Martyrs, Morale, and Militarism: The Political Impact of Devastation and Slaughter

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January 1, 2025

Preliminary and Incomplete: Please do not quote or cite without permission

Abstract

Opinion is sharply divided about whether the bombing of an enemy's civilian targets and the killing of their combatants results in an adversary's government becoming pro-pacifist or pro-militarist. Identification is difficult because natural experiments are rare, and effects may be heterogeneous. For example, killing one's enemies may create martyrs, while devastating their cities may lower a population's support for war. We solve this problem by exploiting a natural experiment in Japan that caused military casualties and urban destruction to vary randomly, but differentially, across cities. We then estimate the impact of devastation and slaughter on support for Japan's Liberal Democratic Party, which aims to revise Japan's constitution to enable it to have the right to go to war. We find contrasting effects of military and civilian casualties—military casualties induce pro-military voting, while urban destruction induces pacifist voting. Moreover, these effects are still observable today.

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"When I imagine what Tokyo would look like if it were bombed—I see a burned-out desert with dead bodies lying everywhere—I'm desperate to stop them carrying out air raids on Tokyo… In this war, there's nothing we can do about soldiers like me out here on the front line dying. But I can't stand the idea that even you, women and children on the mainland, have to feel that your lives are in danger."

Taken from two letters from General Tadamichi Kuribayashi, commander of Japanese forces on Iwo Jima, to his wife, dated September 12 and December 8, 1944, as quoted in Kakehashi, Kumiko (2007) *So Sad to Fall in Battle*

"These leaflets are being dropped to notify you that your city has been listed for destruction by our powerful air force. The bombing will begin within 72 hours. This advance notice will give your military authorities ample time to take necessary defensive measures to protect you from our inevitable attack. Watch and see how powerless they are to protect you."

Text of leaflet dropped on targetted Japanese cities in 1945. Allied Forces, South West Pacific Area, Psychological Warfare Branch.

1 Introduction

What are the political impacts of war? For some, devastating wars produce strong pacifist sentiments, but others view past defeats as a motivation to achieve future military prowess. Examples abound of people drawing diametrically opposed conclusions from the same wartime experience. For example, left and right-wing people in the 1930s drew starkly different views of World War I in 1930s Germany, of the Vietnam War in 1990s America,[1] and whether Japan should eliminate Article 9 of its constitution, renouncing war, following World War II.

We provide an answer to this question by exploiting a natural experiment in Japan that caused wartime destruction and military and civilian casualties to be randomly distributed. We link these data to postwar voting data to show that a significant reason for the bifurcation in Japanese views about WWII arises from whether the survivors experienced high rates of "martyrdom" (battlefield casualties) or "massacres" (civilian death and destruction).[2] We find that the U.S. targeting of civilians and soldiers had contrasting impacts on postwar voting behavior: devastating civilian targets successfully created pro-pacifist political districts, while districts that experienced high military casualty rates consistently voted to allow Japan to rearm.

One of our main contributions is to show that different experiences of an event like war can produce heterogeneous "lessons" for the survivors. Our decision to separate the wartime killing of soldiers from civilian death and devastation stems from the fact that one of the main objectives of area bombing in both

[1] President George H.W. Bush summarized the supposed end of the controversy after the success of the Gulf war: "By God, we've kicked the Vietnam syndrome once and for all." https://www.nytimes.com/1991/03/02/world/after-the-war-white-house-memo-war-introduces-a-tougher-bush-to-nation.html

[2] While it may appear jarring to hear Japanese soldiers killed in battle described as "martyrs" and to describe Japanese civilian casualties as "massacres," we feel it is justifiable because they are often referred to in this way *in Japan*. The term "Martyrs of Showa" (*Showa Junnansha*) is used to describe Japanese leadership executed by the Americans for war crimes. "*Junnansha*" is generally translated a "martyr" and is used, for example, to refer to Japanese Christians who were crucified in 1597. However, the more common term for enshrined Japanese military casualties is *eirei* or "hero spirits," which also connotes the idea that they died for a noble cause. Similarly, we use the word "massacre" because the Government of Japan formally complained to the U.S. government during the war that area bombing of Japanese cities constituted a massacre in contravention of the 1907 Hague Convention on the laws of war (c.f. https://history.state.gov/historicaldocuments/frus1945v06/d336).

Germany and Japan was the destruction of pro-war morale. This appears to have succeeded, at least in the case of Japan. However, the killing of Japanese soldiers created a sense that they were martyred in the defense of Japan, and survivors, who knew them as friends and family, became *more* promilitary in the postwar period. Therefore, while both battlefield casualties and civilian death and destruction can be considered as wartime damage, distinguishing their nature may be crucially important for considering the political impacts of war.

We establish this finding by exploiting a regularity first discovered by Asai and Kambayashi (2023). They argue that the geographic pattern of Japanese WWII battlefield casualties is randomly distributed due to the Japanese army's use of a regiment system. Japanese regiments were formed based on soldiers' hometowns and then sent throughout the empire. As a result, regiments that were sent to places like Iwo Jima had close to 100 percent death rates, while those sent to places like Taiwan saw no combat. Since regiment assignments were not based on regional characteristics, we can treat regional combat death rates of draft-age soldiers as random variation. In other words, cities with few draft-age men—i.e., cities with high female-to-male ratios of people aged 20-44 in 1950—likely suffered high levels of battle casualties. We also document that cities with low female-to-male ratios among people of the "soldier generation" did not have low ratios in other cohorts, establishing that it is unlikely that these high ratios were due to anything due to the cities themselves.

We use data on civilian death and destruction from Davis and Weinstein (2002) to measure U.S. attacks on civilian targets. The March 9 firebombing raid on Tokyo alone killed 88,000 to 100,000 people—more than twice as many people as died during the Blitz—making it the most successful one-day episode of civilian slaughter in the world's history. Overall, close to 300,000 Japanese civilians perished in these raids, and in the typical bombed city, half of all buildings were destroyed. As Davis and Weinstein (2002) argue, much of the success and failure of bombing raids depended on the weather, geography, and learning by doing, which meant that there was very little a city could do to affect the level of destruction it received. Moreover, U.S. bomber range meant that the U.S. bombed virtually all targets in the south of Japan, but not the north.

We merge these data with district-level data on Japanese voting from 1928 to 2021 to assess the impact that battle casualties, as well as civilian death and destruction, had on voting for the conservative Liberal Democratic Party (LDP). The LDP was established in 1955, shortly after the American Occupation ended, with a platform focused on amending Article 9 of the constitution to allow Japan to have a military. Although the LDP has consistently won a plurality of the vote, it has failed to change the constitution because it has not been able to achieve the supermajority necessary to make the change. Thus, while Article 9 revision is often one of the most salient issues in Japanese politics and the LDP has consistently won majorities in the diet, it has not achieved this policy objective. The importance of constitutional revision for the LDP lets us use the vote share for the LDP in each city to measure its support for remilitarising Japan.

Our findings suggest that the martyr effect is particularly effective in generating pro-military sentiments. We find that cities with a high female-to-male ratio among people aged 20-24 vote significantly more for the conservative LDP. However, we find no such association for gender ratios in other cohorts, suggesting that our result captures the effect of battlefield casualties but not persistent voting behavior differences by gender. Cities with high combat losses maintained no attenuation in their levels of support for the LDP in every election for the first 50 years after the end of the Second World War. While the effects remain significant even as late as 2021, redistricting in the early 1990s makes it difficult to compare the magnitudes in post-1990 results with earlier ones. These findings are consistent with Voth (2021) and Ochsner and Roesel (2024), documenting historical memories' persistence.

The destruction of cities also generates a persistent effect of the opposite sign. We call the "morale bombing" effect because this is consistent with bombing reducing morale and support for militarism, as suggsted by our epigraph. Similar to the martyr effect, we find evidence that this effect still remains today. This finding is in line with Harada, Ito and Smith (2024), documenting the persistent impact of Tokyo

air-raid bombing on community-level social capital. Moreover, while we use building destruction rate as a measure of civilian casualties, using the number of death and missing per capita does not affect our conclusion.

We also test to ensure that our results are not driven by pro-military cities having more motivated soldiers who died at higher rates. A salient political issue in the 1928 election was whether Japan should try to increase the size of its Navy to foster the country's territorial ambitions. Votes for the conservative *Seiyukai* can, therefore, be considered a "pro-military party." When we add a control for pre-war support for the *Seiyukai*, we find that it has no explanatory power for postwar voting after controlling for our death and destruction variables, indicating that past political beliefs are not correlated with military and civilian casualties.

We conducted a simple counterfactual exercise to assess the magnitude of our point estimates, indicating that WWII casualties and devastation had a large impact on postwar electoral outcomes for the 1960 election. In our counterfactual exercises, we consider two experiments. First, we note that due to the success of "Operation Starvation," which disrupted Japanese supply lines and caused massive starvation deaths of Japanese soldiers in the last 6 months of the war.[3] In our counterfactual exercise, Japan surrenders due to the air war, sparing two-thirds of its casualties. We estimate that in this world, with much fewer military deaths, support for the LDP would have fallen from its observed level of 51.7 percent of the vote to 49.2 percent. We also consider a second counterfactual in which the U.S. decided not to bomb Japanese cities, which would have largely eliminated civilian casualties. In this case, the LDP vote share would have risen 1.5 percentage points from its 1960 level. On net, we find that the pacifist voting behavior induced by urban destruction was more than offset by the pro-military voting behavior generated by military casualties.

This paper is organized as follows. Section 2 describes our data and empirical strategy. Section 3 presents our main empirical results. Section 4 presents results from our additional analysis.

2 Data and Empirical Strategy

2.1 *Data*

This section explains the definition, construction, and sources of the variables used in this study. We also show that civilian and military casualties are quasi-random. Our research aims to analyze the impact of WWII civilian and military casualties on public willingness to support wars or military actions. To conduct this analysis, we compile a dataset that includes city-level information on voting behavior, civilian casualties from WWII air raids, and military fatalities.

The analysis is based on the largest 300 cities by 1940 population, following Davis and Weinstein (2002), with city definitions standardized to their 1980 boundaries for consistency.[4] Cities in Okinawa are excluded because the U.S. occupation between 1945 and 1972 makes it difficult to measure public attitudes toward war using LDP vote shares. Table 1 presents summary statistics.

LDP Vote Share

After Japan's surrender, the US occupied the country until 1952 and imposed on Japan a constitution that forbade a military. The Liberal Democratic Party (LDP) was established in 1955 with a platform focused on revising the constitution and pursuing re-militarization, shortly after the formation of the Japan Socialist Party, which aimed to uphold Japan's pacifist principles. The LDP secured a Diet majority in every Japanese

[3]For example, Yoshida (2017) estimates that 80 percent of Japanese military casualties happened in the last 12 months of the war.

[4]In 1940, the top 300 cities covers slightly less than 60% of the entire population.

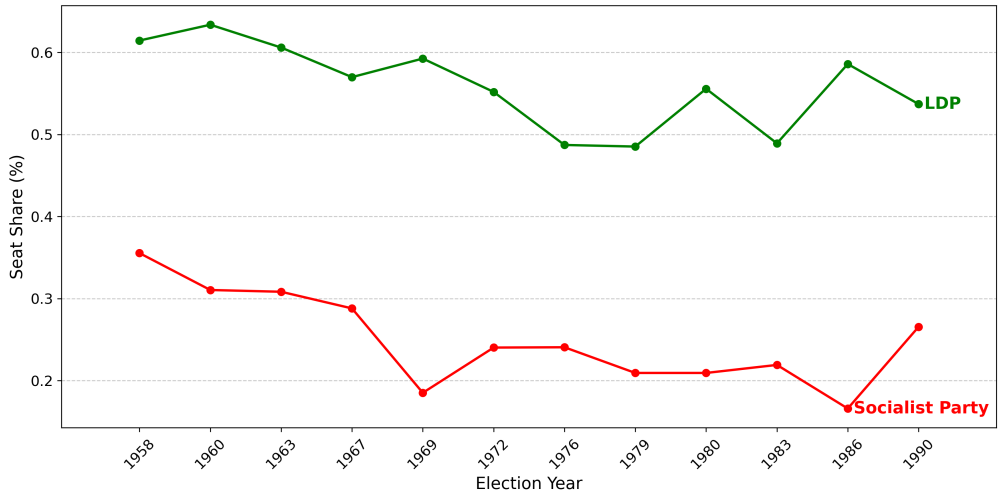
Table 1: Summary Statistics

	mean	sd	p10	p25	p50	p75	p90
LDP vote share (1958–1990)	0.523	0.158	0.314	0.422	0.528	0.637	0.725
LDP vote share (1958–1993)	0.514	0.162	0.297	0.408	0.519	0.632	0.723
LDP vote share (1958–2021)	0.443	0.158	0.261	0.327	0.412	0.554	0.676
Per-Capita Building Destruction	0.019	0.038	0.000	0.000	0.000	0.012	0.085
Per-Capita Death and Missing	0.002	0.013	0.000	0.000	0.000	0.001	0.005
Non-Soldier-Generation Gender Ratio	0.957	0.057	0.896	0.924	0.951	0.982	1.019
Seiyukai's Vote Share in 1928	0.521	0.125	0.395	0.461	0.520	0.592	0.660

Note: Statistics on the LDP voting share are calculating while pooling different election years. Statistics on all the other variables, which do not change over time, are calculated using the 300 cities in the sample.

election until 1990 (see Figure 1). However, revising the constitution required a two-thirds majority, which meant that even though the LDP won majorities, the constitutional issue remained salient.[5]

Figure 1: Seat Share of LDP and Socialist Party (1958–1990)



The LDP vote share is used as a proxy for the public's willingness to support remilitarization. Since its founding in 1955, the LDP has made revising Article 9 of the Japanese Constitution a central objective. Article 9 renounces war and prohibits Japan from maintaining armed forces or using force to resolve disputes. In contrast, the LDP's founding declaration emphasized the creation of self-defense forces and the withdrawal of foreign troops from Japan.

The LDP vote share is calculated for each post-WWII election except for 1955 before the LDP was formed. Data on votes, candidate party affiliations, and the number of eligible voters is sourced from the JED-M database provided by Bokutakusya. Eligible voters are defined as individuals aged 20 or older until 2016, and 18 or older thereafter.

In cities with multiple electoral districts or candidates from the same party, vote shares are aggregated at the city level. For ordinance-designated cities such as Yokohama and Osaka, all wards are aggregated into their corresponding cities to ensure alignment with other datasets on casualties and demographics.

[5]See Kishishita and Yamagishi (2022) for an electoral competition model that includes a supermajority issue. In their model, parties take into account the possibility of obtaining the supermajority or blocking the opponent's sumermajority in choosing their policy platform.

Air Raid Casualties and Destroyed Buildings (Civilian Casualities)

During WWII, Allied bombing campaigns targeted 66 Japanese cities, causing extensive destruction and resulting in approximately 300,000 civilian deaths. On average, targeted cities lost 50% of their buildings, though there was substantial variation in the level of destruction. The devastation was quasi-random, driven by geographical constraints: northern cities were spared due to their greater distance from U.S. bomber bases. Weather conditions also played a crucial role in determining targets. For instance, during the mission to drop the second atomic bomb on Kokura, heavy cloud cover and smoke from fires caused by a previous air raid on a nearby city obscured the target. The bomber made three runs over Kokura but was unable to visually confirm the target due to limited visibility. With fuel running critically low, the crew made the decision to proceed to the secondary target, Nagasaki, where the atomic bomb was ultimately dropped, causing catastrophic destruction and loss of life.

Data on air raid casualties and destroyed buildings is sourced from *the Report on Damage and Casualties of World War II*, published in 1949 by the Central Economic Stabilization Board. This report provides city-level figures on deaths, injuries (serious and minor), missing persons, and destroyed buildings caused by air raids during the war. For Kyoto and Osaka, the data are reported at the city level rather than at the ward level, ensuring consistency with other variables. We use the 1940 population to express them in per-capita terms.

Our primary variable to capture the severity of air-raid damages is the number of destroyed buildings per capita. As disucssed in previous works on the impact of bombing (Davis and Weinstein 2002; Bosker, Brakman, Garretsen and Schramm 2007; Takeda and Yamagishi 2024), this variable suffers from less measurement error and is robust to changes in the evacuation strategies of Japan. That said, we also utilize the number of death and missing per capita in supplementary analysis.

Gender Ratio as a Proxy for Military Fatalities

The Imperial Japanese Army (IJA) adopted the hometown regimental system, which organized infantry regiments by recruiting young males from specific geographical areas. This system ensured that soldiers from the same communities served together, fostering strong bonds but also concentrating the devastating human toll of war within local populations. These regiments were often deployed to defend islands scattered across the Pacific Ocean, where they faced overwhelming Allied counterattacks that frequently resulted in catastrophic losses. Entire defensive units were sometimes obliterated. For instance, the 145th Infantry Regiment from Kagoshima was sent to Iwo Jima, where only 162 of its 2,727 soldiers survived. In contrast, the 24th Infantry Regiment from Fukuoka was stationed in Taiwan, which saw minimal ground combat and consequently suffered far fewer casualties.

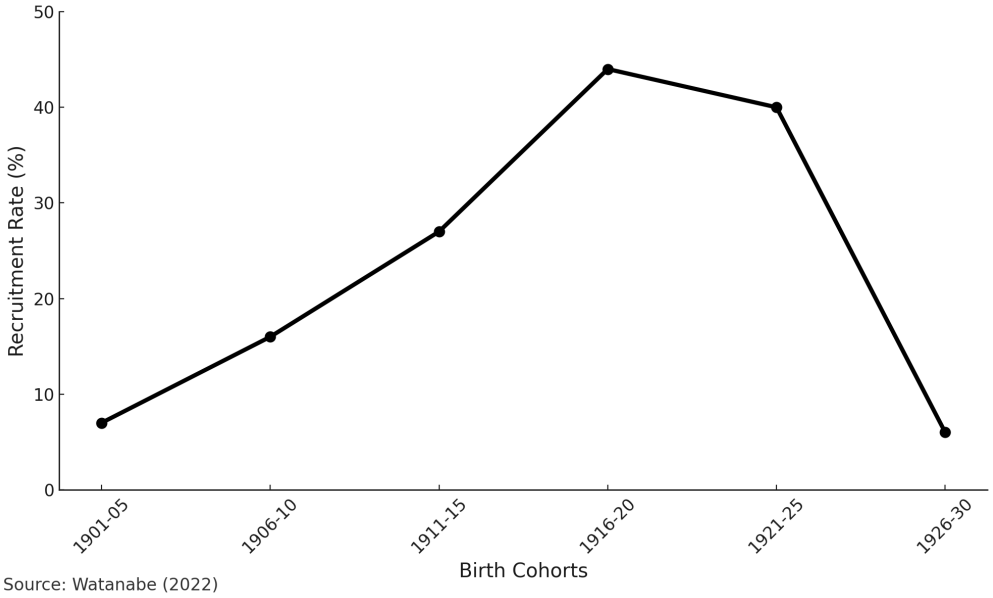
The disparity in military losses across Japanese regiments and across cites was shaped, in part, by the U.S. military's Island-Hopping Strategy. This strategy focused on capturing strategically significant islands to establish military bases while bypassing heavily fortified positions. U.S. forces accelerated their advance, minimized casualties, and disrupted Japanese supply chains to bypassed islands, rendering them strategically irrelevant. The effectiveness of this approach allowed the United States to position itself within striking distance of the Japanese mainland, ultimately enabling the atomic bombings of Hiroshima and Nagasaki.

The interaction between the Japanese hometown regimental system and the U.S. Island-Hopping Strategy created quasi-random variation in military casualties across different regiments and locations. While some units faced overwhelming Allied assaults on key islands, others were stationed in areas that saw little to no combat, resulting in significant heterogeneity in military casualties of the war. Asai and Kambayashi (2023) discusses in detail the quasi-random nature of soldiers' death.

Direct data on soldier death rates at the city level is unavailable. As a proxy, we use the gender ratio

(women/men) of individuals aged 20 to 44 in 1950.[6] This cohort corresponds to individuals aged 15 to 39 during the war, a demographic heavily affected by military drafts. The definition of the soldier cohort is motivated by Figure 2 taken from Watanabe (2014), which documents the widespread presence of teenage soldiers in the last moments of the WW2, which was the period where most loss of soldiers' life occured. Approximately 2.3 million of Japan's 7 million soldiers were killed during the war, disproportionately impacting young men.

Figure 2: Recruitment Rate by Birth Cohort



Source: Watanabe (2022)

A higher gender ratio indicates a greater proportion of women in a population, which serves as a proxy for male military fatalities. The data is sourced from the 1950 Population Census of Japan. Although city-level gender ratio data from 1945 is unavailable, the 1950 ratio is a reliable proxy, as the drafted cohort (aged 15–39 in 1945) corresponds to the 20–44 age group in 1950. Figure 3 illustrates the gender ratio across different age groups. Notably, the soldier cohort exhibits a higher gender ratio compared to other age groups, reflecting the heavy loss of young men during the war. The figure also highlights substantial spatial variation in gender ratios across cities.

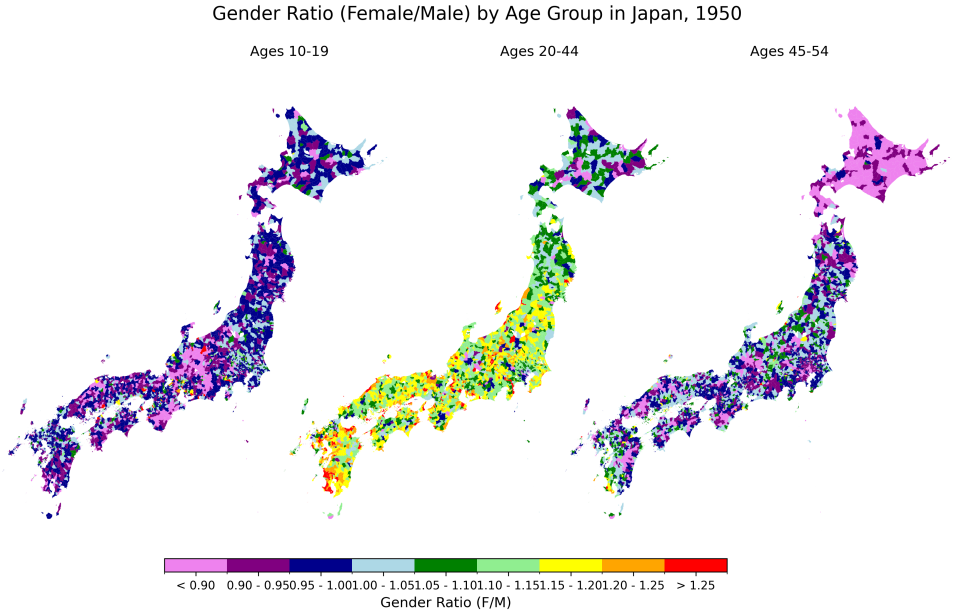
In addition to using the gender ratio for the soldier-aged cohort, we also examine the gender ratio for non-drafted age groups in 1950 to test for any gender-based differences in voting behavior. Specifically we include the gender ratio ratio of people at the ages of 10-19 and 45-54 as of 1950.

Pre-WWII Militaristic Sentiment

To account for pre-WWII pro-militarization sentiment, we include the vote share of the Seiyukai party in pre-war elections as a control variable. The Seiyukai party opposed disarmament efforts such as the 1930 Naval Disarmament Treaty, aligning with right-wing civilian groups and the military to advocate for expansionist policies. The London Naval Treaty of 1930, officially the Treaty for the Limitation and Reduction of Naval Armament, was signed by the United Kingdom, Japan, France, Italy, and the United States. It expanded on the 1922 Washington Naval Treaty by imposing stricter regulations on submarine

[6]The use of gender ratio as a proxy of military casualties in Japan follows Ogasawara and Komura (2022), Asai and Kambayashi (2023), and Ogasawara and Igarashi (2024).

Figure 3: Gender Ratio by Age Cohorts



warfare, further limiting cruisers and destroyers, and curbing naval shipbuilding. By incorporating the Seiyukai vote share, we account for regional variations in militaristic attitudes before WWII.

We take the pre-war voting results at electoral district level using Kawato and Kawato (1997). We then obtain the city-level election outcome by a correspondence table between electoral districts and cities available in the 1925 Universal Manhood Suffrage Act.[7]

Geographic Crosswalks and Standardized Boundaries

To ensure consistent geographic boundaries, we standardize all city-level data from different years to 1980 city definitions using geographic crosswalks. This approach follows the methodology of Eckert, Fort, Schott and Yang (2020). Crosswalks are created by intersecting historical city boundaries (e.g., 1948 for the air raid damages) with 1980 boundaries, dividing cities into subunits. Variables of interest (e.g., the air raid damages) from different years are then proportionally reallocated to 1980 city boundaries based on the area overlap.

For example, if City A in 1980 overlaps 20% with City a from 1948, which had 10 casualties, and 100% with City b from 1948, which had 1 casualty, the total casualties for City A in 1980 are calculated as the weighted sum: $(10 \times 0.2) + (1 \times 1.0) = 3$. Each subunit's share is computed as the fraction of the overlapping area relative to the total area of the 1948 city it intersects. This process is repeated for all years, using 1980 as the reference unit.

2.2 *Empirical Strategy*

We adopt the following linear regression model:

$$\text{LDP vote share}_{it} = \beta_1 \text{SGGR}_i + \beta_2 \text{PCBD}_i + \gamma \text{Controls}_{it} + \text{Year fixed effects}_t + \epsilon_{it}, \tag{1}$$

[7] Available at https://lab.ndl.go.jp/dl/book/1445520?page=35 (In Japanese, last accessed on Decemebr 13, 2024).

where i is the city index and t represents election year.

SGGR stands for "Soldier-Generation Gender Ratio" and PCBD stands for "Per-Capita Building Destruction." The former captures the military casualties and the latter captures the civillian damages, and these two variables are of our primary interest.

There are two important control variables. First, we include the vote share for Rikken Seiyukai in the 1928 election, which is meant to capture the pre-exisiting political preferences in each city. By conditioning on the pre-war political preferences, our identification strategy essentially invokes the idea of difference-in-difference. That is, we analyze how *changes* in the political preferences from the pre-war to post-war periods are associated with military and civillian casualties, which can be considered as *treatments* to each city. Through placebo tests, we show that military and civilian casualties are not associated with the pre-war political preferences. This is consistent with their random nature we discussed in Section 2.1.

Second, we include the gender ratio of non-soldier cohorts to control for persistent difference of voting between men and women. Specifically, we include the genratio ratio of people at the ages of 10-19 and 45-54 as of 1950. On top of these two controls, we also control for (election) year fixed effects longitude and latitude of each city to mitigate spatial autocorrelation.

We focus on top 300 cities in terms of population (as of 1940). To deal with municipal mergers, we use the 1980 administrative definition of cities throughout our analysis, following Davis and Weinstein (2002). t runs from 1958, the first election in which the LDP appeared, to 2021. We cluster the standard error at the prefecture level.

3 Empirical Results

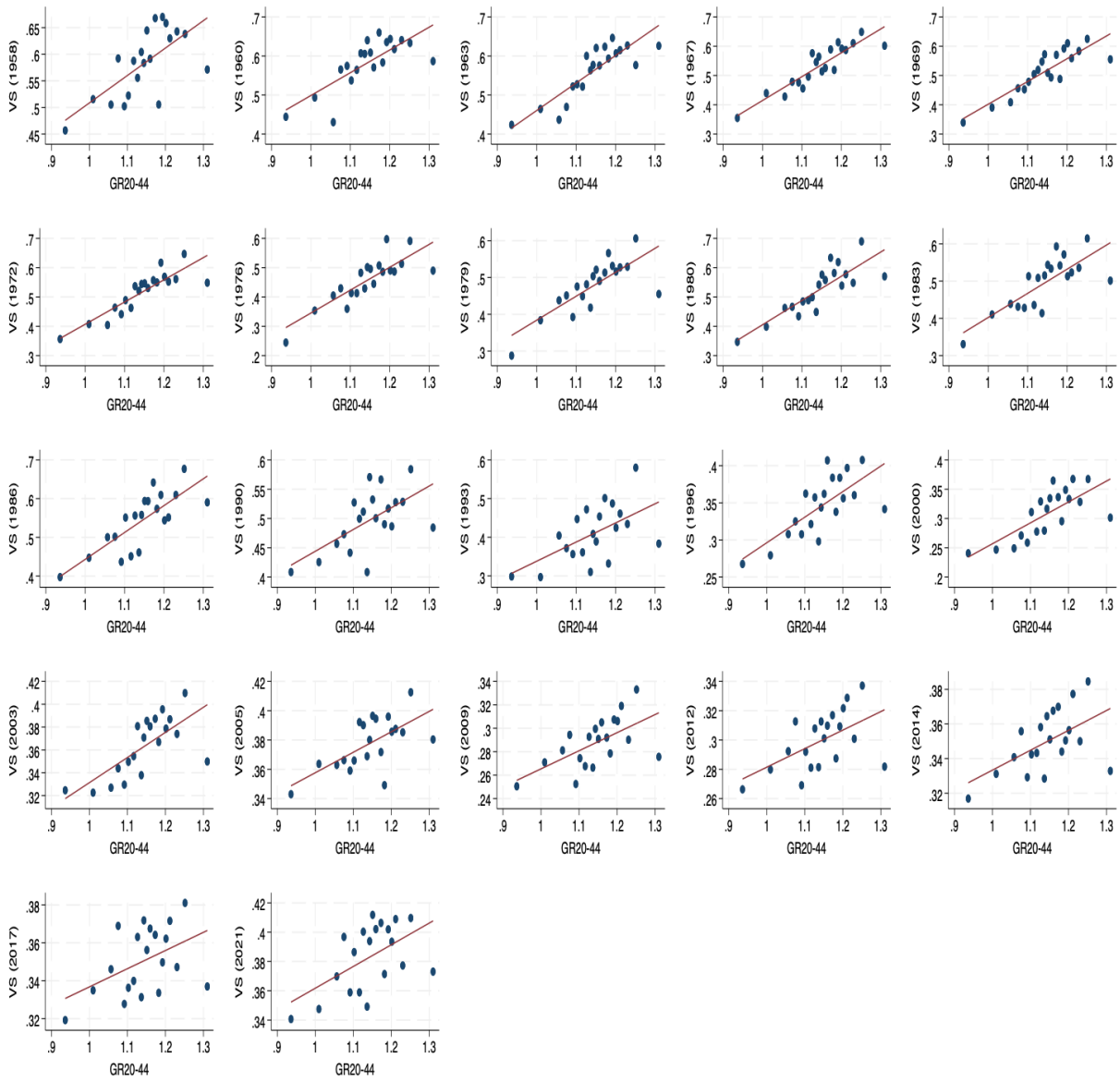
3.1 *Descriptive analysis*

Before presenting our regression results, we first descriptively analyze the relatioship between the LDP vote share and and military or civillian casualties in the WW2. Figure 4 presents, for each election year from 1958 to 2021, the correlation between the LDP vote share and the women-to-men ratio of the soldier generation, which is our proxy for the military casualties. In all election years, we observe a *positive* correlation between these two. Figure 4 is, therefore, suggestive of the possibility of the *martyrs effect:* experiencing more soldiers' death induces pro-military attitudes after the war.

Figure 5 presents, for each election year from 1958 to 2021, the correlation between the LDP vote share and the number of destroyed buildings per capita. In stark contrast to Figure 4, we obnserve a *negative* correlation in almost all election years. Figure 5 is, therefore, suggestive of the possibility of the *morale bombing effect:* experiencing bombing reduces morale among civilians and anti-military attitudes after the war.

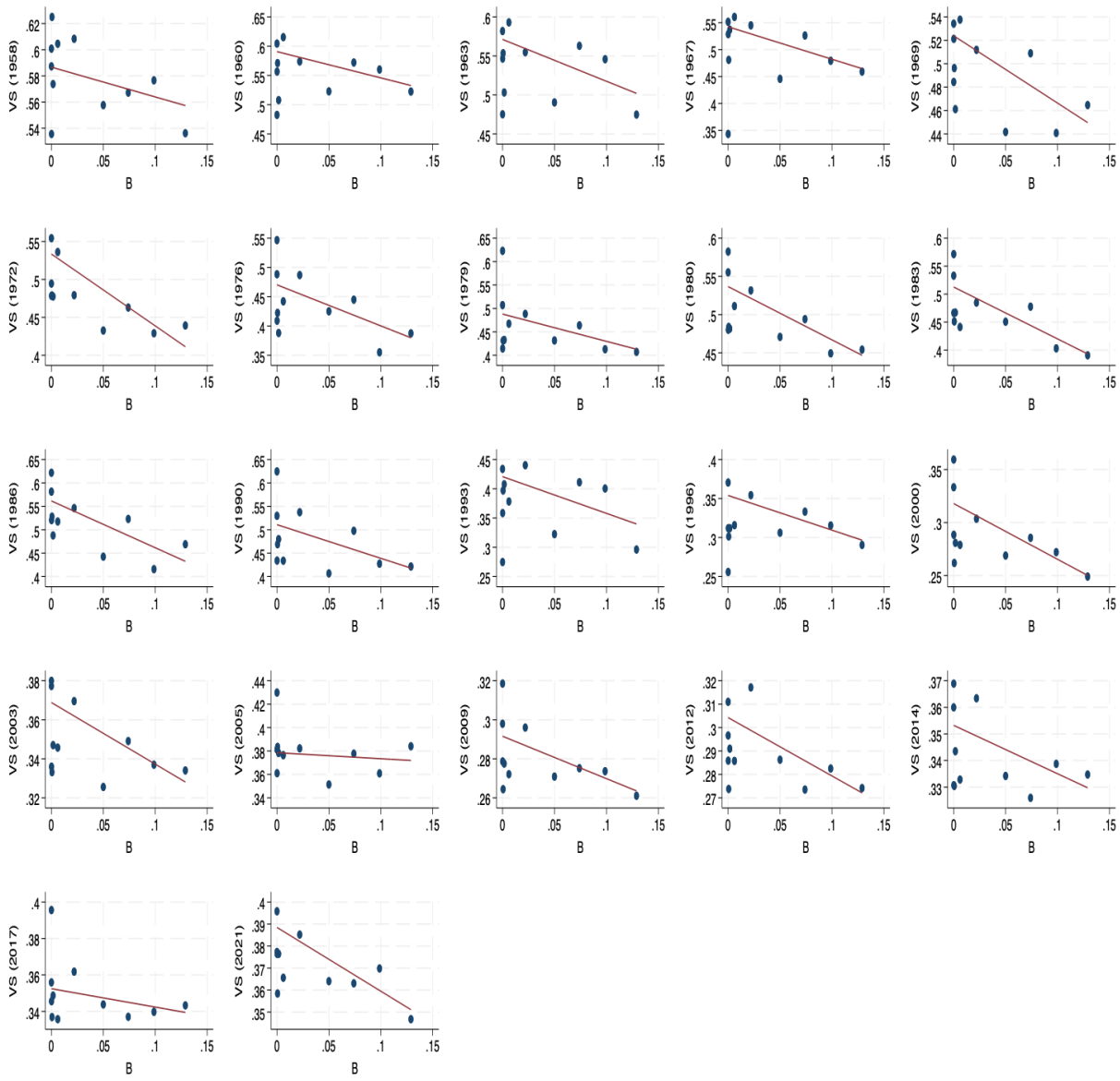
This descriptive pattern highlights the possibility the importance of distinguishing military and civilian casualties, as they might be related to the LDP vote share in the opposite direction. Our regression analysis suggests that these opposite relationships are indeed causal and both statistically and economically significant.

Figure 4: LDP Share and Gender Ratio (20-44 Cohort as of 1950)



Note: This figure plots the women-to-men ratio of soldier-generation (horizontal axis) and the LDP vote share (vertical axis) for each election year. Each dot represents the binscatter of cities and we also plot the fitted line.

Figure 5: LDP Share and Buildings Destroyed Per Capita



Note: This figure plots the women-to-men ratio of soldier-generation (horizontal axis) and the LDP vote share (vertical axis) for each election year. Each dot represents the binscatter of cities and we also plot the fitted line.

3.2 *Regression results*

Main results

Table 2 presents the regression results of equation (4). Columns 1 and 2 pool all elections from 1958 and 1990, the first election since the LDP was formed and the last election before the LDP lost the ruling position. The results suggest the statistically-significant martyrs effect and the morale bombing effect. This conclusion hardly changes after inclusion of control variables (column 2). In particular, controlling for the pre-war political preferences (Seiyukai vote share) and the gender ratio of non-soldier cohorts do not affect our conclusion.

Column 3 and 4 repeat the same analysis, but adding the election of 1993, in which the LDP lost the ruling position but the electoral system was still under the multiple-seat constituency system. The results hardly change from Columns 1 and 2 that do not include the 1993 election. In Columns 5 and 6, we pool all elections from the 1958 to 2021, the latest election in which the city level vote count data are available. The coefficient is smaller than Columns 1-4, but the statistical significance remains and qualitative implications remain intact.

Overall, our regression results in Table 2 suggests that the martyrs effect and the morale bombing effect are statistically significant and robust to various control variables. This confirms the visual descriptive evidence in Figures 4 and 5 in a regression framework.

Table 2: Pooled Regression Results

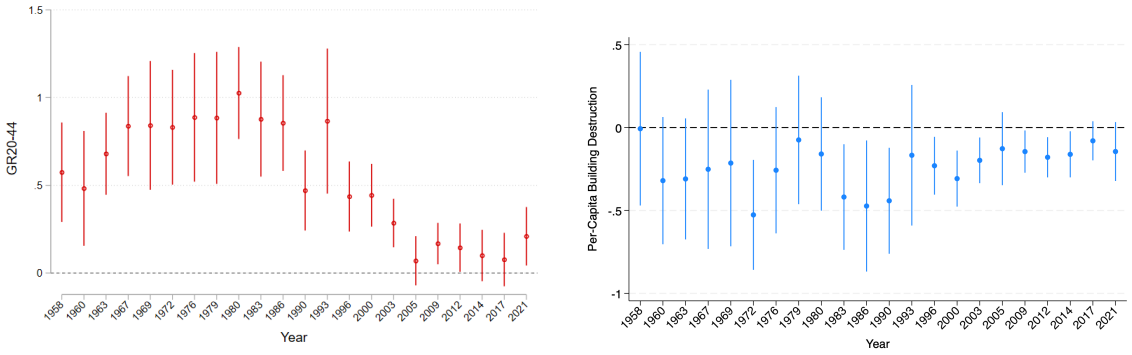
	(1)	(2)	(3)	(4)	(5)	(6)
	1958-1990	1958-1990	1958-1993	1958-1993	1958-2021	1958-2021
Soldier-Generation Gender Ratio in 1950	0.642***	0.771***	0.627***	0.778***	0.441***	0.548***
	(0.111)	(0.121)	(0.111)	(0.123)	(0.089)	(0.096)
Per-Capita Building Destruction	-0.378**	-0.288**	-0.382**	-0.279**	-0.303***	-0.236**
	(0.145)	(0.135)	(0.144)	(0.132)	(0.110)	(0.093)
Non-Soldier-Generation Gender Ratio in 1950		-0.322**		-0.373***		-0.303***
		(0.127)		(0.129)		(0.094)
Seiyukai vote share in 1928		0.072		0.064		0.045
		(0.064)		(0.064)		(0.053)
N	3600	3600	3900	3900	6600	6600
Year FE	✓	✓	✓	✓	✓	✓
Latitude and Longitude		✓		✓		✓
R^2	0.193	0.207	0.207	0.223	0.429	0.439

Note:

We now examine how persistent the martyrs effect and morale bombing effects are. For this purpose we estimate β_1 and β_2 in equation (4) by estimating it separately for each election year. We include the control variables we used in Table 2. We then plot the evolution of β_1 over time in Figure 6(a) and β_2 in Figure 6(b).

Panel (a) of Figure 6(b) presents the results for the coefficients of the soldier-generation gender ratio. It shows strong persistence of the martyrs effect. In particular, the coefficient is positive throughout our sample period over 60 years. Given that the first election in our study period is 13 years after the end of the WW2, it suggests the persistence of the martyrs effect over more than 70 years. However, it should also be

Figure 6: Persistence of the Impact of Gender Ratio and Building Destruction on the LDP Vote Share



(a) Soldier-Generation Gender Ratio

(b) Per-Capita Building Destruction

Note:

noted that the coefficient is decreasing over time, suggesting thatt the martyrs effect may disappear in the future.

Panel (b) of Figure 6(b) presents the results for the coefficients of teh per-capita building destruction. Although the estimates are somewhat noisier than the case of the soldier-generation gender ratio, the qualitative pattern is very similar to the soldider-generation gender ratio (but in the opposite sign): the cooefficient is decreasing in absolute value but it remains negative throughout our sample period. This suggests the persistence of the morale bombing effect.

Placebo Tests

We conduct two placebo tests to check that we indeed capture the martyrs effect and the morale bombing effect. We first address the concern that the gender ratio may capture the gender differences of voting pattern, rather than the effect of the war. To address this, we control for the gender ratio of non-soldier cohorts. To address this, we add to the column 2 of Table 2 the gender ratio of six generations in 1950: 5-9, 10-14, 15-19, 45-49, 50-54, 55-59. Most people in these generations did not serve as a soldier in the WW2 either because they were too young or too old. Figure 7 presents the coefficients, separately for different cohorts. No coefficient of non-soldier cohorts is positive in a statistically significant way, and only the soldier-generation gender ratio exhibits strong statistical significance in the positive direction. In this sense, it is hard to explain the martyrs effect by persistent differences between men and women. This result suggests that the gender ratio matters because it captures military casualties.

Second, to further mitigate the concern that we are not capturing persistent political differences but are capturing the effect of the war, we use the pre-war voting share of Seiyukai (a relatively right-wing party) as an outcome variable in the specification (4). This analysis tests the randomness of military and civilian casualties. In general these can be correlated with pre-war political preferences. For instance, Japan might send troops from stronger pro-military attitudes to a tough battlefield or the US may target cities with stronger pro-military attitudes in air-raid bombing. If such correlation exists, then using the pre-war political attitudes in the outcome variable should exhibit statistical significance. In contrast, since pre-war political attitudes are not affected by the martyrs effect and the morale bombing effect, the importance of these effects does not induce statistical significance.

Table 3 presents results. Note that while our regression results so far have controlled for the pre-war

Figure 7: Regression Coefficients of Gender Ratio of Different Cohorts



voting pattern, in this analysis we exclude the 1928 Seiyukai's vote share from a control variable to avoid tautology. Column 1 uses the 1928 election results, as it is the only pre-war election in which Seiyukai had a candidate in all top 300 cities. Column 2 shows that adding control variables does not change this result. Column 3 and 4 further pools the 1930 and 1932 elections. Either way, both gender ratio and building destruction are not associated with the pre-war election results, which should be the case if pre-exisitng political differences are not correlated with millitary and civilian casualties.

Table 3: Placebo Test: Pre-war Pro-military Vote Share as an Outcome Variable

	(1)	(2)	(3)	(4)
	1928	1928	1928-1932	1928-1932
Soldier-Generation Gender Ratio in 1950	0.035	0.159	0.072	0.101
	(0.115)	(0.137)	(0.094)	(0.093)
Per-Capita Building Destruction	-0.193	-0.103	-0.009	-0.024
	(0.204)	(0.185)	(0.147)	(0.136)
Non-Soldier-Generation Gender Ratio in 1950		-0.202*		-0.168*
		(0.116)		(0.087)
latitude		0.002		-0.002
		(0.009)		(0.007)
longitude		0.003		-0.001
		(0.008)		(0.006)
R^2	0.005	0.022	0.343	0.349
N	300	300	863	863

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4 Additional Analysis

In this section, we examine the relationship between war damages and public opinion toward remilitarization through three distinct channels. First, we analyze different measures of air-raid casualties, focusing on deaths and missing persons. Second, we investigate the effects of war damages on voting patterns for anti-military parties, such as the Socialist Party and the Communist Party. Third, we explore the relationship between voter turnout and the extent of war damages. Finally, we discuss counterfactual LDP voting share when the martyrs effect and the morale bombing effect disappear.

Alternative Measure of Air-raid Casualties (Death and Missing)

Instead of using the number of buildings destroyed by air raids as a measure of civilian casualties, we employ the number of deaths and missing persons to explore the relationship between civilian casualties and public opinion toward remilitarization. For this purpose, we estimate the following regression model:

$$\text{LDP vote share}_{it} = \beta_1 \text{SGGR}_i + \beta_2 \text{PCDM}_i + \gamma \text{Controls}_{it} + \text{Year fixed effects}_t + \epsilon_{it}, \tag{2}$$

where PCDM_i is per capita death and missing. Table 4 shows the results.

Unlike the results using the number of buildings destroyed, we do not observe statistically significant effects of per capita deaths and missing persons, although the coefficients are negative and the qualitative implication remains intact. This lack of significance may stem from the higher measurement error associated with this variable, as discussed in previous studies on the impact of bombing (Davis and Weinstein 2002; Bosker et al. 2007; Takeda and Yamagishi 2024). These studies highlight that the number of buildings destroyed is more robust to variations in evacuation strategies during the war. Nevertheless, we include per capita deaths and missing persons in supplementary analyses to provide additional context and robustness.

Vote Share of Anti-military Party

As discussed earlier, the Japan Socialist Party (JSP) was formed in 1955, with one of its primary goals being the preservation of the pacifist stance enshrined in the Japanese Constitution. If the LDP vote share serves as an indicator of support for remilitarization, we interpret the JSP vote share as a measure of opposition to remilitarization. To examine this relationship, we estimate the following regressions using data from 1958 to 1993;

$$\text{JSP vote share}_{it} = \beta_1 \text{SGGR}_i + \beta_2 \text{PCBD}_i + \gamma \text{Controls}_{it} + \text{Year fixed effects}_t + \epsilon_{it}. \tag{3}$$

Interestingly, the sign of the soldier-generation gender ratio in 1950 is the opposite of what we observe when using the LDP vote share. This suggests that higher military casualties, as measured by a higher soldier-generation gender ratio, are associated with less support for the JSP. In other words, cities with greater military casualties are less likely to support anti-remilitarization policies. This finding aligns with the results obtained using the LDP vote share, where we observed that cities with higher military casualties tend to support remilitarization more strongly.

The Japan Communist Party (JCP) has also opposed any revision of Article 9 of the Constitution. On its website, the JCP states that it "calls for a national united front to oppose any revision of Article 9 and is the only party advocating for the full implementation of Article 9." An advantage of focusing on the Japan Communist Party (JCP) rather than the SDP is twofold. First, the JCP had a policy of having a candidate in every electoral district, which avoids the selection bias that a party may not have a candidate when it

Table 4: Deaths and Missing Persons as Civilian Casualty Measure

	(1)	(2)	(3)	(4)	(5)	(6)
	1958-1990	1958-1990	1958-1993	1958-1993	1958-2021	1958-2021
Soldier-Generation Gender Ratio in 1950	0.641***	0.763***	0.625***	0.768***	0.397***	0.489***
	(0.109)	(0.118)	(0.110)	(0.121)	(0.075)	(0.080)
Per-Capita Building Destruction	-0.406***	-0.324**	-0.403***	-0.307**	-0.273***	-0.212**
	(0.146)	(0.137)	(0.146)	(0.135)	(0.094)	(0.084)
Per-Capita Death and Missing	0.258	0.259	0.214	0.204	0.143	0.119
	(0.265)	(0.266)	(0.270)	(0.268)	(0.188)	(0.191)
Non-Soldier-Generation Gender Ratio in 1950		-0.310**		-0.356***		-0.243***
		(0.119)		(0.121)		(0.076)
Seiyukai vote share in 1928		0.075		0.066		0.042
		(0.064)		(0.064)		(0.045)
N	3,600	3,600	3,900	3,900	6,600	6,600
Year FE	✓	✓	✓	✓	✓	✓
Latitude and Longitude		✓		✓		✓
R^2	.2	.21	.21	.22	.64	.65

Standard errors in parentheses.
** p < 0.10, ** p < 0.05, *** p < 0.01.*

expects a small vote share. Second, since the JCP was a minority party, voting for it would essentially have no effect on the winning candidate selection. Therefore, we may think that those voting for the JCP engage in expressive voting, rather than strategic one, which well reflects their political preferences.

To examine the relationship between war damages and public opinion toward remilitarization, we estimate the following regression model using data from 1958 to 1993:

$$\text{JCP vote share}_{it} = \beta_1 \text{SGGR}_i + \beta_2 \text{PCBD}_i + \gamma \text{Controls}_{it} + \text{Year fixed effects}_t + \epsilon_{it}. \quad (4)$$

Similar to the JSP results, we observe negative effects associated with the soldier-generation gender ratio in 1950. This again indicates that higher military casualties, as measured by a higher soldier-generation gender ratio, are linked to reduced support for the JCP. In other words, cities with greater military casualties are less likely to support anti-remilitarization policies. These findings further align with the results from the LDP vote share, where cities with higher military casualties exhibit stronger support for remilitarization.

Vote Turnout

We now investigate the role of voter turnout in the relationship between war damages and public opition toward remilitarization. First, we explore how voter turnout interacts with war damages in affecting the LDP vote share (Table 7). When the LDP vote share is used as the outcome variable and voter turnout is controlled for, the coefficients for both air raids and war deaths weaken in absolute terms. This suggests the existence of specific channels. In areas that were already supportive of the LDP, air raids appear to reduce voter turnout, which in turn lowers the LDP vote share.

Table 5: Anti-remilitarization Sentiment Using the Japan Socialist Party Vote Share

	(1)	(2)	(3)	(4)
	1958-1990	1958-1990	1958-1993	1958-1993
Soldier-Generation Gender Ratio in 1950	-0.346**	-0.180**	-0.336**	-0.174**
	(0.134)	(0.067)	(0.131)	(0.065)
Per-Capita Building Destruction	-0.055	0.174	-0.048	0.176
	(0.148)	(0.112)	(0.144)	(0.108)
Non-Soldier-Generation Gender Ratio in 1950	-0.066	-0.124*	-0.067	-0.123*
	(0.072)	(0.073)	(0.068)	(0.069)
Seiyukai Vote Share in 1928	-0.052	-0.064	-0.052	-0.064
	(0.050)	(0.044)	(0.049)	(0.043)
N	3,600	3,600	3,900	3,900
Year FE	✓	✓	✓	✓
Latitude and Longitude		✓		✓
R^2	.22	.3	.24	.32

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Now we see how voter turnout reacts to war damages. See Table 8. In areas where individuals were previously less likely to vote, experiencing war deaths may encourage people to participate in elections, and these individuals tend to vote for the LDP. Thus, the observed relationship between air raids, war deaths, and the LDP vote share appears to be mediated by changes in voter turnout.

Counterfactual LDP vote share if military and civilian casualties were avoided To illustrate the magnitude of the martyrs effect and the morale bombing effect, we compute the counterfactual LDP vote share in 1960 in the absence of these effects. We consider a counterfactual scenario in which the Pacific war ended in the end of 1944. If this were the case, Japan would have experienced little air raid bombibg. We therefore consider the case of no morale bombing effect. Although it is difficult to assess how many soldiers' lives could have been saved by an early surrender, here we assume that the distortion in the gender ratio is two-thirds of the actual case. For instance, when the gender ratio is 1.15, 2/3 (1/15-1) + 1 = 1.1 is the counterfactual gender ratio. We compute the aggregate LDP vote share among the top 300 cities in our sample.

Table 9 presents the results. In the data, the LDP had about 51.6% of the vote share in 1960. If there were less martyr effects, the LDP might have lost the vote share by about 2%, leading to the loss of the majority share. In contrast, if there were no morale bombing effect, this raises the vote share of the LDP by about 1.5%. This illustrates that both the martyrs effect and the morale bombing effect had a sizable impact on the LDP vote share.

Table 6: Anti-remilitarization Sentiment Using the Japan Communist Party Vote Share

	(1) 1958-1990	(2) 1958-1990	(3) 1958-1993	(4) 1958-1993
Soldier-Generation Gender Ratio in 1950	-0.106**	-0.100*	-0.108**	-0.101*
	(0.048)	(0.055)	(0.047)	(0.054)
Per-Capita Building Destruction	0.080	0.084	0.077	0.081
	(0.056)	(0.058)	(0.055)	(0.057)
Non-Soldier-Generation Gender Ratio in 1950	0.077*	0.079*	0.077*	0.079*
	(0.045)	(0.045)	(0.046)	(0.046)
Seiyukai Vote Share in 1928	-0.037	-0.040*	-0.038	-0.040*
	(0.024)	(0.022)	(0.025)	(0.022)
N	3,600	3,600	3,900	3,900
Year FE	✓	✓	✓	✓
Latitude and Longitude		✓		✓
R^2	.24	.24	.23	.24

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Voter Turnout as a Control Variable

	(1) vote_share	(2) vote_share	(3) vote_share
Soldier-Generation Gender Ratio in 1950	0.669***	0.570***	0.672***
	(0.105)	(0.096)	(0.104)
Per-Capita Building Destruction	-0.191	-0.308**	-0.186
	(0.136)	(0.145)	(0.134)
Voter Turnout	0.268***	0.117	0.272***
	(0.099)	(0.082)	(0.100)
Non-Soldier-Generation Gender Ratio in 1950	-0.252**	-0.163	-0.250**
	(0.116)	(0.111)	(0.116)
Seiyukai Vote Share in 1928	0.072	0.049	0.071
	(0.059)	(0.079)	(0.063)
N	3,600	3,600	3,600
Year FE	✓	✓	✓
Latitude and Longitude			✓
R^2	.22	.35	.22

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Voter Turnout as a Dependent Variable

	(1) Voter Turnout	(2) Voter Turnout	(3) Voter Turnout
Soldier-Generation Gender Ratio in 1950	0.283***	0.142**	0.330***
	(0.047)	(0.056)	(0.060)
Per-Capita Building Destruction	-0.451***	-0.464***	-0.373***
	(0.091)	(0.074)	(0.098)
Non-Soldier-Generation Gender Ratio in 1950	-0.196***	-0.144***	-0.223***
	(0.069)	(0.044)	(0.063)
Seiyukai Vote Share in 1928	0.010	0.077**	0.013
	(0.030)	(0.033)	(0.030)
N	3,600	3,600	3,600
Year FE	✓	✓	✓
Latitude and Longitude			✓
R^2	.24	.5	.28

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Counterfactual LDP vote share in 1960 under difference scenarios

Scenarios	Mean	Std. Err.	95% Confidence Interval	
			Lower Bound	Upper Bound
Observed LDP vote share	0.5165	0.0067	0.5034	0.5297
Less martyrs effect	0.4923	0.0062	0.4801	0.5046
No morale bombing effect	0.5317	0.0065	0.5189	0.5446

Note: gender ratio is assumed to be 2/3 of the actual gender ratio distortion. For instance, when the gender ratio is 1.15, 2/3 (1/15-1) + 1 = 1.1 is the counterfactual gender ratio. When the gender ratio is below 1 in the raw data, we assume no change in the gender ratio. The vote share aggregates the too 300 cities in the sample by using the number of city population as weights.

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