# THE LEGACY EFFECT OF WWII MASSACRES ON CHINA'S EXTERNAL TRADE PATTERN*

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**Abstract**

We study the legacy effect of historical conflict on contemporaneous trade. Using new data on the regional dispersion of civilian deaths due to massacres in the Sino-Japanese war (1931-45), we find that local conflict intensity predicts international trade patterns of Chinese corporations three generations later. We further explore the transmission mechanism of collective war memory. Conflict intensity correlates with measures of anti-Japanese sentiments inferred from survey data and it appears to be transmitted both through war dramas in the mass media as well as official commemorations. The trade-inhibiting local war memory has a stronger explanatory power on import response and is highly subject to the length of exposure time.

**Keywords**: Historical conflicts, trade, collective memory

**JEL Codes**: F14, F51, J11, N45, Z13

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# I Introduction

This paper studies the long-term impact and transmission mechanisms of historical conflicts on contemporary external trade patterns. We examine a new data set on the geographical distribution of the number of civilian deaths related to Japan's massacres in the Second Sino-Japanese war (1931-1945)[1]. Our aim is to link the degree of conflict intensity three generations ago to contemporary economic outcomes.

The Chinese context offers some unique advantages over previous studies relating historical conflicts to external trade (Blomberg and Hess 2006; Glick and Taylor 2010). First, China stopped external trade (especially with western countries) after World War II and re-opened its economy only in 1978. This interruption in international trade suggests that any current trade pattern should not be a persistent manifestation of initial contemporaneous trade effects. Instead, the transmission has to occur through collective war memory. Interestingly, war memory across regions in China does not converge to a uniform national consensus—underlining the strong cultural diversity within the country.

We find Sino-Japanese conflict intensity predicts current trade patterns with Japan. Using a difference-in-difference methodology, we show that Sino-Japanese war massacres leads to lower regional cumulative trade between 2001-2006 with Japan more than with other countries in the same period in a sample of 255 prefecture-level cities. Specifically, conflict intensity causes trade (ordinary trade type) with Japan to decline by 10.8%. This decline translates into a trade loss of 19.9 billion dollars (constant 2000 US$) for the period 2001-2006.

Massacre deaths turns out to be a better measure of conflict intensity than general civilian war casualty. One recent paper (Che et al., 2016) that is closely related to our work finds that Chinese provinces with higher civilian casualty rate during the Sino-Japanese war have less trade with Japan at 2001. We thus aggregate civilian deaths due to Japan's massacres at the province level and find that the negative trade effect of massacres dominates the effect of civilian casualty. While on average only a tiny proportion of

[1]From 1931 to 1945, the military conflict between China and Japan is known as the Second Sino-Japanese War, which is also regarded as an important part of World War II.

population within an region really experienced the massacres, this is somewhat surprising as civilian casualty rate should capture local common war experience better. Due to the difference on real impact scope, the effect of massacres on a broad range relies on the propagation of social media and other mediums; on the contrary, the effect of civilian casualty can transmit through family education and social interaction. Therefore, our comparison result implies that external propagation mediums play an important role in how historical conflicts influence contemporary economic activities at least in Chinese context.

Why are the economic effects of historical conflicts so persistent over three generations? China stopped international trade for decades following the war, yet in normalizing trade relations with other countries, we find activity with Japan to be disproportionately affected. This pattern suggests a causal effect of local collective war memory on economic activity. In 2008, individual surveys conducted in 68 cities confirm that historical conflict intensity predicts stronger anti-Japanese sentiments as measured by a lower willingness to accept a Japanese person as a colleague. Our second contribution is to explore the underlying transmission mechanism of war memory. We show that the intergeneration transmission of war memory is related to mass media contact and local governmental cultural policies. Mass media contact is measured by the frequency of TV dramas on the Sino-Japanese war broadcast in a given area (2011 and 2012 data). We quantify local cultural policy with the number of Sino-Japanese war memorials (constructed primarily in the 1980s), which are mainly financed by local governments and are common places for local schools, enterprises and governments at which to organize patriotic educational group activities.

We find that both televised war dramas and war memorials correlate with the current biased trade pattern and the proxy for anti-Japanese sentiments. Specifically, these two war memory proxies are positively correlated with historical regional conflict intensity. More importantly, the effects of conflict intensity on external trade and anti-Japanese sentiments vanish while the effects of war dramas and war memorials remain highly significant when they are jointly included in the regression. Quantitatively, war dramas and

war memorials together explains 64% of the massacre effect on trade patterns, and the war memorials have a stronger explanatory power as war dramas become popular only in recent decades. Historical conflict intensity is also positively correlated with so-called Red Army memorials, which mainly commemorate the history of the Chinese Communist Party. These monuments celebrate general patriotism and relate only indirectly with the Sino-Japanese War. We therefore use "Red Army Memorials" in a placebo test and find no effect of this type of commemoration on trade and individual anti-Japanese sentiments. These results imply that the long-lasting impact of massacres can be attributed to event-specific commemoration rather than general patriotism.

We further find that war memory has not only a stronger negative effect on import, but also a stronger explanatory power of massacre effect on import. Intuitively, entrepreneurs are on average more rational than common people as their goal is profit maximization so that their behaviors are not fully driven by their own sentiments. Therefore, import response is expected to be greater than export response as entrepreneurs have to consider local customers' sentiments when deciding to import products from other countries, which however is not for export decision. Our result confirms this hypothesis that both war dramas and war memorials tend to have greater influence on local import. More importantly, the quantification result shows that these two proxies of war memory jointly accounts for 60% of massacre effect on export, and 96% of massacre effect on import. This difference suggests that war memory might have other mediums that influence entrepreneurs' export decisions.

The length of exposure time to war memory determines whether war memory will exert any real influence on trade patterns. Through dividing nation-level Sino-Japanese war memorials into different types based on the year of completion and location, we find that war memorials built before 1980 have the largest negative trade effect, then war memorials built between 1980-2000 have the second largest effect, and the war memorials built after 2000 have a smaller and insignificant effect. Meanwhile, we also find that war memorials built in urban areas has stronger effect than those built in non-urban areas, as most entrepreneurs and business concentrate in urban areas. However, pooling all

different types of war memorials in the same regression shows that only war memorials built before 1980 and between 1980 and 2000 remain to have significant effects. This implies that only a long time exposure to war memory can influence economic activities, which is consistent with the common view that people's unconsciousness and behaviors are gradually shaped by external environment.

Our results are robust to various tests. First, we confirm that negative trade effect is also prominent on local foreign investment in the form of imported goods and equipment, and the war memory is the main underlying transmission mechanism. Second, we show that both massacre cities and non-massacre cities have similar trade structures in terms of product categories, and the negative trade effect of massacres and war memory is not subject to a specific product category, mitigating the concern that, by chance, regions with greater conflict intensity do not produce products that Japan demands or do not demand products that Japan produces. Third, the negative trade effect is not dominated by random yearly shocks, as it remains significant in almost all years between 2001-2006. Further, we show that there is no correlation between conflict intensity and measures of *pre-war* anti-foreigner sentiments, which could influence massacre distribution and current trade patterns simultaneously. Moreover, we re-distribute city-level conflict intensity randomly for 1000 times and find no statistical evidence that our main result is driven by any specification error.

Our work presents a fuller picture of how historical conflicts within a country influence current external trade patterns. Specifically, we present new evidence showing the impact of persistent war memory on economic activity. Our work is closely related to the literature on the persistent impact of historical conflicts on aggregate economic outcomes (Brakman et al. 2004; Keshk et al. 2004; Martin et al. 2008, 2012; Glick and Taylor 2010; Blattman and Miguek 2010; Miguel and Roland 2011; Che et al. 2012; Rohner et al. 2013; Waldinger 2016). Further, in considering the transmission mechanisms of historical conflicts, we add to the recent intense discussion on cultural transmission (Algan and Cahuc 2010; Putterman and Weil 2010; Bisin and Verdier 2011; Nunn and Wantchekon 2011; Voigtländer and Voth 2012; Alesina et al. 2013; Grosfeld et al. 2013; Spolaore

and Wacziarg 2013; Guiso et al. 2016). Also, the effect of televised war dramas on war memory preservation is related to the literature on how mass media affects individual attitudes (Enikolopov et al. 2011; DellaVigna et al. 2014; Adena et al. 2015). The suggestive causal link between anti-Japanese sentiments and biased trade pattern is in line with Guiso et al. (2009)'s finding that bilateral trust influences economic exchange and Michaels and Zhi (2010)'s finding that negative attitudes reduce trade. This paper also contributes to the literature on the persistence of the Sino-Japanese conflict (He 2007; Che et al. 2012; Katz 2013; Fisman et al. 2014), which is of crucial importance to the stability and economic integration of East Asia.

The rest of this paper is organized as follows: the historical background of the Sino-Japanese war (1931–1945), along with a description of civilian anti-Japanese sentiments, is provided in Section II; our data and identification strategy are described in Section III; empirical results are presented in Section IV; and Section V includes robustness checks. Section VI concludes the paper.

# II Historical Background

## II.1 Massacres in Sino-Japanese War between 1931-1945

On September 18, 1931, Japanese troops first attacked northeastern China, an event known as the Mukden Incident. By 1932, the Japanese army had occupied the whole of China's three northeastern provinces (Liaoning, Jilin and Heilongjiang). On July 7, 1937, the Marco Polo Bridge Incident marked the beginning of a full-scale Second Sino-Japanese War. The national government of China organized the anti-Japanese national united front to resist Japanese invasion and finally won the war when Japanese emperor Hirohito officially capitulated to the Allies on August 15, 1945. During the eight years of full-scale war, an estimated 35 million Chinese people lost their lives.

From 1931 to 1945, the Japanese army invaded northeastern, northern, central and southern China successively and, to quell opposition from civilians, conducted hundreds of massacres. The most murderous event was the Nanking Massacre, from December 13,

1937 to February 6, 1938. In order to force the national government to surrender, at least 300,000[2] unarmed civilians died in an episode of mass murder and mass rape within six weeks. This ranks as the first major event under the section "heinous crimes by Japanese troops" in the history textbook (PEP edition) for Chinese high school students.

Figure 1 shows the geographic distribution of civilian deaths in the massacre aggregated at the city level (massacre data will be described in the data section)[3]. It's clear that massacres targeting civilians were widely distributed in China, from the extreme northeast city, Jiamusi, to the extreme southwest city, Baoshan. However, there is also a prominent variation in the location of massacres and death tolls; severely afflicted areas were concentrated in northern Shanxi, central and southern Hebei, southern Shandong to northern Zhejiang, part of Hubei, most areas of Hunan, north Jiangxi and regions around Guangzhou provinces. The Sinkiang, Inner Mongolia, Gansu, Ningxia, Tibet and Qinghai provinces were spared from invasion and has few war conflicts with Japan due to their remote locations. We exclude these regions in the main investigation sample.

## II.2 Anti-Japanese Sentiments and War Memory

The massive number of civilian casualties tied to Japan's massacres undoubtedly became the deep root of civilian anti-Japanese sentiments (including a range of negative feelings: hatred, hostility, distrust, etc,), even though the war ended in victory for China. However, this anti-Japanese sentiment is not only held by massacre survivors and their descendants; it represents a collective memory that continuously reshapes Chinese culture with respect to perceiving foreigners even today.

The transmission of the collective war memory to current generations can be attributed to two channels. The external one is the persistent frictions between China and Japan that can easily arouse Chinese memory of past Sino-Japanese wars. For example, in 2005, the Japanese history textbook controversies[4] triggered large-scale protests in dozens of

[2]This number is cited from many sources, e.g. *National-wide Massacres during the Second Sino-Japanese War (1)-(12)*.

[3]Non-prefecture-level cities are excluded from our investigation sample.

[4]From Wikipedia: Japanese history textbook controversies involve controversial content in one of the government-approved history textbooks used in the secondary education (junior high schools and senior high schools) of Japan. The controversies primarily concern the Japanese nationalist efforts to whitewash

Chinese cities spanning over 20 provinces (He 2007). The internal channel relates to the Chinese central government: He (2007) argues that the Chinese government highlights Japanese war atrocities and Chinese victimhood from the 1980s to promote official patriotism and nationalism.

Despite national war commemorations and uniform history textbooks in China, people in regions with different degree of conflict intensity could have different war memories. First, we consider Sino-Japanese war content in local mass media as a good proxy for local war memory. Specifically, we define local Sino-Japanese war memory as the sum of Sino-Japanese war dramas[5] broadcast on city-, province-, and national-level channels which represents the maximum number of war dramas a resident in a city can watch. We collect this data from 2011 and 2012 manually and Figure 2 (left panel) shows that there exists a positive relationship between war drama exposure and conflict intensity.

Moreover, local governmental policies on culture also matter. We quantify this policy with a count of local war memorials (not limited to massacre memorials), common places where people forge a personal link to the Sino-Japanese wars and thus sustain local war memory. We take the two series of national-level anti-Japanese war memorials and heritage lists published by the State Council in 2014 and 2015, and also local non-national-level anti-Japanese memorials[6] for analysis. Since national-level war memorials are on average more famous, we can collect more information regarding their location (e.g. urban or non-urban) and construction time to do a deeper investigation. Table A1 in the Appendix and related documents show that many national-level war memorials organize commemorative activities frequently and these war memorials are not desolate buildings but attract a large number of visitors annually. These war memorials are commonly used in thematic educational activities for students and adults in China. Figure 2 (right panel) shows that cities with greater conflict intensity have more war memorials as expected.

the actions of the Empire of Japan during World War II.

[5]Wikipedia lists China's TV dramas that first appeared in 2012, separated into different categories by theme. The TV dramas defined as anti-Japanese-dramas are under the categories of war-resistance, spy war, revolution and military. For each TV drama, we refer to the related websites to determine the channels on which the drama was broadcast.

[6]We manually collect these memorials through searching anti-Japaneses ("*Kangri*") on Baidu Map for each city.

# III Data and Identification

## III.1 Data

The data used in this study mainly covers three aspects. First is data on Japan's massacres reported in *National-wide Massacres during the Second Sino-Japanese War (1)-(12)*, a series of books issued by the Party History Research Center of the Chinese Communist Party Central Committee in recent years. These 12 books document 173 massacres conducted by Japanese troops that caused the casualties of at least 800 unarmed civilians each time, from September 1931 to August 1945. We collect information on the civilian death toll and the duration in days for each massacre before matching its location to current administrative regions manually. The detailed data processing procedure is described in Appendix A.

By aggregating civilian deaths by location, Table 1 reports the total civilian death toll for cities in the top and bottom 10 percentiles. Among 266 prefecture-level cities across China, 94 cities experienced at least one massacre while 172 cities did not[7]. We refer to these cities as massacre and non-massacres cities, respectively. If we set aside non-massacre cities, the number of civilian deaths range from 438 to 302,030, with most cities' death tolls concentrated (10th percentile-90th percentile) in the 800 to 12,000 range. Table 1 suggests a variation that can be exploited in our study.

The second data set used comes from Chinese Customs reports on transaction-level trade between 2001-2006. We only consider ordinary trade type, as other types (processing trade) are more likely to be biased by local industrial structures and policies. We pick the top 120 countries (exclude Hong Kong, Macao and Taiwan regions) that trade with China based on the rank of trade value during this period to construct a balanced city-country panel. We aggregate cumulative trade value for each city over this period and determine whether regional trade with Japan is lower in massacre cities compared to other countries. Our sample of 266 prefecture-level cities won't reduce its representativeness, as most modern economic activities in China concentrate in these areas. For unknown

[7]Besides these 94 cities, 6 places suffered from massacres but were excluded from our sample as they were either minority autonomous prefectures, counties or county-level cities.

reasons, 11 cities from the sample (1 massacre cities and 10 non-massacre cities) did not trade with any of those 120 countries between 2001-2006. We exclude these 11 cities in the main empirical regression.

Third, the China General Social Survey (CGSS) of 2008 allows us to study whether Japan's massacres create micro civilian anti-Japanese sentiments. This survey asks directly whether respondents are willing to accept a Japanese person as their colleague in order to gauge anti-Japanese sentiments. In parallel, individual attitudes towards people in South Korea, Taiwan, Hong Kong and Macao, Southeast Asia, Europe and North America are also documented with the same question. A disadvantage of this survey is that it's only conducted in some Chinese cities. Specifically, our sample on individual sentiment of foreigners contains 71 cities (26 massacre cities and 45 non-massacre cities). Table A2 in the Appendix reports the construction of main variables and the corresponding summary statistics of this study.

## III.2 Identification

The main identification strategy follows Che et al. (2016), which allows us to compare trade between each city and Japan to trade between other 119 main trading countries and the same Chinese city (i.e., essentially a DD estimation strategy). The estimation specification is given below:

$$ln\ Trade_{cf} = \alpha + \beta ln\ Massacre\ death_c \times Japan_f + ln\ distance_{cf} + \gamma_c + \lambda_f + (R_c \cdot \lambda_f) + \epsilon_{cf} \tag{1}$$

where $c$ is the city jurisdiction and $f$ is the trade country. On the left-hand side, our outcome variable is $Trade_{cf}$, the (log) cumulative bilateral trade between city $c$ and country $f$ over the period of 2001-2006. On the right-hand side, ln $Massacre\ death_c$ represents the regional conflict intensity which is the (log) number of civilian deaths due to massacres, and $Japan_f$ is a 0-1 indicator that equals 1 when the trade country $f$ is Japan and 0 otherwise, $ln\ distance_{cf}$ denotes (log) physical distance between the city

$c$ and the capital of the country $f$; $\gamma_c$ is the city fixed effect; $\lambda_f$ denotes the country fixed effect. Robust standard errors $\epsilon_{cf}$ are clustered at the city level to correct spatial correlation of residuals.

The inclusion of city fixed effects ($\gamma_c$) eliminates all differences across Chinese cities, which are transmitted to regional trade with all countries in general. Therefore, geographic factors such as distance to the coast and economic capabilities, which are highly relevant in determining trade patterns, are not included in our estimation. Meanwhile, the inclusion of country fixed effects ($\lambda_f$) controls for all differences across countries that influence trade between one country and China, such as cultural and institutional similarities. There is a long-standing and persistent cultural discrepancy between southeastern coastal provinces and the rest of China, which might influence people's attitudes towards different countries and thus regional trade with said countries. To eliminate this concern, we include a region-country fixed effect ($R_c \cdot \lambda_f$) where $R_c$ is defined as the dummy variable of whether city $c$ is located in southeastern coastal provinces (Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, and Hainan) or not.

There could be an endogeneity issue as Japan's massacres are probably more likely to happen in military and economically important cities and in cities with stronger *pre-war* anti-foreigner sentiments. However, the city-level time-invariant features are not expected to affect regional relative trade pattern which are solved by city fixed effects. Meanwhile, in the robustness section we will show that Japan's massacres are not correlated with the proxies of *pre-war* anti-foreigner sentiments. Moreover, the *pre-war* trade pattern should not affect the distribution of massacres and current trade pattern simultaneously as China stopped external trade with western countries for nearly 30 years after WWII, such that the current external trade pattern is not the persistent manifestation of initial *pre-war* trade patterns. Another concern is the unobserved persistent demand-supply mismatches at city-country level such that some regions are somehow more specialized in products that Japan demands. In the robustness section we will show that this possibility does not exist.

The traditional confounding factors in cross-country studies such as common border,

common language, religious similarity and linguistic common roots do not matter anymore due to a specific Chinese context. Through doubling difference and conditioning on physical distance, it's expected that $\beta$ will be negative if Japan's massacres suppress local trade with Japan compared to trade with other countries. Further, we employ the 0-1 dummy of whether cities experienced massacres as well as massacre duration in (log) number of days as alternative measures for regional conflict intensity as robustness checks.

Most Chinese cities only trade with some countries such that our sample contains many city-country observations with zero trade value. Specifically, only 35 cities (13.7%) have trade with all 120 countries; the number of zero-value observations is 5,482 (17.9%). To address this zero problem, we carry out a Poisson pseudo-maximum likelihood estimation (PPMLE) (Santo Silva and Tenreyro 2006).

To further explore whether Japan's massacres affect local civilian anti-Japanese sentiments of current generations, we carry out similar specifications as equation(1) but at the individual level:

$$Sentiment_{icf} = \alpha + \beta Massacre_c \times Japan_f + ln\ distance_{cf} + \varsigma_i + M_c \cdot \lambda_f + (R_c \cdot \lambda_f) + \epsilon_{icf} \tag{2}$$

where $Sentiment_{icf}$ denotes the sentiment of an individual $i$ located in city $c$ towards people in country $f$. Empirically, $Sentiment_{icf}$ equals 1 if the respondent $i$ in city $c$ is willing to accept people in country/region $f$ as his or her colleague and 0 otherwise. As mentioned, CGSS only investigates individual attitudes towards people in several regions, which also include Taiwan, Hong Kong and Macao, so we are actually comparing people's attitudes towards people in different regions outside mainland China. Same as equation(1), $ln\ distance_{cf}$ denotes (log) physical distance between city $c$ and the country capital $f$; for Southeastern Asia, Europe and North America, we use the capitals of Singapore, France and the U.S., respectively.

Japan's massacres might not only create anti-Japanese sentiments but also general patriotism such that people in these regions also have a xenophobic myopia. If this is the case, people in massacre cities are more likely to choose 0 (unwilling) for most

foreign countries as individuals are allowed to rank their willingness using only 0 and 1 in the survey. Hence, it's difficult to observe that people in massacre cities are more anti-Japanese than anti-other foreigners, when compared with people in non-massacre cities. Figure A1 in the Appendix captures this problem. If we pool all cities together, the {0,1} scale limitation could bias the true distribution of anti-Japanese sentiments across massacre- and non-massacre cities as it cannot distinguish anti-Japanese sentiments from a xenophobic effect. To mitigate this survey flaw, we instead control the massacre-country fixed effect ($M_c \cdot \lambda_f$) where $M_c$ is the 0-1 dummy of whether a city $c$ experienced a massacre or not.

$R_c \cdot \lambda_f$ is also employed to eliminate cultural differences in perception of foreigners between different parts of China. Overall, through doubling difference and conditioning on physical distance, it's expected that people in cities suffering more from Japan's massacres tend to be less willing to accept Japanese as their colleagues, such that $\beta$ ought to be negative.

# IV Empirical result

## IV.1 Massacre Impact on Bilateral Trade with Japan

Regression results regarding the impact of Japan's massacres on regional bilateral trade with Japan (via Eq.(1)) are reported in Table 2. Column 1 shows that ln $Massacre\ death_c \times Japan_f$ has a negative statistically significant coefficient at the 1% level using OLS estimation, implying that cities with greater conflict intensity in the Sino-Japanese war between 1931-1945 have less trade with Japan than other countries after more than three generations.

To address zero trade values, we use the PPMLE method by Silva and Tenreyro (2006) to re-estimate Eq.(1) in column 2. We still find the negative and statistically significant (at the 1% level) impact of Japan's massacres on bilateral trade with Japan despite a large decline in coefficient magnitude. Quantitatively, a 100% higher civilian death toll due to massacres would decrease regional bilateral trade with Japan by 0.86% [=-0.0124×ln(2)].

This suggests that the zero problem may cause a downward bias in OLS estimation but does not change the main conclusion. We thus use PPMLE as the benchmark regression method. Column 3 further controls the time-invariant differences between regions of China with a country dummy ($R_c \cdot \lambda_f$); the magnitude of the coefficient does not change and remains significant at the 1% level.

There is concern over an omitted variable problem that *pre-war* anti-Japanese sentiments exist as there are some conflicts between China and Japan in specific regions before WWII. The first series of conflicts happened during the Ming dynasty (13th-16th century) in which Japanese pirates invaded several Chinese coastal provinces. The second conflict is known as the First Sino-Japanese war (1894-1895) that happened mainly in Liaoning and Shandong provinces. The possible *pre-war* anti-Japanese sentiments could cause more massacres and less trade with Japan simultaneously, which would push the estimation result downward. However, there is little literature documenting that people in these early conflict-involved regions were more anti-Japanese before WWII. Moreover, column 4 excludes these regions from the sample and finds that the negative trade effect of Japan's massacres remains highly significant and even has a larger magnitude. This implies that it is not the *pre-war* anti-Japanese sentiments that dominate the current biased trade pattern.

Columns 5 and 6 use a 0-1 dummy for whether cities experienced massacres and the duration of massacres in (log) number of days as alternative measures for city-level exposure to massacres, respectively; the results remain robust. It's worth noting that column 5 implies that bilateral trade of massacre cities with Japan is 10.8% lower than that of non-massacre cities. This translates to a cumulative trade loss (only for ordinary trade types) of 19.9 [=-10.8%×184 (total trade with Japan of 93 massacre cities)] billion dollars between 2001-2006.

Further, Columns 7 and 8 show that Japan's massacres lower a city's export to Japan using both OLS and PPMLE methods despite the difference in coefficient magnitudes. However, contrary to expectation, column 9 does not show a significant negative effect of massacre on a city's import from Japan. This could be attributed to the severe zero trade

problem on import flows as 58.1% of city-country observations have zero value (19.2% for export flow). Column 10 corrects this potential issue by using the PPMLE method and shows that Japan's massacres lowers a city's import from Japan with an even larger magnitude than that of export.

## IV.2 Massacre death or General Civilian Casualty Matters?

While our result shows that Chinese cities with greater civilian deaths in Japan's massacres have less trade with Japan between 2001-2006. Che et al. (2016) finds that Chinese provinces with higher civilian casualty rate in Sino-Japanese war have less trade with Japan at 2001. Both massacre deaths and civilian casualty can measure the regional-level conflict intensity of Sino-Japanese war. As a matter of fact, two measures are significantly correlated with coefficient of correlation $\rho$=0.51. However, they are different in terms of how they could exert influence on people's sentiments towards trade with Japan.

Japan's massacres though are widely distributed across Chinese cities, each massacre concentrates in several small areas within a city so that only a tiny proportion of people really experienced the massacres, except for some extreme cases such as Nanking Massacre. However, people in regions with a high civilian casualty rate implies that most people in the region experienced or at least their friends and relatives experienced conflicts directly. Therefore, the effect of massacres on a broad range relies more on the diffusion through social medias and other external memory mediums, while the effect of civilian casualty is transmitted through family education and interacting with neighbors and relatives. If the legacy effect of historical conflicts is transmitted mainly through family education and social interaction, the effect of civilian casualty should dominate the effect of massacres.

To determine which channel plays a more important role in mediating the war impact, we aggregate the total civilian deaths due to Japan's massacres at the province level[8] to compare with civilian casualty rate using the same sample and same identification strategy directly. Column 1 in Table 3 shows that ln $Massacre\ death_p \times Japan_f$ has a negative

[8]We thus also use the civilian deaths due to massacres in non-prefecture-level cities, shown in Table 1. However, massacres in minority autonomous prefectures are still not counted as these regions are relatively isolated and have few economic activities.

statistically significant coefficient at the 5% level, implying that provinces with greater civilian deaths in Japan's massacres have less trade with Japan than other countries. This is consistent with the previous results using city level outcomes. Column 2 presents a similar result as Che et al. (2016) that provinces with higher civilian casualty rate also have less trade with Japan. Column 3 pools two measures in the same regression and shows that while the magnitude of massacre effect remains almost unchanged, the coefficient of civilian casualty becomes statistically insignificant and closed to zero.

Columns 4 confirms the negative effect of massacres on local export at province level, and column 5 again shows that massacre effect dominates the effect of general war casualty. Especially, the coefficient of civilian casualty becomes even positive. Column 6 finds a similar pattern that massacre effect on local import is more pronounced than for export. The massacre effect on import becomes insignificant in column 7, but the $p$-value is 0.106 which is very closed to the 10% level of significance while the coefficient of civilian casualty still remains highly insignificant and closed to zero.

The comparison above shows that massacre deaths seems to be a better measure of conflict intensity when evaluating long-lasting trade effect. More importantly, this suggests that social medias and other propagation mediums plays an important role in transmitting war memory and war impact as only a small percent of people really experienced Japan's massacres. In the next section, we will use the local war dramas and war memorials to quantify how war memory leads to current biased trade patterns.

## IV.3 Transmission Mechanisms of Historical Conflicts

Since China stopped trade with almost all countries after WWII, the current negative trade effect of past conflicts should be driven via a persistent collective war memory and rather than immediate war destruction. Intuitively, people with a stronger war memory will have stronger anti-Japanese sentiments such that regions with stronger conflict intensity show more biased trade patterns. We first present evidence on anti-Japanese sentiments using data from the China General Social Survey(CGSS) conducted in 2008. The one relevant survey question that can be used to capture individual anti-Japanese

sentiments is already described in the data section. Figure A1 in the Appendix clearly shows a positive relationship between the share of people unwilling to accept a Japanese person as their colleague and local conflict intensity.

To corroborate our findings in the aforementioned figure, we report regression results on the impact of Japan's massacres on individual views of Japan (via Eq.(2)) in Table 4. Column 1 shows that Japan's massacres lower people's willingness to accept Japanese people as colleagues. Column 2 repeats the main specification by controlling for (log) physical distance between cities and countries/regions and reports similar results. Column 3 further controls for the region-country fixed effect to eliminate cultural discrepancies between different regions of China and the result is robust.

Column 4 adds the interaction term of the main explanatory variable ln *Massacre death*$_c$× *Japan*$_f$ as well as $Old_i$, a 0-1 dummy indicating whether an individual $i$ is over 70 years old (i.e. might have stronger war memories). Although the coefficient of this term is negative as expected, it's not statistically significant. This indicates that anti-Japanese sentiment is steadily transmitted along generations but is not stronger in older people. Therefore, it may imply that the negative effect of past conflicts on anti-Japanese sentiments and thus on trade with Japan won't vanish with older generations passing. Column 6 instead adds the interaction term of the main explanatory variable ln *Massacre death*$_c$× *Japan*$_f$ as well as $High\ edu_i$, a 0-1 dummy indicating whether an individual $i$ has at least college education (i.e. might be more rational). Surprisingly, the coefficient of this interaction term is negative though insignificant, suggesting that higher education does not reduce anti-Japanese sentiments.

Column 6 includes the interaction terms of ln *Massacre death*$_c$ with the dummy for North America, the dummy for Europe, the dummy for South Korea, and the dummy for Southeast Asia. In the benchline regression (column 3), we compare people's sentiments of Japan with people's average sentiments for other types of foreigner. In this new restricted specification, the comparison group is the average sentiment of people in Hong Kong, Macao and Taiwan. It shows that the negative effect of massacre on individual sentiment towards the Japanese remains highly significant at the 1% level. Meanwhile,

the coefficients for North America, Europe and South Korea are also shown to be significantly negative. However, the magnitude of the coefficient for Japan (-0.044) is the largest in absolute value. Figure 3 plots this result pattern with the corresponding 95% confidence interval for each country/region.

To confirm that historical conflict intensity determines biased trade patterns with Japan and underlying anti-Japanese sentiments, we further show that persistent collective war memory is the transmission mechanism responsible. As discussed in the historical background, we consider two proxies for local collective war memory. First is mass media exposure, measured by the maximum number of Sino-Japanese war TV dramas local residents can watch (2011 and 2012 data). Second is the local governmental cultural policies, measured by the number of national-level Sino-Japanese war memorials. People in regions with a stronger collective memory tend to watch more war dramas and visit more war memorials.

Table 5 reports the effects of war dramas and war memorials on contemporary trade with Japan using PPMLE (via Eq.(1) but replacing ln *Massacre death*$_c$ by the ln *Sino-Japanese war dramas*$_c$ and ln *Sino-Japanese war memorials*$_c$, separately). Column 1 repeats the same specification as column 1 in Table 2, to show the negative trade effect of massacres. Column 2 however includes the interaction of war dramas with the Japan indicator as the sole explanatory variable; it shows that cities with more Sino-Japanese war TV dramas have less trade with Japan, as expected. Column 3 includes both massacre death and war dramas in the same regression; the magnitude of the massacre effect decreases while the negative trade effect of war dramas remains highly significant. Quantitatively, war dramas explain 17% [=(0.0123-0.0102)/0.0123] of the massacre effect.

Column 4 uses the interaction of war memorials with the Japan indicator as the sole explanatory variable and shows that cities with more Sino-Japanese war memorials have less trade with Japan, as expected. Column 5 includes both massacre death and war dramas in the same regression; the negative trade effect of massacres here becomes insignificant while the negative trade effect of war memorials remains highly significant. Specifically, war memorials explain 56% [=(0.0123-0.0054)/0.0123] of the massacre effect.

The larger explanatory power of war memorials compared with war dramas is that most war memorials are constructed after war, thus exert longer and greater influence on transmitting war memory; on the contrary, war dramas become popular only in recent decades due to the popularity of televisions in China. Column 6 further pools massacre death, war dramas and war memorials together; it's clear that the negative effect of massacres on trade with Japan vanishes. In contrast, the coefficients of war dramas and war memorials are still significantly negative, suggesting that these two terms dominate the massacre effect. Jointly, war dramas and war memorials account for 64% [=(0.0123-0.0044)/0.0123] of the massacre effect, thus improving our understanding of why trade can be dampened by historical conflicts after many generations.

There is another variable that correlates positively with conflict intensity: the history of the Chinese Communist Party memorials. These "Red Army memorials", also called "Red tourism scenic spots", are mainly linked with a collective memory of the Red revolution and Chinese Civil war and relate only indirectly wth the Sino-Japanese war. We collect data from the *2004-2010 National Red Tourism Development Plan* issued by the General Office of the CPC Central Committee and General Office of the State Council on these memorials' preponderance. We include massacre death, two proxies of war memory and "Red Army memorials" in the same regression as a placebo test in column 7. We find that Red Army memorials have no significant effect on trade with Japan and the corresponding coefficient is closed to zero. This comparison implies that the negative trade effect of Japan's massacres is driven by a collective war memory but not necessarily a memory of other wars. There is a concern that war memorials are a automatic response to local massacres, however only a small portion of war memorials are directly related to Sino-Japanese War massacres. The same can be said for war dramas. Therefore, this indicates that Sino-Japanese war memory, but not pure massacre memory, leads to current biased trade patterns.

We further explore whether local anti-Japanese sentiments are also driven by a collective war memory in Table 6 (via Eq.(2) but replacing ln *Massacre death*$_c$ by the ln *Sino-Japanese war dramas*$_c$ and ln *Sino-Japanese war memorials*$_c$, separately). Column

1 repeats the same specification as column 3 in Table 4 to show the negative effect of massacres on people's perception of the Japanese. Column 2 instead uses the interaction of war dramas with the Japan indicator as the sole explanatory variable. We find that cities with more Sino-Japanese war TV dramas have stronger anti-Japanese sentiments, as expected. Column 3 includes both massacre death and war dramas in the same regression. The negative effect of massacres becomes less significant and has a lower magnitude while the negative trade effect of war dramas remains highly significant.

Column 4 uses the interaction of war memorials with the Japan indicator as the sole explanatory variable and shows that cities with more Sino-Japanese war memorials have stronger anti-Japanese sentiments, as expected. Again, column 5 includes both massacre death and war dramas in the same regression. The negative effect of massacres becomes significant only at 10% level while the negative trade effect of war memorials remains highly significant. However, when pooling massacre death, war dramas and war memorials in the same regression in column 6, we find only the effect of war dramas remains significantly negative. As in Table 5, we use "Red Army memorials" in a placebo test in column 7; this variable has no significant effect on local anti-Japanese sentiments and its coefficient becomes even positive. Overall, it's clear that past conflict shapes current individual attitudes towards the Japanese through collective war memory but not other memories.

## IV.4 Heterogeneous Export and Import Responses

Apart from economic factors, whether exports to a specific country relies mostly on local entrepreneurs, however whether imports from a specific country relies not only on local entrepreneurs but also on local customers. This difference partly explains why the negative effect of Japan's massacres on import is more pronounced than for export, as local customers can easily recognize the brand and origin of products, thus exerting feedback influence to import decision. Hence, the war memory is supposed to have a more prominent effect on import. And if war memory influences the unconsciousness of common people greater than that of entrepreneurs, then war memory should explain more variation of

the massacre impact on import than on export.

Table 7 reports the corresponding results. Column 1 repeats the same specification as column 7 in Table 2, to show the negative export effect of massacres. Column 2 however adds the interaction of war dramas with the Japan indicator as an additional explanatory variable. It shows that cities with more Sino-Japanese war TV dramas export less to Japan and the magnitude of massacre effect decreases. Quantitatively, war dramas individually explain only 16% [=(0.0146-0.0123)/0.0146] of massacre effect on export. Column 3 instead adds the interaction of war memorials with the Japan indicator as an additional explanatory variable, and finds a similar result. Individually, war memorials explain 53% [=(0.0146-0.0069)/0.0146] of massacre effect on export. This difference is line with the previous finding on total trade as war memorials can transmit war memory more steadily after WWII whereas exposures to war dramas are limited. Column 4 confirms that war memory dominates the legacy effect of massacres and two proxies jointly explains 60% [=(0.0146-0.0058)/0.0146] of massacre effect on export.

Columns 5 to 8 repeat the same regressions as before but with local import as the dependent variable. Column 6 shows that war drams explain 23% [=(0.0171-0.0131)/0.0171] of massacre effect on import while column 7 shows that war memorials explain explain 85% [=(0.0171-0.0025)/0.0171] of massacre effect on import. Meanwhile, it's worth mentioning that both proxies of war memory has stronger effect on import than for export as expected. Column 9 show that war memory accounts for almost all (96%) the massacre effect on import as the coefficient of massacre death is closed to zero. The difference in explanatory power of war memory on export and export shows that war memory exerts a greater influence on import decision, thus supporting the argument that war memory has a stronger mental effect on common people than on entrepreneurs.

## IV.5 Different Exposures of War Memory

In this section, we further investigate how war memory exerts real influence on current trade patterns by exploring different types of war memorials. Intuitively, earlier memorials should be more influential in line with the aggregate effect of collective war memory.

Following this idea, we divide total national-level war memorials in each city into three types based on the year of completion: war memorials built before 1980 (we use 1980 as the first threshold because China recovered foreign trade from then on), between 1980 and 2000 (we use 2000 as the second threshold as our investigation period of external trade is between 2001-2006), and after 2000. Among the 163 war memorials in our sample, these three series account for 48%, 33% and 19%, respectively. Meanwhile, memorials built in urban areas are supposed to have more prominent effects as most entrepreneurs that conduct trade business concentrate in urban areas. Following this idea, we calculate the number of war memorials built in urban (59%) and non-urban (41%) areas in each city.

Table 8 reports the heterogeneous effects of war memorials by the year of completion and location of construction. Column 1 shows that cities with more war memorials built before 1980 have less bilateral trade with Japan over other countries as expected. Column 2 shows that war memorials built between 1980 and 2000 also lowers trade with Japan but with a smaller magnitude than that of memorials built before 1980 [0.134<0.173]. Column 3 shows that the negative trade effect for war memorials built after 2000 becomes statistically insignificant and the coefficient magnitude is smaller than that of memorials built between 1980 and 2000 [0.079<0.137]. This pattern suggests that the amount of time exposed to war memory matters for its legacy trade effects. This also mitigates our concern that current local governments in cities with greater conflict intensity influence current local trade with Japan directly, as even if they strengthen local war memory through building more memorials, it takes time to exert any real influence.

Column 4 uses the interaction of war memorials built in urban areas with the Japan indicator and shows that cities with more memorials built in urban area have less bilateral trade with Japan over other countries as expected. Column 5 also shows that this negative trade effect is also pronounced for war memorials in non-urban areas, though the coefficient is only at 10% level and has a smaller magnitude. The results are consistent with the fact that people seldom visit war memorials located in relatively remote areas. This comparison suggests that only war memorials that actually are able to attract and influence people has real economic effects.

Column 6 pools all different types of war memorials in the regression for comparison. It shows that the the war memorials built before 2000 still have economically strong and statistically significant negative effect on local trade with Japan, while the coefficients of war memorials in urban and non-urban areas become statistically insignificant. This implies that the amount of time exposed to war memory in a region dominates the long-lasting effect of war memory on local trade patterns. This is reasonable as human unconsciousness that determines economic activities is often gradually shaped by external environment but not changed instantly.

# V Robustness

## V.1 Foreign Investment as an Alternative Outcome

Besides ordinary trade, investment from foreign companies on local branches and affiliates in the form of foreign goods and equipments is also regarded as import. Intuitively, Japan's corporations should establish less affiliates and thus invest less in cities with greater civilian anti-Japanese sentiment if they can perceive such business risks. Hence, we use regional import-channelled foreign investment as an alternative measure to investigate the legacy effect of Japan's massacres and its mechanism using the main specification (via Eq.(1)).

Column 1 in Table 9 shows that cities with greater civilian deaths in Japan's massacres between 1931-1945 receive less investment from Japan than other trading countries after three generations. It's worth mentioning that we have a smaller sample as PPMLE method automatically excludes some observations to ensure that the estimate exists. Column 2 uses whether cities met Japan's massacres as an alternative measure of conflict intensity and finds that foreign investment from Japan of massacre cities is 21.3% lower than that of non-massacre cities. The comparison with the result in Table 2 implies that the negative effect of Japan's massacres is twice as pronounced for foreign investment than it is for the ordinary trade. Several reasons might explain this difference. First is that compared with willingness of conducting business with Japan's companies, people with anti-Japanese

sentiment is even more unwilling to work for Japan's companies. Second possibility is that foreign investment is more subject to cumulative effect that less affiliates established previously affects contemporary investment directly while less trade in the past itself does not predict less contemporary trade.

Further, columns 3 and 4 show that cities with both more Sino-Japanese war TV dramas and more Sino-Japanese war memorials receive less investment from Japan, respectively. More importantly, column 5 pools massacre death, war dramas and war memorials together and finds that the negative effect of massacres on foreign investment from Japan vanishes while the negative effect of war dramas and war memorials remains. This confirms that Sino-Japanese war memory is the underlying mechanism that leads to current biased investment patterns. Specifically, these two proxies of war memory jointly explains 67.8% [=(0.027-0.0087)/0.027] of the massacre effect on foreign investment. This might imply that war dramas and war memorials can not fully capture the true variation in local war memory. In column 6, we add Red Army memorials in the regression as a placebo test and find it has no significant effect, suggesting that memory of Red revolution and its associated nationalism do not influence regional relative foreign investment patterns.

## V.2 Supply and Demand Mismatch

One common concern in research on conflicts and bilateral trade is that gravity model specification may produce a spurious relationship, due to the mismatch of supply and demand at exporting country-importing country level. For example in our context, by accident, massacre cities do not produce or produce fewer products needed by Japan, so these cities export less to Japan than to other countries. Hence, this city-country mismatch cannot be simply solved by including city and country fixed effects. In principle, our estimation should not suffer from this issue as the demand-side and supply-side are similar for countries.

We firstly show that cities that suffered from Japan's massacres have similar export structure as cities that did not suffer from massacres in Table A3 in the Appendix. We decompose China's trade by the share of 22 product categories according to catalogue list

from China customs. It shows that the main products that both massacre cities and non-massacre cities trade with foreign countries are minerals, machinery, mechanical products. More importantly, the difference of trade share of almost all product categories between massacre and non-massacre cities are not statistically significant, except for food, drinks, tobaccos products and art, collectible, antiquities products. However, these two product categories only accounts for a tiny proportion of total trade value.

We also that the anti-Japanese trade pattern is not subject to specific categories of product. According to cumulative trade value (ordinary trade type), the top 5 categories of product that China exports to Japan are textile, minerals and base metal. The top 5 categories of products that China trade with Japan are minerals, machinery products, chemical products, textile products and base metals. Table A4 in the Appendix presents the impact of Japan's massacres and war memory on trade of the top 5 product categories (via Eq.(1)) using PPMLE. It shows that Japan's massacres has significantly negative effect for trade of different products and which is transmitted through war memory. Combined evidences imply that the negative effect of massacres on trade with Japan is not dominated by a mismatch of supply and demand systems across city-country pairs.

## V.3 Dynamic Pattern

The baseline specification uses (log) cumulative bilateral trade between 2001-2006 as the dependent variable. To rule out random shocks in a specific year, we run a baseline regression (via Eq.(1)) using subsamples of 2001, 2002, 2003, 2004, 2005 and 2006 respectively in Table A5 in Appendix.

For (log) trade in all years, the coefficients of ln $Massacre\ death_c \times Japan_f$ are significantly negative in all subsamples. Meanwhile, the negative trade effect is dominated by the proxies of war memories. Therefore, such anti-Japanese trade patterns are not a result attributed to a particular yearly shock but actually exist across different periods. It's worth mentioning that the magnitude of the trade effect is attenuating with time, suggesting that international market integration might mitigate vestigial trade effects tied to historical conflicts.

## V.4 *Pre-war* Anti-foreigner Sentiments

Japan's massacres may not be random events. Two possible objections to the massacres' independence from one another emerge. The first is that, Japanese troops specifically chose geographical and economically important cities to conduct massacres in. Second, the Japanese chose cities where local people were more proto-nationalist in order to discourage civilians from resisting. The first reason does not bias our results as we have controlled for a city fixed effect. Further, we only expect the city-specific features to affect external trade in general but not our variable of interest, which is the bilateral trade with Japan compared with other countries. Following the same logic, the second possible explanation for the effect found should not bias our results either, but it can still be tested by Eq. (4):

$$Massacre_c = \alpha + \beta_1 Anti - foreigner\ sentiment_{c/p,pre-war} + (\beta_2 ln\, Population_{p,1920}) + \epsilon_c \tag{4}$$

where $c$ denotes city and $p$ denotes province. $Anti - foreigner\ sentiment_{c/p,pre-war}$ represents the *pre-war* anti-foreigner sentiments of city $c$ or province $p$. Following Bai et al. (2016), we measure *pre-war* anti-foreigner sentiments by a 0-1 dummy indicating whether the Boxer rebellion occurred in the city $c$ or not in 1900[9], the (log) number of Christian missionaries[10], the (log) number of Christian sites[11], and the (log) number of Christian schools in a province $p$ in 1920, respectively. The (log) population in province $p$ in 1920, ln $Population_{p,1920}$ is used to control size effect.

Table A6 in the Appendix explores the relationship between *pre-war* anti-foreigner sentiments and Japan's massacres (via Eq.(4)). If Japanese troops specifically chose cities where local people were proto-nationalists, then we should observe a positive relationship

[9]Because most of the Boxer rebels were landless peasants (Esherick (1987)), it represents local anti-foreign motivations, ideology and conflict propensity. Data source: Appendix to the Boxer Protocol (1901)

[10]The openness to Christians measures the extent to which local people are open-minded to the West. More Christian missionaries implies more open to foreigners. Data source: Stauffer et al. (1922). Christian occupation of China.

[11]Data source: Religion Explorer

between the Boxer rebellion and massacres, and a negative relationship between Christian missionaries/sites/schools and Japan's massacres. The results show that such relationships do not emerge. That is, cities that suffered massacres were not necessarily *pre-war* pro-conflict or more proto-nationalist than others.

Column 1 uses $Boxer\ rebellion_{c,1900}$ as the explanatory variable, ln $Massacre\ death_c$ as the dependent variable and finds no significantly positive coefficient. It shows that cities where the Boxer rebellion took place did not suffer from more massacre deaths between 1931-1945. That is, cities where people were pro-conflict were not the targets of Japan's massacres. Columns 2 to 4 show that cities with fewer Christian missionaries, sites and schools did not suffer from more massacre deaths between 1931-1945 as all coefficients are insignificant. That is, cities where people are less open to foreign countries were not targets of Japan's massacres. Column 5 includes the four measures of *pre-war* anti-foreigner sentiments together and the result remains unchanged. Column 6 further controls for the (log) population in province $p$ in 1920, and columns 7 and 8 replicate column 6 while replacing massacre deaths by the massacre dummy and its duration in days respectively; the results are robust.

## V.5 Placebo Test

One concern is that the specific functional form or the time periods chosen solely drive our negative results. To rule out these concerns, we randomly reassign the number of massacre deaths, number of Sino-Japanese war dramas and number of Sino-Japanese war memorials to Chinese cities and re-compute the baseline specification. As the reassigned massacre deaths, two proxies of war memory are counterfactual, we are not supposed to find significantly negative coefficients in most regressions.

The results are summarized in Table A7 in the Appendix. Among the 100 replications (via Eq.(1)) for massacre deaths, the coefficient is negative 52 times (significant at the 1, 5, 10 percent level for 0, 3, 4 times respectively), and positive 48 times (significant at the 1, 5, 10 percent level for 1, 1, 3 times respectively). The replication results for war dramas and war memorials are similar. These results are consistent with statistical significance

and rule out the concern that our negative trade effect is purely driven by the specific functional form.

# VI Conclusion

How do historical conflicts between countries affect current trade patterns? The widely distributed Japanese massacres in China and their associated strong variation in civilian death toll provide an ideal case within which to study this important question. Following the difference-in-difference methodology in a sample of 255 Chinese cities, we find that those cities with higher death tolls linked to Japan's massacres in the Sino-Japanese War have less trade (both export and import) with Japan today, when compared to trade with other main trading countries.

The legacy effect of historical conflicts on economic activity has always been a big puzzle. Individual surveys in 2008 find that previous conflict intensity predicts present-day civilian anti-Japanese sentiments, using a smaller sample of 71 cities. Since China stopped trade with most countries for decades after WWII, persistent anti-Japanese sentiments today suggests a central role between massacre impact and modern-day trade. We further show that collective Sino-Japanese War memory is the underlying transmission mechanism by which anti-Japanese sentiments are maintained and trade patterns biased. While war dramas and war memorials can be of collective war memory, we find that these two variables dominate the effect of Japan's massacres jointly and account for 64% of the massacre effect, indicating that collective war memory but not conflict itself contributes to its long-lasting impact.

Moreover, we find that war memory proxied by war dramas and war memorials explains almost all massacre effect on import while only 60% of massacre effect on export. Since import decision replies not only on entrepreneurs but also on local customers' sentiments, this suggests that war dramas and war memorials have a greater influence on common people than on entrepreneurs. Also, we find that the negative trade effect of war memorials decrease with the year of completion that war memorials built in early periods dominates the war memorials built recently regardless of whether they are in urban or non-urban

areas. This highlights the role of the length of exposure time to war memory as which determines whether war memory will have any long-lasting economic effect.

Overall, our study provides a fuller understanding of how historical violence negatively affects current economic outcomes. Turning the historically rooted dark page or negotiating regional trade agreements (Martin et al. 2012) could potentially generate larger trade gains. Since war dramas and war memorials play an important role in transmitting collective war memory, this provides policy implications on promoting trade growth for governments on cultural policies.

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# The Legacy Effect of WWII Massacres on China's External Trade Pattern

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## Figures and Tables

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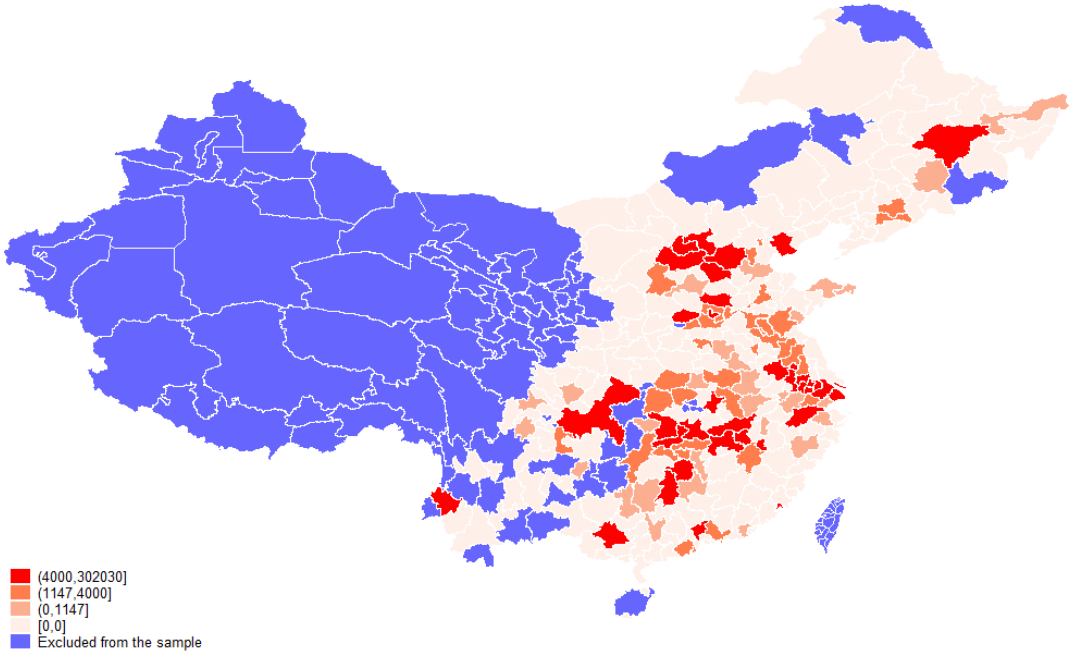


Figure 1 Geographic Distribution of Civilian Deaths in Japan's Massacres

This figure shows the civilian deaths caused by Japan's massacres over the period of 1931-1945 aggregated over prefecture-level cities. Minority autonomous prefectures, counties (without cities) or county-level cities are excluded from our investigation sample. Tibet, Gansu, Qinghai, Ningxia and Sinkiang provinces are excluded as well.

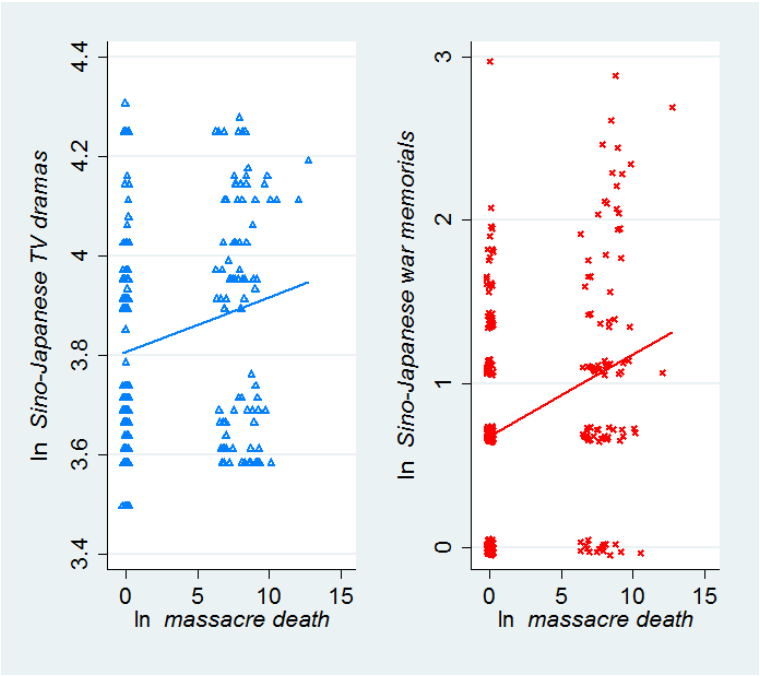


Figure 2 Sino-Japanese War Dramas and Memorials

This figure shows the relationship between (log) number of TV dramas and memorials of Anti-Japanese war and (log) number of civilian deaths in Japan's massacres at city level.

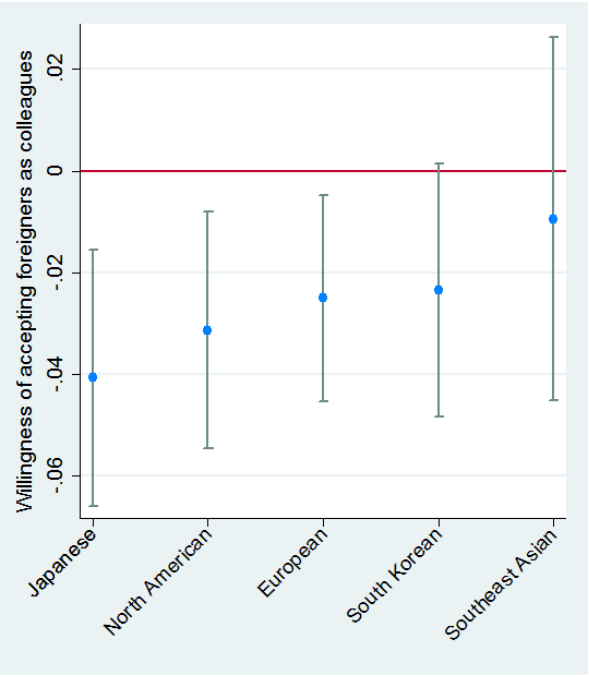


Figure 3 Massacre Impact on Individual Sentiment of Foreigners

This figure plots the estimated coefficients and 95% confidence interval of the massacre effect on local people's willingness to accept Japanese people, people from North America, people from Europe, people from South Korea and people from Southeast Asia as colleagues compared with people from Hong Kong, Macao and Taiwan.

## Table 1 Civilian Deaths in Japan's Massacres

| Prefectures | Civilian deaths in massacres |
|---|---|
| *Top 10 percentile* | |
| Nanjing | 302,030 |
| Changde | 130,000 |
| Yongzhou | 31,906 |
| Yiyang | 26,300 |
| Jincheng | 19,500 |
| Wuxi | 17,915 |
| Suzhou | 16,535 |
| Shijiazhuang | 13,139 |
| Tangshan | 12,300 |
| Chuzhou | 12,000 |
| *Bottom 10 percentile* | |
| Leshan | 839 |
| Weihai | 826 |
| Wuzhou | 800 |
| Jingdezhen | 783 |
| Lishui | 688 |
| Rizhao | 637 |
| Guiyang | 630 |
| Cangzhou | 569 |
| Yantai | 500 |
| Nanchong | 438 |
| Exclusion regions* | |
| Qiannan* | 24,499 |
| Wenchang* | 1,549 |
| Chengmai* | 1,270 |
| Qionghai* | 900 |
| Xiantao* | 800 |
| Qiandongnan* | 38 |
| 162 non-massacre prefectures | 0 |

*Notes*: This table reports the civilian deaths in Japan's massacres (each massacre caused at least 800 civilian casualties) over the period of 1931-1945. Regions(*) are excluded from our investigation sample as they are either minority autonomous prefectures or counties (county-level cities).

## Table 2 Massacre Impact on Trade: Japan vs. Other Countries

| | ln $Trade_{cf}$ | | | | | | ln $Export_{cf}$ | | ln $Import_{cf}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) OLS | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE | (7) OLS | (8) PPMLE | (9) OLS | (10) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.116*** | -0.0124*** | -0.0123*** | -0.0170*** | | | -0.142*** | -0.0146*** | -0.0266 | -0.0171** |
| | (0.0434) | (0.0039) | (0.0037) | (0.0059) | | | (0.0421) | (0.0041) | (0.0370) | (0.0073) |
| *Massacre dummy*$_c$ × *Japan*$_f$ | | | | | -0.108*** | | | | | |
| | | | | | (0.0296) | | | | | |
| ln *Massacre duration*$_c$ × *Japan*$_f$ | | | | | | -0.0266*** | | | | |
| | | | | | | (0.0082) | | | | |
| ln *Distance*$_{cf}$ | -1.713*** | -0.109*** | -0.126*** | -0.178*** | -0.126*** | -0.126*** | -1.669*** | -0.119*** | -2.677*** | -0.290*** |
| | (0.168) | (0.0158) | (0.0172) | (0.0270) | (0.0172) | (0.0173) | (0.175) | (0.0167) | (0.261) | (0.0478) |
| City fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country fixed effects | Yes | Yes | No | Yes | No | No | No | No | No | No |
| Region-Country fixed effects | No | No | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 18,840 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.478 | 0.618 | 0.636 | 0.571 | 0.636 | 0.636 | 0.488 | 0.647 | 0.553 | 0.585 |
| Number of cities | 255 | 255 | 255 | 157 | 255 | 255 | 255 | 255 | 255 | 255 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the effects of Japan's massacres on China's external trade pattern. The dependent variables in Columns 1-5 is (log) cumulative trade (ordinary trade type) that Chinese city $c$ conducted with foreign country $f$, the dependent variables in Columns 6 is (log) cumulative value that Chinese city $c$ exports to foreign country $f$, and the the dependent variables in Columns 7 is (log) cumulative value that Chinese city $c$ imports from foreign country $f$ between 2001-2006. *Massacre death* denotes the number of civilian deaths in Chinese city $c$, *Massacre dummy* denotes whether Chinese city $c$ experienced Japan's massacres, and *Massacre duration* denotes the number of days Chinese city $c$ suffering from Japan's massacres during the Sino-Japanese war between 1931-1945. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance refers to the distance between the city $c$ and the national capital of the foreign country $f$.

## Table 3 Massacres or General Civilian Casualties matters?

| | ln $Trade_{pf}$ | | | ln $Export_{pf}$ | | ln $Import_{pf}$ | |
|---|---|---|---|---|---|---|---|
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE | (7) PPMLE |
| ln *Massacre death*$_p$ × *Japan*$_f$ | -0.0159** | | -0.0151** | -0.0158*** | -0.0160*** | -0.0279* | -0.0270 |
| | (0.0068) | | (0.0069) | (0.0059) | (0.0062) | (0.0148) | (0.0167) |
| *Civilian casualties*$_p$ *(%)* × *Japan*$_f$ | | -0.0220* | -0.0041 | | 0.0013 | | -0.0052 |
| | | (0.0129) | (0.0092) | | (0.0086) | | (0.0310) |
| ln *Distance*$_{pf}$ | -0.0540** | -0.0513** | -0.0541** | -0.0522** | -0.0522** | -0.203*** | -0.204*** |
| | (0.0255) | (0.0257) | (0.0255) | (0.0250) | (0.0250) | (0.0628) | (0.0626) |
| Province fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,360 | 3,360 | 3,360 | 3,360 | 3,360 | 3,360 | 3,360 |
| R-squared | 0.731 | 0.730 | 0.731 | 0.760 | 0.760 | 0.589 | 0.589 |
| Number of provinces | 28 | 28 | 28 | 28 | 28 | 28 | 28 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at province level.

*Notes*: This table investigates whether Japan's massacres or general civilian casualties during the war dominates contemporary China's external trade pattern. The dependent variables in Columns 1-3 is (log) cumulative trade (ordinary trade type) that Chinese province $p$ conducted with foreign country $f$, the dependent variables in Columns 4-5 is (log) cumulative value that Chinese province $p$ exports to foreign country $f$, and the the dependent variables in Columns 6-7 is (log) cumulative value that Chinese province $p$ imports from foreign country $f$ between 2001-2006. *Massacre death* denotes the number of civilian deaths in Chinese province $p$ suffering from Japan's massacres during the Sino-Japanese war between 1931-1945. Civilian Casualties denotes the percentage of civilian casualties in Chinese province $p$ during the Sino-Japanese war. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance refers to the distance between the capital of province $p$ and the national capital of the foreign country $f$.

## Table 4 Massacre Impact and Anti-Japanese Sentiments

| | Dummy for accepting foreigners as colleagues at 2008 | | | | | |
|---|---|---|---|---|---|---|
| | (1) OLS | (2) OLS | (3) OLS | (4) OLS | (5) OLS | (6) OLS |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.0223*** | -0.0223** | -0.0258** | -0.0255** | -0.0253** | -0.0407*** |
| | (0.0084) | (0.0088) | (0.0107) | (0.0107) | (0.0105) | (0.0126) |
| ln *Massacre death*$_c$ × *Japan*$_f$ × *Old*$_i$ | | | | -0.0099 | | |
| | | | | (0.0074) | | |
| ln *Massacre death*$_c$ × *Japan*$_f$ × *High edu*$_i$ | | | | | -0.0010 | |
| | | | | | (0.0060) | |
| ln *Massacre death*$_c$ × *North America*$_f$ | | | | | | -0.0314*** |
| | | | | | | (0.0117) |
| ln *Massacre death*$_c$ × *Europe*$_f$ | | | | | | -0.0250** |
| | | | | | | (0.0102) |
| ln *Massacre death*$_c$ × *South Korea*$_f$ | | | | | | -0.0234* |
| | | | | | | (0.0125) |
| ln *Massacre death*$_c$ × *Southeast Asia*$_f$ | | | | | | -0.0094 |
| | | | | | | (0.0179) |
| ln *Distance*$_{cf}$ | | -0.0135 | -0.0150 | -0.0149 | -0.0151 | -0.0154 |
| | | (0.0130) | (0.0112) | (0.0112) | (0.0113) | (0.0114) |
| Individual fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Massacre-country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Country fixed effects | No | No | Yes | Yes | Yes | Yes |
| Observations | 18,963 | 18,963 | 18,963 | 18,963 | 18,963 | 18,963 |
| R-squared | 0.066 | 0.066 | 0.066 | 0.067 | 0.069 | 0.067 |
| Number of cities | 71 | 71 | 71 | 71 | 71 | 71 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the effects of Japan's massacres on individual sentiment about Japan. The dependent variable in Columns 1-6 is the 0-1 dummy of whether individual $i$ in Chinese city $c$ is willing to accept people from region/foreign country $f$ as his or her colleagues in 2008. *Massacre death* denotes the number of civilian deaths in Chinese city $c$ due to Japan's massacres during the Sino-Japanese war between 1931-1945. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance denotes the physical distance between the city $c$ and the capital of the country $f$.

## Table 5 Transmission of War Memory: War Dramas and War Memorials

| | ln $Trade_{cf}$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE | (7) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.0123*** | | -0.0102*** | | -0.0054 | -0.0044 | -0.0044 |
| | (0.0037) | | (0.0038) | | (0.0038) | (0.0037) | (0.0037) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.263*** | -0.231*** | | | -0.155** | -0.156** |
| | | (0.0637) | (0.0657) | | | (0.0677) | (0.0699) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | | | -0.152*** | -0.144*** | -0.135*** | -0.134*** |
| | | | | (0.0212) | (0.0218) | (0.0227) | (0.0244) |
| ln *Red army memorials*$_c$ × *Japan*$_f$ | | | | | | | -0.0033 |
| | | | | | | | (0.0283) |
| ln *Distance*$_{cf}$ | -0.126*** | -0.127*** | -0.127*** | -0.129*** | 0.129*** | -0.129*** | -0.129*** |
| | (0.0172) | (0.0172) | (0.0172) | (0.0172) | (0.0172) | (0.0172) | (0.0172) |
| City fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Massacre-Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.636 | 0.636 | 0.636 | 0.636 | 0.636 | 0.636 | 0.636 |
| Number of cities | 255 | 255 | 255 | 255 | 255 | 255 | 255 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the transmission of collective war memory on biased trade pattern. The dependent variables in Columns 1-7 is (log) cumulative trade (ordinary trade type) that Chinese city $c$ conducted with foreign country $f$ between 2001-2005. *Massacre death* denotes the number of civilian deaths in Chinese city $c$ due to Japan's massacres during the Sino-Japanese war between 1931-1945. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Red army memorials* denotes the number of red tourism scenic spots Chinese city $c$ has. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance denotes the physical distance between the city $c$ and the capital of the country $f$.

## Table 6 War Memory and Anti-Japanese Sentiments

| | Dummy for accepting foreigners as colleagues at 2008 | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) OLS | (2) OLS | (3) OLS | (4) OLS | (5) OLS | (6) OLS | (7) OLS |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.0258** | | -0.0194* | | -0.0200* | -0.0138 | -0.0176 |
| | (0.0107) | | (0.0110) | | (0.0115) | (0.0117) | (0.0135) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.217*** | -0.208*** | | | -0.207*** | -0.205*** |
| | | (0.0176) | (0.0174) | | | (0.0671) | (0.0667) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | | | -0.0362*** | -0.0327** | -0.0321** | -0.0424** |
| | | | | (0.0133) | (0.0132) | (0.0136) | (0.0186) |
| ln *Red army memorials*$_c$ × *Japan*$_f$ | | | | | | | 0.0221 |
| | | | | | | | (0.0273) |
| ln *Distance*$_{cf}$ | -0.0150 | -0.0171 | -0.0172 | -0.0159 | -0.0159 | -0.0182 | -0.0185 |
| | (0.0112) | (0.0113) | (0.0113) | (0.0113) | (0.0113) | (0.0112) | (0.0112) |
| Individual fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Massacre-country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 18,963 | 18,963 | 18,963 | 18,963 | 18,963 | 18,963 | 18,963 |
| R-squared | 0.066 | 0.067 | 0.067 | 0.067 | 0.067 | 0.067 | 0.068 |
| Number of cities | 71 | 71 | 71 | 71 | 71 | 71 | 71 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the transmission of collective war memory on anti-Japanese sentiments. The dependent variable in Columns 1-7 is the 0-1 dummy of whether individual $i$ in Chinese city $c$ is willing to accept people from region/foreign country $f$ as his or her colleagues in 2008. *Massacre death* denotes the number of civilian deaths in Chinese city $c$ due to Japan's massacres during the Sino-Japanese war between 1931-1945. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Red army memorials* denotes the number of red tourism scenic spots Chinese city $c$ has. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance denotes the (log) physical distance between the city and the capital of the country.

## Table 7 Heterogeneous Export and Import Responses

| | ln $Export_{cf}$ | | | | ln $Import_{cf}$ | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE | (7) PPMLE | (8) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.0146*** | -0.0123*** | -0.0069* | -0.0058 | -0.0171** | -0.0131* | -0.0025 | -0.0006 |
| | (0.0041) | (0.0041) | (0.0040) | (0.0040) | (0.0073) | (0.0073) | (0.0073) | (0.0073) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.258*** | | -0.174** | | -0.457*** | | -0.284** |
| | | (0.0187) | | (0.0179) | | (0.0338) | | (0.0318) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | | -0.161*** | -0.151*** | | | -0.313*** | -0.297*** |
| | | | (0.0243) | (0.0250) | | | (0.0405) | (0.0407) |
| ln $Distance_{cf}$ | -0.119*** | -0.120*** | -0.121*** | -0.122*** | -0.290*** | -0.295*** | -0.300*** | -0.303*** |
| | (0.0167) | (0.0167) | (0.0168) | (0.0168) | (0.0478) | (0.0477) | (0.0465) | (0.0466) |
| City fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.647 | 0.647 | 0.647 | 0.647 | 0.585 | 0.585 | 0.585 | 0.585 |
| Number of cities | 255 | 255 | 255 | 255 | 255 | 255 | 255 | 255 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates different responses of exports and imports to the Japan's massacres and underlying war memory. The dependent variables in Columns 1-4 is (log) cumulative value (ordinary trade type) that Chinese city $c$ exports to foreign country $f$, and the the dependent variables in Columns 5-8 is (log) cumulative value that Chinese city $c$ imports from foreign country $f$ between 2001-2006. *Massacre death* denotes the number of civilian deaths in Chinese city $c$ suffering from Japan's massacres during the Sino-Japanese war between 1931-1945. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance refers to the distance between the city $c$ and the national capital of the foreign country $f$.

## Table 8 Heterogenous Legacy Effects of War Memorials

| | ln $Trade_{cf}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE |
| ln *Sino-Japanese war memorials*$_c^{before1980}$ × *Japan*$_f$ | -0.173*** | | | | | -0.150*** |
| | (0.0352) | | | | | (0.0476) |
| ln *Sino-Japanese war memorials*$_c^{1980-2000}$ × *Japan*$_f$ | | -0.134*** | | | | -0.0970*** |
| | | (0.0347) | | | | (0.0373) |
| ln *Sino-Japanese war memorials*$_c^{after2000}$ × *Japan*$_f$ | | | -0.0793 | | | 0.0064 |
| | | | (0.0537) | | | (0.0586) |
| ln *Sino-Japanese war memorials*$_c^{urban}$ × *Japan*$_f$ | | | | -0.157*** | | -0.0508 |
| | | | | (0.0339) | | (0.0555) |
| ln *Sino-Japanese war memorials*$_c^{nonurban}$ × *Japan*$_f$ | | | | | -0.0899* | 0.0588 |
| | | | | | (0.0471) | (0.0473) |
| ln *Distance*$_{cf}$ | -0.127*** | -0.127*** | -0.127*** | -0.128*** | -0.126*** | -0.128*** |
| | (0.0173) | (0.0172) | (0.0173) | (0.0173) | (0.0173) | (0.0173) |
| City fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.636 | 0.636 | 0.636 | 0.636 | 0.636 | 0.636 |
| Number of cities | 255 | 255 | 255 | 255 | 255 | 255 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the heterogeneous exposures of war memory. The dependent variable in Columns 1-6 is (log) cumulative trade (ordinary trade type) that Chinese city $c$ conducted with foreign country $f$. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance denotes the physical distance between the city and the capital of the country.

## Table 9 Massacre and War Memory Impacts on Foreign Investment: Japan vs. Other Countries

| | ln *Foreign investment*$_{cf}$ | | | | | |
|---|---|---|---|---|---|---|
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.0270*** | | | | -0.0087 | -0.0086 |
| | (0.0090) | | | | (0.0088) | (0.0088) |
| *Massacre dummy*$_c$ × *Japan*$_f$ | | -0.213*** | | | | |
| | | (0.0759) | | | | |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | | -0.717*** | | -0.464*** | -0.466*** |
| | | | (0.154) | | (0.154) | (0.156) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | | | -0.371*** | -0.328*** | -0.326*** |
| | | | | (0.0470) | (0.0509) | (0.0543) |
| ln *Red army memorials*$_c$ × *Japan*$_f$ | | | | | | -0.0075 |
| | | | | | | (0.0663) |
| ln *Distance*$_{cf}$ | -0.0541 | -0.0535 | -0.0744 | -0.0759 | -0.0825 | -0.0827 |
| | (0.0959) | (0.0959) | (0.0956) | (0.0911) | (0.0904) | (0.0904) |
| City fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Region-Country fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 18,046 | 18,046 | 18,046 | 18,046 | 18,046 | 18,046 |
| R-squared | 0.647 | 0.647 | .648 | 0.649 | 0.649 | 0.649 |
| Number of cities | 245 | 245 | 245 | 245 | 245 | 245 |

Significant at ***1%, **5%, *10%. All robust standard errors clustered at city level.

*Notes*: This table investigates the effects of Japan's massacres on China's received foreign investments. The dependent variables in all columns is (log) cumulative foreign investments that Chinese city $c$ receives from foreign country $f$ between 2001-2006. *Massacre death* denotes the number of civilian deaths in Chinese city $c$, *Massacre dummy* denotes whether Chinese city $c$ experienced Japan's massacres during the Sino-Japanese war between 1931-1945. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Red army memorials* denotes the number of red tourism scenic spots Chinese city $c$ has. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance refers to the distance between the city $c$ and the national capital of the foreign country $f$.

# The Legacy Effect of WWII Massacres on China's External Trade Pattern

December 1, 2018

## Internet Appendix

## Not for Journal Publication

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# Internet Appendix

## A. Massacre Data

The number of civilian deaths is determined based on the following rules: (1) If the number of deaths is reported as $N$ in the books, we use $N$; (2) If the number of injuries and deaths is reported as $N$ in the books and there is no way to separate injuries and deaths, which seldom happens, we use $N$; (3) If the number of injuries and deaths is reported as more than $N$ in the books and they do not separate injuries and deaths, which seldom happens, we use $N$; (4) If the number of deaths is reported exactly as being more than $N$ in the books, which always happens, we use $N$ directly. We obey these rules throughout 12 books to make the calculation of civilian deaths consistent.

The locations of massacres can be traced to county level but we collect it at city level for convenience. There exists a problem that the administrative areas have been re-divided or renamed after the war and the books document a large amount of these changes. To avoid this problem, we search websites to use official information to identify the locations of massacres on the current administrative division map.

The massacre methods included, but were not limited to: using biochemical weapons such as pesticides and mustard gas; poisoning drinking water; using bayonet and machine guns; burying alive; and aerial bombing of highly populated areas.

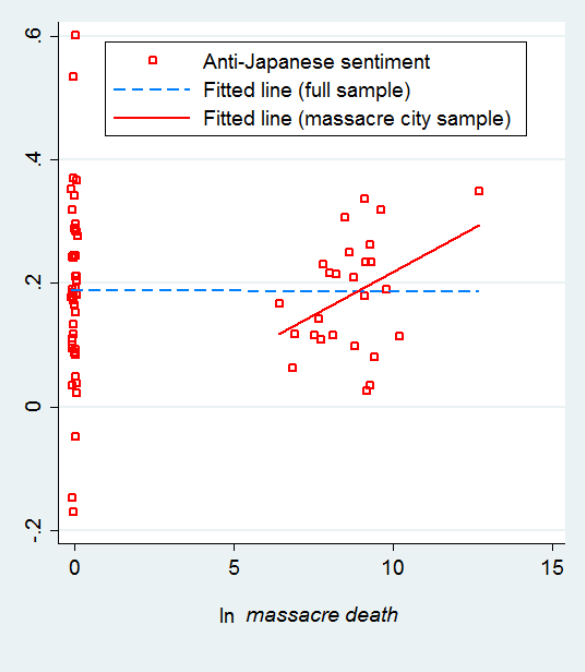


Figure A1 Individual Anti-Japanese Sentiment

This figure shows the relationship between individual sentiment of Japan over people in other regions and (log) number of civilian deaths in Japan's massacres at prefecture level. The y-axis (Anti-Japanese sentiment) refers to difference between the share of people unwilling to accept Japanese people as their colleagues and the average share of people unwilling to accept people from other regions as their colleagues. The comparison group includes South Korea, Taiwan, Hong Kong and Macao, Southeast Asia, Europe and North America.

## Table A1 War Memorial Statistics

| Variable | N | Mean | SD | Q25 | Q50 | Q75 |
|---|---|---|---|---|---|---|
| Foundation Year | 77 | 1970 | 23.32 | 1952 | 1968 | 1989 |
| Open Year | 76 | 1980 | 22.42 | 1958 | 1986 | 1999 |
| Last Construction Year | 76 | 1997 | 17.92 | 1991 | 2004 | 2009 |
| Area(square meter) | 76 | 132,167 | 379,551 | 3,060 | 24,300 | 98,334 |
| Number of Tourists per year(thousand) | 9 | 2,666.7 | 6,881.4 | 100,000 | 450,000 | 500,000 |

*Notes*: This table shows the summary statistics (foundation date, open date, last construction date, area and annual tourists size) of the first series of National Museums and Sites in Memorial of Sino-Japanese war that can be found online.

## Table A2 Variable Construction and Summary Statistics

| Variable | Construction | Obs. | Mean | SD | Q25 | Q50 | Q75 |
|---|---|---|---|---|---|---|---|
| ln $Trade_{cf}$ | ln(x+1) | 30,600 | 12.09 | 6.270 | 10.52 | 13.95 | 16.36 |
| ln $Export_{cf}$ | ln(x+1) | 30,600 | 11.61 | 6.224 | 10.11 | 13.55 | 15.91 |
| ln $Import_{cf}$ | ln(x+1) | 30,600 | 5.989 | 7.402 | 0 | 0 | 13.72 |
| ln $Massacre\ death_{c}$ | ln(x+1) | 255 | 2.924 | 3.931 | 0 | 0 | 7.397 |
| $Massacre\ dummy_{c}$ | 0-1 dummy | 255 | 0.365 | 0.482 | 0 | 0 | 1 |
| ln $Massacre\ duration_{c}$ | ln(x+1) | 255 | 1.019 | 1.658 | 0 | 0 | 1.609 |
| $Sentiment_{icf}$ | 0-1 dummy | 18,963 | 0.514 | 0.500 | 0 | 1 | 1 |
| ln $Sino\text{-}Japanese\ war\ dramas_{c}$ | ln(x) | 255 | 3.840 | 0.214 | 3.664 | 3.892 | 3.970 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}$ | ln(x+1) | 255 | 0.828 | 0.704 | 0 | 0.693 | 1.386 |
| ln $Red\ army\ memorials_{c}$ | ln(x+1) | 255 | 0.407 | 0.570 | 0 | 0 | 0.693 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}^{before1980}$ | ln(x+1) | 255 | 0.179 | 0.362 | 0 | 0 | 0 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}^{1980-2000}$ | ln(x+1) | 255 | 0.127 | 0.314 | 0 | 0 | 0 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}^{after2000}$ | ln(x+1) | 255 | 0.078 | 0.239 | 0 | 0 | 0 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}^{urban}$ | ln(x+1) | 255 | 0.208 | 0.385 | 0 | 0 | 0.693 |
| ln $Sino\text{-}Japanese\ war\ memorials_{c}^{nonurban}$ | ln(x+1) | 255 | 0.150 | 0.355 | 0 | 0 | 0 |
| ln $Foreign\ investment_{cf}$ | ln(x+1) | 29,400 | 1.910 | 4.847 | 0 | 0 | 0 |
| $Boxer\ rebellion_{c,1900}$ | 0-1 dummy | 193 | 0.097 | 0.297 | 0 | 0 | 0 |
| ln $Christian\ missionary_{p,1920}$ | ln(x+1) | 25 | 8.732 | 2.082 | 8.621 | 9.045 | 9.597 |
| ln $Christian\ site_{p,1920}$ | ln(x+1) | 25 | 5.178 | 1.898 | 4.174 | 5.323 | 6.550 |
| ln $Christian\ school_{p,1920}$ | ln(x) | 22 | 8.943 | 0.969 | 8.530 | 9.003 | 9.525 |
| ln $Population_{p,1920}$ | ln(x) | 25 | 16.02 | 1.695 | 15.41 | 16.31 | 17.17 |

*Notes*: This table reports the the construction of the main variables used in our study and the corresponding summary statistics. All variables with raw value of zero are used in $ln(x+1)$ form except for 0-1 dummy variable.

## Table A3 Export Structure Comparison: Massacre Cities vs. Non-massacre Cities

| Export category<br>(1) | Massacre cities<br>(2) | Non-massacre cities<br>(3) | Difference<br>(4) |
|---|---|---|---|
| Minerals | 18.07 | 18.06 | 0.012 |
| | (22.62) | (21.97) | (2.910) |
| Machinery, mechanical apparatus | 16.49 | 14.98 | 1.512 |
| | (10.93) | (11.83) | (1.465) |
| Chemical products | 12.14 | 12.33 | -0.189 |
| | (10.41) | (11.86) | (1.425) |
| Textile products | 11.28 | 9.831 | 1.445 |
| | (13.61) | (11.84) | (1.689) |
| Base metals and products | 11.11 | 10.75 | 0.352 |
| | (10.45) | (11.00) | (1.385) |
| Plant products | 5.147 | 6.765 | -1.618 |
| | (10.14) | (12.70) | (1.449) |
| Vehicles, aircraft, ships and | 4.003 | 2.835 | 1.168 |
| related transport equipments | (8.013) | (6.037) | (0.956) |
| Plastics products; Rubber products | 2.698 | 2.230 | 0.468 |
| | (3.262) | (3.579) | (0.440) |
| Wood products | 2.603 | 2.766 | -0.164 |
| | (4.629) | (6.711) | (0.713) |
| Food; drinks, wine and vinegar; tobacco products | 2.463 | 4.226 | -1.764** |
| | (3.807) | (6.986) | (0.676) |
| Stone, gypsum, cement, asbestos, mica, | 2.308 | 2.357 | -0.049 |
| ceramic, glass products | (4.459) | (5.720) | (0.645) |
| Miscellaneous products | 2.209 | 2.552 | -0.343 |
| | (3.034) | (4.399) | (0.467) |
| Shoes, hats, umbrellas, staffs, | 2.072 | 1.392 | 0.680 |
| whips products | (8.306) | (4.465) | (0.929) |
| Raw leather, leather, fur products | 2.018 | 1.834 | 0.184 |
| | (4.284) | (5.223) | (0.604) |
| Animal products | 1.704 | 2.616 | -0.912 |
| | (3.422) | (6.439) | (0.618) |
| Optical, photographic, film, metrology, inspection, | 1.572 | 1.846 | -0.274 |
| medical or surgical instruments and equipments | (1.422) | (2.357) | (0.237) |
| Paper and paper cardboard products | 1.404 | 1.674 | -0.270 |
| | (3.000) | (4.108) | (0.448) |
| Oils and fats of animal and vegetable | 0.456 | 0.421 | 0.035 |
| | (0.786) | (0.831) | (0.104) |
| Pearl, gem, precious metal, | 0.154 | 0.169 | -0.015 |
| precious metal package products | (0.418) | (0.554) | (0.061) |
| Special items and unclassified | 0.103 | 0.360 | -0.257 |
| | (0.597) | (2.794) | (0.228) |
| Weapons, ammunition | 0.007 | 0.005 | 0.002 |
| | (0.049) | (0.032) | (0.006) |
| Art, collectibles and antiquities | 0.002 | 0.006 | -0.004* |
| | (0.007) | (0.025) | (0.002) |

Significant at ***1%, **5%, *10%.

*Notes*: This table compare the export product structures (ordinary trade type) between cities suffering from Japan's massacres and cities not suffering from Japan's massacres. The first column reports the export products category defined from Chinese custom data. The second and third columns report the average export share (%) of each export product category for massacre and non-massacre cities, respectively, while the standard deviation is in the parenthesis. The last column reports the corresponding mean difference and the robust standard deviation is in the parenthesis.

## Table A4 Massacre and War Memory Impacts on Main Products

| | ln $Trade_{cf}$ | | | | | |
|---|---|---|---|---|---|---|
| | Minerals | | Machinery products | | Chemical products | |
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.030*** | -0.011 | -0.019*** | -0.005 | -0.022*** | -0.007 |
| | (0.011) | (0.011) | (0.007) | (0.007) | (0.006) | (0.006) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.085 | | -0.295** | | -0.330*** |
| | | (0.217) | | (0.137) | | (0.120) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | -0.310*** | | -0.250*** | | -0.269*** |
| | | (0.063) | | (0.040) | | (0.039) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,360 | 30,360 | 30,600 | 30,600 | 30,480 | 30,480 |
| R-squared | 0.508 | 0.508 | 0.644 | 0.645 | 0.616 | 0.617 |

| | ln $Trade_{cf}$ | | | |
|---|---|---|---|---|
| | Textile products | | Base metals | |
| | (7) PPMLE | (8) PPMLE | (9) PPMLE | (10) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.016** | -0.003 | -0.016** | 0.001 |
| | (0.006) | (0.007) | (0.008) | (0.008) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.429*** | | -0.215 |
| | | (0.114) | | (0.148) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | -0.203*** | | -0.332*** |
| | | (0.038) | | (0.044) |
| Controls | Yes | Yes | Yes | Yes |
| Observations | 30,480 | 30,480 | 30,600 | 30,600 |
| R-squared | 0.650 | 0.651 | 0.635 | 0.635 |

Significant at ***1%, **5%, *10%. All standard errors clustered at city level.

*Notes*: This table investigates the effects of Japan's massacres on China's external trade pattern by the top 5 products (ordinary trade type) that China trade with foreign countries. The dependent variables in Columns 1-10 are (log) cumulative value that Chinese city $c$ trade with foreign country $f$ of the top5 product category. *Massacre death* denotes the number of civilian deaths in Chinese city $c$. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Distance refers to the (log) distance between the city $c$ and the national capital of the foreign country $f$. Robust standard errors clustered at city level are in parentheses.

## Table A5 Massacre and War Memory Impacts on External Trade by Year

| | ln $Trade_{cf}$ | | | | | |
|---|---|---|---|---|---|---|
| | 2001 | | 2002 | | 2003 | |
| | (1) PPMLE | (2) PPMLE | (3) PPMLE | (4) PPMLE | (5) PPMLE | (6) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.022*** | -0.007 | -0.019*** | -0.005 | -0.021*** | -0.007 |
| | (0.007) | (0.007) | (0.006) | (0.006) | (0.006) | (0.006) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.221* | | -0.235** | | -0.288*** |
| | | (0.125) | | (0.113) | | (0.106) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | -0.274*** | | -0.251*** | | -0.233*** |
| | | (0.038) | | (0.035) | | (0.034) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.616 | 0.617 | 0.617 | 0.618 | 0.621 | 0.622 |

| | ln $Trade_{cf}$ | | | | | |
|---|---|---|---|---|---|---|
| | 2004 | | 2005 | | 2006 | |
| | (7) PPMLE | (8) PPMLE | (9) PPMLE | (10) PPMLE | (11) PPMLE | (12) PPMLE |
| ln *Massacre death*$_c$ × *Japan*$_f$ | -0.019*** | -0.006 | -0.017*** | -0.005 | -0.015*** | -0.003 |
| | (0.006) | (0.006) | (0.006) | (0.005) | (0.005) | (0.005) |
| ln *Sino-Japanese war dramas*$_c$ × *Japan*$_f$ | | -0.287*** | | -0.270*** | | -0.280*** |
| | | (0.105) | | (0.100) | | (0.091) |
| ln *Sino-Japanese war memorials*$_c$ × *Japan*$_f$ | | -0.231*** | | -0.223*** | | -0.192*** |
| | | (0.034) | | (0.032) | | (0.029) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 | 30,600 |
| R-squared | 0.624 | 0.625 | 0.623 | 0.624 | 0.623 | 0.624 |

Significant at ***1%, **5%, *10%. All standard errors clustered at city level.

*Notes*: This table investigates the effects of Japan's massacres on China's external trade pattern by year. The dependent variables in Columns 1-12 are (log) annual value (ordinary trade type) that Chinese city $c$ exports to foreign country $f$ in each year between 2001-2006. *Massacre death* denotes the number of civilian deaths in Chinese city $c$. *Sino-Japanese war dramas* denotes the number of TV dramas associated with Sino-Japanese war residents in Chinese city $c$ can usually watch. *Sino-Japanese war memorials* denotes the number of Sino-Japanese war memorials Chinese city $c$ has built. *Japan* is an indicator variable that takes a value of one if the foreign country is Japan and zero otherwise. Controls include (log) bilateral distance, city fixed effects and region-country fixed effects.

## Table A6 *Pre-war* Anti-foreigner Sentiment matters for Japan's massacres?

| | ln *Massacre death* | | | | | | *Massacre Dummy* | ln *Massacre duration* |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
| *Boxer rebellion*$_{c,1900}$ | 0.614 | | | | 0.374 | 0.855 | 0.085 | 0.538 |
| | (0.917) | | | | (0.933) | (0.807) | (0.095) | (0.406) |
| ln *Christian missionary*$_{p,1920}$ | | 0.278 | | | 0.516 | -0.293 | -0.037 | -0.171 |
| | | (0.289) | | | (0.433) | (1.161) | (0.130) | (0.583) |
| ln *Christian site*$_{p,1920}$ | | | -0.055 | | -0.114 | -0.028 | -0.003 | 0.021 |
| | | | (0.292) | | (0.458) | (0.395) | (0.042) | (0.190) |
| ln *Christian school*$_{p,1920}$ | | | | 0.287 | -0.430 | -0.326 | -0.043 | -0.065 |
| | | | | (0.468) | (1.318) | (1.393) | (0.149) | (0.707) |
| ln *Population*$_{p,1920}$ | | | | | | 1.011 | 0.128 | 0.407 |
| | | | | | | (1.167) | (0.130) | (0.612) |
| Observations | 193 | 247 | 247 | 243 | 191 | 191 | 191 | 191 |
| R-squared | 0.005 | 0.019 | 0.000 | 0.004 | 0.047 | 0.067 | 0.070 | 0.049 |

Significant at ***1%, **5%, *10%. All standard errors clustered at city level.

*Notes*: This table investigates the relationship between *ex-ante* anti-foreigner sentiments and conflict intensity during the Sino-Japanese war between 1931-1945. *Massacre death* denotes the number of civilian deaths in Chinese city *c*, *Massacre dummy* denotes whether Chinese city *c* met Japan's massacres, and *Massacre duration* denotes the number of days Chinese city *c* suffering from Japan's massacres during the Sino-Japanese war between 1931-1945. Robust standard errors clustered at city level are in parentheses in column 1. Robust standard errors clustered at province level using the percentile-t cluster bootstrap method (Cameron et al., 2008) are in parentheses in columns 2-8.

## Table A7 Placebo Test Results Summary

| Panel A: ln *Counterfactual Massacre death*$_c$ × *Japan*$_f$ | Negative | Positive |
|---|---|---|
| Significant at the 1 percent level | 0 | 1 |
| Significant at the 5 percent level | 3 | 1 |
| Significant at the 10 percent level | 4 | 3 |
| Insignificant | 45 | 43 |
| **Panel B: ln *Counterfactual Sino-Japanese war dramas*$_c$ × *Japan*$_f$** | **Negative** | **Positive** |
| Significant at the 1 percent level | 1 | 2 |
| Significant at the 5 percent level | 1 | 2 |
| Significant at the 10 percent level | 1 | 3 |
| Insignificant | 48 | 42 |
| **Panel C: ln *Counterfactual Sino-Japanese war memorials*$_c$ × *Japan*$_f$** | **Negative** | **Positive** |
| Significant at the 1 percent level | 1 | 0 |
| Significant at the 5 percent level | 0 | 1 |
| Significant at the 10 percent level | 0 | 3 |
| Insignificant | 45 | 50 |

*Notes*: This table reports the distribution of estimated coefficients for ln *Massacre death*, ln *Sino-Japanese war dramas*, and ln *Sino-Japanese war memorials* in the placebo test. We run 100 replications for the trade effect of each of these variables, respectively.