The Situation of the Manchurian Plague in 1910* by Shibayama Gorosaku (1957).

Figure 2
Land owned by households/individuals in plague-hit and non-plague-hit villages in 1935-36 by migration cohort (Unit: Shang per household/person)



a. Land per household



b. Land per person

Note: 1 Shang in northeast China = 10,000 square meters.

Table 1

Summary statistics for the variables in the empirical analysis

	No. of Obs.	Mean	Sd. Dev.	Min	Max	No. of Obs.	Mean	Sd. Dev.	Min	Max	No. of Obs.	Mean	Sd. Dev.	Min	Max
	Panel A: All villages					Panel B: Plague-hit villages					Panel C: Non-plague-hit villages				
Household characteristics															
Land per household (unit: *Shang*)[a]	677	18.8	73.2	0.0	1600.0	373	12.5	26.2	0.0	226.9	304	26.5	104.9	0.0	1600.0
Land per person (unit: *Shang*)	677	2.3	2.7	0.5	10.7	373	1.4	1.4	0.5	6.4	304	3.4	3.4	0.5	10.7
Household size	677	7.1	5.5	1.0	68.0	373	7.1	5.2	1.0	56.0	304	7.2	5.9	1.0	68.0
Male	677	3.6	2.9	0.0	35.0	373	3.6	2.8	0.0	35.0	304	3.7	3.0	0.0	33.0
Female	677	3.5	3.0	0.0	35.0	373	3.6	2.8	0.0	21.0	304	3.5	3.3	0.0	35.0
Age of the household head	677	49.3	12.1	18.0	60.0	373	49.8	11.9	20.0	60.0	304	48.7	12.2	18.0	60.0
Number of household farm laborers	677	2.5	1.9	0.0	17.0	373	2.6	2.0	0.0	17.0	304	2.4	1.8	0.0	12.0
Number of household off-farm laborers	677	0.3	0.7	0.0	8.0	373	0.2	0.6	0.0	4.0	304	0.3	0.8	0.0	8.0
Social status upon arrival[b]	677	2.9	0.8	1.0	4.0	373	2.8	0.8	1.0	4.0	304	3.0	0.7	1.0	4.0
Presence of relatives upon arrival (yes=1, no=0)	677	0.6	0.5	0.0	1.0	373	0.6	0.5	0.0	1.0	304	0.7	0.5	0.0	1.0
Time living in village (unit: *Year*)	677	98.4	88.5	15.0	350.0	373	96.5	89.0	15.0	300.0	304	100.9	88.0	15.0	350.0
Village characteristics															
Average household size in village	37	6.3	1.3	4.3	10.1	19	6.4	1.0	4.3	9.6	18	6.2	1.5	4.7	10.1
Average number of households in village	37	57.3	19.0	9.0	91.0	19	59.2	18.4	22.0	91.0	18	55.0	19.4	9.0	79.0
Age of village	37	153.4	87.9	18.0	285.0	19	148.0	95.7	25.0	285.0	18	160.2	76.9	18.0	256.0
Distance to the county seat (Unit: *Li*)	37	33.6	27.7	8.0	167.0	19	21.9	9.0	8.0	45.0	18	48.0	35.2	9.0	167.0
Distance to the nearest major city (Unit: *Li*)	37	199.6	146.9	36.0	535.0	19	109.6	52.4	36.0	314.0	18	309.7	150.3	57.0	535.0
Distance to the nearest railway (Unit: *Li*)	37	1140.3	1137.1	74.6	3953.8	19	535.2	670.2	74.6	2387.2	18	1880.4	1153.7	74.6	3953.8

Note: a. 1 Shang = 10,000 square meters. b. Social status is categorized at four levels, from the highest to the lowest, as landlord=4, cultivator=3, tenant=2, and laborer=1.

Table 2

The 1910-11 plague and the economic welfare of migrants: baseline estimates

Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)	(5) Land per household (log)	(6) Land per person (log)
DID estimators (plague-hit village ×migrant cohort, yes=1)						
1906-1907	0.43 (0.96)	0.43 (0.40)	0.67 (0.71)	0.32 (0.35)	0.88 (0.78)	0.48 (0.49)
1908-1909	-0.53 (0.83)	-0.63 (0.51)	-0.36 (0.58)	-0.40 (0.45)	-0.35 (0.75)	-0.38 (0.47)
1910-1911	0.40 (0.48)	0.50* (0.29)	0.64 (0.38)	0.42 (0.28)	0.68 (0.56)	0.45 (0.35)
1912-1913	1.48*** (0.45)	0.98*** (0.30)	1.53** (0.57)	1.03*** (0.36)	1.53*** (0.42)	1.04*** (0.27)
1914-1915	0.49 (0.58)	0.54** (0.24)	0.66* (0.37)	0.44** (0.21)	0.62** (0.30)	0.42** (0.19)
1916-1917	1.11 (0.71)	0.65 (0.39)	0.8 (0.54)	0.56* (0.32)	0.82** (0.38)	0.57** (0.24)
1918-1919	-0.17 (0.43)	0.01 (0.26)	-0.01 (0.33)	-0.06 (0.21)	-0.004 (0.37)	-0.05 (0.23)
1920-1921	0.01 (0.57)	0.03 (0.23)	0.28 (0.50)	0.16 (0.33)	0.23 (0.45)	0.12 (0.29)
Other control variables						
Household size（log）			0.96*** (0.07)	0.09* (0.04)	0.98*** (0.07)	0.09** (0.05)
Ratio of males in a household（%）			0.71*** (0.22)	0.43** (0.16)	0.72*** (0.23)	0.45*** (0.15)
Age of the household head (log)			0.25** (0.10)	0.16*** (0.06)	0.27* (0.14)	0.17* (0.09)
Ratio of off-farm laborers（%）			-0.75** (0.37)	-0.33 (0.24)	-0.96*** (0.20)	-0.48*** (0.13)
Social status upon arrival[a]			0.29*** (0.10)	0.16*** (0.06)	0.34*** (0.06)	0.19*** (0.04)
Time living in village (log)			0.17* (0.10)	0.14** (0.07)	0.16** (0.07)	0.14*** (0.05)
Average number of households in village (log)			0.05 (0.29)	0.09 (0.19)	0.06 (0.16)	0.10 (0.10)
Age of village (log)			0.09 (0.16)	0.05 (0.10)	0.09 (0.10)	0.05 (0.06)
Distance to the county seat（log）			-0.03 (0.20)	-0.06 (0.13)	-0.03 (0.09)	-0.06 (0.06)
Distance to the nearest major city (log)			-0.09 (0.27)	-0.06 (0.18)	-0.08 (0.11)	-0.05 (0.07)
Distance to the nearest railway (log)			0.11* (0.06)	0.09** (0.04)	0.11** (0.05)	0.09*** (0.03)

	(1)	(2)	(3)	(4)	(5)	(6)
Region dummy (North Manchuria=1)			0.60** (0.24)	0.36** (0.16)	0.65*** (0.13)	0.39*** (0.08)
Intercept	2.58*** (0.16)	1.15*** (0.12)	-3.30** (1.50)	-1.90* (1.10)	-3.70*** (1.02)	-2.17*** (0.65)
F statistics/LR chi-squared	13.18	4.91	143.83	96.73	383.88	221.40
R-squared/Pseudo R-squared	0.13	0.16	0.43	0.27	0.17	0.15

Note: 1. No. of observations is 677. 2. Coefficient estimates of β_{1t} and β_2 in Eq. 1 are not reported. 3. Columns (1)-(4) and (5)-(6) show the results from an OLS model and a Tobit model, respectively. 4. Robust standard errors are presented in parentheses. 5. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

a. Social status is categorized at four levels, from the highest to the lowest, as landlord=4, cultivator=3, tenant=2, and laborer=1

Table 3

The 1910-11 Plague and the economic welfare of migrants: the severity of plague estimates

Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)	(5) Land per household (log)	(6) Land per person (log)
DID estimators (the degree of the severity in plague-hit villages (most severe=4, less severe=3, moderately severe=2 and least severe=1)×migrant cohort)						
1906-1907	0.24 (0.27)	0.14 (0.10)	0.21 (0.20)	0.10 (0.11)	0.28 (0.28)	0.15 (0.18)
1908-1909	-0.42**(0.19)	-0.31** (0.13)	-0.24 (0.16)	-0.21* (0.12)	-0.30 (0.25)	-0.24 (0.16)
1910-1911	0.02 (0.23)	0.18 (0.17)	0.22 (0.24)	0.16 (0.17)	0.25 (0.28)	0.18 (0.18)
1912-1913	0.30* (0.17)	0.21** (0.10)	0.35** (0.15)	0.24*** (0.08)	0.35*** (0.13)	0.25*** (0.08)
1914-1915	-0.09 (0.12)	0.03 (0.06)	0.04 (0.10)	0.04 (0.05)	0.01 (0.09)	0.02 (0.05)
1916-1917	0.09 (0.18)	0.07 (0.10)	0.04 (0.16)	0.06 (0.09)	0.03 (0.11)	0.05 (0.07)
1918-1919	-0.15 (0.17)	-0.06 (0.10)	-0.12 (0.14)	-0.10 (0.09)	-0.10 (0.17)	-0.09 (0.10)
1920-1921	-0.03 (0.20)	-0.04 (0.09)	0.03 (0.16)	0.02 (0.10)	0.02 (0.14)	0.01 (0.09)
Other control variables						
Household size（log）			0.97*** (0.08)	0.09* (0.05)	0.99*** (0.07)	0.10** (0.05)
Ratio of males in a household（%）			0.74*** (0.22)	0.46*** (0.16)	0.75*** (0.23)	0.47*** (0.15)
Age of the household head (log)			0.25** (0.10)	0.16*** (0.05)	0.26* (0.14)	0.17* (0.09)
Ratio of off-farm laborers（%）			-0.76** (0.37)	-0.33 (0.24)	-0.97*** (0.20)	-0.48*** (0.13)
Social status upon arrival[a]			0.30*** (0.10)	0.16*** (0.06)	0.35*** (0.06)	0.20*** (0.04)
Time living in village (log)			0.16 (0.10)	0.14* (0.07)	0.16** (0.07)	0.14*** (0.05)
Average number of households in village (log)			0.11 (0.30)	0.13 (0.20)	0.11 (0.16)	0.14 (0.10)
Age of village (log)			0.11 (0.16)	0.05 (0.11)	0.10 (0.10)	0.05 (0.06)
Distance to the county seat（log）			-0.10 (0.19)	-0.10 (0.13)	-0.10 (0.09)	-0.10* (0.06)
Distance to the nearest major city (log)			-0.03 (0.27)	-0.01 (0.18)	-0.01 (0.11)	-0.003 (0.07)
Distance to the nearest railway（log）			0.12* (0.06)	0.10** (0.04)	0.12*** (0.05)	0.10*** (0.03)

	(1)	(2)	(3)	(4)	(5)	(6)
Region dummy (North Manchuria=1)			0.62** (0.26)	0.37** (0.17)	0.67*** (0.13)	0.40*** (0.08)
Intercept	2.50*** (0.16)	1.17*** (0.14)	-3.94*** (1.36)	-2.28** (1.01)	-4.33*** (1.02)	-2.55*** (0.64)
F statistics/LR chi-squared	10.68	6.57	180.43	79.25	373.60	210.77
R-squared/Pseudo R-squared	0.11	0.14	0.42	0.25	0.17	0.14

Note: 1. No. of observations is 677. 2. Coefficient estimates of β_{1t} and β_2 in Eq. 1 are not reported. 3. Columns (1)-(4) and (5)-(6) show the results from an OLS model and a Tobit model, respectively. 4. Robust standard errors are presented in parentheses. 5. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

a. Social status is categorized at four levels, from the highest to the lowest, as landlord=4, cultivator=3, tenant=2, and laborer=1

Table 4

The likelihood of moving to the plague-hit versus non-plague-hit villages

Dependent variables	(1) Moved to plague-hit village	(2) Moved to plague-hit village	(3) Moved to plague-hit village	(4) Moved to plague-hit village	(5) Moved to plague-hit village	(6) Moved to plague-hit village
Household size (log)			-0.07 (0.07)	-0.10 (0.09)	-0.12(0.09)	-0.10(0.08)
Ratio of males in a household (%)			-0.02 (0.38)	-0.19 (0.35)	-0.09(0.35)	-0.19(0.26)
Age of the household head (log)			-0.21 (0.21)	-0.09 (0.20)	-0.10(0.19)	-0.09(0.20)
Social status upon arrival[a]	-0.22 (0.16)	-0.25* (0.14)	-0.17 (0.14)	-0.20 (0.13)	-0.15(0.14)	-0.20(0.12)
Relatives' presence in receiving village (yes =1)	-0.29 (0.26)	-0.30 (0.27)	-0.19 (0.26)	-0.22 (0.27)	-0.22(0.27)	-0.20(0.26)
Average number of households in village (log)			1.20 (0.92)	1.03 (1.05)	1.14(1.01)	1.13(1.01)
Age of village (log)	-1.16** (0.52)	-1.40** (0.56)	-1.32** (0.55)	-1.52*** (0.58)	-1.53***(0.58)	-1.53***(0.58)
Distance to the county seat (log)	-0.67 (0.55)	-0.73 (0.55)	-0.52 (0.60)	-0.56 (0.62)	-0.57(0.62)	-0.55(0.62)
Distance to the nearest major city (log)	-1.74* (0.97)	-2.01** (0.96)	-1.72** (0.87)	-1.96** (0.87)	-1.95**(0.87)	-1.95**(0.86)
Distance to the nearest railway (log)	-0.37 (0.30)	-0.37 (0.30)	-0.26 (0.30)	-0.26 (0.30)	-0.26(0.29)	-0.26 (0.29)
Region dummy (North Manchuria = 1)	1.36 (0.92)	1.24 (1.06)	1.20 (0.92)	1.15 (1.01)	1.02 (1.06)	1.02 (1.05)
Cohort dummy						
1906-1907		0.43 (0.54)		0.29 (0.47)	0.27 (0.47)	0.29 (0.46)
1908-1909		0.74 (0.80)		0.55 (0.66)	0.57 (0.66)	0.56 (0.65)
1910-1911		-0.52 (0.33)		-0.53 (0.33)	-0.48 (0.33)	-0.51 (0.32)
1912-1913		-0.09 (0.55)		-0.20 (0.49)	2.09* (1.19)	-0.02 (0.55)
1914-1915		-0.15 (0.52)		-0.284 (0.49)	-0.25 (0.49)	-0.27 (0.48)
1916-1917		-0.67 (0.62)		-0.78 (0.63)	-0.76 (0.64)	-0.76 (0.63)
1918-1919		-1.62** (0.65)		-1.59** (0.67)	-1.60** (0.66)	-1.58** (0.66)
1920-1921		-0.61 (0.38)		-0.47 (0.35)	-0.45 (0.34)	-0.47 (0.35)
Interaction terms						

Social status upon arrival*1912-13 dummy					-0.76* (0.39)	
Relatives' presence in receiving village*1912-13 dummy						-0.40 (0.67)
Intercept	18.40*** (5.45)	21.43*** (5.53)	14.14*** (5.11)	16.70*** (5.40)	16.84*** (5.55)	16.76*** (5.42)
Wald Chi-squared	21.34	164.32	42.78	4273.29	10676.53	8398.34
R-squared	0.55	0.58	0.57	0.60	0.60	0.60

Note: 1. No. of observations is 677. 2. Robust standard errors are presented in parentheses. 3. ***, ** and * denote significance at the 1%, 5%, and 10% level, respectively.

a. Social status is categorized at four levels, from the highest to the lowest, as landlord=4, cultivator=3, tenant=2, and laborer=1.

Appendix

Table A1

The 1910-11 Plague and the economic welfare of migrants: Robustness check - 2SLS

Panel A: First-stage results

Dependent variables	Plague-hit village? Yes=1	Severity in plague-hit village[a]
Whether a neighbor was a plague-hit village? Yes=1	1.02*** (0.04)	
Degree of severity in a neighboring plague-hit village		0.74*** (0.06)
Other control variables		
Characteristics of households and villages	yes	yes
F-statistics	374.36	45.96
R-squared	0.96	0.87

Panel B: Second-stage results: Plague-hit village (Yes=1)

Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)
DID estimators (plague-hit village ×migrant cohort, yes=1)				
1906-1907	0.70 (0.72)	0.34 (0.35)	0.32 (1.14)	0.21 (0.55)
1908-1909	-0.33 (0.58)	-0.38 (0.45)	-1.15 (0.70)	-0.92* (0.51)
1910-1911	0.70* (0.39)	0.46 (0.29)	0.97** (0.45)	0.67** (0.32)
1912-1913	1.62***(0.58)	1.09*** (0.36)	1.49** (0.62)	1.03*** (0.30)
1914-1915	0.79** (0.39)	0.52** (0.22)	0.65 (0.42)	0.45* (0.24)
1916-1917	0.90 (0.54)	0.62* (0.33)	0.30 (0.64)	0.31 (0.35)
1918-1919	0.08 (0.33)	0.003 (0.21)	0.22 (0.50)	0.03 (0.31)
1920-1921	0.61 (0.60)	0.31 (0.36)	0.73 (0.66)	0.38 (0.39)
Other control variables				
Characteristics of households and villages	yes	yes	yes	yes
F statistics/LR chi-squared	110.19	67.77	223.8	54.95
R-squared	0.43	0.27	0.42	0.26

Panel C: Second-stage results: Severity in plague-hit village

Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)
DID estimators (the severity in plague-hit village ×migrant cohort)				

1906-1907	0.25 (0.34)	0.11 (0.17)	0.13 (0.32)	0.08 (0.15)
1908-1909	-0.05 (0.20)	-0.09 (0.15)	-0.28 (0.19)	-0.24* (0.14)
1910-1911	0.23 (0.26)	0.16 (0.19)	0.33 (0.22)	0.23 (0.16)
1912-1913	0.58*** (0.21)	0.40*** (0.13)	0.39** (0.15)	0.27*** (0.07)
1914-1915	0.31** (0.13)	0.20** (0.08)	0.21** (0.09)	0.14*** (0.05)
1916-1917	0.35* (0.19)	0.24* (0.12)	0.11 (0.16)	0.10 (0.09)
1918-1919	-0.08 (0.18)	-0.07 (0.11)	0.004 (0.17)	-0.04 (0.10)
1920-1921	0.29 (0.21)	0.16 (0.13)	0.26 (0.20)	0.14 (0.12)
Other control variables				
Characteristics of households and villages	yes	yes	yes	yes
F statistics/LR chi-squared	84.26	42.57	133.49	40.3
R-squared	0.44	0.29	0.44	0.29

Note: 1. No. of observations is 677. 2. Village and time fixed effects are included. 3. Columns (1)-(4) and (5)-(6) show the results from an OLS model and a Tobit model, respectively. 4. Robust standard errors are presented in parentheses. 5. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively. 6. The other control variables include all variables that are listed in Table 2 under *Other control variables*.

a. The severity in a plague-hit village is categorized at four levels: most severe=4, less severe=3, moderately severe=2, and least severe=1.

Table A2

The 1910-11 Plague and the economic welfare of migrants

Robustness check – 3-year interval

Panel A: Plague-hit village (Yes=1)				
Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)
DID estimators (plague-hit village ×migrant cohort, Yes=1)				
1907-1909	0.36 (0.57)	0.06 (0.37)	0.43 (0.58)	0.12 (0.36)
1910-1911	0.64 (0.38)	0.42 (0.28)	0.69 (0.56)	0.45 (0.36)
1912-1914	1.17** (0.47)	0.81*** (0.29)	1.20*** (0.32)	0.83*** (0.20)
1915-1917	0.62 (0.42)	0.41 (0.25)	0.56* (0.29)	0.38** (0.18)
1918-1920	0.14 (0.33)	0.05 (0.21)	0.12 (0.30)	0.03 (0.19)
Other control variables				
Characteristics of households and villages	yes	yes	yes	yes
F statistics/LR chi-squared	49.58	19.28	376.46	212.87
R-squared/Pseudo R-squared	0.42	0.26	0.17	0.14

Panel B: Degree of severity in plague-hit village (most severe=4, less severe=3, moderately severe=2 and least severe=1)				
Dependent variables	(1) Land per household (log)	(2) Land per person (log)	(3) Land per household (log)	(4) Land per person (log)
DID estimators (the degree of the severity in plague-hit village ×migrant cohort)				
1907-1909	0.05 (0.14)	-0.02 (0.09)	0.05 (0.19)	-0.01 (0.12)
1910-1911	0.23 (0.23)	0.17 (0.17)	0.26 (0.28)	0.19 (0.18)
1912-1914	0.26* (0.16)	0.20** (0.08)	0.27** (0.11)	0.21*** (0.07)
1915-1917	0.02 (0.11)	0.03 (0.06)	-0.01 (0.08)	0.01 (0.05)
1918-1920	0.01 (0.12)	-0.01 (0.07)	0.004 (0.11)	-0.01 (0.07)
Other control variables				
Characteristics of households and villages	yes	yes	yes	yes
F statistics/LR chi-squared	69.07	23.24	366.79	203.15
R-squared/Pseudo R-squared	0.41	0.24	0.16	0.14

Note: 1. No. of observations is 677. 2. Village and time fixed effects are included. 3. Columns (1)-(4) and (5)-(6) show the results from OLS models and Tobit models, respectively. 4. Robust standard errors are presented in parentheses. 5. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively. 6. The other control variables include all variables that are listed in Table 2 under *Other control variables*.