Once an enemy, forever an enemy? the long-run impact of the Japanese invasion of China from 1937 to 1945 on trade and investment

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Once an Enemy, Forever an Enemy? The Long-run Impact of the Japanese Invasion of China from 1937 to 1945 on Trade and Investment

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Abstract

We are living in an increasingly globalized world yet with constant and endless conflicts among countries. While studies have uncovered the impacts of various economic factors and policy regimes on trade and investment, a much less understood issue is whether conflicts among countries have any, especially long-lasting, impacts on cross-border trade and investment. In this paper, we exploit one of the most important conflicts of the 20th century between what are currently the world's second and third largest economies, the Japanese invasion of China from 1937 to 1945, to investigate its long-run impact on contemporary trade and investment between the two countries. We find that Chinese regions that suffered more severe damage in the Japanese invasion are both less likely to trade with and trade less with Japan. Consistently, we also find that Japanese multinationals are less likely to invest in Chinese regions that suffered greater numbers of casualties during the Japanese invasion. Our study shows that historical animosity still matters for international trade and investment, despite the trend toward a flat world.

Keywords: Sino-Japanese War; Trade; Foreign Direct Investment
JEL Codes: F1; D74; F21; F23

1 Introduction

We are living in an increasingly globalized world with substantial cross-border trade and investment due to the dramatic reduction in trade barriers and advancements in communications and logistics. Yet we have also witnessed constant and endless conflicts among countries, or even the so-called clash of civilizations. While existing research in international economics has uncovered the impacts of various economic factors and policy regimes on trade and investment, a much less understood issue is whether conflicts among countries have any, especially long-lasting, impacts on cross-border trade and investment.[1] In this paper, we exploit one of the most important conflicts of the 20th century between the current world's second and third largest economies, the Japanese invasion of China from 1937 to 1945, to investigate its long-run impacts on contemporary trade and investment between the two countries.

The Japanese invasion of China from 1937 to 1945 was an important part of the Pacific Front of the Second World War, but lasted longer than the Second World War (1939-1945). It was also a very cruel war, with China suffering an estimated total of 35 million military and non-military casualties (both dead and wounded) and an estimated total of US$383 billion property losses (see Section 2 for details). The heavy losses China suffered during the war, and more importantly, the apparent lack of sincere remorse for war crimes on the Japanese side have made this war a major obstacle to improving bilateral relations between the two peoples and their respective governments. Even though six decades have passed since the Japanese invasion of China came to an end, there remains great antagonism among the Chinese people toward the Japanese invasion as reflected in both traditional and modern media, such as movies and internet forums. According to a Pew Global Attitudes Project report released in September 2006,[2] roughly seven in ten Chinese people dislike Japan.[3] Much of the antipathy among Chinese people toward Japan is rooted in the long memory of the Japanese invasion of the 1930s and 1940s. Eighty one percent of the Chinese surveyed believed Japan had not apologized adequately for the war atrocities it committed against the Chinese people during the 1930s and 1940s.

[1] Recently, there emerge a few studies examining the impact of conflicts on trade (Blomberg and Hess, 2006; Martin, Mayer, and Thoenig, 2008; Glick and Taylor, 2010). We will discuss the the relation of our work with these studies later in this section.

[2] See "Publics of Asian Powers Hold Negative Views of One Another", available online at http://pewresearch.org/pubs/249/publics-of-asian-powers-hold-negative-views-of-one-another.

[3] An equal proportion of the Japanese hold an unfavorable view of China because of its growing economic and military strength and its repeated criticism of the Japanese attitude toward the Sino-Japanese War six decades ago.

To identify the impact of the Japanese invasion on bilateral trade and investment, we require variations in the severity of damage caused by the Japanese invasion and hence the seriousness of the sequelae of the war across Chinese regions. To that end, we use the percentage of civilian casualties caused by the Japanese invasion across Chinese regions. More serious war damage is expected to generate more acute sequelae of war that persist to the present, which would deter bilateral trade and investment.[4] Specifically, from *China's Damage during World War II*, we collect the province-level data on the number of civilians who suffered minor wounds, sustained major wounds or died due to the Japanese invasion; from the *Statistical Abstract of the Republic of China*, we obtain the pre-war total population of each Chinese region. The percentage of civilian casualties is thus calculated as the ratio between the two. The outcome variables in our study concern bilateral trade between Chinese regions and Japan, and direct investment by Japanese multinationals in Chinese regions. Specifically, we obtain data on trade from China Customs Data in 2001 and data on direct investment from the survey of foreign-invested enterprises conducted by the National Bureau of Statistics of China in 2001.

To examine the impact of the Japanese invasion of China on trade between Chinese regions and Japan, we employ a two-stage estimation method developed by Helpman, Melitz and Rubinstein (2008), in which the first-stage estimation focuses on the likelihood of trade (or the extensive margin) and the second-stage estimation centers on the trade volume (or the intensive margin). Specifically, this method tackles both the selection bias caused by zero bilateral trade flows and the omission of firm heterogeneity in the conventional gravity model. To examine the impact of the Japanese invasion on location choices made by Japanese multinationals in Chinese regions, we use the discrete choice model developed by McFadden (1974) with controls for determinants found to be important in the literature (e.g., cost of production, market size, agglomeration, economic institutions).

We find that those regions of China that suffered greater war damage and

[4]One may note that there has been significant trade between Japan and China and massive direct investment by Japanese multinationals in China since China adopted the open-door policy in 1978. Nevertheless, if we examine the relative performance of trade and investment between Japan and China, we can still detect some signs of weak growth in the past decade. For example, though the China-Japan trade flow grew at an average annual rate of 14.4% in 2001-10, it is far below the annual growth rate of 21.2% for China's total trade volume in the period (Chinese Academy of Social Sciences, Blue Book on the Japanese Economy, 2010). Meanwhile, the rate of growth in Japanese direct investment in China has lagged behind that in total foreign direct investment (FDI) in China (Liu Changli, The Retrospect, Prospects and Strategies in Japanese FDI in China, Studies of Foreign Affairs, Vol. 3, 2011).

its sequelae are less likely to engage in trading with Japan (the extensive-margin effect) and trade less intensively (the intensive-margin effect). Specifically, if there had been no Japanese invasion of China, in 2001, there would have been 1,956 more Chinese firms trading with Japan, and the trade volume with Japan of existing Chinese exporters and importers would have increased by US$4.5 billion. Note that this number represents a lower-bound estimation of the per-year trade volume loss due to the Japanese invasion of China. The actual annual losses in trade volume would be certainly much larger, taking the potential trade volume generated by "missing" firms into account. Moreover, the trade losses have been accumulated over more than six decades. In view of the cumulative loss in trade volume from 1945 (the end of the Japanese invasion) to 2001 and beyond, the Japanese invasion of China has caused a far greater trade loss between China and Japan.

These results are robust to various sensitivity checks such as alternative specifications of the first-stage estimation, the progressive inclusion of reference countries, and a more disaggregated product-level estimation.

Consistently, we also find that Japanese multinationals are less likely to invest in those regions of China that suffered greater casualties during the Japanese invasion. Specifically, we find that if there had been no Japanese invasion, the probability of Japanese multinationals investing would have increased by 10%. This result is robust to various sensitivity checks such as the independence of irrelevant alternatives assumption of the discrete choice model, counterfactual analysis to examine potential omitted variables bias, a sub-sample of firms established in 2001 to check for the sample selection bias, and sub-samples of joint ventures and wholly-owned subsidiaries.

Bilateral trade and investment may have remained depressed for a short period after the war because of the destruction of production capacity and trading opportunities, the costs and inconvenience of postwar reconstruction, etc. Our study suggests that war damage may produce chronic sequelae that take much longer to heal. Such persistent sequelae of war can adversely affect bilateral trade and investment. In Section 5.3, we discuss possible mechanisms by which the war may have exerted long-term impacts on bilateral trade and investment. In general, our study shows that past wars might still exert negative effects on economic globalization. If the Chinese and the Japanese could turn over the historically rooted dark page they continue to face, their bilateral trade and investment might well reach a much higher level.

Our study is part of an emerging stream of literature examining the impact of conflicts on bilateral trade (Blomberg and Hess, 2006; Martin, Mayer, and Thoenig, 2008; Glick and Taylor, 2010). In comparison with the three aforementioned studies investigating multiple and different types of conflicts,

our analysis focusing on one major war between two countries avoids the problem of comparability across different conflicts. In addition, cross-region variations in war damage and its sequelae within China enable us to avoid difficulties in controlling for bilateral trade resistance in cross-country analysis (such as non-tariff trade barriers), and therefore isolate the long-run impact of the Japanese invasion. Moreover, instead of using the conventional gravity model adopted in the three aforementioned studies, we employ the two-stage estimation method recently developed by Helpman, Melitz, and Rubinstein (2008) to correct for sample-selection bias and the omission of firm heterogeneity in the identification process. Finally, we examine long-lasting, rather than contemporary or short-run, impacts of conflicts on not only bilateral trade, but also direct investment.

Our paper is also related to Head, Mayer, and Ries (2010) in examining the impact of historical events on current trade. Specifically, Head, Mayer, and Ries (2010) study the effect of independence on post-colonial trade, and find that it has little short-run effect but leads to a significant long-run decline in trade between colonizers and colonies. Furthermore, our study is based on within-country and cross-region analysis, whereas theirs is a cross-country one, and the nature of historical events examined in their study (i.e., termination of colonial ties) is different from that of ours (i.e., war).

Our study also contributes to the literature on the location choice of foreign direct investment by being the first to examine the possible impact of historical conflicts on cross-border capital flow. Existing studies focus almost exclusively on the impacts of economic factors such as size of market, cost of operations, degree of agglomeration, and quality of economic institutions. Our study highlights the impacts of non-economic factors such as conflicts among nations in accounting for the location choice of foreign direct investment.

The rest of the paper is organized as follows. Section 2 provides an overview of the historical background of the Sino-Japanese war of 1937-1945. Section 3 lays out the estimation specifications used to identify the impact of the Japanese invasion of China on both bilateral trade between Chinese regions and Japan and direct investment from Japanese multinationals. Data and variables are described in Section 4, while empirical findings are presented and discussed in Section 5. Section 6 concludes the paper.

2 Historical Background

The Japanese invasion of China in the 1930s and 1940s is referred to as the Second Sino-Japanese War in the West.[5] From 1937 to 1941, China fought Japan alone. After the Japanese attack on Pearl Harbor in 1941, the war became a major front of the Pacific War in World War II. This was the largest Asian war in the 20th century,

The breakout of the War was by no means a historical accident. Japan had aimed to dominate China politically and militarily to secure its abundant economic resources. Military conflicts in the form of small and localized engagements between China and Japan started in 1931. In September 1931, Japan invaded Manchuria immediately after the Mukden Incident, and established the puppet state of Manchukuo in 1932 by installing Puyi, the last emperor of Imperial China, as a puppet ruler. Incessant fighting ensued.

The Marco Polo Bridge Incident on July 7, 1937 marks the beginning of the Second Sino-Japanese War. In other words, the Sino-Japanese military conflict entered the stage of total war. Unlike Japan, China had little military and industrial strength to undertake a full-scale war. Consequently, the Imperial Japanese Army (IJA) easily defeated the poorly equipped Chinese army and captured Beijing and Tianjin. To prove their ability to fight the IJA and then win support from the U.S. and other foreign nations, the Kuomintang (KMT) central government led by Chiang Kai-shek started a fierce battle with the IJA in Shanghai in August 1937. After over three months of cruel fighting, the IJA eventually captured Shanghai; nonetheless, the Chinese demonstrated to the world their determination to defend their territories.

Encouraged by the hard-won victory in Shanghai, the IJA captured the KMT capital of Nanjing and southern Shanxi by the end of 1937. After the fall of Nanjing on December 13, 1937, up to 300,000 Chinese were estimated to become the victims of mass murder in the astonishing Nanjing Massacre, also known as the "Rape of Nanjing". In October 1938, the IJA captured the city of Wuhan, the political, economic and military center of China at that time. The KMT central government was forced to retreat to Chongqing to set up a provisional capital. At the same time, the IJA launched massive air raids on civilian targets in the provisional capital of Chongqing and other major cities in the unoccupied areas, leaving millions dead, injured and homeless.

By 1941, Japan occupied much of northern and coastal China, but the KMT central government and military continued their resistance in the west-

[5]The 1894-95 war between the two countries is referred to as the first Sino-Japanese war, which took place exclusively in two coastal regions of northeastern China and involved minimal and mostly military casualties (an estimated total of 31,500 soldiers died).

ern interior, while the Chinese communists kept control of base areas in Shaanxi. Due to the stubborn Chinese resistance, Japan suffered tremendous casualties and failed to conquer China in a manner resembling the fall of France and western Europe to Nazi Germany.

Following the Japanese attack on Pearl Harbor, the Sino-Japanese war was merged into the Pacific Front of World War II. Nonetheless, foreign aid was extremely limited because sea routes to China and the Yunnan-Vietnam Railway had been closed since 1940. Most of China's own industrial base had already been captured or destroyed by Japan. Despite the severe shortage of resources and materials, in 1943, the Chinese were successful in repelling major Japanese offensives such as the Battle of Western Hubei and the Battle of Changde.

The Second Sino-Japanese War came to an end in 1945. In the spring of 1945, the Chinese military launched offensives and retook Hunan and Guangxi. In August, the U.S. dropping of atomic bombs on Hiroshima and Nagasaki and the Soviet Union attack on the IJA in Manchuria hastened the Japanese surrender. The official surrender was signed on September 2, 1945.

The eight-year Second Sino-Japanese War caused tremendous losses to the Chinese people. Official Chinese statistics put China's civilian and military casualties at 20 million dead and 15 million wounded in the 1937-45 period.[6] Most Western historians believe that the total number of casualties was at least 20 million.[7] According to historian Mitsuyoshi Himeta, at least 2.7 million civilians died in a single episode, i.e., the Three Alls Policy – "kill all, loot all, burn all" – operation implemented in May 1942 in northern China.[8] The war also wreaked havoc on the Chinese economy. Property losses suffered by the Chinese were estimated to be at US$383 billion based on the currency exchange rate in July 1937, roughly 50 times the GDP of Japan at that time.[9]

The huge number of Chinese casualties in the War were a result of massive killings and other severe war crimes committed by the Japanese military forces against millions of civilians and prisoners of war. According to documents produced by the International Military Tribunal for the Far East, the Japanese military carried out a wide variety of war crimes that encompassed mass killings, human experimentation and biological warfare, the use of chemical weapons, torturing of prisoners of war, cannibalism, forced labor,

[6]See "Remember Role in Ending Fascist War". Chinadaily.com.cn, August 15, 2005.

[7]See "Nuclear Power: The End of the War Against Japan", Bbc.co.uk.

[8]Himeta, Sanko sakusen towa nan dataka-Chogokujin no mita Nihon no senso, Iwanami Bukuretto 1996, p.43.

[9]See Ho Ying-chin (1978), Who Actually Fought the Sino-Japanese War 1937-1945?

comfort women (sexual slaves in military brothels), and looting.[10]

The war has created a permanent scar on the heart of the Chinese people, partly because of the atrocities committed by the Japanese military during the war, and more importantly because of the lack of sincere remorse for the war crimes on the Japanese side. Although China and Japan normalized their diplomatic relations in 1972 and there have been several episodes indicating warm bilateral relations in recent decades, the war still remains a primary point of contention and a stumbling block to Sino-Japanese relations. War-related issues include Japanese textbook controversies, Japanese denial of war crimes, and the political visits of top Japanese government officials to the Yasukuni Shrine allegedly housing the souls of war criminals.[11] In the case of Japanese textbook controversies, Japanese nationalists have attempted to whitewash actions of the Japanese military during WWII that generated controversial content in government-approved history textbooks used in the secondary education system of Japan. Japanese officials and nationalists also often downplay or even deny war crimes alleged to have been committed by the Japanese military. China and Japan continually debate the actual number of people killed in the Nanking Massacre. China claims that at least 300,000 civilians were killed, whereas Japan argues the number was far lower. Some Japanese nationalists even claim that the Rape of Nanking did not even occur. A number of Japanese officials and nationalists have denied that comfort women operated as sexual slaves and that biological and chemical weapons were used by troops such as those in Unit 731 during the war. Top Japanese government officials have often visited the Yasukuni Shrine, a memorial dedicated to the soldiers and others who died fighting on behalf of the Emperor of Japan. These disputes and actions have been viewed by the Chinese and other nations that suffered in WWII as a clear indication of a lack of remorse for war crimes in Japan. On various occasions, these controversies have refreshed war memories and stirred up an unfavorable view of Japan, or have even fostered a sense of enmity against Japan among the Chinese people. In recent years, the rising level of Chinese nationalism incited or tolerated by the Chinese Communist government has reinforced the anti-Japanese sentiment among a large segment of Chinese society, which has aggravated the sequelae of the war.

[10] Please refer to "Japanese War Crimes" in Wikipedia for detailed information.

[11] Numerous WWII war criminals are listed in its Symbolic Registry of Divinities.

3 Estimation Strategy

In this section, we lay out our estimation specifications for the long-run impacts of the Japanese invasion of China on bilateral trade between Chinese regions and Japan, and of investment by Japanese multinationals in Chinese regions, and discuss several related estimation issues.

3.1 Trade

3.1.1 Estimation Model

To examine the long-run impact of the Japanese invasion of China on bilateral trade between Chinese regions and Japan, we employ the two-stage estimation specification developed by Helpman, Melitz, and Rubinstein (2008). Specifically, assume that the representative consumer in place l has the following utility

$$U_l = \sum_{j=1}^{J_l} \mu_{lj} \ln \left[\int_0^{N_{lj}} y_{lj}(i)^{\alpha_j} di \right]^{\frac{1}{\alpha_j}}, \tag{1}$$

where $l = \{r, f\}$, in which r represents a China's province-level region and f represents a foreign country, including in particular Japan; j represents a product category with a total of J_l product categories, and i represents a variety within product category j with a total of N_{lj} varieties; $\alpha_j < 1$ is the elasticity of substitution across varieties within product category j, assumed to be constant across places, and $y_{lj}(i)$ is the consumption of variety i within product category j in place l; and $\mu_{lj} < 1$ is the weight of expenditure spent on product category j by consumers in place l. As products are symmetric, j is left out hereon.

Given the utility function (1), we can derive place l's demand function for variety i as

$$y_l(i) = \frac{\mu_l E_l}{P_l^{1-\varepsilon}} p_l(i)^{-\varepsilon}, \tag{2}$$

where E_l is the total expenditure in place l; $\varepsilon \equiv \frac{1}{1-\alpha} > 1$; and $P_l = \left[\int_0^{N_l} p_l(i)^{1-\varepsilon} di \right]^{\frac{1}{1-\varepsilon}}$ is the aggregate price index in place l, with $p_l(i)$ representing the price for variety i in place l.

Under the setting of monopolistic competition, different firms produce different varieties. Hence, variety i corresponds to firm i. Some of the product varieties are produced locally, whereas others are imported from other places.

Assume that firm i in place l produces one unit of output at a constant marginal cost $c_l a_i$, where c_l is the place-specific cost reflecting differences in

factor prices across places, and a_i is a firm-specific productivity level capturing the heterogeneity among firms in the same place. It is assumed that a_i is drawn from a cumulative distribution function $G(.)$ with support $\left[a_l^L, a_l^H\right]$, where $a_l^H > a_l^L > 0$.

If firm i of place l sells only in place l, there is no additional cost. However, if it exports to another place, say $l' \neq l$, it needs to pay two additional costs: a fixed cost of selling in place l', which is equal to $c_l f_{ll'}$, and a transport cost, which is assumed to take the iceberg transport cost specification, i.e., $\tau_{ll'}$ $[\tau_{ll'} \geq 1]$ units to be shipped from place l to l' for one unit to arrive in place l'. Henceforth, we use subscript ll' to represent a trading pair, with the first letter denoting the exporting place and the second letter denoting the importing place.

Given the demand function (2), the optimal price firm i from place l charges in place l' is

$$p_{ll'}(i) = \frac{c_l a_i}{\alpha} \tau_{ll'}. \tag{3}$$

As a result, the profit that firm i of place l derives from serving place l' is

$$\pi_{ll'}(i) = (1-\alpha) \left(\frac{\tau_{ll'} c_l a_i}{\alpha P_{l'}} \right)^{1-\varepsilon} \mu_{l'} E_{l'} - c_l f_{ll'} \tag{4}$$

and the corresponding export volume is

$$R_{ll'}(i) = \left(\frac{\tau_{ll'} c_l a_i}{\alpha P_{l'}} \right)^{1-\varepsilon} \mu_{l'} E_{l'}. \tag{5}$$

Hence, firm i from place l exports to place l' if and only if

$$\pi_{ll'}(i) \geq 0$$

$\Leftrightarrow$

$$a_i \leq \left(\frac{\mu_{l'} E_{l'} (1-\alpha)}{c_l f_{ll'}} \right)^{\frac{1}{\varepsilon-1}} \frac{\alpha P_{l'}}{\tau_{ll'} c_l} \equiv a_{ll'}. \tag{6}$$

Clearly, only firms with a sufficiently high productivity level are able to cover their fixed and transport costs and export their goods to other places. The threshold productivity level increases (i.e., a lower level of $a_{ll'}$) when trade costs are higher (i.e., $\tau_{ll'}$ and $f_{ll'}$).

Aggregating the export volume of all firms from place l to place l' leads to the total export volume from l to l' as being

$$\begin{aligned} M_{ll'} &= \int_0^{N_l} R_{ll'}(i) di = N_l \int_{a_l^L}^{a_l^H} R_{ll'}(a) dG(a) \\ &= \left(\frac{\alpha P_{l'}}{\tau_{ll'} c_l} \right)^{\varepsilon-1} \mu_{l'} E_{l'} N_l V_{ll'}, \end{aligned} \tag{7}$$

where

$$V_{ll'} \equiv \begin{cases} \int_{a_l^L}^{a_{ll'}} a^{1-\varepsilon} dG_l(a) & \forall a_{ll'} \geq a_l^L \\ 0 & otherwise \end{cases} . \tag{8}$$

Clearly, the export volume increases in demand for exports ($\mu_{l'} E_{l'}$), export good variety (N_l), and the proportion of exporting firms with above-threshold productivity ($V_{ll'}$, which in turn decreases in fixed and variable trade costs, i.e., $\tau_{ll'}$ and $f_{ll'}$), but decreases directly in variable trade costs ($\tau_{ll'}$).

3.1.2 Estimation Specification

The export volume from l to l' derived in equation (7) can be estimated in a log-linear form, i.e.,

$$\begin{aligned} m_{ll'} &= (\varepsilon - 1) \ln \alpha + [(\varepsilon - 1) p_{l'} + \ln \mu_{l'} + e_{l'}] \\ &\quad + [n_l - (\varepsilon - 1) \ln c_l] - (\varepsilon - 1) \ln \tau_{ll'} + v_{ll'}, \end{aligned} \tag{9}$$

where lowercase variables represent the natural logarithms of their corresponding uppercase variables. $\tau_{ll'}$ captures variable trade costs. Assume $\tau_{ll'}^{\varepsilon-1} \equiv D_{ll'}^{\gamma} exp\left(\beta z_{ll'} + \mathbf{X}_{ll'}' \boldsymbol{\delta} - u_{ll'}\right)$, where $D_{ll'}$ is the distance between l and l'; $\mathbf{X}_{ll'}$ is a vector of other bilateral variable trade costs; and $u_{ll'}$ is an i.i.d. error term. $z_{ll'}$ is our regressor of interest reflecting the severity of the damage caused by the Japanese invasion in different regions of China. More serious war damage and its more acute sequelae are expected to raise various trade costs. For example, average consumers in regions with more severe war damage are less enthusiastic about Japanese products, which thus sell relatively slowly. Merchants in such regions would bear higher inventory costs for Japanese products and/or have to provide discounts when selling them. In the empirical analysis, we measure $z_{ll'}$ by the percentage of civilian casualties (those who suffered minor wounds, severe wounds or died) caused by the Japanese invasion in each of Chinese regions (variable construction details are provided in Section 4).

We therefore have the following estimation equation:

$$m_{ll'} = \theta + \lambda_l + \xi_{l'} - \gamma d_{ll'} - \beta z_{ll'} - \mathbf{X}_{ll'}' \boldsymbol{\delta} + v_{ll'} + u_{ll'}, \tag{10}$$

where λ_l is the fixed effect of the exporting place, absorbing $[n_l - (\varepsilon - 1) \ln c_l]$; $\xi_{l'}$ is the fixed effect of the importing place, absorbing $[(\varepsilon - 1) p_{l'} + \ln \mu_{l'} + e_{l'}]$; and θ is a constant, absorbing $(\varepsilon - 1) \ln \alpha$. Consistent estimation of equation (10) requires a control for $v_{ll'}$ (firm heterogeneity) and the possible correlation between $u_{ll'}$ and explanatory variables (sample-selection bias).

Define a variable $Y_{ll'}$ as

$$Y_{ll'} \equiv \frac{(1-\alpha)\left(\frac{\alpha P_{l'}}{\tau_{ll'}c_l}\right)^{\varepsilon-1}\mu_{l'}E_{l'}\left(a_l^L\right)^{1-\varepsilon}}{c_l f_{ll'}}, \tag{11}$$

which is the ratio of variable export profits for the most productive firm in place l to the fixed export cost from l to l'. Hence, we observe positive exports between places l and l' only when $Y_{ll'} > 1$. Similar to the case of the variable trade cost $\tau_{ll'}$, we assume $f_{ll'} \equiv exp\left(\bar{\beta}z_{ll'} + \mathbf{W}'_{ll'}\boldsymbol{\varphi} - \upsilon_{ll'}\right)$, where $\mathbf{W}_{ll'}$ is a vector of other fixed trade costs; and $\upsilon_{ll'}$ is an i.i.d. error term. Hence, the latent variable $y_{ll'} \equiv \ln Y_{ll'}$ can be written as

$$y_{ll'} = \varkappa + \varsigma_l + \phi_{l'} - \gamma d_{ll'} - \tilde{\beta}z_{ll'} - \mathbf{X}'_{ll'}\boldsymbol{\delta} - \mathbf{W}'_{ll'}\boldsymbol{\varphi} + \eta_{ll'}, \tag{12}$$

where ς_l is the fixed effect of the exporting place, absorbing $\left[-\varepsilon \ln c_l + (1-\varepsilon)\ln a_l^L\right]$; $\phi_{l'}$ is the fixed effect of the importing place, absorbing $\left[(\varepsilon-1)p_{l'} + \ln \mu_{l'} + e_{l'}\right]$; $\varkappa$ is a constant, absorbing $\ln(1-\alpha)$; and $\eta_{ll'} \equiv \upsilon_{ll'} + u_{ll'}$ is an i.i.d. error term.

Define $T_{ll'}$ to equal 1 when place l exports to l' and 0 when it does not. Hence, we have

$$\begin{aligned} \rho_{ll'} &= \Pr\left(T_{l'l} = 1 | observed\ variables\right) \\ &= F\left(\varkappa + \varsigma_l + \phi_{l'} - \gamma d_{ll'} - \tilde{\beta}z_{ll'} - \mathbf{X}'_{ll'}\boldsymbol{\delta} - \mathbf{W}'_{ll'}\boldsymbol{\varphi}\right), \end{aligned} \tag{13}$$

where $F(.)$ is the cumulative distribution function of $\eta_{ll'}$. Let $\hat{\rho}_{ll'}$ be the predicted value from equation (13) and $\hat{y}_{ll'} = F^{-1}(\hat{\rho}_{ll'})$. Given a distribution function of $G(.)$ and equation (8), $v_{ll'}$ is a monotonic function of $y_{ll'}$. A consistent estimate of $v_{ll'}$ can then be derived as

$$\hat{v}_{ll'} = H(\hat{\rho}_{ll'}). \tag{14}$$

In addition, $E\left[u_{ll'}|., T_{ll'} = 1\right] = corr\left(u_{ll'}, \eta_{ll'}\right)\left(\sigma_u/\sigma_\eta\right)\bar{\eta}_{ll'}$, where a consistent estimate of $\bar{\eta}_{ll'}$ is obtained from the inverse Mills ratio, i.e.,

$$\hat{\eta}_{ll'} = f(\hat{y}_{ll'})/F(\hat{y}_{ll'}) \equiv I(\hat{\rho}_{ll'}). \tag{15}$$

By correcting for firm heterogeneity (equation (14)) and sample-selection bias (equation (15)), we can consistently estimate equation (10) by using the following transformed equation

$$m_{ll'} = \theta + \lambda_l + \xi_{l'} - \gamma d_{ll'} - \beta z_{ll'} - \mathbf{X}'_{ll'}\boldsymbol{\delta} + B(\hat{\rho}_{ll'}) + e_{ll'}, \tag{16}$$

where $B(\hat{\rho}_{ll'}) \equiv H(\hat{\rho}_{ll'}) + corr\left(u_{ll'}, \eta_{ll'}\right)\left(\sigma_u/\sigma_\eta\right)I(\hat{\rho}_{ll'})$; and $e_{ll'}$ is an i.i.d. error term satisfying $E\left[e_{ll'}|., T_{l'l} = 1\right] = 0$.

3.1.3 Estimation Issues

Equations (13) and (16) constitute our two-stage estimation of the long-run impact of the Japanese invasion on Sino-Japanese bilateral trade. More specifically, in the first stage, we estimate equation (13) and investigate whether the Japanese invasion affects the likelihood of trade between Chinese regions and Japan (or the extensive margin). In the second stage, we estimate equation (16) and study, conditional on participation in trade, whether the Japanese invasion affects trade volume (or the intensive margin).

Next, we discuss several estimation issues arising from this two-stage estimation specification.

First, as our focus here is on the impact of the Japanese invasion on Sino-Japanese bilateral trade, we restrict the trading pair $\{l, l'\}$ to combinations comprising a Chinese province-level region (r) and a foreign country (f). Here, the foreign country includes Japan and at least a reference country. The inclusion of the reference country (in which $z_{ll'} = 0$) allows us to control for all Chinese province-level characteristics such as geographic and endowment advantages, wage costs, and education levels. Essentially, this is a difference-in-difference estimation, in which all regional factors that affect both Sino-Japanese bilateral trade and bilateral trade between China and the reference country in the same way have been controlled for; whereas our identification comes from the differential impact caused by the Japanese invasion. Meanwhile, the effect of $z_{ll'}$ may not solely be interpreted as indicating how the severity of civilian casualties caused by the Japanese invasion affects the Sino-Japanese bilateral trade, but also as a measure of how Sino-Japanese bilateral trade differs from bilateral trade between China and the reference country due to the Japanese invasion. For the choice of reference country, we use the United States (U.S.) in the benchmark analysis. In robustness checks, we experiment by including as the reference country Germany, Singapore, and the United Kingdom (U.K.), which are China's top trading partners.[12]

Second, for the model laid out in the previous section, we focus on the analysis of one product category, as products are symmetric. The empirical analysis, however, is carried out with a data set containing a number of products. Hence, we augment equations (13) and (16) by including product

[12]It is documented that a large number of Koreans were both enlisted and conscripted into the Japanese military and participated in the invasion of China. They even earned a reputation for brutality (see Philip S. Jowett, 2004. *Rays of the Rising Sun*, West Midlands: Helion & Company Limited, pp. 34). In fact, Koreans and Chinese traitors (Hanjian in Chinese) are referred to as "second devils" (*Er Gui Zi* in Chinese), with the Japanese being the "first devils". Hence, the heavy involvement of Koreans in the Japanese invasion of China precludes the possibility of using South Korea as a reference country.

dummies (ϱ_j and ϖ_j), i.e.,

$$\rho_{ll'j} = F\left(\varkappa + \varsigma_l + \phi_{l'} + \varrho_j - \gamma d_{ll'} - \beta z_{ll'} - \mathbf{X}'_{ll'}\boldsymbol{\delta} - \mathbf{W}'_{ll'}\boldsymbol{\varphi}\right) \tag{17}$$

$$m_{ll'j} = \theta + \lambda_l + \xi_{l'} + \varpi_j - \gamma d_{ll'} - \beta z_{ll'} - \mathbf{X}'_{ll'}\boldsymbol{\delta} + B(\hat{\rho}_{ll'}) + e_{ll'j}. \tag{18}$$

In our data, we can observe trade volume at the HS-8 digit level. However, due to a lack of computational capacity, we are unable to carry out the non-linear estimation of equation (17) at such a disaggregated level (as there are 7,918 product dummies if we define a product at the HS-8 digit level). As a compromise, we define a product at the HS-4 digit level (with 1,253 product dummies) in the benchmark analysis. To investigate whether there is any aggregation bias, in a robustness check, we conduct a linear estimation with each product defined at the HS-6 digit level (with 5,453 product dummies).

Third, to estimate equation (17), we first assume that $\eta_{ll'}$ follows a normal distribution and hence use the Probit estimation as in Helpman, Melitz, and Rubinstein (2008). We then experiment with three alternative estimation approaches: Logit estimation (a non-linear estimation assuming a logistic distribution for $\eta_{ll'}$) OLS estimation (a linear estimation with no prior distribution assumption of $\eta_{ll'}$), and a semi-nonparametric estimation developed by Gallant and Nychka (1987) (no prior distribution assumption for $\eta_{ll'}$).

Fourth, to estimate equation (18), we use a large number of indicator dummies to approximate an arbitrary functional form of $B(.)$ in as flexible a manner as possible. More specifically, we partition the predicted value $\hat{\rho}_{ll'}$ into a number of bins with an equal number of observations and assign a bin indicator to every bin. We then replace $B(\hat{\rho}_{ll'})$ with a number of bin indicator dummies. The compromise involved in using this flexible estimation is that we are not able to distinguish between firm heterogeneity and sample-selection effects, which are not the key interests of this study. As it is a linear equation, we use the OLS estimation with 50 or 100 bins to ensure a large degree of flexibility as in Helpman, Melitz, and Rubinstein (2008).

Fifth, in estimating standard errors, we use robust standard errors controlling for clustering at the trading pair $\{l, l'\}$ level in the first stage, as our regressor of interest is at the trading-pair level and product trade within the same trading pair may thus be correlated. In the second stage, we use bootstrapped standard errors to correct for the fitted regressors in the estimation.

Sixth, to identify the effects in the second stage, we need some variables that are part of the first stage only. In other words, we require some variables to affect the fixed trading costs but not to affect the variable trade costs. Helpman, Melitz, and Rubinstein (2008) use regulatory costs of firm entry and religion. Due to data limitations, we do not observe the differential

regulatory costs of entry borne by different foreign firms. Meanwhile, religion is the same for all trading pairs between a region in China and a foreign country. We instead use an indicator for the presence of an embassy or consulate of the foreign country (Japan and the reference country) in each region in China as the excluded variable in the first stage. Intuitively, the existence of an embassy or consulate may help firms resolve information asymmetry problems to some degree and ease their entry to the market. However, it may not affect or have a negligible effect on trade volume, as the latter depends on production costs and market demand.

3.2 Investment

3.2.1 Estimation Model

As we do not observe outward foreign direct investment (FDI) from Chinese regions to Japan, we focus on the regional distribution of Japanese FDI in China. To investigate whether the Japanese invasion affects the location choices of Japanese multinationals in China, we employ the discrete choice model developed by McFadden (1974).

Let the profit of Japanese multinational f obtained from investing in region r of China in year t be approximated by

$$\pi_{frt} = \alpha + \beta z_r + \mathbf{X}_{rt-1}^{'}\boldsymbol{\delta} + \epsilon_{frt}, \tag{19}$$

where z_r is civilian casualties in region r caused by the Japanese invasion in 1937-1945; $\mathbf{X}_{rt-1}$ is a vector of covariates affecting FDI location choice, including costs of production, the size of the local market, the degree of agglomeration, the quality of economic institutions and other macro factors in year $t-1$ (see the Appendix for a description of these control variables);[13] ϵ_{frt} is an error term. In a region that suffered heavier civilian casualties during the Japanese invasion, Japanese multinationals might incur higher costs in their business operations. For instance, to induce Chinese employees to work for Japanese-invested firms, a higher wage rate is needed for prospective employees with equivalent qualifications than that paid by foreign invested firms from other source countries.

Observing the information $\left\{z_r, \mathbf{X}_{rt-1}^{'}\right\}$ for all regions, Japanese multinational f at time t chooses to invest in a region when its profit obtained from investing in that region is the largest among all Chinese regions. More specifically, if we define $T_{frt} = 1$ if Japanese multinational f invests in region r at time t, then we have

[13] Here we choose the value of covariates in year $t-1$ to alleviate the reverse causality problem from π_{frt} to X_{rt-1}.

$$
\begin{aligned}
p_{frt} &= \Pr\{T_{frt} = 1 | \textit{observed variables}\} = \Pr\{\pi_{frt} \geq \pi_{fkt} \ \forall k \in R\} \\
&= \Pr\{(\epsilon_{frt} - \epsilon_{fkt}) \geq \beta(z_k - z_r) + (\mathbf{X}'_{kt-1} - \mathbf{X}'_{rt-1})\boldsymbol{\delta} \ \forall k \in R\}, \quad (20)
\end{aligned}
$$

where R is the set of Chinese regions.

Assuming ϵ_{frt} follows a Type I extreme distribution, McFadden (1974) derives the following explicit solution for p_{frt}:

$$
p_{frt} = \frac{exp(\beta z_r + \mathbf{X}'_{rt-1}\boldsymbol{\delta})}{\sum_{k \in R} exp(\beta z_k + \mathbf{X}'_{kt-1}\boldsymbol{\delta})}. \quad (21)
$$

3.2.2 Estimation Issues

We use the maximum likelihood method to estimate equation (21) regarding the long-run impact of the Japanese invasion on Japanese investment in China. In what follows, we discuss several empirical analysis issues arising from the estimation of equation (21).

First, to derive equation (21), we implicitly assume an Independence of Irrelevant Alternatives (IIA) condition whereby the choice between two alternative regions in China is not affected by the inclusion of other alternative regions in the choice set. However, this could be a strong assumption, as Chinese regions are quite different from each other. As robustness checks, we conduct three tests on satisfaction of the IIA assumption. Following the literature on FDI location choice (Head, Ries, and Swenson, 1995), we first investigate whether our results are affected by the exclusion of certain influential regions. The second approach is to use the Poisson regression, which is shown by Guimarães, Figueiredo, and Woodward (2004) to be an effective way of controlling for the potential IIA violation in FDI location choice. As a final check, we explicitly relax the IIA assumption and assume a nested discrete choice structure. More specifically, we assume Japanese multinationals first consider a super-region area (e.g., coastal versus inland areas of China) before choosing a particular region within that super-region area.[14]

Second, as our regressor of interest (z_r) varies only at the regional level, we cannot include regional dummies in the estimation. Consistent estimation of the effect of z_r, however, requires $E\left[\epsilon_{frt} \cdot z_r | \textit{observed variables}\right] = 0$, which could be a very strong assumption without the use of regional dummies. For

[14]The super-regions are: (1) Northwest (Inner Mongolia, Qinghai, Xinjiang, Gansu and Ningxia), (2) Southwest (Yunnan, Guizhou and Guangxi), (3) Central East (Shanxi, Hebei, Henan, Anhui and Jiangxi), (4) Central West (Hubei, Hunan, Sichuan and Shaanxi), (5) Coastal (Shandong, Jiangsu, Zhejiang, Fujian, Guangdong and Hainan), and (6) municipalities directly under the central government (Beijing, Tianjin and Shanghai).

example, Japanese could have encountered more stalwart civilian resistance (and hence more civilian casualties) in regions with a tradition of xenophobia, which in turn adversely affects the contemporary FDI location choice. Hence, the negative sign found for z_r may not reflect the damage caused by the Japanese invasion, but may instead reflect such adverse omitted regional factors. Rather than finding exogenous variations to instrument z_r, we conduct a counterfactual analysis. More specifically, instead of looking at the FDI location choices made by Japanese multinationals, we use a sample of multinationals from China's major FDI source countries such as the U.S., Germany, Singapore and the U.K.[15] Conceptually, if there are some regional unobservables (not captured by the long list of control variables in $\mathbf{X}_{kt-1}$) that are correlated with z_r and persist to adversely affect the contemporary FDI location choice, we may pick up such adverse effects in at least one of these China's major FDI source countries.

Third, the data we use to estimate equation (21) are taken from a survey of foreign-invested enterprises conducted by the National Bureau of Statistics of China in 2001. From this survey, we observe the location of each foreign-invested enterprise in 2001 and its establishment year. Assuming no post-establishment location change, we can back out the location when the foreign-invested enterprise invested in China.[16] However, if there are substantial changes of location over the years and/or entry and exit, our estimation could be biased. As a robustness check, we focus on a sub-sample of Japanese multinationals that started investing in China in 2001, for which we have precise information on their location choice at the time of investment.

Fourth, multinationals can invest in China by either setting up wholly-owned subsidiaries or forming joint ventures with Chinese domestic firms. Conditional on their formation of joint ventures with local partners, Japanese multinationals should be less affected by the damage caused by the Japanese invasion, as local partners may mitigate the hostility of Chinese people toward the Japanese. Following this insight, we divide the whole sample into two sub-samples comprising a sub-sample of firms wholly owned by Japanese multinationals and a sub-sample of joint ventures, and test whether the adverse effect of the Japanese invasion is smaller in the latter than in the former.

[15] These countries are among China's top 10 FDI source countries. We also experiment with other FDI (top 20) source countries for China such as Holland, France, Canada, Australia, Malaysia and Italy, and do not find the Japanese invasion to have any significant impact on their FDI location choices. To save space, we do not report these results, but they are available upon request.

[16] We focus on the 1993-2001 period, because the data on many of the control variables are not available in the years before 1993, and FDI flows into China began increasing dramatically only in 1992.

4 Data

Most of the data used in this study come from the following three sources:

1. China Customs Data in 2001, from which we collect the total bilateral trade volume between Chinese regions and foreign countries (Japan and reference countries) at the HS-4 and HS-6 digit industry levels.

2. Survey of foreign-invested enterprises conducted by the National Bureau of Statistics of China in 2001, from which we collect information on Japanese multinationals and multinationals from China's major FDI source countries.

3. *China's damage during World War II* and *Statistical Abstract of the Republic of China*, from which we obtain information on civilian casualties across Chinese regions caused by the Japanese invasion of China and regional pre-war total population, respectively.

Table 1 presents information on the key variables, including trade between Chinese regions and Japan in 2001, Japanese direct investment in Chinese regions, civilian casualties caused by the Japanese invasion and the distance between Chinese regions and Japan.

Regarding Sino-Japanese trade, it is clear that coastal areas, in particular regions in the Yangtze River Delta and the Pearl River Delta, are not only more likely to trade with Japan (measured by the percentage of trade incidence among HS 4-digit or 6-digit products), but are also more likely to trade more intensively with Japan. In contrast, inland regions such as Tibet, Qinghai and Ningxia are less likely to trade with Japan and do so less intensively.

Similarly, coastal regions such as Shanghai, Jiangsu and Shandong receive the most direct investment from Japan, while Northwestern regions such as Xinjiang and Qinghai barely receive any direct investment from Japan.

The regressor of interest in this study concerns the severity of damage caused by the Japanese invasion and its persistent impact to this day. To capture variations in the severity of damage across Chinese regions, we use the percentage of civilian casualties. Specifically, from *China's damage during World War II*, we collect the number of civilians who suffered minor wounds, suffered major wounds or died due to the Japanese invasion for different regions in China.[17] We then divide the number of civilian casualties by the total pre-war population obtained from the *Statistical Abstract of the*

[17]Note that the three northeastern regions of Helongjiang, Jilin and Liaoning are not included in the analysis. This is because the data source does not cover these regions. As

Republic of China to calculate the percentage of civilian casualties (denoted as *Civilian Casualties* in all the regression tables).[18] Civilian casualties are often the most direct indicator of the cruelty of a war and are the most striking measure of losses incurred in the war. Taking advantage of regional variations in civilian casualties, we are able to capture the differences in war damage and its sequelae across regions.

Although civilian casualties caused by the Japanese military invasion were widespread in China, at the same time, owing to the vast size of the country, there was still a fairly large degree of variation in war atrocities across regions. Approximately half of the Chinese territories (mostly populous regions) were occupied by Japan and suffered civilian casualties during various conflicts. The unoccupied regions also suffered a great deal in various ways such as from the Japanese air bombing that resulted in civilian casualties. Figure 1 shows the geographic distribution of civilian casualties across China, with the darker color representing more severe casualties. Clearly, civilian casualties were concentrated in the central corridor of China, starting with Shanxi all the way down to Guangxi, passing through Henan, Hubei, Hunan and Jiangxi. This was because of the strategic intention of the Japanese army to build a supply line for its war in the Pacific Ocean (so-called *Operation Ichi-Go*).[19] The central corridor regions also suffered most because they formed the boundary zone between the Chinese resistance regions and the Japanese occupied areas where conflicts occurred frequently. In contrast, there were far fewer casualties in coastal regions, except in the case of Jiangsu where the notorious Rape of Nanjing took place. The western part of China, still under the control of the Kuomintang, also suffered far fewer casualties. This large variation in war casualties and atrocities provides an ideal setting for our study.

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a matter of fact, these three regions were occupied by the Japanese much earlier (1931) than the rest of China (1937), and were subject to a much less confrontational invasion strategy (the hijack and then installation of the last emperor of the Qing dynasty as the puppet ruler of these three regions, collectively called Manchuria) than that taken on the rest of China.

[18] A caveat for this data set is that Shanghai was counted geographically as part of Jiangsu province, while Beijing and Tianjin were treated as part of Hebei. We set the number of *Civilian Casualties* for Beijing and Tianjian to be the same as that for Hebei. However, as Shanghai is historically an immigrant city, we first use the 2000 population census to find the Chinese regions from which Shanghai citizens originally came and then calculate a weighted average value for Shanghai. Our regression results remain qualitatively the same if these three cities are excluded from the analysis.

[19] For more information, see http://en.wikipedia.org/wiki/Operation_Ichi-Go.

5 Empirical Results

5.1 Trade

5.1.1 Benchmark Results

Benchmark estimation results are reported in Table 2, in which the U.S. is used as the reference country and the error term ($\eta_{l'l}$) in the first stage is assumed to follow a normal distribution.

Column 1 of Table 2 presents the Probit estimation of equation (17). It is found that *Civilian Casualties* has a negative and statistically significant estimated coefficient.

This result implies that Chinese regions that suffered more civilian casualties from the Japanese invasion are less likely to engage in trade with Japan. The economic impacts of the Japanese invasion on the likelihood of Chinese firms trading with Japan are reported in Columns 1-3 of Table 3. Specifically, for each region in China, we calculate the incremental number of firms that would have participated in exporting to Japan, importing from Japan, and either of these two trading relations if Japan had not invaded China. Our finding implies that a total of $1,956$ firms were "missing" from Sino-Japanese bilateral trade in 2001 due to the Japanese invasion in 1937-1945. Meanwhile, distance is found to adversely affect firms' likelihood of trading with Japan and the U.S., in line with the result of Helpman, Melitz, and Rubinstein (2008).[20]

Columns 2 and 3 of Table 2 report the OLS estimation of equation (18), in which 50 or 100 bin dummies are used to approximate $B(\hat{\rho}_{l'l})$, respectively. Regarding our central issue, *Civilian Casualties* is found to have negative and statistically significant estimated coefficients in both of these specifications. These results imply that Chinese regions that suffered more from the Japanese invasion trade less intensively with Japan. In terms of economic magnitude, for each region in China, we calculate the increase in the volume of trade with Japan among existing Chinese exporters and importers if there had been no Japanese invasion of China in 1937-1945. As shown in Column 4 of Table 3, the Japanese invasion of China caused a total loss of US$4.5 billion in trade volume between China and Japan in 2001. Note that this

[20]Note that the magnitude of the distance effect (e.g., 0.434) is almost twice as large as that found by Helpman, Melitz, and Rubinstein (2008) (e.g., 0.213). The difference in estimated magnitude may be attributed to two factors: (1) our analysis is undertaken at a more disaggregated product level (i.e., HS 4-digit product level) than is that of Helpman, Melitz, and Rubinstein (2008) (aggregated at the country level); (2) our analysis is based on bilateral trade between a Chinese region and a foreign country, while that of Helpman, Melitz, and Rubinstein (2008)'s is between two countries.

number represents a lower-bound estimation of the per-year trade loss due to the Japanese invasion of China. If we take into account the potential trade volume generated by firms that would have participated in Sino-Japanese bilateral trade had there been no invasion, the per-year trade loss would be much larger. If we go beyond a single year of 2001, trade losses are expected to have been accumulated to a much higher level. Hence, in view of the cumulative loss in trade volume from 1945 (the end of the Japanese invasion) to 2001 and beyond, the Japanese invasion of China causes a far greater loss of trade between China and Japan.

In summary, the results presented in Table 2 suggest that the Japanese invasion of China in the 1930s-1940s has a substantial long-run, adverse impact on Sino-Japanese trade at both the extensive and intensive margins.

5.1.2 Robustness Checks

In this sub-section, we conduct several robustness checks of our findings presented in Table 2.

Alternative estimation of the first-stage equation. In the benchmark analysis, we assume a normal distribution of the error term in the first-stage equation and hence use the Probit estimation accordingly. To check whether our findings are sensitive to the particular distribution assumption, we use three alternative estimation methods for the first-stage equation: Logit estimation (a non-linear estimation assuming a logistic distribution of the error term), OLS estimation (a linear estimation with no prior distribution assumption for the error term), and a semi-nonparametric estimation developed by Gallant and Nychka (1987) (no prior distribution assumption for the error term). The estimation results are reported in Table 4. Clearly, our findings on the long-run adverse impact of the Japanese invasion of China on both the likelihood and volume of Sino-Japanese bilateral trade are generally robust to these alternative methods for estimating the first-stage equation.

Alternative reference countries. In the benchmark analysis, we use the U.S. as the reference country to control for China's regional fixed effects. To check whether our findings are sensitive to the reference country selected, we experiment by including more reference countries: Germany, Singapore, and the U.K. The estimation results are reported in Table 5. It is found that the inclusion of more reference countries has little impact on our findings on the adverse impact of the Japanese invasion.

HS-6 digit level estimation. In the benchmark analysis, due to computational limitations, we define a product at the HS-4 digit level. To check whether our findings are biased due to aggregation problems, we use a linear

rather than a non-linear estimation of the first-stage equation (17), in which the former allows us to include HS-6 digit rather than HS-4 digit product fixed effects. The estimation results are reported in Table 6. Comparing the estimation results with those obtained using HS-4 digit product fixed effects (Columns 4-6 of Table 4), we find that the change in the product disaggregation level has almost no effect on our findings.

5.2 Investment

5.2.1 Benchmark Results

Benchmark estimation results are reported in Table 7, with the progressive inclusion of control variables. It is found that in all three specifications, *Civilian Casualties* has negative and statistically significant estimated coefficients. These results imply that Chinese regions that suffered more from Japanese invasion in the 1930s-1940s accommodate fewer contemporary Japanese investments.

To assess the economic significance of the impact of the Japanese invasion on the FDI location choice, we follow the method used by Head, Ries, and Swenson (1995). Specifically, their method shows that the average probability elasticity with respect to the impact of the Japanese invasion has the following form

$$E_z = \hat{\beta}\frac{R-1}{R}, \tag{22}$$

where $\hat{\beta}$ is the estimated coefficient of civilian casualties; and R is the total number of regions. Using our most conservative estimate (Column 3 of Table 7), we find that if civilian casualties decrease by 10%, the probability of investment by Japanese multinationals increases by 1%. Meanwhile, if there had been no Japanese invasion (in other words, civilian casualties decrease by 100%), the probability of investment by Japanese multinationals would increase by 10%.

The results for the control variables all make economic sense. More specifically, it is found that Japanese multinationals prefer to invest in regions geographically closer to Japan with a larger market size, a better quality labor force, better infrastructure, greater degrees of agglomeration of Japanese firms and domestic Chinese firms, better economic institutions (such as intellectual property rights protection), and more favorable government policies (such as special economic zones, or national economic development zones). It is clear that the magnitude of the impact of civilian casualties is much larger than that of wages and education, and is similar to that of local economic

institutions. This shows the importance of historical legacy in affecting the location choice of FDI.

5.2.2 Robustness Checks

In this sub-section, we conduct several robustness checks of our findings reported in Table 7.

Checks on the IIA assumption. In estimating the benchmark equation (21), we need the IIA assumption to be satisfied (i.e., the choice between two alternatives should not be affected by the inclusion of other alternatives). We conduct three tests to check whether our findings are sensitive to the imposition of the IIA assumption. First, we exclude regions fewer than 10 Japanese multinationals have entered (Guizhou, Gansu, Hainan, Xinjiang and Qinghai) in Column 1 of Table 8, and exclude the three regions in which the most Japanese multinationals have entered (Shanghai, Shandong, and Jiangsu) in Column 2 of Table 8. Second, we use the Poisson estimation in Column 3 of Table 8, which is shown to more effectively control for potential IIA violation in FDI location decisions (Guimarães, Figueiredo, and Woodward, 2004). Third, we explicitly relax the IIA assumption and instead propose a nested structure in Column 4 of Table 8, in which Japanese multinationals first consider a super-region area before selecting a particular region within that super-region area. We conclude that our findings on the negative impact of the Japanese invasion on Japanese investments remain robust to all three alternative estimation specifications.

Counterfactual analysis. As our regressor of interest varies at the regional level, we are unable to include regional fixed effects in the benchmark estimation. Instead, we include a list of control variables commonly used in the literature on FDI location choice, and assume a conditional orthogonality of civilian casualties, i.e., $E\left[\epsilon_{frt} \cdot z_r | observed\ variables\right] = 0$. To check whether our findings are biased due to the imposition of this assumption, we conduct a counterfactual analysis. Conceptually, if some omitted regional variables are correlated with z_r and have a persistently adverse effect on contemporary FDI location choices, we may find such an adverse effect in samples of multinationals from other countries. More specifically, civilian casualties might reflect some uncontrolled and/or unobservable regional characteristics that affect FDI inflow. For instance, higher civilian casualties indicate higher physical and human capital costs brought about by the war, which might lower the region's potential for economic growth and make the region unattractive to FDI. Also, for example, as noted above, higher civilian casualties might reflect the existence of more serious xenophobia among local residents. If civilian casualties really capture these factors, they should not

only affect FDI from Japan, but should also exert strong negative impacts on FDI from other source countries. In Table 9, we examine the impact of civilian casualties caused by the Japanese invasion on FDI location choice using samples from the U.S., Singapore, Germany and the U.K., respectively. It is found that none of these regressions shows any statistically significant and negative impact of civilian casualties; three coefficients have a positive sign, and one has a negative sign but is statistically insignificant. Interestingly, we find that U.S. multinationals invest more in regions that suffered more from the Japanese invasion. It is possible that in regions where the Japanese invasion caused more civilian casualties, the United States is perceived as a savior (through its nuclear bombing of Japan and provision of military aid to China), and hence local Chinese people have a more favorable view of Americans and more direct investment from the United States. Alternatively, because the industrial structure of the U.S. is highly similar to that of Japan, there is substitution between Japanese and U.S. multinationals.

Sub-sample of year 2001. The analysis thus far utilizes a survey of foreign invested enterprises conducted in 2001 to extrapolate location information in the 1993-2001 period. If location changes and/or entry and exit occurred during this period, we may face a measurement error problem and/or sample selection bias. To check whether our findings are biased due to these problems, we focus on a sub-sample of Japanese multinationals established in 2001 so that we can have precise location information. The estimation results are reported in Table 10. Clearly, we still find the Japanese invasion has a negative and statistically significant impact on the location choice of Japanese direct investment. However, the increase in the estimated magnitude of this impact does suggest potential measurement errors and/or a sample selection issue, which causes an under-estimation in our benchmark analysis.

Joint-venture versus wholly-owned. We conduct a conceptual experiment as a further check on our findings on the impact of the Japanese invasion. In the data, there are two forms of Japanese multinationals in China: Japanese wholly-owned subsidiaries and Sino-Japanese joint ventures. Conceptually, local partners of Sino-Japanese joint ventures should alleviate some of the hostility among local Chinese people toward Japanese investment. Indeed, we find in Table 11 that the impact of the Japanese invasion on the location choices of Japanese multinationals is smaller for Sino-Japanese joint ventures than for Japanese wholly-owned subsidiaries.

5.3 Discussion of Results

Our analysis demonstrates that the Japanese invasion of China exerts negative effects on bilateral trade and investment, even though more than six decades have passed since the war came to an end. There could be various *a priori* reasons for war damage deterring bilateral trade and investment. Some examples are as follows. First, the war could have damaged physical infrastructure, transportation facilities and production capacity, thereby adversely affecting trade and investment. Second, the war resulted in tremendous casualties and thus heavy losses of human capital. As a result, there is a shortage of capable human resources to organize production, trade and investment. Third, the physical and human capital losses incurred in the war sent various regions into a poverty trap, which retarded their subsequent development for a long period. Fourth, the war could have damaged the natural environment of a particular region, thereby hampering its socioeconomic development. These possible scenarios are, however, unlikely to account for the long-term impact of the war in our context. If the damage caused by the Sino-Japanese war undermined regional capacity for economic development, it is also likely to have negative impacts on bilateral trade and investment between Chinese regions and any major trading partner and FDI source country other than Japan. Nonetheless, our analysis shows forcefully that this is not the case. This indicates that the sequelae of war damage are not generally reflected in a lower ability among regions to foster economic development. Instead, they are quite specific to economic relations with Japan.

In our opinion, the most plausible interpretation of the long-term impacts of the war is that the war has created chronic sequelae that are primarily psychological in nature. As noted above, the Japanese invasion of China in the 1930s and 1940s remains a root cause for the unfavorable view of Japan held by the majority of Chinese people. The apparent lack of sincere remorse for the war on the Japanese side and the rising nationalism tolerated by the Chinese Communist government contribute to the unfavorable attitude of many Chinese toward Japan. Lingering war memories might well exert a negative impact on people's willingness to expand bilateral trade and investment. According to the China Topline Report of Global Views 2006 released by the Chicago Council on Global Affairs, 31% of the Chinese people surveyed were against China having a free trade agreement with Japan, whereas the corresponding figure for those opposing a free trade agreement with the U.S. was 19%. Similarly, 58% of the Chinese surveyed did not agree that Japanese companies should be allowed to purchase a controlling stake in Chinese companies, whereas the corresponding figure for EU countries was 33%. Hence, such persistent sequelae of the war may adversely affect

the willingness of Chinese people to restore and expand bilateral trade and investment connections with Japan.

This interpretation of the results is reinforced by the measure of war damage employed in our study. Civilian casualties are expected to be particularly powerful in capturing the psychological sequelae of the war. Unlike property damage and losses incurred in the war, the negative effects of human casualties are often irreversible and long-lasting. Furthermore, in comparison with military casualties, civilian casualties are much more likely to produce long memories of war atrocities within a local community. Military troops were typically made up of service personnel from different parts of the country. Civilians were much less mobile. They often had extended family relations and social networks in the local area, and most of them remained in the province from one generation to another. Injury or death among their family members and friends during the War could cast a shadow on the hearts of the family and the local community for a long time. Consequently, unfavorable views of or even animosity toward Japan could persist across generations. Hence, we expect residents in regions with more civilian casualties to have a more unfavorable view of Japan on average.

The long-term impacts of the war uncovered in our study focus on relative performance, i.e., the shortfall in trade and investment compared with a scenario whereby no such war occurred or war disputes had been resolved. These are more subtle consequences of the war than are the short-term impacts of wars on economic performance in the immediate years following the conflict. The literature to date does not reveal that wars have much of a long-term impact. For example, Davis and Weinstein (2002) find no long-term impact of the U.S. bombing of Japanese cities during World War II on the populations of these cities in the post-war period. Similarly, Miguel and Roland (2011) find that the U.S. bombing in the Vietnam War did not lead to a persistent local poverty trap. Przeworski, Alvarez, Cheibub, and Limongi (2000) also find rapid postwar recovery in a cross-country study. In terms of the effects of wars on trade, Glick and Taylor (2010) find that the negative impacts of wars on trade flows dissipated nearly ten years after the wars had come to an end. The differences between our findings and those reported in the literature primarily stem from the fact that existing studies focus on declines in the output level, trade volume and other economic performance indicators caused by wars and on the postwar recovery of these indicators, whereas our study sheds light on the shortfall in trade and investment performance compared with the counterfactual benchmark scenario whereby no such war occurred. Hence, our study adds to the literature by revealing a deeper layer of costs imposed by the war on economic growth.

6 Conclusion

Research on international trade and investment tends to focus on economic factors such as comparative advantage, market size and geographic distance. The impacts of non-economic factors such as political, sociological and historical influences are often overlooked. A prominent feature of today's world is conflict among countries or races. Whether conflict adversely affects international trade and investment is a crucial issue for us to understand in this increasingly globalized world. Several existing studies focus on how conflict reduces trade flows in the years immediately following the war and how fast trade flows recover. Nevertheless, it is equally important to understand whether past conflicts among countries generate long-term impacts and affect contemporary trade and investment among them, not only in terms of the absolute level of trade and investment flows, but also in terms of their relative level. That is, whether historical conflicts cause current economic exchange to fall short of the level that could have been reached if there were no war-induced animosity is a key issue. This paper utilizes one of the most important historical conflicts in Asia in the last 100 years, the Japanese invasion of China from 1937 to 1945, to examine whether it has any adverse impact on contemporary trade between the two countries and direct investment from Japan.

To measure the severity of damage brought by the Japanese invasion, we collect data on the percentage of civilian casualties for 28 regions in China. For estimating the impact on trade between China and Japan, we apply an augmented gravity model developed by Helpman, Melitz, and Rubinstein (2008) to 2001 China Customs data. It is found that the invasion has led to not only smaller numbers of firms participating in trade between Japan and Chinese regions (the extensive margin effect), but also lower trade volumes (the intensive margin effect). To estimate the impact of the invasion on foreign direct investment from Japan, we apply the discrete choice model developed by McFadden (1974) to 2001 data on foreign-invested enterprises. It is found that regions that suffered more severe losses from the Japanese invasion attract smaller numbers of Japanese-invested enterprises. Our study shows that historical animosity still matters for international trade and investment, despite the trend toward a flat world.

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Table 1: Information of key variables

China's Regions	Trade with Japan: Volume (m US$)	Trade with Japan: HS 4-digit non-zeros	Trade with Japan: HS 6-digit non-zeros	Investment from Japan (number)	Civilian Casualties (%)	Distance (km)
Anhui	608.2	0.49	0.26	64	1.75	2113.0
Beijing	4167.9	0.80	0.59	288	1.24	2090.4
Chongqing	175.7	0.29	0.12	-	0.07	3163.1
Fujian	4249.9	0.71	0.49	169	0.47	2215.1
Gansu	148.7	0.11	0.04	7	0.02	3223.9
Guangdong	23345.8	0.85	0.71	266	1.27	2904.6
Guangxi	200.1	0.32	0.13	26	7.08	3342.4
Guizhou	116.9	0.15	0.05	10	0.67	3282.4
Hainan	281.5	0.31	0.13	9	0.00	3550.6
Hebei	924.6	0.62	0.37	170	1.24	2253.4
Henan	433.2	0.41	0.18	52	2.89	1567.4
Hubei	770.2	0.43	0.22	55	5.08	2427.6
Hunan	404.6	0.38	0.18	20	4.57	2644.0
Inner Mongolia	227.6	0.23	0.08	31	1.44	2504.6
Jiangsu	14441.2	0.83	0.69	985	2.37	1971.3
Jiangxi	271.3	0.34	0.15	34	3.41	2366.3
Ningxia	96.8	0.14	0.05	11	0.57	2966.4
Qinghai	50.7	0.05	0.02	2	0.00	3389.2
Shaanxi	417.7	0.41	0.19	50	0.02	2795.8
Shandong	7620.2	0.82	0.62	648	0.83	2037.4
Shanghai	14807.6	0.87	0.73	1118	2.09	1760.4
Shanxi	472.3	0.24	0.09	26	5.81	2424.7
Sichuan	803.8	0.49	0.26	109	0.09	3345.6
Tianjin	4063.7	0.77	0.56	294	1.24	2020.0
Tibet	7.8	0.05	0.01	-	0.00	4538.5
Xinjiang	148.5	0.11	0.04	2	0.00	4463.1
Yunnan	176.4	0.28	0.11	17	0.65	3714.4
Zhejiang	6747.5	0.77	0.59	508	1.38	1915.0

Table 2: Impact of the Japanese invasion of China on the Sino-Japanese bilateral trade, Benchmark results

	1	2	3
	First Stage	Second Stage	
		50 bins	100 bins
Reference Country		U.S.	
Estimation Method	Probit	OLS	
Civilian Casualties	-0.013**	-0.040**	-0.033*
	(0.007)	(0.018)	(0.018)
Log of Distance	-0.434***	-1.565***	-1.427***
	(0.072)	(0.166)	(0.166)
Excluded Variable			
Embassy or Consulates	0.178***		
	(0.015)		
Firm Heterogeneity and Selection Bias			
50 Bins Dummies		Yes	
100 Bins Dummies			Yes
Other Controls			
Exporter Fixed Effects	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes
Product Fixed Effects	Yes	Yes	Yes
Number of Industries	1253	1253	1253
Number of China's Regions	28	28	28
Number of Foreign Countries	2	2	2
Pseudo R2/R2	0.43	0.34	0.34
Log pseudo likelihood	-48741	-	-
Observations	136976	42637	42637

Note: Robust-standard errors, clustered at region-country pair level, are reported in the parenthesis in Column 1; whereas bootstrapped standard errors are reported in Columns 2-3. ** and *** represent statistical significance at 5% and 1% level, respectively.

Table 3: Impact of the Japanese invasion of China on the Sino-Japanese bilateral trade, Magnitude in the Year of 2001

	1	2	3	4
	Number of "Missed" Firms			Increase in Trade Volume by Existing Exporters and Importers
	Export	Import	Export or Import	(US$ million)
Anhui	9.5	8.7	18.2	35.1
Beijing	17.5	67	84.5	170.5
Chongqing	0.1	0.2	0.3	0.4
Fujian	15	15.3	30.3	65.9
Gansu	0.01	0.01	0.02	0.1
Guangdong	104	289.8	393.8	978.4
Guangxi	22.1	14.4	36.5	46.8
Guizhou	0.5	0.5	1	2.6
Hainan	0	0	0	0
Hebei	9.8	13	22.8	37.8
Henan	9.9	8.6	18.5	41.3
Hubei	14.7	26.9	41.6	129.1
Hunan	12.2	16.2	28.4	61
Inner Mongolia	2.6	1.6	4.2	10.8
Jiangsu	151.2	295.9	447.1	1129
Jiangxi	7.7	6.5	14.2	30.5
Ningxia	0.3	0.4	0.7	1.8
Qinghai	0	0	0	0
Shaanxi	0.05	0.08	0.13	0.3
Shandong	43	48.3	91.3	208.7
Shanghai	142.7	355.8	498.5	1021
Shanxi	9.3	6.1	15.4	90.6
Sichuan	0.4	0.7	1.1	2.4
Tianjin	18.2	54.1	72.3	166.3
Tibet	0	0	0	0
Xinjiang	0	0	0	0
Yunnan	1.6	0.9	2.5	3.8
Zhejiang	69.9	63.5	133.4	307.3
Total	662.3	1294.5	1956.8	4541.5

Table 4: Impact of the Japanese invasion of China on the Sino-Japanese bilateral trade, Alternative estimation of the first-stage

	1	2	3	4	5	6	7	8	9
	First Stage	Second Stage		First Stage	Second Stage		First Stage	Second Stage	
		50 bins	100 bins		50 bins	100 bins		50 bins	100 bins
Reference Country		U.S.			U.S.			U.S.	
Estimation Method	Logit	OLS		OLS	OLS		Semi-nonparametric	OLS	
Civilian Casualties	-0.021	-0.041**	-0.036**	-0.003**	-0.045**	-0.045**	-0.008*	-0.036**	-0.035**
	(0.013)	(0.018)	(0.018)	(0.002)	(0.018)	(0.017)	(0.004)	(0.017)	(0.014)
Log of Distance	-0.880***	-1.701***	-1.550***	-0.091***	-1.565***	-1.567***	-0.446***	-1.666***	-1.590***
	(0.125)	(0.169)	(0.160)	(0.015)	(0.147)	(0.161)	(0.040)	(0.177)	(0.210)
Excluded Variable									
Embassy or Consulates	0.306***			0.042***			0.140***		
	(0.035)			(0.004)			(0.019)		
Firm Heterogeneity and Selection Bias									
50 Bins Dummies		Yes			Yes			Yes	
100 Bins Dummies			Yes			Yes			Yes
Other Controls									
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Industries	1253	1253	1253	1253	1253	1253	1253	1253	1253
Number of China's Regions	28	28	28	28	28	28	28	28	28
Number of Foreign Countries	2	2	2	2	2	2	2	2	2
Pseudo R2/R2	0.43	0.34	0.34	0.43	0.34	0.34		0.34	0.34
Log pseudo likelihood				-48533			-48311		
Observations	140336	42637	42637	136640	42637	42637	140336	42637	42637

Note: Robust-standard errors, clustered at region-country pair level, are reported in the parenthesis in Columns 1, 4 and 7; whereas bootstrapped standard errors are reported in Columns 2-3, 5-6, and 8-9. ** and *** represent statistical significance at 5% and 1% level, respectively.

Table 5: Impact of the Japanese invasion of China on the Sino-Japanese bilateral trade, more reference countries

	1	2	3	4	5	6	7	8	9
	First Stage	Second Stage		First Stage	Second Stage		First Stage	Second Stage	
		50 bins	100 bins		50 bins	100 bins		50 bins	100 bins
Reference Countries	U.S. and Germany			U.S., Germany and Singapore			U.S., Germany, Singapore, and U.K.		
Estimation Method	Probit	OLS		Probit	OLS		Probit	OLS	
Civilian Casualties	-0.027***	-0.064***	-0.062***	-0.027***	-0.060***	-0.056***	-0.028***	-0.050***	-0.048***
	(0.001)	(0.016)	(0.017)	(0.001)	(0.015)	(0.015)	(0.011)	(0.015)	(0.016)
Log of Distance	-0.460***	-1.475***	-1.451***	-0.380***	-1.151***	-1.093***	-0.409***	-1.190***	-1.155***
	(0.072)	(0.125)	(0.145)	(0.059)	(0.097)	(0.107)	(0.060)	(0.090)	(0.098)
Excluded Variable									
Embassy or Consulates	0.113**			0.119***			0.113**		
	(0.047)			(0.041)			(0.047)		
Firm Heterogeneity and Selection Bias									
50 Bins Dummies		Yes			Yes			Yes	
100 Bins Dummies			Yes			Yes			Yes
Other Controls									
Exporter Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Industries	1253	1253	1253	1253	1253	1253	1253	1253	1253
Number of China's Regions	28	28	28	28	28	28	28	28	28
Number of Foreign Countries	3	3	3	4	4	4	5	5	5
Pseudo R2/R2	0.43	0.33	0.34	0.43	0.33	0.33	0.43	0.32	0.32
Log pseudo likelihood	-70177			-80735			-99245		
Observations	205632	58308	58308	240492	65527	65527	309204	77041	77041

Note: Robust-standard errors, clustered at region-country pair level, are reported in the parenthesis in Columns 1, 4 and 7; whereas bootstrapped standard errors are reported in Columns 2-3, 5-6, and 8-9. ** and *** represent statistical significance at 5% and 1% level, respectively.

Table 6: Impact of the Japanese invasion of China on the Sino-Japanese bilateral trade, HS-6 digit estimation

	1	2	3
	First Stage	Second Stage	
		50 bins	100 bins
Reference Country		U.S.	
Estimation Method	OLS	OLS	
Civilian Casualties	-0.004**	-0.045***	-0.048***
	(0.001)	(0.012)	(0.013)
Log of Distance	-0.099***	-1.708***	-1.762***
	(0.015)	(0.097)	(0.105)
Excluded Variable			
Embassy or Consulates	0.031***		
	(0.008)		
Firm Heterogeneity and Selection Bias			
50 Bins Dummies		Yes	
100 Bins Dummies			Yes
Other Controls			
Exporter Fixed Effects	Yes	Yes	Yes
Importer Fixed Effects	Yes	Yes	Yes
HS-6 digit Product Fixed Effects	Yes	Yes	Yes
Number of Industries	1253	1253	1253
Number of China's Regions	28	28	28
Number of Foreign Countries	2	2	2
R2	0.35	0.31	0.31
Observations	610736	103497	103497

Note: Robust-standard errors, clustered at region-country pair level, are reported in the parenthesis in Column 1; whereas bootstrapped standard errors are reported in Columns 2-3. ** and *** represent statistical significance at 5% and 1% level, respectively.

Table 7: Impact of the Japanese invasion of China on the Japanese investment in China, Benchmark results

	1	2	3
Civilian Casualties	-0.150***	-0.127***	-0.097***
	(0.013)	(0.019)	(0.021)
Log of Distance	-6.739***	-3.959***	-3.634***
	(0.122)	(0.119)	(0.155)
Economic Institutions			
Government Intervention in Business Operations		-0.180	-0.761
		(0.682)	(0.725)
Intellectual Property Right Protection		0.148***	0.105***
		(0.038)	(0.040)
Agglomeration			
Agglomeration of Japanese Firms		2.008***	1.950***
		(0.100)	(0.100)
Agglomeration of Chinese Firms		3.808***	3.826***
		(0.211)	(0.212)
Cost of Production			
Wage		0.055***	0.011
		(0.012)	(0.016)
Education		0.020**	0.040***
		(0.010)	(0.011)
Infrastructure		0.357	-0.386
		(0.217)	(0.275)
Market Demand			
Gross Domestic Product		0.307***	0.249***
		(0.014)	(0.015)
Other Macro Factors			
Presence of Japanese Embassy or Consulates			0.333***
			(0.094)
Special Economic Zone			0.363***
			(0.080)
National Economic Development Zone			0.152*
			(0.080)
Number of Choices	26	26	26
Number of Firms	4971	4971	4971
Pseudo R2	0.21	0.29	0.29
Log pseudo likelihood	-12876	-11554	-11508
Observations	129246	129246	129246

Note: Robust-standard errors are reported in the parenthesis. * and *** represent statistical significance at 10% and 1% level, respectively.

Table 8: Impact of the Japanese invasion of China on the Japanese investment in China, Checks on IIA assumption

	1	2	3	4
Estimation Method	Conditional Logit		Poisson	Nested Logit
Sample	Excluding regions with less than 10 entries	Excluding regions with the top three entries	Whole	Whole
Civilian Casualties	-0.121***	-0.091***	-0.259***	-0.123***
	(0.022)	(0.024)	(0.091)	(0.027)
Control Variables				
Log of Distance	Yes	Yes	Yes	Yes
Economic Institutions	Yes	Yes	Yes	Yes
Agglomeration	Yes	Yes	Yes	Yes
Cost of Production	Yes	Yes	Yes	Yes
Market Demand	Yes	Yes	Yes	Yes
Other Macro Factors	Yes	Yes	Yes	Yes
Number of Choices	21	23	26	26
Number of Firms	4941	2220	4971	4971
Pseudo R2	0.25	0.24		
Log pseudo likelihood	-11265	-5263		-1144
Observations	103761	51060	234	129246

Note: Robust-standard errors are reported in the parenthesis. *** represents statistical significance at 1% level.

Table 9: Impact of the Japanese invasion of China on the Japanese investment in China, Counterfactual analysis

	1	2	3	4
Sample	U.S.	Singapore	Germany	U.K.
Civilian Casualties	0.057***	0.042	0.017	-0.042
	(0.013)	(0.028)	(0.065)	(0.072)
Control Variables				
Log of Distance	Yes	Yes	Yes	Yes
Economic Institutions	Yes	Yes	Yes	Yes
Agglomeration	Yes	Yes	Yes	Yes
Cost of Production	Yes	Yes	Yes	Yes
Market Demand	Yes	Yes	Yes	Yes
Other Macro Factors	Yes	Yes	Yes	Yes
Number of Choices	26	26	26	26
Number of Firms	6944	2409	948	924
Pseudo R2	0.54	0.70	0.87	0.85
Log pseudo likelihood	-10348	-2327	-414	-444
Observations	180544	62634	24648	24024

Note: Robust-standard errors are reported in the parenthesis. *** represent statistical significance at 1% level.

Table 10: Impact of the Japanese invasion of China on the Japanese investment in China, Sub-sample of year 2001

	1
Sample	Year 2001
Civilian Casualties	-0.221***
	(0.079)
Control Variables	
Log of Distance	Yes
Economic Institutions	Yes
Agglomeration	Yes
Cost of Production	Yes
Market Demand	Yes
Other Macro Factors	Yes
Number of Choices	26
Number of Firms	602
Pseudo R2	0.37
Log pseudo likelihood	-1227
Observations	15652

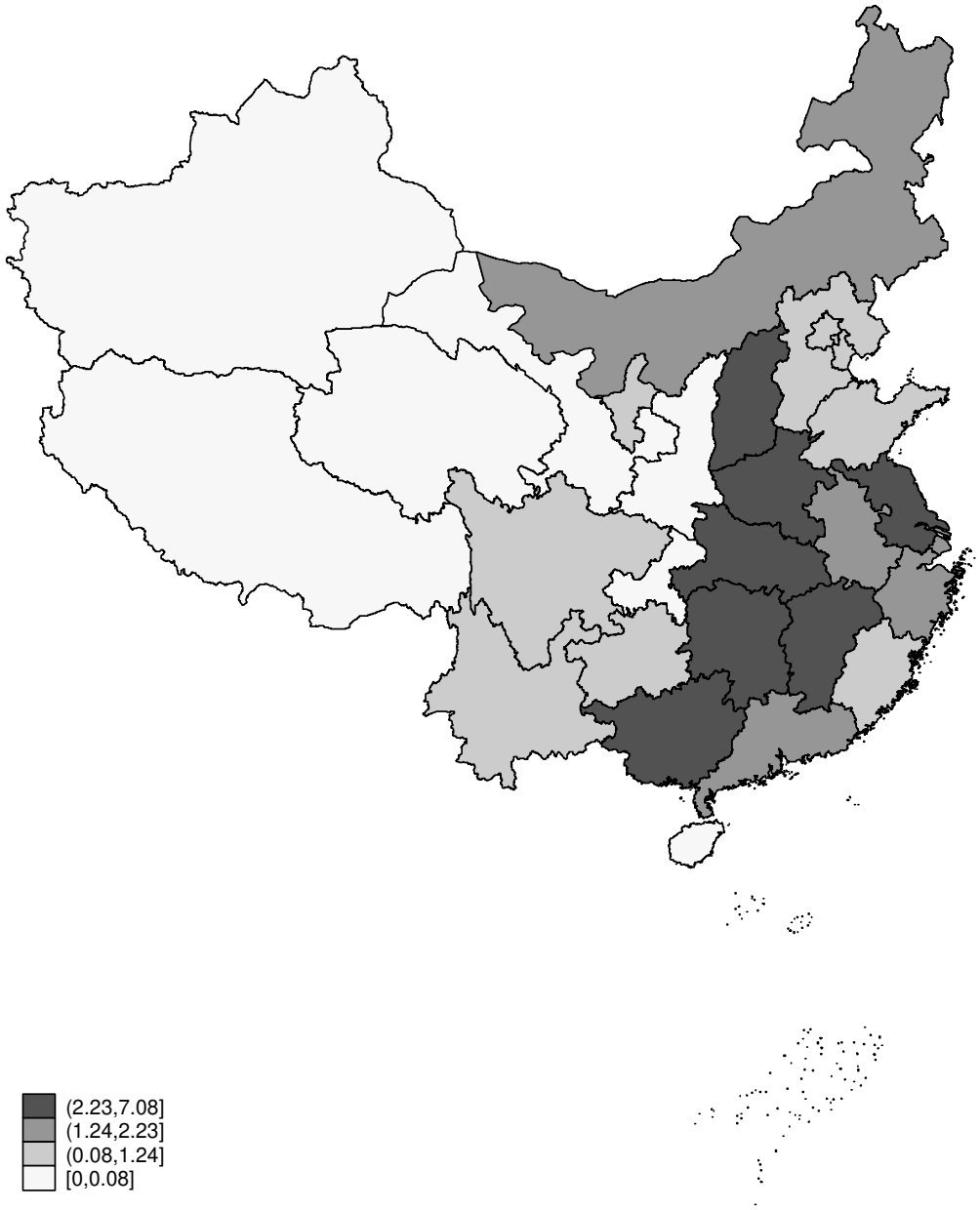
Note: Robust-standard errors are reported in the parenthesis. *** represents statistical significance at 1% level.

Table 11: Impact of the Japanese invasion of China on the Japanese investment in China, Joint-venture versus wholly-owned

	1	1
Sample	Joint-venture	Wholly-owned
Civilian Casualties	-0.068***	-0.188***
	(0.024)	(0.041)
Control Variables		
Log of Distance	Yes	Yes
Economic Institutions	Yes	Yes
Agglomeration	Yes	Yes
Cost of Production	Yes	Yes
Market Demand	Yes	Yes
Other Macro Factors	Yes	Yes
Number of Choices	26	26
Number of Firms	3315	1656
Pseudo R2	-7845	-3615
Log pseudo likelihood	0.27	0.33
Observations	86190	43056

Note: Robust-standard errors are reported in the parenthesis. *** represents statistical significance at 1% level.

Figure 1: Geographic pattern of civilian casualties in China



Appendix: Description of control variables

Variable	Construction	Source
Log of Distance	Log of distance the great circle distance between the capital city of a region and Tokyo of Japan	Wikipedia
Government Intervention in Business Operations	The proportion of entrepreneurs requesting government help in case of business disputes in a region	Survey of China's Private Enterprises
Intellectual Property Right Protection	The logarithm of the number of approved patents per capita in a region	China Statistical Yearbook
Agglomeration of Japanese Firms	The number of Japanese-invested firms belonging to a 4-digit industry located in a region divided by the national total of the same industry	2001 NBS survey of foreign-invested enterprises
Agglomeration of Chinese Firms	The number of China's domestic firms belonging to a 4-digit industry located in a region divided by the national total of the same industry	NBS annual Survey of industrial firms
Wage	The average of manufacturing wages in a region	China Statistical Yearbook
Education	the proportion of the number of students enrolled in higher education institutions in a region to its total population	China Statistical Yearbook
Infrastructure	The length of highway per square kilometer in a region	China Statistical Yearbook
Gross Domestic Product	Regional GDP figure in the year before the FDI project took place	China Statistical Yearbook
Presence of Japan Embassy or Consulates	A dummy variable taking value one if there is Japanese embassy or consulate in the concerned region, and zero otherwise	History of the diplomatic establishment between China and United States 1786–1994, Huang Gang, 1995 Taiwan
Special Economic Zone	A dummy variable taking value one if a region has either special economic zone or open coastal city, and zero otherwise	Comprehensive statistical data and materials on 50 years of new china 1949–1999, NBS, 1999
National Economic Development Zone	A dummy variable taking value one if a region has national economic and technological development zone, and zero otherwise	Ministry of Commerce of China