Scars of War: the Legacy of WWI Deaths on Civic Capital and Combat Motivation

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Abstract

What drives soldiers to risk their life in combat? Using individual-level data from over 4 million British war records, we show that the legacy of WWI deeply affected local communities and the behaviour of the next generation of soldiers. Servicemen from localities that suffered heavier losses in WWI were more likely to die or to be awarded military honours for bravery in WW2. To explain these findings, we document that WWI deaths promoted civic capital in the inter-war period – as demonstrated by the creation of lasting war memorials, veterans' associations and increased voter participation.

Keywords: World War, Combat Motivation, Conflict, Civic Capital, Memory

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1. Introduction

Throughout history, the capacity to engage in warfare has played a pivotal role in the establishment and survival of states. Warfare is a topical example of a collective action problem, where benefits accrue to a broad group but costs fall squarely with those who fight. Nevertheless, governments are frequently successful in mobilising armies of individuals who are willing to serve and risk their lives in combat. The motivation soldiers often show in battle is difficult to rationalise in terms of pecuniary costs and benefits. Therefore, the question remains: What motivates individuals to fight?

Exposure to the violence of war can be a powerful catalyst for combat motivation by strengthening group identity and uniting people against a common enemy.[1] Recent research indicates that war exposure can also promote pro-social and cooperative behaviours and attitudes. Concurrently, models of social or civic capital and cultural transmission suggest mechanisms through which shared community values may persist across generations.

This paper studies how exposure to war deaths impacts the accumulation of civic capital in communities and the combat behaviour of the next generation of soldiers. To this end, we use a newly assembled dataset on individual war records and community-level characteristics for Britain during the two World Wars. Our main focus lies in investigating how the efforts of British soldiers in WW2 were shaped by deaths of members of their community of origin during WWI. We hypothesise that the cultural transmission of civic capital – shared values and beliefs that motivate groups to engage in socially beneficial activities (Guiso, Sapienza and Zingales, 2011) – connected the behaviour of soldiers involved in the two wars. Our empirical analysis establishes three key facts: (i) Community-level deaths during WWI impact the risk-taking behaviour of British soldiers in WW2, (ii) These effects are mediated by changes in community-level civic capital, and (iii) The persistence of combat behaviour across generations is driven by both family- and community-level transmission.

The historical setting we consider is particularly well-suited to study how exposure to past war violence shapes the behaviour of soldiers. The shock that the First World War inflicted on British communities was deep and heterogeneous, providing substantial variation across space. The subsequent outbreak of WW2 then allows us to directly measure how communities responded to WWI deaths and to what extent this response affected the behaviour of the next generation of soldiers in battle. Seven hundred thousand people lost their lives fighting with the British Armed Forces during WWI, making it the deadliest war in British history. Importantly, the war was never fought on British soil, so the exposure of communities to the violence of the conflict was mainly shaped by the experiences and sacrifices of servicemen. That said, the impact of the war extended beyond its human toll: memories of the war endured in media and political discourse, art and literature, the construction of

[1] Recent work in economics and political science on the legacy effects of war on group identity and nation-building include Lupu and Peisakhin (2017); Dell and Querubin (2018); Dehdari and Gehring (2022). For research on the effect of war exposure on pro-social behaviour see Voors et al. (2012), and Bauer et al. (2016) for a comprehensive review.

numerous memorials, and the collective consciousness of millions of veterans. Two decades later, in 1939, the next generation of Britons was being conscripted to another war and urged to replicate the courage of their parents and grandparents.[2]

Our empirical approach exploits spatial variation in WWI mortality across local communities. To implement it, we gather detailed individual-level data covering over four million British soldiers serving in either of the wars, combined with local characteristics of 14,000 parishes in England and Wales. We start by documenting a strong positive association between mortality at the parish level in WWI and WW2 that holds after conditioning on mobilisation, population and other covariates. Causal interpretation of this correlation relies on assuming that WWI deaths are (conditionally) uncorrelated to parish-level drivers of mortality in either war. This assumption may be violated in the presence of persistent and unobservable determinants of combat behaviour.[3]

To circumvent the possible endogeneity of WWI deaths, we instrument this variable with predicted deaths, constructed using variation in the mortality of different battalions in which soldiers served during the war. Soldiers were assigned to different units, and this allocation largely determined their chances to survive and return to their community. We exploit this institutional feature to construct a shift-share instrument where battalion-level death rates play the role of the exogenous "shocks", while the fraction of individuals from a given parish serving in each battalion correspond to the exposure shares (Borusyak, Hull and Jaravel, 2022). The validity of the instrument relies on the shocks being unrelated to parish-level characteristics that may drive mortality in war, such as socio-economic conditions, local norms, or persistent genetic traits. We provide several complementary pieces of evidence in support of this assumption, and show results are robust to alternative definitions of the instrument and specifications.

The main result of the paper is that exposure to WW1 deaths has a positive and large effect on soldier mortality during WW2. Our estimates indicate that a 1% increase in the number of deaths in WW1 from a community increases deaths of servicemen from that community during WW2 by between 0.2% and 0.5%.

We interpret this as evidence that the combat behaviour of soldiers is affected by exposure to past war deaths and the subsequent remembrance of these deaths within communities.[4]

[2]The weight of the memory of WWI in the early months of WW2 is illustrated by a Times article published on Remembrance Day in 1939 (Times, 1939), "In a remarkable degree, the present conflict is a continuation of the last... We cannot falter where they stood fast; we cannot grudge to give our little where they gave their all". Similarly, on the same day, the Daily Mail included Gerald Sanger's poem "Remembrance", which ends: "So in Remembrance, pledge that we will not cease; Our toil and travail till the deed is done; And we redeem our fallen comrade's glory."

[3]The exogeneity of war deaths is frequently invoked, for instance, in the literature studying the effect of wars on marriage markets – e.g., Abramitzky, Delavande and Vasconcelos (2011), Brainerd (2017) and Boehnke and Gay (2020). Studies relying on the exogeneity of war related destruction in other settings include, for example, Davis and Weinstein (2002), Dericks and Koster (2021), and Acemoglu et al. (2022). There are reasons to be sceptical about the exogeneity of soldier deaths in general, however. For example, using data on British servicemen, Bailey, Hatton and Inwood (2023) report that some area and household characteristics predict being killed in action in WWI.

[4]This interpretation hinges on the assumption that WW2 combat deaths are a suitable measure of WW2

To investigate the mechanisms driving this result, we collect data on different proxies for local-level civic capital – i.e., the presence of charities and mutuals, listed war memorials, branches of the British Legion and voter turnout. We find WW1 deaths positively affect all of these measures, suggesting that community-level changes in civic capital in the inter-war period drive the effects on soldier behaviour observed in WW2. To further investigate the role of civic capital as a mediating factor, we implement an IV mediation analysis using the method proposed by Dippel et al. (2019). Estimates indicate that a large fraction – about two-thirds – of the total effect of WW1 deaths on WW2 behaviour is driven by the indirect effect operating through changes in civic capital. The response of local communities to past war sacrifices thus appears to create conditions that encourage younger generations to take greater risks when fighting for their country in the next conflict.

In the second part of the analysis, we turn to soldier-level data to confirm that the effect on WW2 mortality is indeed due to a change in soldiers' risk-taking behaviour. Using information on all soldiers who were killed in WW2, we show that coming from a parish with higher WWI mortality increases the probability of being awarded an honour for bravery, such as the Victoria Cross or the Distinguished Service Order. Estimates are robust to controlling for age, rank, and regiment fixed effects, indicating that selection of soldiers from different locations into riskier units or more favourable tasks is not driving these results.

We then explore the role of intergenerational transmission of values within British families. To this end, we link individualised data from the 1911 Census to soldiers serving in either of the wars and provide evidence that the transmission of values through the community documented above is complemented by a direct channel that goes from father to son: children of soldiers who were killed in WWI are about 30% more likely to die in WW2 than those who did not lose their father. We find no effect of losing another male household member. This father-son effect co-exists with the community-level effect estimated using our parish-level measure of WWI mortality, lending support to the hypothesis that both "horizontal" and "vertical" transmission of values are important in this setting (Campante and Yanagizawa-Drott, 2016; Bisin and Verdier, 2001).

We next perform additional analyses to assess the extent to which our results can be explained by other candidate mechanisms. To show that our main results are unlikely to be driven by grievances against Germany, we document effects of similar magnitude when focusing only on deaths in battles that did *not* involve the German Army. Next, we show our effect cannot be explained by WWI deaths fuelling higher mobilisation during WW2, as measured in electoral records of 1945. Previous work in other settings has found that war

soldier motivation. This is justified because British WW2 soldiers had many opportunities to avoid combat. For example, the death penalty for desertion had been abolished in 1930 and at least 100,000 British soldiers chose to desert. The fraction of killed or wounded over those taken prisoners was one of the measures used by military officials to measure courage among the troops, and occasional large values raised concerns during the war among the army commanders (French, 1998). Note that we do not need to assume that WWI deaths measure combat motivation since it is the perception of these deaths by subsequent generations that is the driving force for changes in WW2.

losses can affect communities' demographic and economic conditions. For instance, Boehnke and Gay (2020) find an effect of WWI deaths on female labour force participation in France while Abramitzky, Delavande and Vasconcelos (2011) and Brainerd (2017) document impacts on marriages and fertility. Economic and demographic effects in our setting could plausibly affect the opportunity cost of risky actions or parental investments in children which could then feed through to behaviour in WW2. To evaluate this, we regress a battery of related outcomes measured in inter-war years – including rates of unemployment, female labour force participation, and infant mortality as well as measures of population growth and demographic composition – on WWI deaths. There is no detectable effect on any of these potential mediators. In sum, we find no evidence suggesting that the effect of WWI mortality on WW2 behaviour is the result of changes in economic conditions or demographic factors at the local level.

Our results are robust to alternative definitions of the instrument, estimation strategies, and sample selection. We start by showing that estimating the model using death rates instead of log deaths yields very similar results. Recent work has cautioned about the perils of models in logarithms when the dependent variable can take value zero, hence we also demonstrate that our main results remain largely unaffected when dealing with this issue in different ways, including using Bellégo, Benatia and Pape (2022)'s iterative OLS estimator. Next, we estimate the model again using an alternative instrument obtained after excluding Pals battalions – volunteer units that were raised locally in the early stages of the Great War – or using only late-war deaths (when the army was composed almost entirely of conscripts). We also evaluate the robustness of our findings when using an instrument that relies on variation between infantry regiments only. Reassuringly, in all of these exercises we obtain IV estimates that are very similar to our baseline results. Finally, we also demonstrate that standard errors are essentially unchanged when taking into account spatial correlation of different form using Conley (1999)'s procedure (see also the discussion in Kelly 2019 and Voth 2021).

The contribution of our work is to bring forward new evidence to literatures on the social consequences of war, the cultural transmission of values, and the combat motivation of soldiers.

The study of the consequences of war is of interest across the social sciences. In economics, one focus has been to study the consequences of war-related destruction (Davis and Weinstein 2002; Brakman, Garretsen and Schramm 2004; Riaño and Valencia Caicedo 2020; Ciccone 2021).[5] Given the minimal physical destruction of capital in Britain in WWI, most closely related are recent studies that use surveys in developing countries to explore how exposure to conflict-related deaths affects individual behaviour. These studies have found that conflict exposure can foster cooperative and pro-social behaviour, including social group

[5]There are many others. For example, the theoretical game theory literature on conflict in economics has been an active area of enquiry for over half a century - see the review in Kimbrough, Laughren and Sheremeta 2017 and Sandler and Hartley (2007).

participation and political party membership (Voors et al., 2012; Bauer et al., 2016).[6] We contribute to this literature by documenting sizeable and persistent effects of war on community-level civic capital and combat motivation in the context of a large-scale conflict in a developed country.

Our study also relates to the literature that examines the formation of identity (Akerlof and Kranton, 2000; Seror, 2022) and the transmission of values and beliefs across generations (Bisin and Verdier, 2001). The focus on values that sustain individuals' willingness to make voluntary contributions to public good provision connects this paper with models of civic or social capital accumulation (Guiso, Sapienza and Zingales, 2008; Tabellini, 2008), and to studies highlighting that the pro-sociality of children is influenced by their social environment (Kosse et al., 2020). Perhaps the closest work to our own is Campante and Yanagizawa-Drott (2016), who use US data to document that parental war service increases the propensity of offspring to serve throughout the 20^{th} century. While we also study cultural transmission across generations in a military context, we highlight the role of community-level transmission in addition to the father-son channel and document effects on risk-taking behaviour by using data on medals and mortality.

One channel through which cultural transmission operates in our setting is memory and commemorative activity throughout the inter-war period. Bordalo, Gennaioli and Shleifer (2020) highlight how memory influences behaviour through the association of choices today with similar past experiences. Dessi (2008) argues that significant shared experiences can become embedded in collective memory and identity of nations and communities through shared narratives, symbols such as memorials, teaching, and acts of remembrance. Our paper is connected to this strand of work by showing that the collective memory of conflict can translate into behavioural changes with substantial material consequences for the individuals involved (see also Fouka and Voth 2022 and Ochsner and Roesel 2019).

We also relate to previous work on nation building and the role of memory in shaping national identity. Alesina, Reich and Riboni (2020) present a model where modern states that need to mobilise large armies can implement "positive nation-building" policies, such as promoting values of shared culture for which it is worth fighting. Depetris-Chauvin, Durante and Campante (2020) show that shared collective experiences help build a national identity by inducing individuals to identify less with their ethnic group and more with the nation as a whole. Madestam and Yanagizawa-Drott (2012) study how participating in Fourth of July celebrations as a child affect patriotism and political affiliation as an adult. Our results provide empirical evidence illustrating how the legacy of past conflict can promote cooperative behaviour and complement nation-building efforts, especially those directed at strengthening the military capacity of the country.

Finally, there is a clear connection between this paper and the economics and political

[6] Exposure to conflict can also have negative repercussions. For example, WWI heroes were instrumental in the spread of anti-democratic political behaviour in France (Cagé et al., 2023), and individuals who had family members killed or injured in WW2 had lower trust in political institutions (Grosjean, 2014).

science literatures on the combat motivation of soldiers. Costa and Kahn (2003) show that company characteristics – in particular, socio-economic and cultural homogeneity – affected desertion in the US Civil War. Ager et al. (2022) emphasises the role of social image concerns in motivating Luftwaffe pilots to take additional risks in WW2. Other drivers of combat motivation found to be important are propaganda (Barber IV and Miller, 2019), religiosity (Beatton, Skali and Torgler, 2019), and government coercion (Rozenas, Talibova and Zhukov, 2022). All of these papers stress the importance of contemporaneous factors. Instead, we focus on the commemoration of war losses and civic capital, hence focusing specifically on how inter-generational forces can affect combat behaviour.

2. Background

In this section, we describe how men were incorporated into the British Army and how the army was organised during WWI and WW2. We also provide historical context and describe the genesis of some of the customs and traditions of remembrance that developed following the Great War, many of which persist to this day. These institutional details will motivate our subsequent empirical analysis.

2.1. The British Armed Forces during WWI: Enlisting and Conscription

A total of 4.5 million men from England and Wales served with the British Army in the First World War (Winter, 1977), while an additional 200,000 served with the British Navy. Roughly half of these men served as volunteers, while the other half were conscripted. The size of the British military increased by over an order of magnitude during the course of the war, rising rapidly from the small regimental force of only 244,000 units in service at the onset of the war to a massive army at its dénouement.

The composition of the British forces also evolved markedly throughout the war. Before the conflict broke out, the army had been a small and mobile professional force designed to work in tandem with the dominant Royal Navy to maintain an empire covering a quarter of the globe. Britain did not have conscription, and service was entirely voluntary. It was this professional army – the regulars – that provided the six divisions of the British Expeditionary Force that landed in France in the summer of 1914. By the end of that year, much of this initial force had been spent: one third of the men in the initial expedition had been killed and more were wounded or missing (Travers, 1994).

Anticipating high levels of attrition, the Secretary of State for War, Lord Kitchener, issued a call for volunteers immediately after the declaration of war with Germany. This call was initially very successful, with roughly 2.5 million men joining the army in 1914 and 1915 alone (Simkins, 2007). Some centralised efforts were made to prevent recruitment from key industries like mining and shipbuilding, but these restrictions were often ignored by local recruiters or circumvented by volunteers themselves.

The British War Office believed that morale and cohesion would benefit if men could volunteer and fight alongside their friends and peers. To this end, local committees were permitted to raise "Pals" battalions, i.e., units of volunteers from the same locality, occupation, or social club. Because Pals battalions were recruited locally, the creation of these units had the added benefit of relieving the strain on recruitment efforts by the War Office (Simkins, 1994).

In 1915, to further expand the army to match the demand from the war, the Government passed the National Registration Act. Following this Act, a Census was conducted and measures to stimulate recruitment were put in place. After disappointing results, the Military Service Act on January 1916 introduced conscription for all unmarried British males aged 19-41. Only a few months later, the age requirement was reduced to 18 and the exemption for married men was dropped. During conscription, the process of determining who was enlisted was tightened: medical examinations became more rigorous and men working in "reserved occupations" – those deemed vitally important to sustain the war effort or the operation of other essential sectors – were exempted from service.[7] The introduction of conscription in 1916 also led to the effective end of the practice of raising Pals battalions. Conscription would continue until the end of the war in November 1918.

Throughout the Great War, the British Army maintained the death penalty for cowardice and desertion, with over 3,000 men sentenced to death for these reasons. Of these, only 284 men were ultimately executed (French, 1998).

2.2. Organisation of the British Army during WWI

Since the 19^{th} century – and to this day – the British Army has been organised into administrative units called regiments. Most infantry during WWI came from regiments with a regional identity and a specific recruitment area, such as the *Essex* or *Norfolk* regiments. Figure 1 shows a map of local regiments' recruitment areas in 1916, together with regimental headquarters. A man who wanted to enlist could, in principle, do so in any recruitment office across the country. However, the most common choice was to enlist at the local regimental depot. Appendix Figure B.1 shows that this was indeed the case, and that most regiments which had local recruiting areas were disproportionately manned by recruits from their own county.

Regiments are composed of fighting units called battalions, each comprising roughly 1,000 soldiers, of which 35 were officers. Pre-war regiments usually had between 2 and 4 battalions but this number was expanded substantially when the war began. Most of the battalions that took part in the war were created in 1914 and then re-filled with new recruits as attrition took its toll on the army. While assignment of soldiers to regiments was often based on geographical proximity, allocation to battalions was mostly a mechanical process, unrelated to the characteristics of recruits. During Kitchener's call to arms, service battal-

[7]A list of reserved occupations was published in the Times on November 22, 1915. The list included occupations engaged in the production or transport of munitions, mining of coal and certain other minerals, the operation and maintenance of railways, agriculture, and food and clothing production. Besides occupational dispensations, conscientious objectors could be exempted from service on the grounds of political, religious, or moral beliefs at the discretion of a military tribunal.

Figure 1
British Army regiments' recruitment areas in WWI

Notes: Edited extract of a poster originally published by the Parliamentary Recruitment Committee, London, in 1915. Image from the Imperial War Museum archive. © IWM Art.IWM PST 11946. Enlarged section introduced by the authors. Note that not all regiments had a specific recruitment area. Some regiments such as the Royal Field Artillery, Royal Garrison Artillery or the Royal Rifle Corps recruited from all over the United Kingdom.

ions were formed simultaneously and each was filled with recruits as soon as they arrived, in lots of 100 soldiers, until all battalions' ranks were full. Reserve battalions – duplicates of the service battalions – were then formed using the same method (Simkins, 2007). Fighting units deployed in the field were usually divisions, containing 12 infantry battalions and a total force about 18,000 men.

Historians have described how the process of assigning men to battalions was often dominated by the immediate needs of the battlefield. For example, Bet-El (2009) notes that in the vast majority of cases, *"military requirements were the only true measure, given the need to despatch most available men to the front, either in a fighting capacity or as auxiliaries"* .

2.3. WWI Remembrance

Fighting ceased on 11 November 1918 and the Great War was officially concluded in June 1919. The end of the war naturally led to a profound reflection on the lives lost and a desire to acknowledge that sacrifice, manifested in the subsequent adoption of numerous traditions and customs of public and private remembrance. Britain commemorated Armistice Day on 11 November 1919 by observing a two-minute silence with bowed heads to reflect on the fallen, and on the same day in 1921, 9 million remembrance poppies – artificial silk flowers that could pinned on a lapel were sold to raise funds for disabled ex-soldiers. “Battlefield pilgrimages” to sites in Northern France and Belgium by both bereaved family members and tourists became commonplace (Lloyd, 2014), and the unknown serviceman entombed in Westminster Abbey in 1920 was visited by more than a million people in the first week alone. These rituals were sustained throughout inter-war Britain and remain closely observed today. For example, members of the royal family place wreaths on the Cenotaph in London and the public wear artificial red paper poppies on Remembrance Sunday (the second Sunday of November). Also, the Remembrance Trail around the Somme battlefield receives some 200,000 visitors each year.

A widespread form of commemoration that will be important in our empirical analysis is embodied in the thousands of war memorials scattered through many of the country’s cities, towns and villages. These memorials were typically built in remembrance of war dead from each location. In most cases, the creation of WWI memorials was funded locally, through voluntary donations and money-raising activities organised by local parish committees (King, 2014; Winter, 1998). It is estimated that as many as 50,000 WWI war-related memorials of one type or another were built in England and Wales, although a large proportion of this total are memorials to individuals, e.g., gravestones. Around 1 in 10 of these memorials have subsequently been added to the National Heritage List as Listed Buildings, indicating they are legally preserved because of their special architectural or historical interest. Because building memorials that are worthy of being listed was only possible where donations were sufficiently large, they arguably represent a good measure of a high level of local civic capital, that is, those values and beliefs that help a group deal with collective action problems in pursuing socially valuable activities (Guiso, Sapienza and Zingales, 2011).

2.4. The British Armed Forces during WW2

In Spring 1939, the British government began preparations for a possible war against Nazi Germany. The May 1939 Military Training Act introduced limited conscription for single men aged between 20 and 22 so that when war was declared on September 3 there were some 259,000 men in the the Regular British Army (Danchev, 1994). As had happened in the Great War, the army would grow by more than an order of magnitude by the end of WW2.

The National Service (Armed Forces) Act was passed immediately after war was declared and required all males aged between 18 and 41 to register for conscription. Registration began in October 1939 and men were then conscripted by age cohort, starting with the youngest from January 1940. In December 1941 the call-up age was increased to 50. Relative to the army that had taken part in the Great War, the British Army during WW2 was disproportionately, and indeed almost wholly, manned by conscripts.

Those medically unfit were exempted and conscientious objectors could also seek an exemption before a tribunal. Anticipating a long war from the outset, the government had detailed plans to balance manpower across the armed forces and industry, which again relied on reservation by occupation. This was in place until 1942 when scarcity of resources necessitated moving to a system of individual deferment. At the start of WW2, the assignment of men to roles in the services was *ad hoc*, being largely determined by a recruiting officer's recommendation and the War Office's requirements (Crang, 1999). Men were routinely assigned to unsuitable roles. This problem was widely acknowledged and as the war wore on more systematic assessment and allocation systems were introduced.

One important difference between the British Armies of WWI and WW2 is that the death penalties for desertion and cowardice had been abolished in 1930. While WW2 servicemen could still face significant punishment for refusing their duties, these would typically take the form of a prison sentence. Thus, the power that discipline had to prompt men to risk their lives was considerably more modest in 1939-1945 than what it had been in the Great War.

According to the Commonwealth War Graves Commission, over 380,000 soldiers died fighting with Britain during WW2. Heavy fighting took place in many different fronts: France, the North of Africa, South East Asia, Germany. British armies suffered defeat after defeat between 1939 and 1942, before turning the tide of war to victory in 1945.[8] The navy and, in particular, the air force played a more prominent role than in WWI. Yet the army continued to absorb the lion's share of the materiel and human resources of the British effort. It also endured the majority of the British deaths suffered during the war.

2.5. Gallantry awards

Soldiers who distinguished themselves through acts of courage became eligible for a gallantry award. Recommendations for such awards were initated by commanding officers, and would often include endorsements or supporting statements from witnesses. A form containing these details and the soldier's name and unit was then passed up the military hierarchy where it could be approved, rejected, or amended. The highest honour for bravery in combat was – and still is – the Victoria Cross, which was awarded by the monarch to just 627 servicemen in WWI and 181 in WW2. Just below in terms of importance was the Distinguished Service Order, that could be awarded to soldiers of any rank but – unlike the Victoria Cross – not posthumously. Our data also contain information on all the other gallantry awards that were given for less impactful acts of bravery – such as being "mentioned in despatches", as well as medals reserved to servicemen in specific service branches – such as the Distinguished Flying Cross for the Royal Air Force. Campaign medals, e.g., the 1939 to 1945 Star or the Atlantic Star, were given as a simple recognition for service and are unrelated to

[8]The 2^{nd} Battle of El Alamein in 1942 is widely regarded as the turning point of the war in the west. Prime Minister Winston Churchill would later quip "Before Alamein we never had a victory. After Alamein we never has a defeat." (D'Este, 1994)

combat behaviour, hence we exclude them entirely from our analysis.

3. Data and Descriptives

3.1. Data Sources and Assembly

Our empirical analysis rests on two main estimation datasets: the first is a parish-level dataset covering England and Wales and the second is an individual-level dataset including all soldiers who died in WW2. In this section we give an overview of sources and dataset assembly; Appendix A provides a more comprehensive account.

Our principal source for British service personnel deaths and medals is the Commonwealth War Graves Commission (CWGC). We corroborate and enhance the CWGC data using a database obtained from the military genealogy specialist Forces War Records (FWR). Figure 2 is built using data from the CWGC and illustrates the timing of death of British soldiers throughout the war. The main battles are clearly recognizable from the figure, which also illustrates the composition of war deaths by rank.[9]

Individual records on men mobilised during WWI are obtained from the British Army Service Records for 1914 to 1918, which we access through FamilySearch. These records are only partially complete because of a fire that destroyed part of the collection in 1940. We also obtain information on all British men from the full 1911 population Census. These soldier-level sources are then combined with Census information aggregated at the level of parishes and districts obtained from the website "A Vision of Britain through Time" (VoB). Finally, we identify war memorials using the Imperial War Museum's register and the National Heritage List, and construct other measures of civic capital from registers of charitable organisations and election archives.

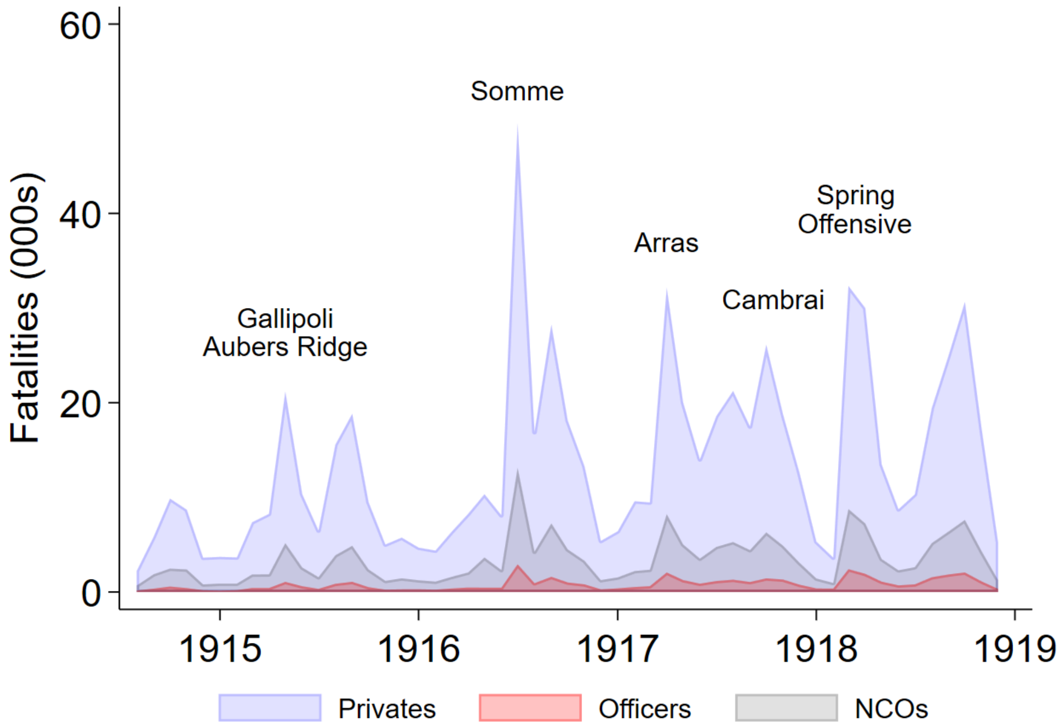
In 1911 England and Wales were divided into 14,664 parishes. We use parishes as our measure of a community throughout for two reasons. First, parishes are a well-defined geography for which we can obtain accurate measures of demographic and economic conditions, as well as proxies for civic capital. Second, due to their small size and the administrative functions they were responsible for in this period (e.g., welfare administration through the Poor Law), parishes arguably represent a good approximation to tightly connected local communities, as individuals living there share the same public services, places of worship, and entertainment.

In constructing our estimation datasets, we rely on a number of data processing steps. For analysis, we group several parishes together, usually because the name of a small parish coincides with the name of the conurbation.[10] We further exclude ten parishes which have names that repeat often – such as Bury – as well as parishes with no residents in 1911,

[9] The time-line of deaths during the 1939-1945 period can be found in Appendix Figure B.2.

[10] Other cases in which grouping is needed is when a conurbation is divided into an *urban* and a *rural* part, or in the case of London, into several parishes that correspond to boroughs.

FIGURE 2
TIMELINE OF WWI DEATHS OF BRITISH SERVICE PERSONNEL



Notes: Number of British Army and British Navy fatalities in each month during WWI. Overlaid text indicates the name of five key battles: Aubers Ridge, on May 9, 1915. Somme, started in July of 1916. Arras, started in April of 1917. Cambrai, started in November of 1917. Spring Offensive, which began in March of 1918. Source: authors' elaboration based on Commonwealth War Graves Commission data.

which are usually parcels of empty land. After restrictions and grouping our final parish set encompasses 14,448 parishes, of which 13,288 are in England and 1,160 are in Wales.

We geolocate soldiers to these parishes using their reported place of birth and residence by a combination of matching location strings to parish names and batch geolocation – for more detail see Appendix A.3, where we also discuss measurement error issues and several validation procedures. The geolocation procedure assigns parishes to over 73% (585,371) of the soldiers killed, 63% (2.6 million) of the soldiers mobilised in our WWI data, and 56% (245,001) of the soldiers killed in our WW2 data. We occasionally use units at higher levels of spatial aggregation (e.g., districts) when information is not available at the parish level. In order to aggregate observations or impute information across geographies and periods, we use a spatial matching procedure that assumes uniform population distribution within small spatial units.

3.2. Descriptives

The panels in Figure 3 represent 1911 parishes and shows the level of spatial variation that we use in the empirical analysis. Panel A is provided for reference and plots population densities, with darker colours corresponding to denser parishes. The geolocation process described in the previous section allows us to represent aggregate mobilisation and death rates at the level of these geographies. As illustrated in Panel B of Figure 3 all regions of Britain contributed with recruits, with mobilisation rates – the ratio of enlisted men over population – above 10% in some locations.[11] Differences in WWI death rates across parishes are shown in Panel C. Substantial spatial variation can also be observed in WW2 death rates, illustrated in Panel D.

Our parish-level dataset includes parish characteristics from the 1911 Census, the number of soldiers coming from each parish and killed in each war, as well as the number of mobilised soldiers during WWI. Descriptive statistics for this dataset can be found in Panel A of Table 1. The average parish had a population of about 2,500 in 1911 and an area of 10.6 square kilometres. The average number of WWI mobilised servicemen taking part in WWI was 199, which puts the average mobilisation rate (defined as mobilised over total 1911 population) at roughly 5%. The average death rate was around 1% in WWI and just about 0.4% in WW2. One-quarter of parishes had a WWI memorial that would later be added to the Heritage List built within their boundaries after the war.

Panel B tabulates statistics for the soldier-level dataset on servicemen who died in WW2. The average age at death was 27, and roughly half of servicemen who died in the War were privates. Only a small fraction of these men – about 3% – received any gallantry honour in WW2.[12]

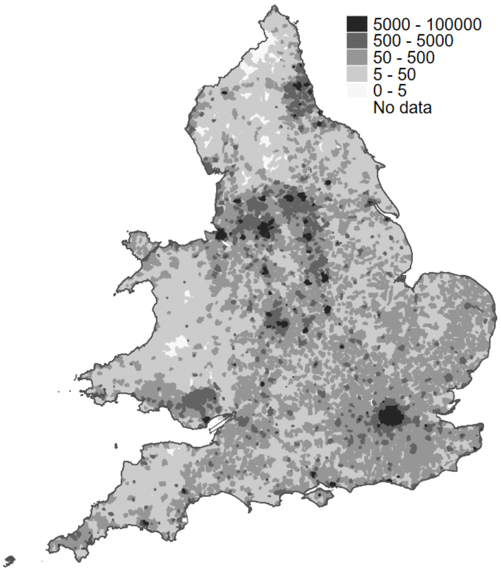
4. The Legacy of WWI Deaths on British Communities

In this section, we study the effects of the deaths of servicemen in WWI on their communities of origin. Specifically, we analyse how WWI mortality affects mortality in WW2 and the accumulation of local civic capital in the inter-war period. The mortality of soldiers during war is, naturally, shaped by the individual motives of servicemen and by their behaviour in battle. For example, the likelihood of being killed in combat is affected by differences in risk-taking attitudes (Ager et al., 2022) and in the willingness of soldiers to obey orders (Rozenas, Talibova and Zhukov, 2022). Because surrendering is often an attractive option for less motivated soldiers to eschew their duty, the British Army command monitored the ratio of apprehended soldiers relative to the number of deaths and wounded as a measure of combat motivation during the course of the WW2 (French, 1998). These considerations thus motivate the choice to use WW2 mortality as a measure of combat motivation in the first part of our analysis.

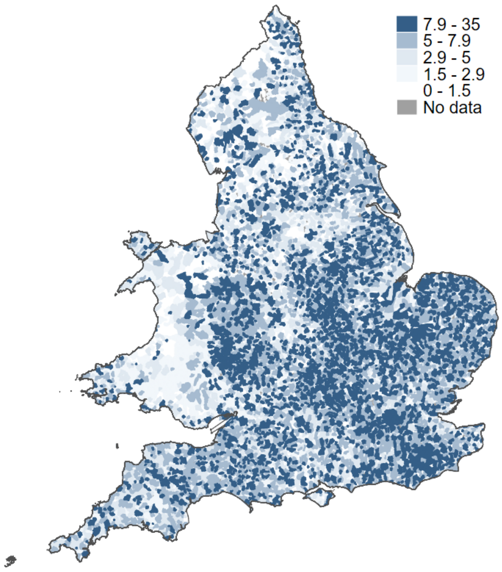
[11] These figures generally underestimate the effective mobilisation rates because the surviving WWI records are incomplete (see previous section and Appendix A for details).

[12] Examples of gallantry honours that appear in the data are the Victoria Cross (the highest honour awarded to fighting servicemen), the Distinguished Service Order, the Military Cross, the Distinguished Flying Cross (for the Royal Air Force), and being "mentioned in despatches". Notice that the information in the data only covers gallantry awards, and not, e.g., campaign medals that were given to all soldiers.

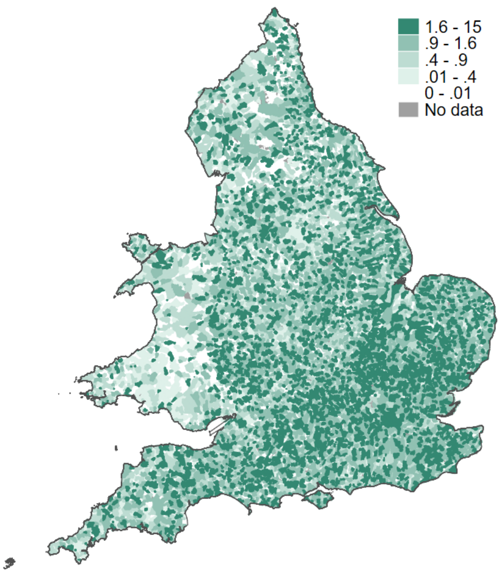
FIGURE 3
DENSITY, MOBILISATION AND WAR DEATHS



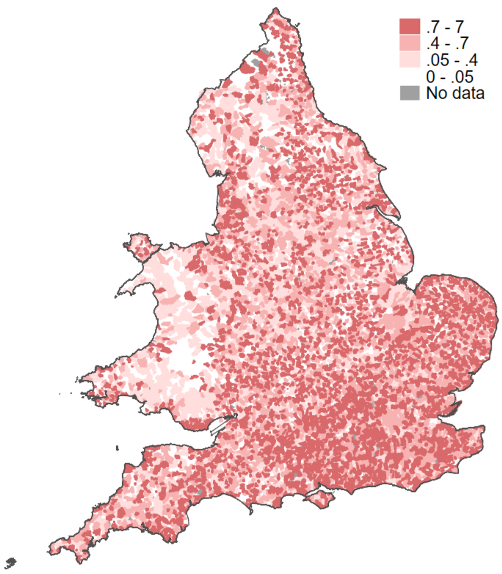
(A) POPULATION DENSITY (POP./KM^2)



(B) MOBILISATION PER CAPITA IN WWI (%)



(C) DEATHS PER CAPITA IN WWI (%)



(D) DEATHS PER CAPITA IN WW2 (%)

Notes: Historical (grouped) parishes in England and Wales. Panel A shows population density, measured as 1911 population per squared kilometre. Panel B shows mobilisation per capita (in percentage points), measured as number of mobilised soldiers from each parish over population. Panels C and D show similar figures for the number of soldiers killed in WWI and WW2, respectively.

Table 1
Descriptive statistics

	Mean	Std. dev.	Min	Max
A. Parish-level data				
Population 1911	2,485.28	39594.44	3	4521685
Area (sq. km)	10.64	11.52	0	314
Population density 1911	268.09	1304.52	0	81090
Share in a reserved occupation (indicator)	0.39	0.17	0	1
Male ratio	0.50	0.04	0	1
Mobilisation WWI	199.32	4457.12	0	503459
Mobilisation Rate WWI (%)	5.20	4.73	0	58
Number WWI Dead	38.63	785.84	0	87918
Number WW2 Dead	14.52	170.64	0	18110
Death Rate WWI (%)	0.99	1.27	0	13
Death Rate WW2 (%)	0.44	0.62	0	7
Listed WWI Memorial (indicator)	0.23	0.42	0	1
British Legion branch (indicator)	0.09	0.28	0	1
Charity/mutual (indicator)	0.28	0.45	0	1
Observations	14448			
B. WW2 Soldier-level data				
Age of Soldier at Death	27.36	7.83	14	91
Received honours (indicator)	0.03	0.17	0	1
Private (indicator)	0.49	0.50	0	1
Officer (indicator)	0.12	0.33	0	1
Mobilisation Rate WWI in origin parish (%)	8.48	5.93	0	58
Death Rate WWI in origin parish (%)	1.78	1.33	0	13
Memorial in origin parish (indicator)	0.72	0.45	0	1
Observations	367827			

Notes: Panel A provides descriptives for the parish-level dataset. Panel B provides descriptives for the soldier-level dataset of all British and Welsh WW2 fatalities (excluding civilians).

Our community-level analysis also studies how WWI deaths affect the accumulation of civic capital during the inter-war period. The remembrance and commemoration of the members of a community fallen while serving may help create a stronger sense of shared values (Voors et al., 2012). We thus study whether WWI deaths affect civic capital by analysing their effect on measures of the intensity of remembrance as well as participation in charities, mutuals and other local-level organizations in the period between the two World Wars. Finally, we conduct a mediation analysis to quantify how much of the effect of WWI deaths on WW2 mortality is due to changes in civic capital during the inter-war period. Civic capital may matter for combat behaviour because it prompts individuals to assume individual costs for collective gain, overcoming the collective action problems that are so pervasive in war.

4.1. Empirical Strategy: Specification and Validation

To study the community-level effect of WWI servicemen deaths on WW2 deaths we begin by considering the following equation:

$$Log(\mathrm{d}_i^{WW2}) = \gamma_0 + \beta Log(\mathrm{d}_i^{WWI}) + \gamma' X_i + \mathbb{FE} + e_i, \tag{1}$$

where d_i^{WW2} is the number of servicemen from parish i who died in WW2, d_i^{WWI} is the number of servicemen from parish i who died in WWI, X_i is a vector of controls, and $\mathbb{FE}$ refers to different sets of fixed effects as described below.[13] The parameter of interest is β, which captures the (conditional) elasticity of deaths in WW2 to deaths in WWI.

The vector of controls X includes (log) population of the parish in 1911 in all specifications. In this way we ensure that the identification of β does not come from cross-sectional differences in parish size. In most specifications, we also include variables related to mobilisation in WWI or its determinants.[14] Finally, we consider an expanded set of controls that includes proxies for local economic conditions.[15]

In order to account for persistence in the identity of the regiments to which local populations are mobilised we occasionally include two different sets of fixed effects. First, we control for the historic county of each parish. The boundaries of the 52 historic counties in England and Wales often coincide with the boundaries of the recruitment areas (see Figure 1). Therefore, accounting for between-county variation should absorb a large part of the differences in the determinants of mobilisation and mortality across the regiments into which men served. Second, we control directly for dummies corresponding to the regiments to which soldiers were mobilised from each parish. That is, we include a dummy for each one of the WWI British Army regiments that will take value one if the parish had any men mobilised into the regiment in question. We cluster standard errors at the historic county level throughout.

We estimate the model by OLS and then move on to an instrumental variable (IV) strategy, based on instrumenting WWI deaths with deaths predicted using variation in the riskiness of different battalions. Causal interpretation of the OLS estimates requires assuming that, controlling for our set of controls and fixed effects, the number of deaths in WWI is exogenous in equation 1. A similar assumption is commonly made in a variety of recent papers that use soldier deaths as a source of exogenous variation – see, e.g,. Abramitzky, Delavande

[13]A graphical illustration of the bivariate relationship between $Log(\mathrm{d}_i^{WW2})$ and $Log(\mathrm{d}_i^{WWI})$ can be found in Appendix Figure B.3. Throughout this section, we consider models in logarithms for reasons that will be clear shortly. We provide results for models in death rates – defined as the number of deaths over total population – in Section 7.

[14]These include the total number of men mobilised in WWI, obtained from aggregating data from FamilySearch. From the 1911 census, we also obtain the share of men of military age, the share employed in military/defence, the male ratio, the share of married men, and the share of workers in what would become reserved occupations during WWI.

[15]These are the share of workers in white collar occupations from the 1911 census, the average rooms per person for residents in the parish, the local unemployment rate, the share of households with no servant, the share with one servant, and log population density as a proxy for urbanisation.

and Vasconcelos (2011), Brainerd (2017), Boehnke and Gay (2020), Acemoglu et al. (2022). The unpredictable nature of warfare – i.e., the "fortunes of war" – justifies the validity of this assumption in some contexts. However, it is reasonable to worry about the presence of unobservable drivers of combat motivation that influence behaviour in both wars.

Instrumenting WWI Deaths

To deal with the potential endogeneity of WWI deaths, we propose to instrument this variable with a measure of predicted deaths based on the assignment of servicemen to different battalions. To develop the intuition, notice that deaths in parish i can be expressed as the sum of deaths of soldiers serving in each battalion j, $\mathrm{d}_i = \sum_{j=1}^{J} d_{ij}$. This quantity can then be decomposed as follows:

$$\begin{aligned} d_{ij} &= m_i \frac{m_{ij}}{m_i} \frac{d_{ij}}{m_{ij}} = m_i \alpha_{ij} \frac{d_{ij}}{m_{ij}} \\ &= m_i \alpha_{ij} \left[\frac{d_j}{m_j} + \left(\frac{d_{ij}}{m_{ij}} - \frac{d_j}{m_j} \right) \right] \\ &= m_i \alpha_{ij} \left[\delta_j + \xi_{ij} \right], \end{aligned}$$

where m_i denotes total mobilisation from parish i, m_{ij} is mobilisation from parish i to battalion j, α_{ij} is the fraction of soldiers from a parish i mobilised in each battalion and, finally, δ_j denotes the battalion-level death rate.

The expression above shows that deaths can be decomposed in a part predictable using battalion-level mortality and an idiosyncratic part – due to parish-level unobservable determinants of mortality:

$$\mathrm{d}_i^{WWI} = \underbrace{m_i \sum_{j=1}^{J} \alpha_{ij} \delta_j}_{predictable} + \underbrace{m_i \sum_{j=1}^{J} \alpha_{ij} \xi_{ij}}_{idiosyncratic}.$$

We then instrument $Log(\mathrm{d}_i^{WWI})$ with

$$z_i = Log \left(m_i \sum_{j=1}^{J} \alpha_{ij} \tilde{\delta}_j \right),$$

where $\tilde{\delta}_j = \frac{d_j - d_{ij}}{m_j - m_{ij}}$ is battalion j's leave-out-mean death rate.

This instrument has a shift-share structure, with shares α_{ij} and shocks $\tilde{\delta}_j$. Identification can thus be achieved by assuming that either the shares or the shocks are exogenous (see, e.g., Goldsmith-Pinkham, Sorkin and Swift 2020). Given that the variation in mortality across battalions is likely to be driven mostly by where they were deployed and by the fortunes of war, in our setting the most promising approach for identification is the one that relies on assuming shocks are exogenous (Borusyak, Hull and Jaravel, 2022). Formally, our assumption is that battalion-level mortality – conditional on a set of observables and fixed effects – is unrelated to parish-level determinants of mortality in WWI.

In the following, we show balancing checks to validate the claim that battalion-level shocks are indeed orthogonal to parish-level characteristics. To further strengthen our confidence in this empirical strategy, in estimation we will at times also include as a control a variable z_i^r, which mimics z_i but is constructed using regiment (rather than battalion) death rates.

We report first-stage estimates of the effect of z_i on $Log(\mathrm{d}_i^{WWI})$ under different sets of controls in Appendix Table B.1. Predicted deaths obtained from battalion-level mortality are strongly and positively correlated with actual deaths. Formal tests of the relevance condition indicate that the instrument is strong, with F-statistics between 19 and 56 depending on the specification.

In Figure 4, we report a series of balancing checks obtained by regressing parish characteristics on the instrument z. All specifications include, alongside the instrument, the logarithms of 1911 population and WWI mobilisation, as well as historic county and regiment mobilisation fixed effects. The first estimate from the top corresponds to the (standardised) first-stage coefficient which, as expected, is positive and significant. All other coefficients are close to zero and statistically insignificant at conventional levels, indicating that the instrument is not correlated with observable characteristics that could affect deaths in WW2. The validity of our proposed IV strategy then relies on this lack of correlation holding also for unobservable factors that could affect death rates in both wars.

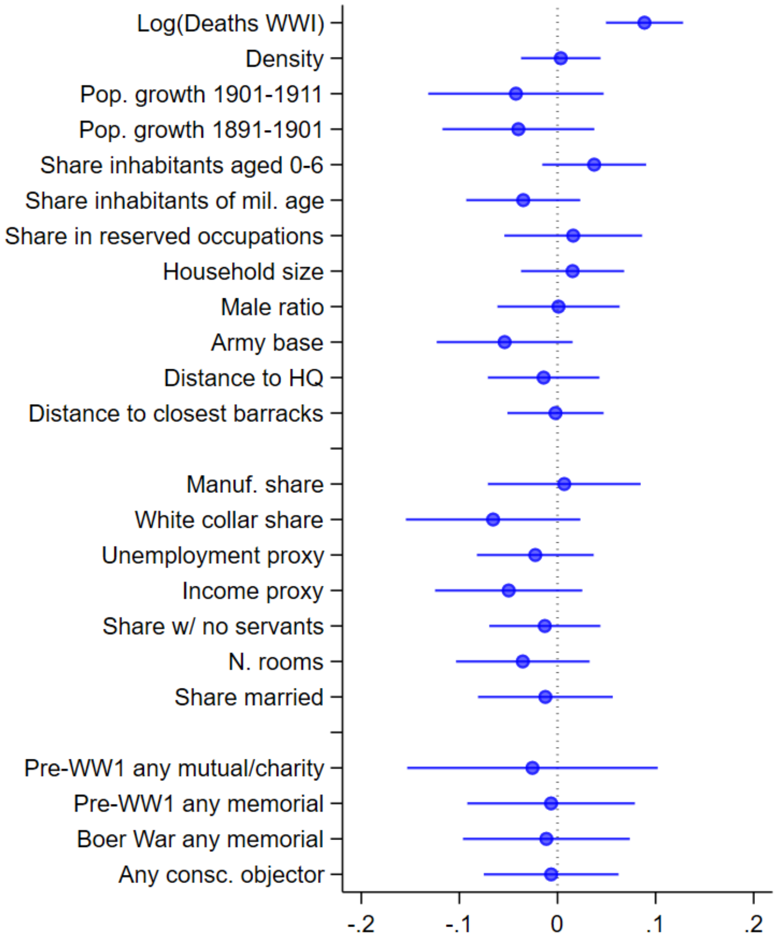
The fact that the instrument is constructed by aggregating death rates of different battalions is likely to induce dependence across parishes with similar exposure shares. To take into account this correlation in inference, Borusyak, Hull and Jaravel (2022) recommend to aggregate the data at the shock level – in our setting, the battalion – using the shares as weights, and perform balancing checks at this level. We show in Appendix Figure B.4 that results from battalion-level balancing checks are analogous to those reported in this section.[16]

4.2. Results: Legacy Effect of WWI Deaths on Deaths in WW2

OLS estimates from equation 1 are reported in Table 2. Each column corresponds to a different set of controls and fixed effects as indicated in the table foot. A 1% increase in the deaths in WWI is associated to an increase in the deaths in WW2 of about 0.16-0.22%. This effect is sizeable, indicating there is a strong impact of deaths taking place in a community during WWI on WW2 combat outcomes. Adding socio-economic controls (col. 3), county fixed effects (col. 4) and regiment mobilisation fixed effects (col. 5) has modest impact on point estimates.

[16] Borusyak, Hull and Jaravel (2022)'s identification result also relies on the assumption that there is a sufficiently large number of shocks and that these are sufficiently dispersed in terms of their average exposure. We follow their recommendation and report the inverse of the Herfindahl Index of shock-level average exposure as a way to describe the effective sample size. The effective sample size in our dataset is is equal to 202, suggesting that shocks are well dispersed and our setup is appropriate to rely on the asymptotic results derived in the paper.

Figure 4
Instrumental Variable Balancing Checks



Notes: OLS estimates of individual regressions of the instrument z_i on different variables, together with 95% confidence intervals. All outcomes have been standardised to have mean zero and unit standard deviation. The first coefficient shows the first-stage, that is the regression coefficient of the effect of the instrument on the (standardised) instrumented variable, $Log(\mathrm{d}_i^{WWI})$. All specifications control for logged 1911 population, WWI mobilisation, regiment mobilisation and historic county fixed effects. Standard errors clustered at the historic county level.

In Table 3, we report IV estimates. The resulting elasticities vary between 0.4 and 0.5 depending on the specification. In columns 3 and 4 we control, respectively, for regiment mobilisation fixed effects and for z^r – predicted deaths based on *regiment*-level death rates. The fact that point estimates are largely unaffected by the inclusion of these controls suggests that the endogenous selection of soldiers into regiments is of little consequence for our findings.

Instrumental variable estimates are in line with OLS results but larger in magnitude. Part of this difference may be attributable to the presence of measurement error in our WWI deaths measure, due for example to misreporting of the place of origin in military records, possible geo-coding errors, and missing records. Additionally, IV estimates are local in that they identify the treatment effect only for the group of compliers (Imbens and Angrist, 1994).

Table 2
Effect of WWI Deaths on WW2 Deaths – OLS Estimates

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$	(5) $Log(d^{WW2})$
$Log(d^{WW1})$	0.222***	0.180***	0.179***	0.176***	0.156***
	(0.015)	(0.017)	(0.017)	(0.017)	(0.017)
Obs.	6349	6349	6349	6349	6349
R2	0.72	0.73	0.73	0.74	0.75
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	N	Y	Y
Regiment mob. FE	N	N	N	N	Y

Notes: OLS estimation results of the effect of WWI deaths on WW2 deaths at the parish level. All specifications control for the logarithm of 1911 parish population. Different additional sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level in parentheses.

Table 3
Effect of WWI deaths on WW2 deaths – IV Estimates

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.404***	0.488***	0.506**	0.409**
	(0.124)	(0.131)	(0.228)	(0.202)
First stage F-stat	42.7	55.9	19.4	26.8
Obs.	5466	5466	5466	5376
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: IV estimation results of the effect of WWI deaths on WW2 deaths at the parish level. All specifications control for the logarithm of 1911 parish population. Different sets of controls and fixed effects are used in each column. In column 3 we include regiment mobilisation fixed effects whereas in column 4 we control for our measure of predicted deaths constructed using regiment-level mortality, z^r. Standard errors clustered at the historic county level in parentheses.

In Appendix D we attempt to characterise the group of compliers following Imbens and Rubin (1997) and show that compliers are, on average, parishes that are more populated and have higher density. This heterogeneity in effects across parishes could then be explained by larger effects in urban centres, for example because commemoration and celebration of war fatalities is facilitated in densely populated communities.

Overall, the findings in this section indicate that servicemen who were more exposed to past war deaths have higher risk of dying in WW2.[17] Several recent studies in economics and political science have used death as a proxy for combat motivation (see e.g., Ager et al. 2022, Beatton, Skali and Torgler 2019, Rozenas, Talibova and Zhukov 2022). The observed effect on deaths would then reflect a change in the behaviour of soldiers, who become more willing to take risks in combat. This behavioural change could in turn help overcome the collective action problems that characterise warfare. In Section 5 below, we use individual-level data to provide additional evidence linking the legacy of WWI deaths with servicemen motivation by studying their impact on honours received for bravery in combat during WW2.

4.3. Results: Legacy Effect of WWI Deaths on Commemoration and Civic Capital

We hypothesise that the causal link between localised war deaths in WWI and WW2 has roots in the cultural transmission of values in communities across generations. In particular, the actions of community members in WWI and how those actions are remembered may foster the creation of civic capital – those shared values that encourage cooperation and socially valuable behaviour. Civic capital matters for combat behaviour of subsequent generations because it prompts individuals to assume large private costs for widespread gain.[18] In this section, we provide estimates showing that WWI deaths affected a community's civic capital by studying the response of local measures of civic capital in the inter-war period.

We begin by studying whether the number of WWI deaths affected the presence of memorials commemorating WWI soldiers in a community. We restrict our attention to listed memorials, i.e., buildings or structures that must be legally preserved because of their historical or architectural significance. The funding to create these memorials was often raised locally, so listed memorials will be present in communities that spent substantial time and effort on their design and construction. In addition, in an attempt to focus only on memorials that were relevant in the inter-war period, we exclude those listed after the WWI Centenary in 2014, when a campaign by Historic England doubled the number of listed memorials to preserve them from degradation.[19]

Next, to create an additional proxy of local civic capital, we use information on all branches of the British Legion. The Legion was the largest veteran's association created after WWI. To this day, it still leads the annual poppy appeal taking place in Britain during the fall and several other remembrance initiatives (see Section 2). Then, we gather information on the presence of mutuals or charities created in the inter-war period in the parish. Mutuals

[17]This interpretation requires that WWI mortality has no impact on the likelihood of participating in WW2. We show that there is indeed no effect of WWI deaths on WW2 mobilisation in Section 6 below.

[18]Civic capital can accumulate through cultural transmission of civic values and beliefs to children, formal or informal education, and through socialisation and social pressure (Guiso, Sapienza and Zingales, 2011), while Kosse et al. 2020 highlight how role models and social environments can determine prosociality. In our setting all these mechanisms may be at play: families hailing from parishes that suffer more losses are more likely to be bereaved or otherwise exposed to local sacrifice thereby socialising them to selfless behaviour; children from these same areas may in turn be more exposed and receptive to the transmission of civic and pro-social values from a range of possible role models including surviving and remembered parents and family members, community participants and leaders, and local educators.

[19]We show that this restriction has little qualitative impact on our results in Table C.1 in Appendix C.

are co-operative organisations that are owned and democratically controlled by their members and usually aim to benefit those who are affiliated or the local community. Charities are typically institutions with philanthropic aims involving members of the community as providers of funding or management services.

Using this information, we estimate an IV model analogous to the one presented above but with the dependent variable replaced with a dummy taking value one if a parish contains one of these attributes. Estimates reported in Table 4 show positive and significant effects of WWI deaths on all proxies for civic capital. Column 1 in Panel A indicates that doubling the number of deaths will, on average, increase the probability of having a listed memorial in the parish by 13 percentage points, an effect roughly as large as the baseline probability. The estimate in column 2 indicates that doubling deaths increases the probability of having a British Legion branch by 28 percentage points, an effect of half the baseline. We also find a statistically significant effect of similar magnitude on the presence of charities and mutuals in the parish. OLS and Poisson regression results for these outcomes are qualitatively similar and reported in Table B.2 of Appendix B.

TABLE 4
EFFECT OF WWI DEATHS ON CIVIC CAPITAL – IV ESTIMATES

	(1) Memorials	(2) Legions	(3) Mutuals/Char.
$Log(d^{WW1})$	0.135*	0.282***	0.232***
	(0.068)	(0.102)	(0.076)
Mean of dep.var.	0.13	0.43	0.15
First stage F-stat	27.43	27.43	27.43
Obs.	6751	6751	6751
Mobil. controls	Y	Y	Y
Econ. controls	Y	Y	Y
County FE	Y	Y	Y
Regiment mob. FE	Y	Y	Y

Notes: IV estimation results of the effect of WWI deaths on indicators for having a listed memorial built (column 1), a British Legion branch (column 2), or a charity or mutual established (column 3) in the inter-war period. Full controls and fixed effects are included in all specifications. Standard errors clustered at the historic county level in parentheses.

We conclude this section by testing for the presence of an effect of WWI deaths on electoral turnout in national elections for the period December 1910-November 1935. Data are available only at the electoral constituency level so we aggregate variables at this level for this analysis. Estimates of the effect of WWI deaths for different general elections are reported in Table 5. Results show that, as expected, WWI deaths are uncorrelated with election turnout in 1910. Estimates in other columns, however, indicate a positive effect of WWI deaths on turnout in all elections in the inter-war period. These effects are robust to controlling for election turnout in December 1910 in panel B and again provide evidence that deaths during the Great War positively impacted civic capital in the most affected communities.

TABLE 5
EFFECT ON ELECTION TURNOUT

	(1) 1910	(2) 1922	(3) 1929	(4) 1935
A. Baseline				
$Log(d^{WW1})$	-0.015	0.027	0.036**	0.039*
	(0.030)	(0.022)	(0.018)	(0.021)
Mean of dep.var.	0.86	0.74	0.78	0.73
Obs.	496	460	496	471
B. Conditional on 1910 turnout				
$Log(d^{WW1})$		0.036	0.043***	0.046***
		(0.024)	(0.013)	(0.015)
Mean of dep.var.		0.74	0.78	0.73
Obs.		453	488	464
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	Y	Y	Y	Y
Regiment mob. shares	Y	Y	Y	Y

Notes: OLS results of the effect of WWI deaths on national election turnout at the constituency level, obtaining from estimating the following model:

$$\text{Turnout}_c^t = \gamma_0 + \beta Log(\text{d}_c^{WWI}) + \gamma_1 \text{Turnout}_c^{1910} + \gamma_2' X_c + \gamma_3' \text{MSh}_c + \varepsilon_c$$

where Turnout_c^t is the turnout rate recorded in constituency c in the general election taking place in year t, $Log(\text{d}_c^{WWI})$ is the logarithm of the number of WWI deaths of servicemen from c. This variable, as well as the control variables included in X_c, is obtained from aggregating parish-level data to constituencies. MSh_c is a vector of shares of mobilised men in each regiment. Unlike the parish-level analysis, here we use shares rather than dummies for each regiment because dummies would be 1 for most constituencies. Finally, Turnout_c^{1910} is the turnout in constituency c in the December 1910 general election. Full controls and fixed effects are included in all specifications. Panel B additionally conditions on December 1910 turnout. Standard errors clustered at the historic county level in parentheses.

Taken together, our findings display a large and positive impact of WWI mortality on all our measures of civic capital. This is evidence that WWI deaths indeed caused a strong reaction at the community level through commemoration, the creation of associations of social significance, and political participation.

4.4. Results: The Effect of Civic Capital on WW2 Deaths

In the previous sections we showed that communities with high WWI mortality are more likely to commemorate deaths, accumulate more civic capital and, ultimately, have high mortality in WW2. These results indicate that changes in shared values might indeed be a channel through which WWI mortality affects the behaviour of soldiers in WW2. However suggestive, these results might not warrant the existence of such a link. WWI deaths can affect WW2 deaths either directly or indirectly through civic capital accumulation. In the latter case, civic capital is called a "mediator". To understand whether civic capital can explain part of the total effect of WWI deaths on WW2 deaths, we need to separately identify the importance of the direct and indirect effects.

To this end, we follow Dippel et al. (2019) and Dippel, Ferrara and Heblich (2020), who show that identification of both effects with a single instrument is possible under the assumption that WWI deaths can be endogenous in a regression of WW2 deaths on WWI deaths, but this endogeneity cannot arise from unobserved factors that affect both WWI deaths and WW2 deaths. Instead, it must come only from factors that affect both WWI deaths and civic capital.

In our setting, this assumption allows for the existence of parish-level unobservables that determine both WWI deaths and civic capital. One such instance arises, for example, if soldiers from poorer communities are in worse health conditions and die more often and, at the same time, these communities have higher civic capital. However, conditional on civic capital (and its unobserved determinants), WWI deaths are required to be exogenous in a regression of WW2 deaths on both WWI deaths and civic capital.

Table 6 reports IV results obtained by applying the method by Dippel et al. (2019). Estimates suggest that the total effect of WWI deaths on WW2 deaths (also estimated above with our baseline IV model) is driven in part – roughly one-third – by a direct effect of WWI mortality, and in part by an indirect effect of these deaths that goes through the accumulation of civic capital. Although estimates of both effects are, in some specifications, imprecise, overall the results strongly indicate that a significant part of the effect of WWI mortality is due to civic capital, supporting our hypothesis.[20]

5. Individual-Level Analyses: War Honours & Inter-generational Transmission

5.1. WWI Deaths and WW2 Honours

To further investigate the behavioural mechanisms through which exposure to war deaths leads to higher mortality in the subsequent conflict, we turn to our soldier-level dataset. Specifically, we study whether soldiers from parishes exposed to higher mortality in WWI were more likely to receive military gallantry honours in WW2.[21]

We can use information on the gallantry honours awarded during service to construct a measure of effort and bravery in battle. We then regress an indicator for having been awarded an honour during service or posthumously on the WWI mortality shock, a set of controls and fixed effects as follows:

$$\text{Honour}_{is} = \alpha + \beta Log(\text{d}_i^{WWI}) + \gamma' X_i + \mathbb{FE} + \epsilon_{is}, \tag{2}$$

[20]It is legitimate to ask what is the direct effect capturing in this setting. One possibility is that civic capital is imprecisely measured by our proxy variable, and the direct effect captures the part of the correlation between WWI and WW2 deaths that we are unable to explain using this proxy.

[21]The soldier-level dataset only contains information on servicemen who died during the war, hence we do not observe honours awarded to soldiers who survived. However, it is reasonable to expect that studying the award of medals to soldiers who eventually die is informative about the behavioural response of the universe of soldiers.

Table 6

IV results – Effects of WWI Deaths on WW2 Deaths with civic capital as mediator

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
total effect	0.456***	0.530***	0.527**	0.433**
	(0.153)	(0.109)	(0.214)	(0.189)
direct effect	0.137***	0.121***	0.112***	0.124***
	(0.030)	(0.021)	(0.028)	(0.026)
indirect effect	0.328	0.416***	0.418	0.315*
	(0.208)	(0.131)	(0.268)	(0.189)
Obs.	5465	5465	5465	5375
F-stat $Log(d^{WW1})$ on Z	41.95	54.26	20.21	26.60
F-stat M on $Z\|Log(d^{WW1})$	27.04	25.83	5.85	20.27
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: Mediation IV results of the effect of parish-level WWI deaths on WW2 deaths using an index of civic capital as mediator M. This index is constructed as the first principal component of the number of listed WWI memorials, of branches of the British Legion, and of charities and mutuals registered in the parish in the inter-war period. Implementation is carried out in in Stata using the command *ivmediate*. See Dippel, Ferrara and Heblich (2020). Controls and fixed effects are included as specified in each column. Standard errors clustered at the historic county level in parentheses.

where s indexes soldiers and i parishes. X_i is a vector that includes parish-level mobilisation and socio-economic controls as before. In addition, we also incrementally include fixed effects for age in 1939 (with catch-all indicators for individuals under 10 and above 65), rank, and regiment.[22] If soldiers coming from localities that were disproportionately affected by WWI fight more bravely, we should observe a positive effect of deaths in WWI on the probability of being awarded honours.

Results in Table 7 suggest that this is indeed the case. WWI deaths are positively related to the probability of receiving an honour with estimates significant at conventional levels in all specifications. These effects are also not negligible: a soldier coming from a parish with twice as many deaths in WWI has a 0.0014-0.0035 higher probability of being awarded a medal, a 5-12% increase over the baseline probability in the estimation sample (0.029). Estimation results using the number of honours received as outcomes are very similar and reported in panel B.[23]

[22]The first-stage of our instrument in this dataset is weak and this precludes an IV analysis using soldier-level data. However, the endogeneity problems that the IV mitigates are arguably weaker in this analysis, since we can here control for a range of soldier-level characteristics and, importantly, regiment fixed effects.

[23]Because the dependent variable in this case is a count variable which often takes value zero, a Poisson regression model might be preferable. Results from such a model are very similar and reported in Appendix's Table B.3.

TABLE 7
EFFECT OF WWI DEATHS ON WW2 HONOURS

	(1)	(2)	(3)	(4)
A. Outcome: Honours Dummy				
$Log(d^{WW1})$	0.005***	0.004***	0.003***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.029	0.029	0.030	0.030
Obs.	221215	221215	207024	207024
B. Outcome: N. Honours				
$Log(d^{WW1})$	0.006***	0.005***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.032	0.032	0.032	0.032
Obs.	221215	221215	207024	207024
Mobil. controls	Y	Y	Y	Y
Econ. controls	N	Y	Y	Y
Age FE	N	N	Y	Y
Rank FE	N	N	N	Y
Regiment FE	N	N	Y	Y

Notes: Soldier-level OLS estimation results of the effect of WWI deaths on the probability of receiving one or more WW2 gallantry honours (Panel A) or the number of honours received (Panel B). Different sets of controls are used in each column (see text for details). Age fixed effects are dummies for age in 1939 (with catch-all dummies for individuals below 10 and above 65). Rank fixed effects are dummies for each rank. Regiment fixed effects are dummies for serving in a given regiment. Standard errors clustered at the historic county level in parentheses.

Importantly, results hold when controlling for age, rank, and regiment fixed effects. In column 4, the most demanding specification, we are effectively comparing servicemen born in the same year, who served in the same regiment with the same rank, but come from parishes with different WWI mortality. Because soldiers had some discretion over which regiment to enlist in, it is important to control for fixed effects at this level to purge all factors determining the regiment each soldier is assigned to. Reassuringly, using only within-regiment variation does not alter the main conclusion of this analysis, with the coefficient being slightly lower in magnitude but still positive and precisely estimated.

In sum, results in this section lend further support to the notion that WW2 soldiers coming from areas that suffered more losses in the Great War took greater risks and fought more bravely, as reflected in the higher propensity to be awarded a medal for their courage.

5.2. Household-Level Effects and Intergenerational Transmission of Values

So far, we have focused on the effects on combat motivation of an aggregate mortality shock, and how its commemoration can affect the civic capital of the community. Of course, however, the experience of war varies across individual households. The loss of a father, husband, brother, friend, could have had profound emotional and economic consequences on those who survived at home.

The set of values and beliefs that a person carries are affected in part by those held by the community she belongs to ("oblique" or "horizontal" transmission), and those passed along by her close family ("vertical transmission", using the terminology by Bisin and Verdier 2001). In a related paper, Campante and Yanagizawa-Drott (2016) show that war service by parents in the US increases the propensity to serve by their offspring throughout the 20^{th} century, and present evidence suggesting father-son and community transmission of war service may be substitutes. It is unclear, however, whether these results on volunteering carry over to our setting and if they translate into changes in actual behaviour in battle.

Our setting and data are suitable to try to shed some light on this hypothesis and to evaluate whether vertical and horizontal transmission mechanisms co-exist in our context. To circumvent the fact that the UK authorities do not release information on WW2 service personnel, we resort to using information from matching the 1911 Census to WWI and WW2 military records. We construct a dataset starting from the 3.4 million male children that were aged 0 to 8 in the 1911 Census. We can then determine who, among those children, died in the war by matching them to our dataset of WW2 deaths. Finally, we use the 1911 Census information to identify their fathers and other household members and match them to WWI deaths. All matches are performed using the automated matching algorithm developed by Abramitzky, Boustan and Eriksson (2012) (henceforth ABE).[24]

Using this approach, we identify some 23,000 of the boys in the 1911 dataset who lost their father in WWI and another 91,500 who lost a different co-habiting household member. Next, we identify about 27,400 children in the Census who are recorded to have been killed in WW2. This dataset is then used to run a series of individual-level regressions of the following form:

$$D_{ic}^{WW2} = \alpha + \lambda_1 D_c^{Father} + \lambda_2 D_c^{Other} + \beta Log(\mathrm{d}_i^{WWI}) + \gamma' X_{ic} + \mathbb{FE} + \epsilon_{ic},$$

where c indexes children aged 0-8 in 1911 and i parishes. D_{ic}^{WW2} is an indicator for whether the child died in WW2, which we multiply by 100 for presentational reasons. D_c^{Father} and D_c^{Other} are indicators for whether the father or another household member co-habiting with the child in 1911 died in WWI. The variable d_i^{WWI} and the fixed effects are the same as above, while X_{ic} includes the same parish-level mobilisation and socio-economic controls as before, plus child-level characteristics (categorical variables for age and father's occupation in 1911). Standard errors are clustered at the historic county level.

Findings are presented in Table 8. We first test in column 1 whether the number of WWI dead in the parish of residence affects the probability of dying in WW2 when conditioning on county fixed effects. Consistent with previous results, we obtain a positive coefficient that suggests that an increase in the number of WWI deaths increases the probability of dying in

[24]We use the ABE matching code from `https://ranabr.people.stanford.edu/historical-record-linking`, last accessed 21 February 2023. Our matching variables include place of birth or residence, forename and surname, age, and father's initial. See Appendix A.5 for details.

WW2.[25] We next evaluate in column 2 if the loss of a co-habiting household member in WWI leads to a greater likelihood of a child dying in WW2, finding a large and highly significant impact of the loss of the father but no significant impact of losing another household member. The magnitude of the father effect is large and amounts to an increment in the probability of dying in WW2 of almost 40% of the baseline. The coefficient on the parish-level WWI deaths are essentially unchanged by adding these two indicators, suggesting that community-wide and household-level transmission mechanisms operate side-by-side in this context. In the final two columns we add district-level fixed effects in an attempt to absorb more local variation, obtaining similar and slightly more precise estimates for the community-level coefficient.

TABLE 8
EFFECTS OF WWI DEATHS ON WW2 DEATHS OF 1911 CENSUS CHILDREN

	(1)	(2)	(3)	(4)
$Log(d^{WW1})$	0.024**	0.023**	0.032***	0.032***
	(0.012)	(0.012)	(0.012)	(0.012)
Father died		0.316***		0.309***
		(0.072)		(0.074)
Oth.HH died		-0.012		0.006
		(0.037)		(0.032)
Mean of dep.var.	0.79	0.79	0.79	0.79
Obs.	3032909	3032909	3032909	3032909
R2	0.003	0.003	0.004	0.004
Full Parish controls	Y	Y	Y	Y
Individual controls	Y	Y	Y	Y
County FE	Y	Y	N	N
District FE	N	N	Y	Y

Notes: OLS estimation results of the effect of parish-level WWI deaths and household deaths on the probability of dying in WW2 for male children aged 0 to 8 in 1911. Individual-level regressions. All regressions include economic and mobilisation controls at the parish level. Individual controls are fixed effects for age in 1911 and father's occupation. Standard errors clustered at the historic county level in parentheses.

These results indicate that vertical and horizontal transmission of values co-exist, suggesting that they could be cultural complements, rather than substitutes. In Bisin and Verdier (2001)'s framework, substitutability derives from the observation that parents living in an environment where their values are also shared strongly by the community do not need to invest in direct transmission by trying to inculcate their children with their values (see also Campante and Yanagizawa-Drott 2016).

Our results do not stand necessarily in contrast with this mechanism. To start, the way

[25]This coefficient is much smaller than our parish-level estimates because here we include *all* male children aged 0-8 in 1911 in estimation. Although a large fraction of them did not fight in WW2, they will still appear as survivors in our estimation, likely attenuating our estimates.

cultural traits are transmitted in our setting is necessarily different, because some of the most important individuals that are meant to be transmitting those values – fathers and members of the community – lose their lives in the war. As such, the values that are passed over are likely to be different from those typically associated with serving, such as helping individuals to mature or work as a team (Campante and Yanagizawa-Drott, 2016). Rather, it is plausible that losing someone close evokes feelings of sorrow, remembrance and possibly celebration among members of the community. These cultural traits may then lay the foundation for building a communal stock of civic capital. In this respect, losing one's father could well have a similar – though perhaps stronger – effect as losing other members of the community, making horizontal and vertical transmission complements rather than substitutes.

6. Alternative Mechanisms

Our main hypothesis is that local deaths during WWI motivated men to exert more combat effort in WW2 because they fostered the accumulation of civic capital in grieving communities during the inter-war period. However, there are other possible mechanisms that may also – at least in part – explain our findings for WW2 outcomes. We discuss four of them in the following.

6.1. Grievance Against the German Army

Most of the fighting carried out by the British Army in both WWI and WW2 was against the German Army. In addition, Germany was perceived – for good reason – as the most important contender within the Central Powers, in WWI, and the Axis, in WW2. Therefore, grievances held specifically against Germany were significant in both wars, and could have been consequential for behaviour in WW2, where the memory of the death caused by the previous war against Germany was ever present. Is it, therefore, possible that the effects of WWI deaths on WW2 outcomes that we document are in part driven by anti-German sentiment.

To investigate this possibility we use the fact that a significant part of the fighting by the British armed forces took place in campaigns that did *not* involve the German forces. In the South-East Asian theatre of war, the British Army confronted the Japanese Imperial Army in Malaysia (then Burma), Singapore, India, and other areas. In the East Africa campaign, the British fought the Italians. This was also the case in the North Africa campaign before the arrival of the *Afrika Korps* in February 1941.

Using data on place of burial from CWGC, we can create a parish-level variable d^{WW2}_{Other} measuring the number of deaths in these campaigns.[26] We then use this variable as the

[26]We count as soldiers killed fighting in the South-East Asia campaigns all of those in the CWGC dataset who were buried in Asian countries east of (and including) Pakistan. Soldiers who died fighting in the East Africa campaign are those that were buried in modern day Ethiopia, Somalia, Eritrea, Djibouti, Sudan, Kenya, Uganda, Tanzania and Zimbabwe. Finally, deaths in the North Africa campaign against Italy correspond to soldiers buried in Egypt or Lybia before February 1941.

outcome in the logarithmic specification presented in equation 1. If the effect of WWI deaths on WW2 outcomes is driven by a specific animosity against Germany we should not observe an effect of WWI deaths on WW2 deaths taking place when fighting other nations.

TABLE 9
EFFECT OF WWI DEATHS ON WW2 DEATHS IN CAMPAIGNS WITH NO GERMAN PRESENCE

	OLS		IV	
	$Log(d^{WW2}_{Other})$	$Log(d^{WW2}_{Other})$	$Log(d^{WW2}_{Other})$	$Log(d^{WW2}_{Other})$
$Log(d^{WW1})$	0.092***	0.088***	0.554**	0.685*
	(0.022)	(0.022)	(0.231)	(0.366)
First stage F-stat			55.9	26.8
Obs.	2886	2862	2886	2862
Regiment mobilization	N	Y	N	Y

Notes: Estimates of the effect of WWI deaths on WW2 deaths taking place in the East Africa and South-East Asian campaigns. Columns 1 and 2 report OLS estimates and columns 3 and 4 report IV estimates. All specifications control for the full set of controls described in Section 4.1 and historic county fixed effects. In columns 2 and 4, we control for our measure of predicted deaths constructed using regiment-level mortality, z^r. First-stage F-statistics are also provided in the table foot for IV specifications. Standard errors clustered at the historic county level in parentheses.

Estimates are reported in Table 9. Columns 1 and 2 correspond to OLS estimates and columns 3 and 4 to IV estimates, obtained using the parish-level instrument described in Section 4.1. We find significant effects of WWI deaths on WW2 deaths that had taken place fighting against Japan and Italy in all specifications. OLS estimates are smaller than those reported for total deaths, but IV point estimates are slightly larger that main results from Table 3. Taken together, these estimates indicate that it is unlikely that the effects of WWI deaths on WW2 outcomes reported in Sections 4 and 5 are driven by the differential grievances of servicemen against the German Army.[27]

6.2. WW2 Mobilisation

Legacy effects of WWI deaths on WW2 outcomes could be explained via a response through increased mobilisation: if WWI deaths generate more mobilisation during WW2, then this would mechanically lead to more deaths in that conflict. The plausibility of this channel is somewhat constrained by the fact that mobilisation in WW2 was obtained via mass conscription. Any effects on mobilisation would have to operate via differences in the proportion of ineligible men across locations, or in attempts at draft evasion. However, because the effect of mobilisation on deaths is expected to be large and mechanical – more men go to war, more of them die – it is possible that this limited variation in mobilisation is nonetheless important.

[27]Estimates of the effect of WWI deaths on the probability of receiving an honour in WW2 reported in Section 5 are robust to restricting observations to soldiers fighting in campaigns that did not involve the German army. Results available upon request.

To evaluate whether this is the case, we use data on the number of mobilised servicemen aggregated at the level of 1945 electoral constituencies. These figures are obtained from electoral data and consist of the number of servicemen registered to vote in the general election that took place in December 1945.[28] We thus estimate the following regression relating mobilisation in 1945 to WWI deaths:

$$Log(m_c^{1945}) = \alpha + \mu Log(\mathrm{d}_c^{WWI}) + \gamma_1' X_c + \gamma_2 Log(\mathrm{electors}_c^{1945}) + e_c, \tag{3}$$

where c indexes constituencies. Controls in X_c refer to the same set of controls in our parish-level analysis, now aggregated at the constituency level. Regiment-specific mobilisation shares are also included in some specifications. Variable $Log(\mathrm{electors}_c^{1945})$ is the log number of eligible voters in constituency c. Columns 1 through 4 of Table 10 reports OLS estimates of μ for different sets of controls. We find insignificant coefficients across columns, with all point estimates indicating very small and sometimes negative elasticities. For comparison purposes, we report the effect of deaths across wars at this level of aggregation in column 5. The associated elasticity is at least 10 times larger in absolute value than all the point estimates for the mobilisation outcome. This leads us to conclude there was no discernible effect of WWI deaths on WW2 mobilisation.

TABLE 10
EFFECT OF WWI DEATHS ON WW2 MOBILISATION

	(1) $Log(m^{1945})$	(2) $Log(m^{1945})$	(3) $Log(m^{1945})$	(4) $Log(m^{1945})$	(5) $Log(d^{WW2})$
$Log(d^{WW1})$	0.008	-0.016	-0.038	-0.038	0.401***
	(0.028)	(0.035)	(0.027)	(0.027)	(0.111)
Mean of dep.var.	8.43	8.43	8.43	8.43	6.32
Obs.	504	504	504	504	504
R2	0.80	0.94	0.97	0.97	0.89
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	Y	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment mob. shares	N	N	N	Y	Y

Notes: OLS results, from equation 3, of the effect of WWI deaths on WW2 mobilisation at the constituency level (columns 1-4) and WW2 deaths, for comparison (column 5). Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level in parentheses.

6.3. Local Economic and Demographic Impacts

The toll of WWI deaths in a community could influence the combat behaviour in WW2 through its impact on local economic conditions, by changing incentives and constraints faced

[28]The use of more aggregated data is made necessary by the fact that, as discussed earlier, individual military records for WW2 are still closed to the public at the time of writing.

by potential recruits. For example, the locations most affected by war mortality may become relatively more impoverished, leading to worse employment prospects for individuals and weaker incentives to invest in education. This could, in turn, lower the opportunity cost of taking risky actions later in life. Conversely, the labour supply shock of WWI could result in a tighter labour market and improved employment conditions which could also influence combat behaviour. Finally, demographic factors might also play a role, through the effect of WWI deaths shocks on available populations, local marriage markets and fertility decisions (see, for instance, Abramitzky, Delavande and Vasconcelos 2011; Brainerd 2017).

To test for the effects of the war on local economic and demographic conditions, we use district-level data to estimate the following specification:

$$y_d^t = \pi Log(\mathrm{d}_d^{WWI}) + \gamma' X_d + \mathbb{FE} + \varepsilon_d, \tag{4}$$

where y_d^t is an outcome measuring the economic or demographic conditions in district d, either in 1921 or 1931.[29] The vector of controls X_d contains the same covariates as in our baseline parish-level specification (aggregated at the district-level), including WWI mobilisation and other variables measured in 1911. All specifications include county and regiment mobilisation fixed effects.

Columns 1 and 2 of Table B.4 (in the Appendix) show our findings for economic outcomes. Panel A presents results for outcomes derived from the 1921 Census while Panel B shows results for outcomes recorded in 1931. The first measure of local economic conditions is a proxy for the unemployment rate, calculated as the number of individuals not in employment or employed in unclassified occupations as a percentage of population of employment age. Results in column 1 show negative and insignificant coefficients in both periods. Our second economic outcome of interest is the female labour force participation rate. Estimates for this outcome are reported in column 2 and are again statistically insignificant in both panels. This contrasts with evidence that war losses stimulated female labour force participation in other countries (Boehnke and Gay, 2020). A possible explanation for this is while many women in Britain entered the workforce during WWI, the Restoration of Pre-War Practices Act of 1919 meant these jobs were given to returning servicemen. Certainly, female labour force participation was essentially unchanged until after the end of WW2 (Hatton and Bailey, 2001).

Columns 3 through 5 turn attention to demographic outcomes. In column 3 we estimate the effects on the population growth rate (in percentage points) relative to 1911. Estimates are small and not significantly different to zero, possibly because of population re-adjustment taking place in the years immediately after WWI. In columns 4 and 5, we look at the share of population between 15 and 64 and between 0 and 4 respectively. Again we find no significant

[29] This analysis is conducted at the district level because economic variables are not currently available at the level of parishes. Individual-level data for the inter-war year censuses is still not publicly available at the time of writing.

effects of WWI deaths on these measures of demographic structure, which suggests war losses had at most small effects on subsequent demographic composition.

One possible concern with these results is that they refer to specific points in time and these particular years may not be representative of the whole inter-war period. In addition, controlling for 1911 variables may be insufficient to deal with the potential endogeneity of deaths in equation 4. To address this point, we use two additional outcomes for which annual data is available throughout the pre-WWI and inter-war period, infant mortality and births outside of wedlock, in an event-study design to generate point estimates for each year. These outcomes proxy for local incomes and the latter has been shown to correlate with parental investment in many contexts (see e.g., Greenwood, Guner and Vandenbroucke 2017). The event study design allows us to control for district fixed effects and yields estimates of the slope between the logarithm of WWI deaths and the outcome for every year.[30] Resulting estimates are plotted in Appendix Figure B.5. In both cases, we find no evidence of an effect of the WWI shock on the outcomes in the pre-WWI or inter-war periods. In summary, although we are limited by imperfect data, we find little support for the idea that the WWI mortality shock significantly affects local economic or demographic conditions in a way that could explain our main findings.

6.4. Other Mortality Shocks: The Case of the Spanish Flu Epidemic

One possibility is that the observed effect on WW2 deaths is a result of a generic mortality shock, of which WWI deaths are simply an example. Other types of local mortality shocks may affect behaviour in future conflicts through channels such as civic capital accumulation or turnover in local population. Under this interpretation, our main results would not be a consequence of localised *war* deaths and their remembrance, but simply a direct effect of the deaths themselves. To test this hypothesis, we use data on an alternative mortality shock that took place across the country in the late 1910s: the Spanish flu epidemic.

In Appendix Table B.5 we provide a series of estimates obtained using data on Spanish flu deaths at the district level.[31] In column 1, we show that WWI deaths were conditionally uncorrelated with the deaths from the Spanish flu. This is perhaps not surprising as the epidemic quickly spread through the United Kingdom in 1918, so that its incidence was unaffected by people returning (or not returning) from the war. Column 2 is included for comparison purposes and indicates that we still find an effect of WWI deaths on deaths in

[30]Specifically, we estimate:

$$y_d^t = \sum_{\substack{k=1911 \\ k\neq 1913}}^{1938} \Big((\pi_k Log(\mathrm{d}_d^{WWI}) + \gamma_k Log(\mathrm{m}_d^{WWI})) \times \mathbb{1}\{k=t\} \Big) + \alpha_d + \delta_t + \varepsilon_d^t$$

where $Log(\mathrm{m}_d^{WWI})$ is the log of mobilisation in district d during WWI, α_d is district fixed effect and δ_t is a time effect. The object of interest is the sequence of estimates of π_ks.

[31]Data on flu deaths for 1918-1919 are obtained from Registrar-General (1920). Disaggregated data is only available for London boroughs, districts designated as County Boroughs (typically large towns and cities), and other districts with populations greater than 20,000, so the sample here is restricted to 268 districts.

WW2 for the selected sample of districts. In column 3 we show that the number of deaths from the 1918-19 epidemic had no effect on deaths during WW2. Finally, in column 4 we show that controlling for the number of flu deaths has no impact on the effect of WWI deaths.

Taken together, these results show that the mortality shock deriving from the flu epidemic had no impact on deaths during WW2. It also complements our results regarding the impact of deaths on economic conditions as flu deaths were concentrated in high poverty areas.

7. Robustness Checks

In this section, we present three different sets of results to illustrate the robustness of our empirical findings. First, we explore different specifications that also use information from parishes with no deaths and, hence, incorporate the extensive margin of variation in the number of deaths across locations. Second, we use a different method to calculate standard errors which explicitly accounts for spatial dependence in our outcome and explanatory variables. Finally, we consider alternative definitions of the instrument to deal with potential issues with the endogenous selection of soldiers into fighting units.

Additional robustness checks, pertaining to sample restrictions, data imputation and other methodological choices are discussed and presented in Appendix C.

7.1. Alternative Specifications

In the following, we evaluate the robustness of the main results described above to variations of the main specification in equation 1.

We begin by considering two different strategies to deal with the problem that the logarithmic specification used in our main analysis requires excluding parishes with zero deaths in either WWI or WW2 from the sample. This specification hence only uses the intensive-margin variation in deaths to estimate our main effects of interest. In Table B.6 in the Appendix, we report results from estimating our baseline model adding a positive constant c to the variables measuring WWI and WW2 deaths and WWI mobilisation before taking logarithms. In column 1, we report the baseline OLS and IV results for reference, whereas in columns 2-4 we vary the choice of c. Reassuringly, neither these transformations nor the increase in sample size they facilitate changes the sign of the estimates for the effect of WWI deaths on WW2 deaths reported in our main analysis.

We can conduct similar robustness tests for our civic capital and WW2 honours results. In those cases, because the outcomes are kept in levels, we only add a positive constant to WWI deaths and mobilisation before taking logarithms of these variables. Results are reported in Appendix Tables B.9 and B.10 for civic capital and Appendix Table B.11 for honours. Estimates are in line with those reported in the main analysis both in terms sign and of magnitude.

Recent research on solutions to the problem of zeroes in models with logarithms has shown that the rather common practice of adding a fixed constant before taking logarithms may lead to biased estimates. Bellégo, Benatia and Pape (2022) suggest an alternative approach that avoids this problem and is based on an iterative OLS procedure (iOLS) that relies on adding an observation-specific scalar to the selected variables before taking logarithms. In Appendix Table B.12, we implement the iOLS estimator using our data, showing results for different choices of the hyper-parameter δ. We also report the value of their proposed test statistic, λ. Following the authors' recommendations, one should prefer choices of δ for which λ is close to 1.

Except for very low levels of parameter δ, point estimates using iOLS are similar to the baseline OLS estimates reported in Table 2.[32] Taken together, these results show that the sample selection due to dropping zeros in our logged variables does not affect the main findings, neither in terms of their magnitude or precision.

As a final exercise, we estimate the baseline OLS model using death rates – i.e., deaths per population in 1911 – instead of logged deaths as measures of WWI and WW2 mortality. We do not use this specification in our main analysis because the distribution of death rates is heavily right-skewed – since several parishes have very low death rates. Nonetheless, in Appendix Table B.13 we show that results are qualitatively analogous to those reported in Section 4.2, reassuring us about the robustness of these findings to a different specification of the model. IV results, reported in Appendix Table B.14 are in line with OLS ones but less precisely estimated. Finally, Appendix Table B.15 shows that a death rate specification also leads to positive estimates of the effect of WWI death rates on our measures of civic capital.[33]

7.2. Alternative Inference Method: Spatial HAC

Throughout most of our empirical analysis we have calculated standard errors clustering at the level of historic counties. This renders a total of 52 clusters in most specifications and accounts for within-county dependence in the unobserved term, which may originate from common shocks associated to cultural or historic factors. However, it is possible that local shocks will exhibit dependence that goes beyond county boundaries.

To account for spatial dependence across locations in continuous space, we calculate standard errors for our main specifications based on a procedure similar to the one described in Conley (1999), with spatial dependence across locations captured by a local kernel with a 50 km bandwidth. To account for the fact that dependence is probably stronger between locations that are closer together within that 50 km radius, we use a Bartlett kernel instead of the traditional uniform kernel. Implementation is carried out using the routines proposed by Hsiang (2010), Fetzer (2020), and Foreman (2020).

Standard errors calculated for the effect of WWI deaths on WW2 deaths using this method are reported alongside point estimates and clustered errors in Appendix Table B.7. This

[32] Notice that the value of λ becomes closer to 1 the larger δ is, suggesting that our preferred specification should have a value of δ around 10.

[33] In all specifications in rates we drop observations with death rate in either WWI or WW2 (or, in IV specifications, the instrument in rates) above the 99^{th} percentile.

method yields standard errors that are very close to those obtained using clustering at the county level. Analogous results are reported in our specification for effects on civic capital in Appendix Table B.16. Taken together, these estimates suggest that modelling spatial correlation in alternative ways does not appear to alter the conclusions of our statistical inference.

7.3. Alternative Definitions of the Instrument

In this section, we explore the robustness of our main findings to alternative definitions of the instrument, particularly to try to address remaining concerns about its exogeneity with respect to parish-level factors that also affect WW2 mortality.

One potential issue could arise if voluntary enlistment in the army was related to systematic differences across locations – such as poor local economic conditions or lack of job prospects (see, e.g., Humphreys and Weinstein 2008) – that persisted into WW2. Using volunteers in constructing our instrument could then induce omitted variable bias in estimation if, for example, battalions formed by volunteers have higher average death rates.[34]

In an attempt to rule out this possibility, we first re-construct our instrument after excluding soldiers who served in one of the Pals battalions.[35] As discussed in Section 2, these battalions were formed with men who came from the same community or workplace and who volunteered to serve together. Excluding these units from the calculation of our instrument should mitigate concerns around the spatially concentrated deaths of volunteers associated to these battalions. Results using this alternative instrument definition are reported in Appendix Table B.8 and are very similar to the IV estimates reported in Section 4.

Another approach to limit the influence of WWI volunteers is to build our instrument only using deaths that occurred in 1917 and 1918. At that stage of the conflict, most of the volunteer army of 1914-1915 had been put out of action. Mass conscription had been in place since 1916. Hence, it is reasonable to assume that the vast majority of those who died towards the end of the war were conscripts. Because conscription left limited room for individual choice over when and where to enlist, using only deaths later in the war in the construction of the instrument helps mitigate the potential confounding effect of persistent differences in the propensity to volunteer. The corresponding instrumental variable estimates are reported in Appendix Table B.17 and show first-stage and IV results that are very similar to those reported in our baseline results.

Finally, a remaining reason for concern may be present if soldiers are able to self-select into less risky units. As argued in Section 2, recruits in general could not choose which battalion to serve in. Yet it is possible that soldiers may have sorted into unit types (e.g., infantry, support, artillery) based on their individual characteristics, perhaps because of

[34]The mobilisation data does not allow us to precisely distinguish between volunteers and conscripts, so we cannot control for differential types of mobilisation in Equation 1.

[35]We identify a total of 221 battalions that were made of Pals at some point during the War in our data using information from James (2012) and Becke (1938). These battalions contributed to about 9% of all fatalities in WWI.

recruitment needs, connections or other factors. For instance, more skilled soldiers may be spared from serving with infantry and may instead be assigned to – typically less risky – support units. If this were the case, certain communities may experience greater losses in both wars for reasons unrelated to combat motivation.

In the main analysis, we address this selection problem with our instrument – which relies on the exogeneity of battalion death rates and not on the shares – and by controlling for regiment-level mobilisation in different ways. As an alternative solution, we here recalculate our instrument using exclusively information on soldiers who served in infantry regiments. In this way, we ensure that we are only using variation in death rates across infantry units to identify our effect of interest.[36] Appendix Table B.18 provides IV estimates using this instrument. The restriction to infantry does not compromise the power of our instrument to predict the variable measuring WWI mortality, calculated using information on soldiers from all regiments. IV results are also very similar in magnitude to those in the baseline, with precisely estimated coefficients across all specifications.

Naturally, we can also use these alternative instruments to estimate the effect of WWI deaths on our measures of civic capital. A summary of these results is reported in Appendix Table B.19. Once again, IV estimates are qualitatively analogous to those reported using the full-sample instrument in Section 4.3.

8. Conclusions

In the summer of 1914, the European powers embarked in what would become one of the most lethal wars in human history. Only 25 years later, with the memories of the Great War still fresh in people's minds, the continent was drawn into a new, tragic conflict. Using new data at the parish level and geolocated military records for both wars, in this paper we show that local deaths from a community during WWI affected the number of soldiers killed from that community in WW2, as well as the likelihood that they were awarded military honours for their actions. We provide evidence in favour of the existence of a channel from WWI deaths to WW2 combat motivation that operates via the accumulation of local civic capital: the memory and commemoration of fallen soldiers and their courage at the community-level changes soldiers' subjective value of individual sacrifice and induces them to take additional risks in combat.

Our results inform the understanding of the determinants of combat motivation and emphasise the role of common memories as a key factor both for nation-building and to generate the conditions that allow states to raise and motivate an army. This literature has typically focused on the incentives and actions of governments or military hierarchies, for instance in organising propaganda and recruitment campaigns, forced conscription, and other deliberate efforts to create national identity. We provide evidence on the importance of the history

[36] A similar argument motivates the choice by Acemoglu et al. (2022) to use only foot soldiers casualties in measure the War mortality shock in the context of Italy.

and memory of previous conflicts in shaping the actions of those who fight.

The importance of past conflicts in shaping a nation's determination in the face of war is eloquently portrayed in a speech by Queen Mother Elizabeth, broadcast on Armistice Day of 1939, months after the beginning of WW2: "For 20 years, we have kept this day of remembrance as one consecrated to the memory of past and never to be forgotten sacrifice. And now, the peace, which that sacrifice made possible, has been broken, and once again we have been forced into war. (...) We have all a part to play, and I know you will not fail in yours. Remembering always the greater your courage and devotion, the sooner shall we see again in our midst the happy ordered life for which we long."

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Appendix

A. Data

In order to estimate the impact of the deaths in the Great War on civic capital in the inter-war period and outcomes in WW2, we assemble a database combining information for individual service personnel from both wars with harmonised data at the level of 1911 parishes. We use these sources to create our two main estimation datasets: one at the parish level, using 1911 historical parishes as the underlying unit of observation; and another, at the level of individual WW2 soldiers.

A.1. Data Sources

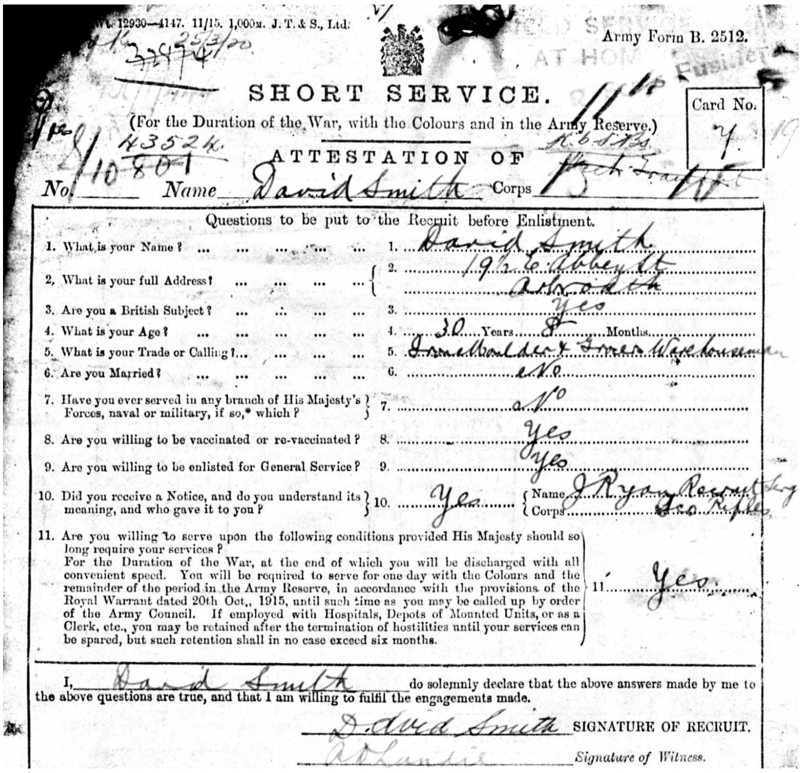
Data on British service personnel killed in both wars is obtained from the Commonwealth War Graves Commission (CWGC) (Commonwealth War Graves Commission, 2023). The CWGC is an intergovernmental organisation dedicated to marking, recording and maintaining the graves, memorials and memories of the men and women of the Commonwealth forces who died in both World Wars. Open data from this organisation contains individualised information on names, time of death, rank, regiment, honours (e.g., medals) and – for a large sub-sample – age at the time of death and a string from which we can extract the location of origin of dead soldiers. For those dying during WWI, data on locations is augmented using information on residence from Forces War Records (FWR), a military genealogy specialist website (Forces War Records, 2023).

Data on 4,135,026 war records of soldiers mobilised during WWI is obtained from FamilySearch, a non-for-profit organisation which offers on-line access to large genealogical datasets (FamilySearch, 2023). FamilySearch draws its information from the British Army Service Records for 1914 to 1920. These records contain information on enrolled soldiers including names, place of residence, birthplace, age at the time of enlistment, year and unit in which the soldier was enlisted. An example of one of these records can be found in Figure A.1.[37] The information on place of birth and residence contained in the FamilySearch source allows us to measure WWI mobilisation at the parish level, which can readily be aggregated to other geographies. The information on soldiers' regiment and battalion of service is used to construct our instrument (see Section 4.1). When cleaning and processing this information, we use as reference the Table of Organisation of each regiment as detailed in James (2012).

Individual-level information on the English and Welsh population before the Great War is obtained from the 1911 Census of population. The data we use originates from Schürer

[37]Digitised versions of these records can be consulted at www.ancestry.co.uk. The FamilySearch collection, which includes the extracted data, is called "United Kingdom, World War I Service Records, 1914-1920". The original sources of this information are the "Burnt documents" (record code WO 363) and the "Unburnt collection" (record code WO 364), which are kept in the National Archives at Kew in London. The Burnt Documents are roughly 2.5 million records on WWI soldiers which survived the fire resulting from an incendiary bomb hitting the War Office Record Store in 1940. The Unburnt Collection is made of soldier information obtained from pension claims. This collection was stored separately in 1942 and, therefore, did not suffer the fate of many of the Burnt Documents.

Figure A.1
British Army WWI Service Record - Example



12930—4147. 11/15. 1,000m. J. T. & S., Ltd.

Army Form B. 2512.

SHORT SERVICE.

(For the Duration of the War, with the Colours and in the Army Reserve.)

Card No. 7.

ATTESTATION OF

No. 10801 Name David Smith Corps

Questions to be put to the Recruit before Enlistment.

1. What is your Name? ... 1. David Smith
2. What is your full Address? ... 2. 19 ... Abbey St ... Arbroath
3. Are you a British Subject? ... 3. Yes
4. What is your Age? ... 4. 30 Years 8 Months
5. What is your Trade or Calling? ... 5.
6. Are you Married? ... 6. No
7. Have you ever served in any branch of His Majesty's Forces, naval or military, if so,* which? 7. No
8. Are you willing to be vaccinated or re-vaccinated? 8. Yes
9. Are you willing to be enlisted for General Service? 9. Yes
10. Did you receive a Notice, and do you understand its meaning, and who gave it to you? 10. Yes Name J Ryan Recruiting Corps
11. Are you willing to serve upon the following conditions provided His Majesty should so long require your services? For the Duration of the War, at the end of which you will be discharged with all convenient speed. You will be required to serve for one day with the Colours and the remainder of the period in the Army Reserve, in accordance with the provisions of the Royal Warrant dated 20th Oct., 1915, until such time as you may be called up by order of the Army Council. If employed with Hospitals, Depots of Mounted Units, or as a Clerk, etc., you may be retained after the termination of hostilities until your services can be spared, but such retention shall in no case exceed six months. 11. Yes

I, David Smith do solemnly declare that the above answers made by me to the above questions are true, and that I am willing to fulfil the engagements made.

David Smith SIGNATURE OF RECRUIT.

Signature of Witness.

Source: British Army World War 1 Service Records, 1914-1920. Accessed at Ancestry.co.uk on February 2, 2021.

and Higgs (2014) and is distributed by IPUMS (Minnesota Population Center, 2019). We use this data both at the individual level in Section 5.2 and to construct aggregates at the parish level. From this source, we obtain information on the occupational composition of the workforce and several income proxies including the number of servants and the number of rooms per household. We obtain aggregate area-level information for Census years 1901-1931, as well as digital maps for parishes, districts and constituencies from "A Vision of Britain through Time" (VoB), an online library of spatial data created by the Geography Department at the University of Portsmouth (University of Portsmouth, 2011). The parish-level population counts in the VoB data come from the *Census Reports* that were published following each Census. There are known to be discrepancies between the population counts in this source and the more recently published micro-data, for example because not all records have survived or there is ambiguity in the true parish in the individual level records. Consequently, in general we use the counts from the *Census Reports* where available. Further, to minimise discrepancies we also implement the corrections to assigned parishes in the 1911 micro-data using the look-up tables published on the I-CeM website.[38]

We use data from a number of sources to obtain spatially disaggregated proxies for civic capital. Data on war memorials built both before and after the Great War are obtained from

[38] Available at https://www.essex.ac.uk/-/media/newparids11.txt?la=en, accessed on May 5, 2023.

the Imperial War Museum memorial registry (Imperial War Museum, 2023*b*), and complemented with information on Listed memorials from Historic England and the Welsh equivalent, Cadw (Cadw, 2023; Historic England, 2023). Information on registered charities and their location is from the Charity Commission for England and Wales (Charity Commission for England and Wales, 2023). Data on mutual societies – a type of enterprise that can be likened to a cooperative – is obtained from the Financial Conduct Authority (Financial Conduct Authority, 2023). Data on branches of the British Legion – a veteran's association set up after WWI – is contained in the Charity Commission data but is incomplete in terms of addresses so we complete these using the Royal British Legion website and internet directories, including the website `www.192.com`, and link these addresses back to parishes using official postcode directories (Office for National Statistics, 2022) Our election data are from the Constituency-Level Elections Archive (Kollman et al., 2019).

Our work also relies on a number of other ancillary data sources. We use the Imperial War Museum's Lives of the First World War database (Imperial War Museum, 2023*a*) to create lists of soldier surnames and to construct counts of WWI conscientious objectors by parishes. A Parliamentary return to the House of Commons provides counts of mobilised soldiers that are eligible to vote by constituency in 1945 (H.M Stationary Office, 1945). We compute Pythagorean distance to the nearest WWI barracks using parish centroids and coordinates of barracks given in listed buildings data from Historic England (Historic England, 2021). We do likewise for distance to Regimental Headquarters after geolocating the HQs using a contemporaneous map. We obtain 1918-1919 influenza deaths by district from the Supplement to the Eighty-First Annual Report of the Registrar-General (Johnson, 2001). Finally, we create a list of Pals Battalions using information in James (2012) and Becke (1938).

A.2. Spatial Units of Analysis and Reconciliation

Our main analysis is based on a 1911 parish-level dataset covering England and Wales. We take 1911 as our reference year because it was the last Census conducted before the onset of the Great War in 1914. The civil parishes we use in our analysis are administrative units corresponding to the lowest level of local government in the United Kingdom. Civil parishes evolved from ecclesiastical parishes during the 19^{th} century, but by 1880 had no religious or ecclesiastical duties. In 1911, the territories of England and Wales were divided into 14,664 parishes, of which 13,404 in England and 1,260 in Wales. We drop all parishes that had zero population in 1911 – usually parcels of empty land in remote rural areas – and 10 additional parishes that have repeated names. After applying these restrictions and grouping parishes as described in the main paper, our final dataset encompasses 14,448 parishes, of which 13,288 are in England and 1,160 are in Wales.

Parishes are nested within local government districts, of which there were 1,861 in 1911, and in turn within 52 counties. In some specifications we use data for 509 constituencies, which are electoral units that are distinct from the aforementioned local government areas.

Parish boundaries change over time and in some cases variables are only available at other (higher) levels of aggregation. In order to aggregate or re-weight information to common boundaries we use a spatial matching procedure based on the assumption of uniform population distribution within parishes. Because our main spatial units (parishes) are relatively small (10 sq. km on average) and parish boundaries are often quite stable in the 30-year period we study, we expect the measurement error induced by making this assumption to be limited.

Our data on 1911 parishes come from two different sources: the 1911 Census micro-data from I-CeM and the *Census Reports* from VoB. These sources use different parish codes and contain a slightly different set of parishes, so we create a mapping file and reconcile the data before conducting analysis.

A.3. Geolocation Procedure, Measurement Error, and Validation

Our empirical analysis relies on exploiting variation in the location of origin of mobilised and killed service personnel. This requires adequately geolocating soldiers based on information on their place of birth and of residence contained in the data sources described above. Here we provide details of the geolocation procedures used to assign soldiers to their parish of origin. We also produce a series of figures that serve as validation for the resulting parish-level aggregates in WWI mobilisation and soldiers killed in both wars.

The CWGC data on soldiers killed during WWI includes 796,601 records.[39] Given that our analysis will focus on England and Wales only, we remove servicemen born in Scotland, Ireland, and abroad. We then extract information for residence or birthplace (or both) from either the birthplace and residence fields in FWR or the "additional information" string included in the CWGC source.

The CWGC dataset on soldiers killed in WW2 has information on 435,696 deaths (of which 67,591 were civilians) during 1939-1945. For about 344,000 of them (79% of total), some additional information is provided in the form of a short text that very often includes the location of origin.

Geolocation of WWI dead soldiers proceeds by combining a) direct string matches with parish names based on data from FWR on historic county and location of birthplace/residence, b) direct string matching as above but based on the CWGC additional information field, and c) latitudes and longitudes obtained from a batch geolocating service to which we input the FWR locations. For the batch geolocation process, we use a service provided by the company OpenCageGeo, which is based on OpenStreetMap and is available across platforms. In order to validate the geolocation process used by this source, we randomly selected 800 individual servicemen and validated the imputed locations by hand. Only 9 observations in this sample were incorrectly imputed and 6 of these 9 were imputed to nearby areas. Hence, we conclude

[39] This number is in line with the 702,410 born in the British Isles and killed in the war, as reported by the British government (BWO, 1922) because the CWGC data also includes men from British dominions and Commonwealth countries.

that the geolocation process based in this method is sufficiently reliable for our purposes, resulting in a limited amount of measurement error.

Geolocation of WW2 soldiers is slightly different because FWR information is of much lower quality, and proceeds as follows: a) extraction of location information from the CWGC additional information field, geolocated using OpenCageGeo, combined with b) direct string matching with parish and historic county names based on the CWGC additional information field, and c) direct string matching based on data from FWR on historic county and location of birthplace/residence.

The data on parish of origin (birthplace or residence) of mobilised men in WWI – obtained from FamilySearch – has a slightly different structure and, therefore, we use a different procedure from the one used for CWGC/FWR data.[40] To match the FamilySearch records to an individual parish we combine: a) a direct string match with parish names for records that have both an historic county and a location, b) direct string matching with parish names for records that only include no county information (only match to parishes with unique names), c) hand matching of a fraction of remaining records carried out by identifying locations via GoogleMaps. We are able to geolocate just over 2.6 million of these records.

When using this data together with the CWGC information on deaths to construct our instrument, we further exclude 1.36 million records for which the battalion is missing. Finally, we drop 20,547 entries that are duplicates in terms of all variables, 473 individuals that switched battalions during the war, 49,625 records dated before 1905 or after 1920, as well as 19,149 from regiments with zero or negligible mortality, such as the Hussars. Finally, to ensure we have enough observations to construct the shares serving in each battalions, we drop 64,641 soldiers from battalions with less than 100 servicemen in the data.

Because of the measurement error deriving from the geolocation and the incompleteness of the FamilySearch records, some parishes exhibit values of mobilisation or WWI and WW2 deaths that are unusually large relative to their population. To ensure that these possible outliers are not driving the results, we identify all parishes in which the number of mobilised, WWI deaths and WWI deaths for all parishes have per-capita values above the 99^{th} value of the respective distribution. We then replace those figures with the imputed number of dead and of mobilised obtained by multiplying the 1911 parish population by the district-level death or mobilisation rates, as appropriate. In Appendix C we show that results are robust to not applying this correction.

As an additional step to validate the WWI mobilisation figures derived from FamilySearch – and the associated geolocation process – we first investigate the relationship between mobilisation and 1911 population figures from the Census. The associated binned scatter plot of both variables in log scale is depicted in panel A of Figure A.2. We can observe a clear positive relationship, which is what we would expect given the nature of the mobil-

[40]For example, the batch geocoding procedure that we used and validated when using FWR data on locations for killed soldiers yields very poor results when used with the FamilySearch strings.

isation process. The associated univariate regression yield a fairly high R-squared of 0.64 and a slope coefficient of 0.91.

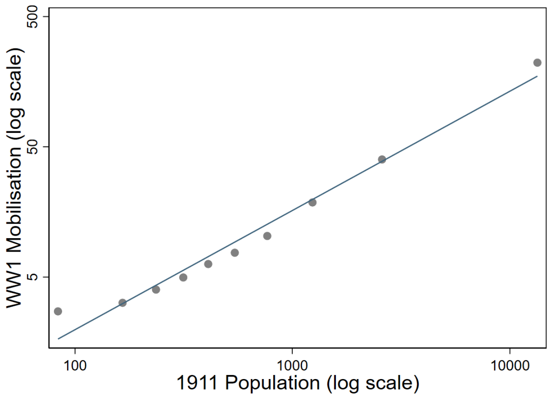
We can jointly validate the parish-level mobilisation and deaths figures by looking at the relationship between mobilisation rates and death rates (i.e., the relationship between both mobilisation and deaths divided by population). The associated binned scatter plot (in log scale) is provided in Panel B of Figure A.2. Again we find a positive and almost linear relationship, in line with expectations. The associated univariate regression yields an R-squared of 0.27 and a slope coefficient of 0.48, indicating that there was a clear relationship between mobilisation and deaths – as expected – but that there was substantial unexplained variation in deaths after accounting for differences in mobilisation and population.

To validate the geolocation procedure for deaths we can show two figures for death rates at the parish level constructed using two different sources for the underlying location of origin data: the information coming from the "additional information" string in the CWGC data and the information on location of origin provided in the FWR records (either birthplace or residence). The corresponding binned scatter plot is illustrated in Panel C of Figure A.2. Again, we find a clearly positive and close to linear relationship between dead rates from both sources. The associated univariate regression yields and R-squared of 0.37 and a slope coefficient of 0.68.

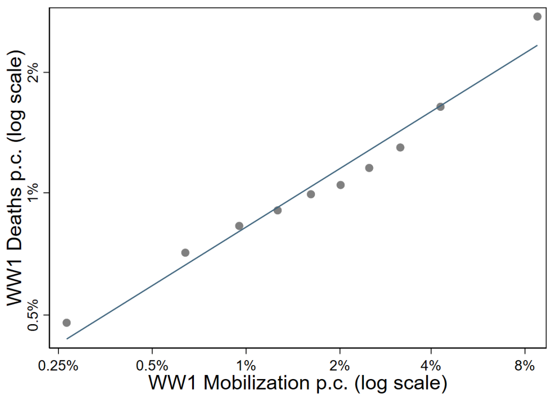
Finally, we can complete the validation of the geolocation procedure for our data on deaths by using comparing the death rates obtained using the FWR data on location of origin using either birthplace or residence. We expect that both sources would yield very similar figures for deaths because most people reside in the same parish in which they were born. The associated binned scatter plot is provided in Panel D of Figure A.2 and again shows a clearly positive and linear relationship. The associated univariate regression yields an R-squared of 0.65 and a slope coefficient of 0.84.

We can further validate the baseline measure of WWI deaths used in the paper with one constructed using the number of dead commemorated in local memorials. As discussed in Section 2, memorials often include a list of names of the servicemen from the specific location that lost their lives in the war. We aggregate these figures at the parish level and investigate the correlation between the parish-level death rate thus constructed and the death rate constructed using our main measure. Results of these comparisons for both WWI and WW2 are illustrated in panels A and B of Figure A.3. The depicted relationships are positive and close to linear. The associated univariate regressions yield elasticities of over 0.2, significant at all conventional levels.

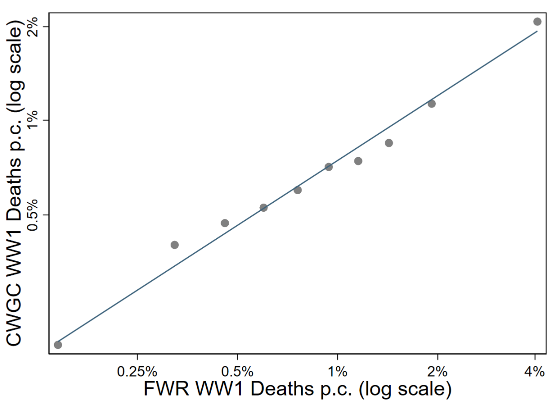
Figure A.2
Validation: Mobilisation and Death Rates



(A) Population & Mobilisation



(B) Mobilisation Rate & Death Rates WWI

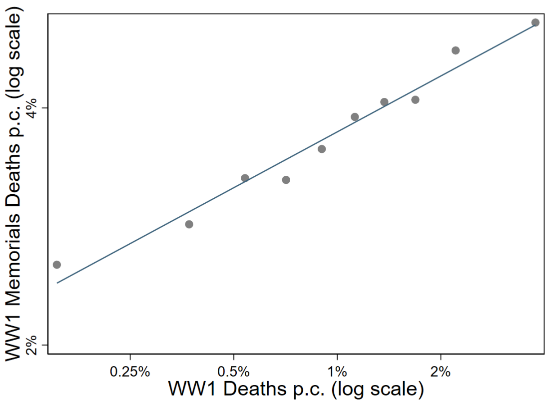


(C) Death Rates WWI – FWR & CWGC

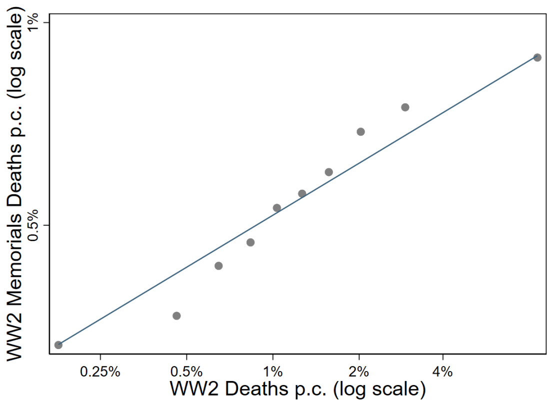
(D) Death Rates WWI – Residence & Birth

Notes: **Panel A**: binned scatter plot of the relationship between parish-level WWI mobilisation and 1911 population, both in logs. Fitted line corresponds to OLS estimates using the underlying data. **Panel B**: binned scatter plot of the relationship between log death rates for WWI calculated from the CWGC source in the horizontal axis and from log mobilisation rates at the parish level. **Panel C**: binned scatter plot of the relationship between log death rates at the parish level calculated using FWR and CWGC information. **Panel D**: binned scatter plot of the relationship between death rates at the parish level calculated using FWR information based on birthplace data and residence data.

FIGURE A.3
VALIDATION: DEATH RATES WWI AND WW2



(A) WWI DEAD RATES: MEMORIALS & CWGC



(B) WW2 DEAD RATES: MEMORIALS & CWGC

Notes: **Panel A**: binned scatter plot of the relationship between WWI death rates from memorials (vertical axis) and from the CWGC data (horizontal axis). Fitted line correspond to OLS estimates using the underlying data. **Panel B**: binned scatter plot of the relationship between WW2 death rates from memorials (vertical axis) and from the CWGC data (horizontal axis). Fitted line corresponds estimated via OLS.

A.4. *Details of Civic Capital Measures*

We use data from a number of sources to create measures of civic capital in the pre-WWI and inter-war periods. All of the data sources have limitations so our general approach is to examine results across several distinct measures to assess robustness.

A.4.1. *War Memorials*

Our first measure of civic capital is the presence of one or more listed war memorials in a parish. We focus on listed, rather than all war memorials, as listed status indicates memorials have historical or architectural significance. This measure should thus capture those communities that expended effort and money to create a high quality memorial. The data on war memorials chiefly comes from Historic England and Cadw - the public bodies responsible for caring for and promoting historic and heritage assets in England and Wales respectively - and is likely to be a comprehensive record of listed war memorials. We classify listed memorials as memorialising different conflicts (e.g., Boer War; WWI; WW2) using additional information contained within the IWM Memorial Register. As we wish to examine civic capital in the inter-war period, we define listed WWI memorials as those that commemorate WWI and were built before the start of WW2. For balancing checks we define pre-WWI memorials as all those built before 1914, and Boer War memorials as those that commemorate those conflicts. We also use the counts of names who died in WWI and WW2 on memorials (listed or otherwise) in robustness checks to validate our measures of war deaths. Since we have location details (postcode or grid reference) for the vast majority of memorials, we are able to assign counts of memorials to 1911 parishes with a high degree of accuracy.

One potential concern about using listed memorials is that the listed building regime only began in earnest following WW2. It is therefore possible, albeit unlikely due to their durable nature, that some significant memorials deteriorated or were even lost before they could be listed. Perhaps of greater importance is that a large number of listed WWI memorials were not listed until the centenary of WWI in 2014-2018 under a project by Historic England that aimed to add 2,500 memorials to the list. As listing can occur because a structure is "at risk",[41] a concern is that the memorials that were added after 2014 are not listed because of the effort communities made to honour WWI soldiers, but because they were subsequently neglected or else happen to be located in places that were being considered for renewal or redevelopment in the 2010s. We therefore exclude these memorials in some specifications.

A.4.2. *Charities, Mutuals, and British Legion Branches*

We use two further measures of civic capital that are based on the formation of new charities, mutuals, and British Legion branches. The main data sources for constructing these measures are the Charity Commission's Register of Charities, and the Financial Conduct Authority's Mutuals Public Register. For charities, we first extract the first year recorded in

[41] See for example https://www.warmemorials.org/listing-england/

the governing document description data field. This text is often of the form "Deed Dated DATE YEAR", and "Scheme of DATE YEAR" which suggests it should be a good proxy for formation year. We obtain a year for more then 90% of charities in this way. We then restrict attention to the approximately 48,500 entries where the year we extract is before 1939. We geolocate around 12,700 of these from postcodes in the data, and a further 12,000 from string matching the location given in the area of benefit field to a unique parish name in our dataset, before dropping roughly 4,200 relating to the formation of Scouts and Guides groups. For mutual societies, the raw data contains registration year. We begin with some 7,600 pre-1939 mutuals of which we are able to geolocate around two thirds. We construct counts of British Legion branches from the charities data. As there are only around 2,100 branches listed in the data, we supplement the geolocation approach used for charities with manual searches of the Royal British Legion website and internet directories to obtain addresses/postcodes and hence parishes. By doing so we assign one 1911 parish to close to 90% of the branches.

These data have a number of limitations which suggest the resulting variables will be measured with error. First, we are unable to geolocate all charities and mutuals in the data. Second, particularly for charities, we may mis-measure the year of formation. Third, both the charities and mutuals registers may exclude organisations that had closed before the register data was digitised, and hence do not appear in the version of the register we access. It is unclear how many organisations are missing for this reason. What we can say is that the charities data includes charities that were removed from the register as far back as 1961, and the mutuals register includes those deregistered as far back as 1881.

A.4.3. Voter Turnout

The final measure of civic capital that we use is electoral turnout in national elections in the period between December 1910 and November 1935. The source of our data is the Constituency-Level Elections Archive voting data for England and Wales. As constituencies names and boundaries change throughout the period we consider, we clean constituency names and use spatial re-weighting to harmonise the data to common spatial units. We compute voting turnout as the number of valid votes divided by the number of eligible voters in each constituency-election combination.

A.5. Linking 1911 Census to Military Records

As described in the main text of the paper, we exploit that we can access the full 1911 Census including names and addresses and unique individual and household identifiers to estimate how WWI deaths within households affect the behaviour of men in WW2. The basic idea is that we take all male children in the 1911 Census aged 0-8 (so aged 28 to 36 at the start of WW2), then link these children to WW2 deaths. We separately link WWI deaths to all the men in the 1911 Census that could have fought in WWI. We then combine this second merge with the children dataset to identify which children had fathers and other household members that died in WWI.

In more detail, we conduct this exercise by the following steps. First, we correct some minor 1911 Census parish errors using a file issued by IPUMS in December 2020. We then create two files from the 1911 Census that will be matched to the war dead. The first file, which will be linked to WWI dead, comprises men aged between 10 and 50 in 1911 (and hence between 17 and 57 by the end of WWI). These are potential fathers and cohabiting household members of children in 1911. The second file, which will be linked to WW2 dead, is a file of male children aged between 0 and 8 in 1911 which includes the forenames of the boys, the forenames of their cohabiting father, and a household identifier.

We then prepare the war dead data for both WWI and WW2 for the ABE merge. There are 796,601 WWI dead in our data, of which some 383,000 are potentially matchable as age, forename, and surname fields are non-missing. There are 435,696 WW2 dead in our data. We only attempt to match the 85,250 or so that are aged between 0 and 8 in 1911.

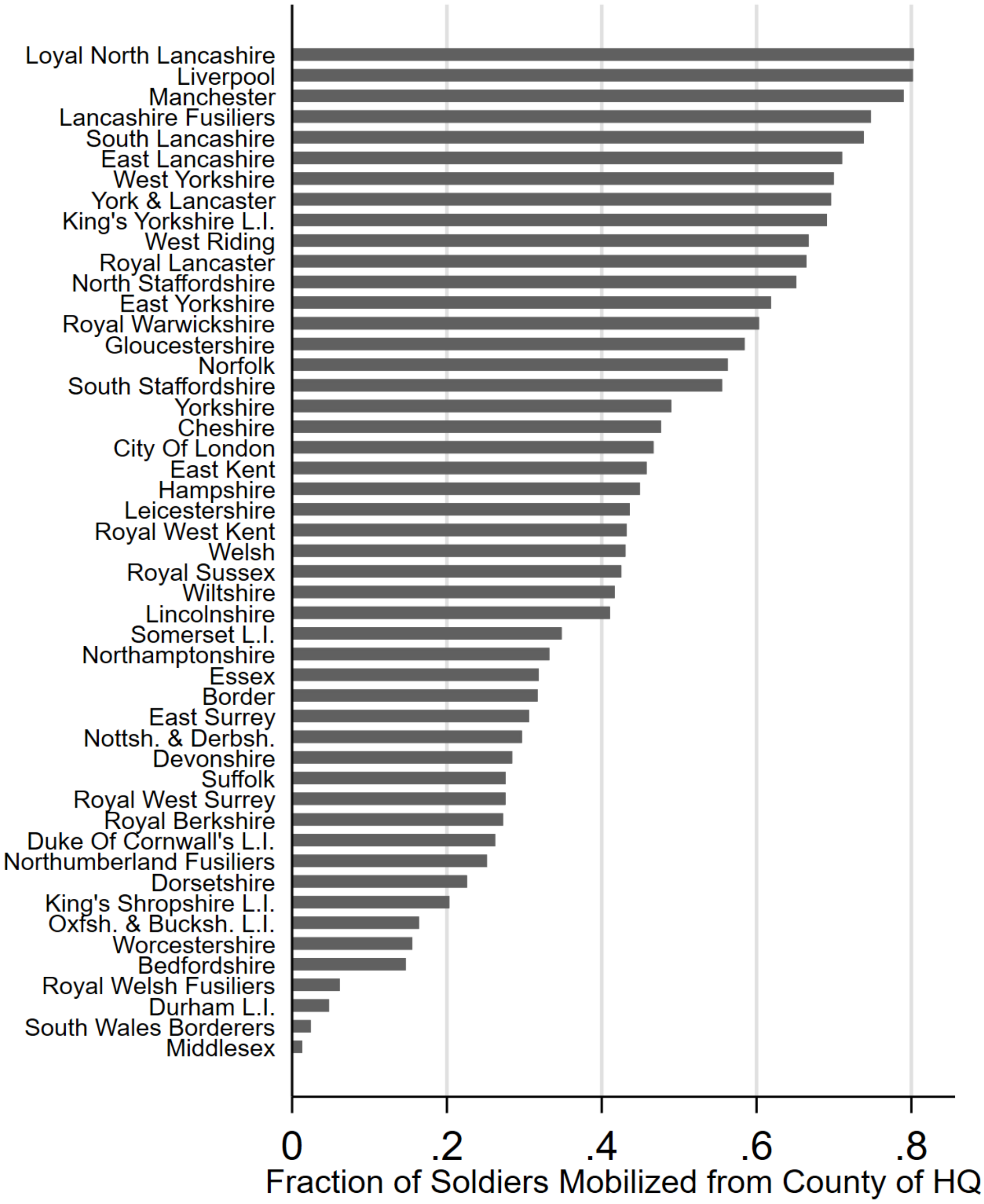
We next run merges using the ABE algorithm. For matching WWI soldiers to 1911 Census men we use three matching strategies (i) surname, forename, birthyear and birthplace; (ii) surname, forename, birthyear and parish of residence; (iii) surname, forename and birthyear. For matching WWI soldiers to 1911 Census men we also use three matching strategies (i) surname, forename, birthyear, and father's forename initial; (ii) surname, forename, county of residence and birthyear; (iii) surname, forename and birthyear. In each case we use the default ABE parameters, NYSIIS standardised names, and allow the option to use standard nicknames. Note that the ABE matching procedure only considers records to be matched when matches are unique, hence we will only identify a subset of the true matches between the war dead and 1911 Census participants.

In the final step we combine the 1911 Census with the outputs of the ABE merges. We first take all boys aged 0 to 8 in the 1911 Census and we use the ABE WW2 merge to create an indicator variable for those which died in WW2 (we code non-matched children as 0). This provides our dependent variable. We then use the ABE WWI merge to create an indicator for children whose father died in WWI (we code non-matched fathers as 0). Finally, we link in the ABE WW2 merge into our dataset for a second time but now merging on the household identifier rather than the person identifier. By doing so we can then create an indicator for a household member other than a father died in WWI (we code non-matched households as 0).

B. Additional Figures and Tables

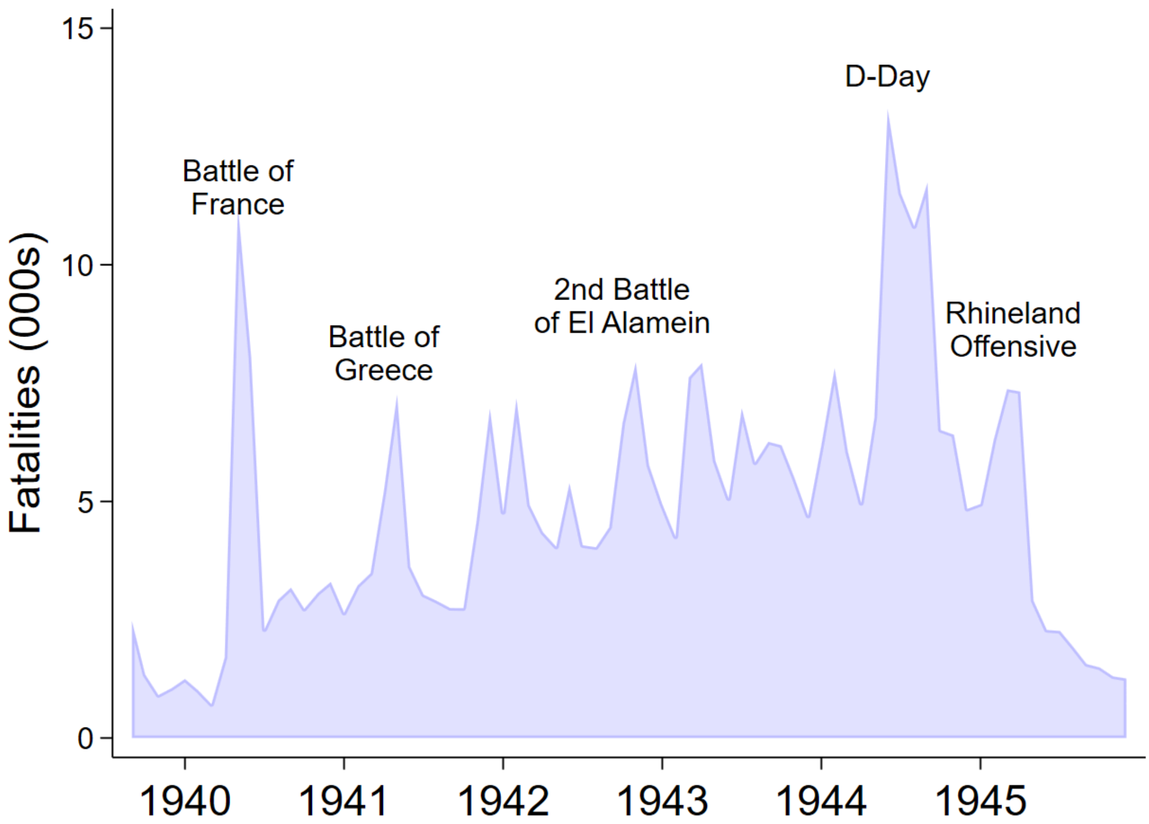
FIGURE B.1

WWI REGIMENTS AND LOCALISED RECRUITING



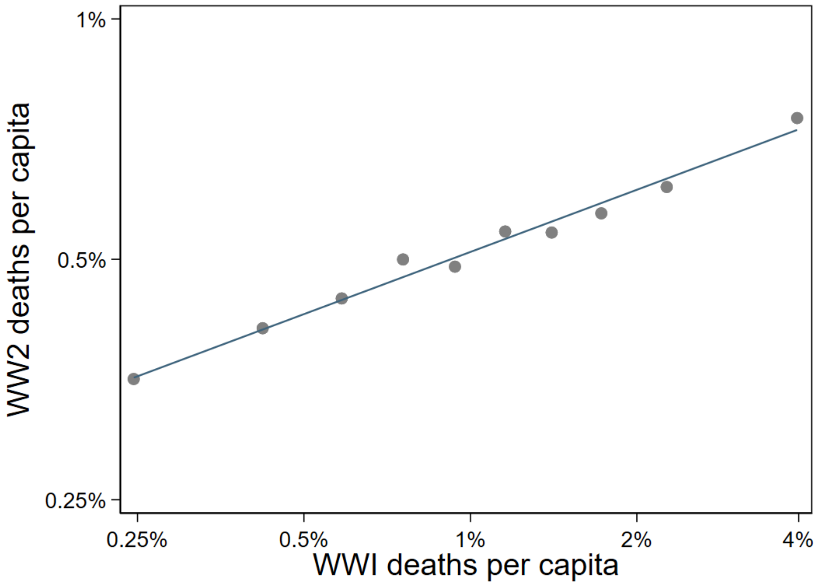
Notes: Horizontal axis represents the fraction of soldiers who served in a given regiment whose parish of origin is in the same county as the regiment's headquarters. Regiments organised in the vertical axis correspond to the 45 regiments in the British Army that had pre-specified recruiting areas.

Figure B.2
Timeline of WW2 Deaths of British Servicemen



Notes: Number of British Army, Navy and Air Force servicemen fatalities in each month during WW2. Overlaid text indicates the name of five key battles: Battle of France (May 1940), Battle of Greece (April 1941), 2nd Battle of El Alamein (October 1942), D-Day (June 1944), and Rhineland Offensive (February 1945). Source: Own elaboration based on Commonwealth War Grave Commission data.

Figure B.3
Death Rates in WWI and WW2



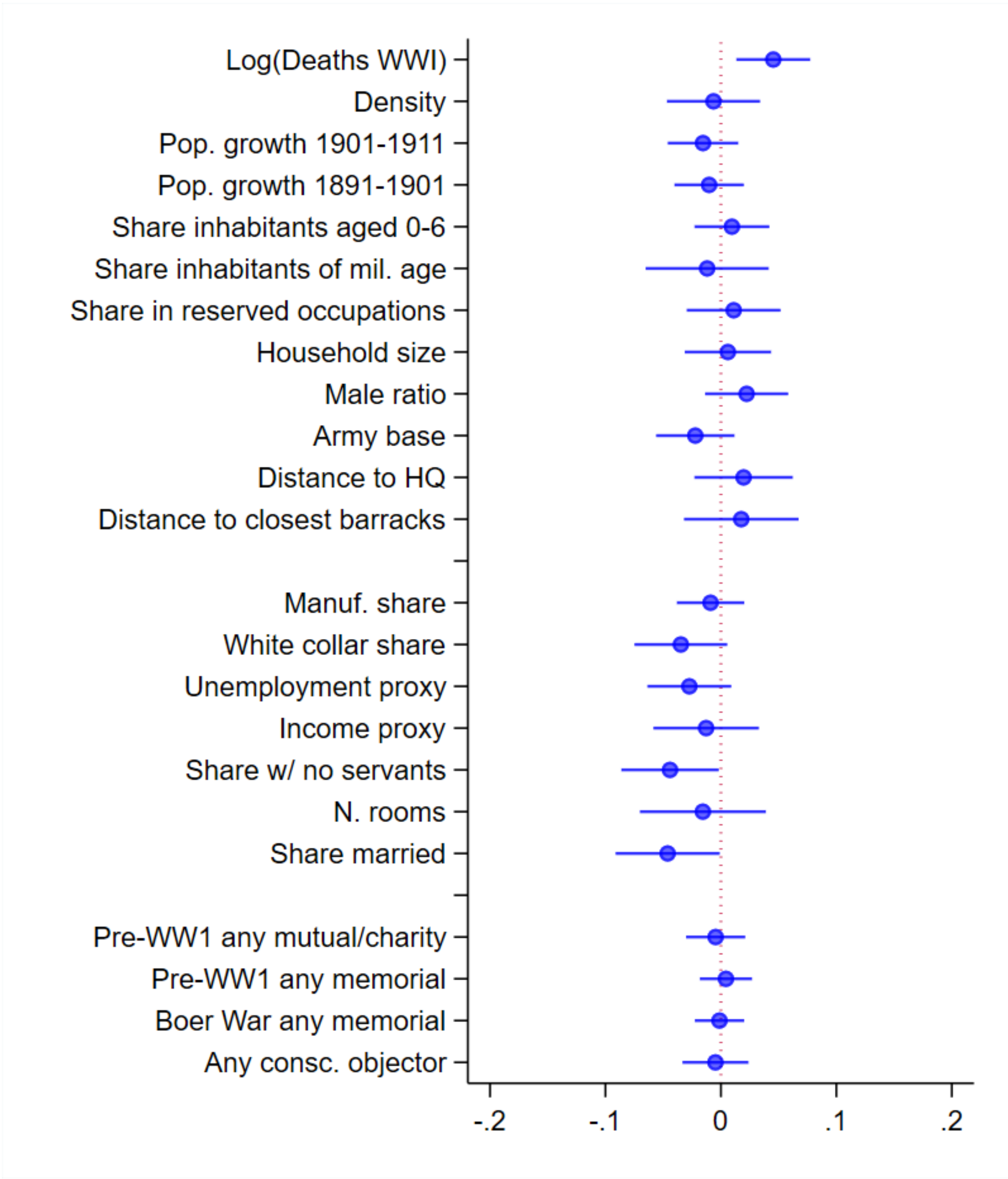
Notes: Binned scatter plot (log scale) of the death rate in WWI, defined as the number of service personnel killed in the war divided by 1911 population at the parish level, and the death rate in WW2, defined as WW2 deaths over 1931 population (last available figure).

Table B.1
First-stage Results

	(1) $Log(d^{WW1})$	(2) $Log(d^{WW1})$	(3) $Log(d^{WW1})$	(4) $Log(d^{WW1})$
z	0.159***	0.152***	0.097***	0.127***
	(0.024)	(0.020)	(0.022)	(0.024)
F-stat	42.7	55.9	19.4	26.8
Obs.	5466	5466	5466	5376
R2	0.81	0.82	0.83	0.82
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: First-stage OLS estimates of the effect of the instrument on WWI deaths at the parish level. All specifications control for 1911 population. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level in parentheses.

Figure B.4
Instrumental Variable Balancing Checks – Shock-level Regressions



Notes: OLS estimates from individual regressions of instrument z_i on different variables, together with 95% confidence intervals. All variables have been aggregated at the battalion level using the *ssaggregate* command in Stata following Borusyak, Hull and Jaravel (2022) and then standardised to have mean zero and unit standard deviation. The first coefficient shows the first-stage, that is the regression coefficient of the effect of the instrument on the (standardised) instrumented variable, $Log(\mathrm{d}_i^{WWI})$. Standard errors clustered at the regiment level.

Table B.2
Effect of WWI Deaths on Memorials and Civic Capital Measures

	(1) Memorials	(2) Legions	(3) Mutuals/Char.
A. LPM (dummy outcome)			
$Log(d^{WW1})$	0.020***	0.017***	0.030***
	(0.005)	(0.005)	(0.008)
Mean of dep.var.	0.12	0.13	0.39
Obs.	8255	8255	8255
B. Poisson (count outcome)			
$Log(d^{WW1})$	0.016**	0.016*	0.155***
	(0.007)	(0.009)	(0.026)
Mean of dep.var.	0.14	0.17	0.92
Obs.	8254	8101	8254
Mobil. controls	Y	Y	Y
Econ. controls	Y	Y	Y
County FE	Y	Y	Y
Regiment mob. FE	Y	Y	Y

Notes: Effect of WWI deaths on the listed memorials built (column 1), British Legion branches (column 2) and charities and mutuals established (column 3). Panel A presents estimates for linear probability models where the outcomes are dummies taking value 1 if the corresponding institution is present in the parish. Panel B shows average marginal effects from a Poisson model estimated using the corresponding count variables instead. Full controls and fixed effects are included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.3
Poisson regression results – effect of WWI deaths on WW2 honours

	(1)	(2)	(3)	(4)	(5)
Outcome: N. honours					
$Log(d^{WW1})$	0.006***	0.005***	0.005***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.032	0.032	0.032	0.033	0.033
Obs.	221215	221215	221215	204993	204993
Mobil. controls	Y	Y	Y	Y	Y
Econ. controls	N	Y	Y	Y	Y
Age FE	N	N	N	Y	Y
Rank FE	N	N	N	N	Y
Regiment FE	N	N	N	Y	Y

Notes: Soldier-level Poisson regression estimation results of the effect of WWI deaths on the number of honours received. Table reports marginal effects. Standard errors clustered at the historic county level in parentheses.

Table B.4
Effect of WWI Deaths on Inter-War Outcomes

	(1) Unempl.	(2) Fem.LFP	(3) Pop.Growth	(4) Working Age	(5) Children
A. 1921					
$Log(d^{WW1})$	-0.059	0.076	-0.545	-0.120	0.072
	(0.074)	(0.213)	(1.182)	(0.113)	(0.043)
Mean dep.var.	7.80	28.80	7.78	65.61	8.49
Observations	1697	1697	1697	1697	1697
B. 1931					
$Log(d^{WW1})$	-0.077	0.023	4.406	-0.128	0.051
	(0.066)	(0.186)	(3.342)	(0.101)	(0.038)
Mean dep.var.	5.79	29.73	22.13	67.86	7.28
Observations	1698	1698	1698	1698	1698
Mobil. controls	Y	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y

Notes: OLS estimation results of the effect of WWI deaths on inter-war economic and demographic outcomes (in rates in percentage points) at the district level. Controls and fixed effects included as indicated in the table foot. Standard errors clustered at the historic county level in parentheses.

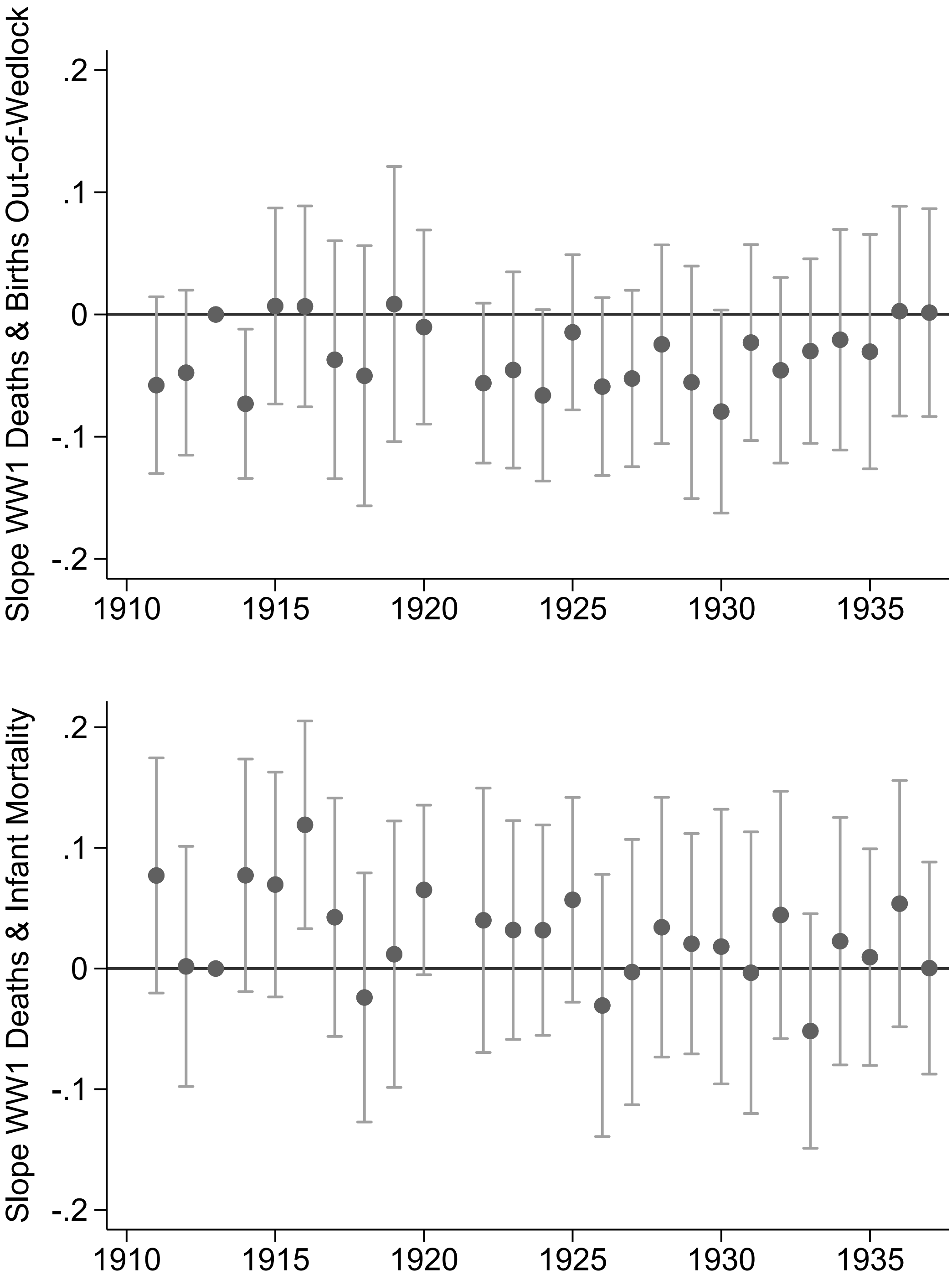
Table B.5
1918 Flu

	(1) $Log(d^{Flu})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	-0.000	0.456***		0.456***
	(0.092)	(0.113)		(0.113)
$Log(d^{Flu})$			-0.017	-0.016
			(0.290)	(0.211)
Mean of dep.var.	5.39	5.50	5.50	5.50
Obs.	262	262	262	262
R2	0.96	0.90	0.89	0.90
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	Y	Y	Y	Y

Notes: District-level OLS regression estimation results on 1918 flu deaths. Controls and fixed effects included as indicated in the table foot. Standard errors clustered at the historic county level in parentheses.

Figure B.5

Event-Study Graphs: WWI Deaths for Pre- & Inter-War Economic Outcomes



Notes: Each point is an estimate for yearly interactions of the (log) number of WWI deaths on the outcome. All specifications include district fixed effects, year effects and interactions between year dummies and the log of WWI mobilisation (see footnote 30 for details). Standard errors clustered at the historic county level in parentheses. No data is available for 1921

Table B.6

Robustness: Dealing with the Log of Zero – Effect of WWI Deaths on WW2 Deaths

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. OLS				
$Log(d^{WW1}+c)$	0.156***	0.203***	0.230***	0.262***
	(0.017)	(0.017)	(0.017)	(0.018)
Obs.	6349	14448	14448	14448
R2	0.75	0.70	0.72	0.74
B. IV				
$Log(d^{WW1}+c)$	0.506**	0.336*	0.425**	0.537***
	(0.228)	(0.194)	(0.165)	(0.131)
Obs.	5466	9353	9353	9353

Notes: OLS (panel A) and IV (panel B) estimation results of the effect of WWI deaths on WW2 deaths at the parish level. In column 1 we report the baseline estimates from the model in logarithms, where parishes with zero reported WWI or WW2 deaths are dropped. In columns 2-4 we estimate our baseline model adding a constant *c* to the number of dead before taking logarithms for both the outcome (the number of WW2 dead), the variable of interest (the number of WWI dead), and (in panel B) the instrument. Full sets of controls and fixed effects included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.7

Robustness: Spatial HAC Standard Errors

	OLS		IV	
	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.156***	0.156***	0.506*	0.409**
HAC Errors:	(0.018)	(0.018)	(0.260)	(0.207)
Clustered Errors:	(0.018)	(0.019)	(0.228)	(0.202)
Obs.	5466	5376	5466	5376
Regiment mob. FE	Y	N	Y	N
Regiment Predicted Rate	N	Y	N	Y

Notes: Estimates of the effect of WWI deaths on WW2 deaths. In all columns standard errors are computed incorporating spatial dependence in the error term using a spatial heteroskedasticity and autocorrelation robust standard errors following the tradition of Conley (1999), using a Bartlett kernel with a 50km bandwidth to model dependence. Columns 1 and 2 correspond to OLS estimates obtained using the *reg2hdfespatial* Stata command by Fetzer (2020), which is itself based on the previous implementation by Hsiang (2010). Columns 3 and 4 correspond to IV estimates obtained using the *spatial_hac_iv* Stata command created by Foreman (2020). All specifications include mobilisation and economic controls. Regiment mobilisation fixed effects are included in columns 1 and 3. In columns 2 and 4 we control of our measure of predicted deaths constructed using regiment-level mortality, z_r.

TABLE B.8
ROBUSTNESS: REMOVING PALS BATTALIONS – EFFECT OF WWI DEATHS ON WW2 DEATHS

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.426***	0.472***	0.455**	0.410**
	(0.109)	(0.121)	(0.193)	(0.185)
First stage F-stat	39.8	45.7	21.1	24.0
Obs.	5336	5336	5336	5262
R2	0.73	0.69	0.70	0.70
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: Instrumental variable estimation results of the effect of WWI deaths on WW2 deaths, using only soldiers not belonging to Pals battalions to construct $Log(d^{WWI})$, its instrument, and mobilisation. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level in parentheses.

Table B.9
Robustness: Effect of WWI Deaths on Civic Capital – OLS Estimates

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. Outcome: Listed Memorial Dummy				
$Log(d^{WW1} + c)$	0.020***	0.017***	0.024***	0.034***
	(0.005)	(0.003)	(0.004)	(0.005)
Obs.	8255	14448	14448	14448
R2	0.21	0.19	0.19	0.19
B. Outcome: Legion Branch Dummy				
$Log(d^{WW1} + c)$	0.017***	0.019***	0.028***	0.040***
	(0.005)	(0.002)	(0.003)	(0.004)
Obs.	8255	14448	14448	14448
R2	0.23	0.22	0.22	0.22
C. Outcome: Charity/Mutual Dummy				
$Log(d^{WW1} + c)$	0.030***	0.034***	0.045***	0.058***
	(0.008)	(0.005)	(0.006)	(0.008)
Obs.	8255	14448	14448	14448
R2	0.27	0.29	0.29	0.29

Notes: OLS estimates of the effect of WWI deaths on our parish-level measures of civic capital. In Panel A, the outcome is a dummy taking value 1 if the parish has a WWI listed memorial. In Panel B, the outcome is a dummy taking value 1 if the British Legion created a branch in the parish in the inter-war period. In Panel C, the outcome is a dummy taking value 1 if a mutual or charity was recorded as created in the parish during the inter-war period. Baseline estimates from the model in logarithms, where parishes with zero reported WWI deaths and/or zero mobilisation are dropped, are reported in column 1. In columns 2-4, we estimate our baseline model adding a constant *c* to the number of dead before taking logarithms for both the outcome (the number of WW2 dead) and the variable of interest (the number of WWI dead). Full sets of controls and fixed effects included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.10

Robustness: Effect of WWI Deaths on Civic Capital – IV Estimates

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. Outcome: Listed Memorial Dummy				
$Log(d^{WW1} + c)$	0.135*	-0.019	0.026	0.078
	(0.068)	(0.061)	(0.072)	(0.077)
Obs.	6751	9353	9353	9353
R2	0.13	0.17	0.18	0.17
B. Outcome: Legion Branch Dummy				
$Log(d^{WW1} + c)$	0.232***	0.131*	0.176**	0.197**
	(0.076)	(0.074)	(0.078)	(0.076)
Obs.	6751	9353	9353	9353
R2	0.01	0.10	0.09	0.11
C. Outcome: Charity/Mutual Dummy				
$Log(d^{WW1} + c)$	0.282***	0.160	0.206**	0.216**
	(0.102)	(0.102)	(0.102)	(0.091)
Obs.	6751	9353	9353	9353
R2	0.10	0.19	0.18	0.20

Notes: Instrumental variable estimates of the effect of WWI deaths on our parish-level measures of civic capital. In Panel A, the outcome is a dummy taking value 1 if the parish has a WWI listed memorial. In Panel B, the outcome is a dummy taking value 1 if the British Legion created a branch in the parish in the inter-war period. In Panel C, the outcome is a dummy taking value 1 if a mutual or charity was recorded as created in the parish during the inter-war period. Baseline estimates from the model in logarithms, where parishes with zero reported WWI deaths and/or zero mobilisation are dropped, are reported in column 1. In columns 2-4, we estimate our baseline model adding a constant *c* to the number of dead before taking logarithms for the outcome (the number of WW2 dead), the variable of interest (the number of WWI dead), and the instrument. Full sets of controls and fixed effects included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.11

Robustness: Dealing with the Log of Zero – Effect on WW2 Honours

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. Outcome: Honours Dummy				
$Log(d^{WW1} + c)$	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.000)	(0.000)	(0.000)
Obs.	209954	229891	229891	229891
B. Outcome: N. Honours				
$Log(d^{WW1} + c)$	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.000)	(0.000)	(0.000)
Obs.	209954	229891	229891	229891

Notes: Soldier-level OLS estimation results from equation 2 of the effect of WWI deaths on the probability of receiving one or more WW2 honours (Panel A) or the number of honours received (Panel B). Full controls and FE are always included (see Section 5 for details). In columns 2-4, we add a constant to both the number of dead and of mobilised in WWI before taking logarithms, as specified in each column header. Standard errors clustered at the historic county level in parentheses.

Table B.12

OLS results – effect of WWI deaths on WW2 deaths - iOLS estimator

	(1) δ = 0.1	(2) δ = 1	(3) δ = 2	(4) δ = 10	(5) δ = 100
$Log(d^{WW1})$	-0.009	0.076**	0.099***	0.139***	0.164***
	(0.054)	(0.036)	(0.032)	(0.027)	(0.026)
Obs.	14448	14448	14448	14448	14448
λ stat.	1.033	1.042	1.045	1.045	1.028

Notes: iOLS estimation results of the effect of WWI deaths on WW2 deaths at the parish level using Bellégo, Benatia and Pape (2022)'s iterative OLS estimator. Full controls, county fixed effects, and regiment mobilisation fixed effects are included in all specifications. Standard errors clustered at the historic county level in parenthesis.

Table B.13

Robustness: OLS estimates of the effect of WWI deaths on WW2 deaths – using rates

	(1) $D. rate^{WW2}$	(2) $D. rate^{WW2}$	(3) $D. rate^{WW2}$	(4) $D. rate^{WW2}$	(5) $D. rate^{WW2}$
$Death\ rate^{WWI}$	0.100***	0.077***	0.075***	0.068***	0.064***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Obs.	14161	14036	14036	14036	14036
R2	0.04	0.07	0.08	0.10	0.11
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	N	Y	Y
Regiment mob. FE	N	N	N	N	Y

Notes: OLS estimation results of the effect of WWI death rate (number of deaths in a given parish over 1911 population) on the WW2 death rate (number of deaths over 1931 population, the last available figure from Census data). Different sets of controls and fixed effects are used in each column (see text for details).

Table B.14

Robustness: IV estimates of the effect of WWI deaths on WW2 deaths – using rates

	(1) $D. rate^{WW2}$	(2) $D. rate^{WW2}$	(3) $D. rate^{WW2}$	(4) $D. rate^{WW2}$
$Death\ rate^{WWI}$	0.180**	0.157*	0.198**	0.169
	(0.074)	(0.081)	(0.091)	(0.104)
First stage F-stat	28.1	30.1	26.0	22.0
Obs.	9026	9026	9026	9016
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: IV estimation results of the effect of WWI death rate (number of deaths in a given parish over 1911 population) on the WW2 death rate (number of deaths over 1931 population, the last available figure from Census data). Different sets of controls and fixed effects are used in each column (see text for details).

Table B.15

Robustness: OLS Estimates of the Effect of WWI Death Rates on Civic Capital

	Outcome: Listed Memorial Dummy				
	(1)	(2)	(3)	(4)	(5)
Death rate^{WWI}	3.129***	1.904***	1.496***	1.743***	0.788***
	(0.405)	(0.275)	(0.265)	(0.264)	(0.242)
Obs.	14304	14173	14173	14173	14173
R2	0.01	0.06	0.10	0.11	0.18
	Outcome: Legion Branch Dummy				
Death rate^{WWI}	3.343***	1.761***	1.245***	1.339***	0.358*
	(0.310)	(0.260)	(0.246)	(0.220)	(0.209)
Obs.	14304	14173	14173	14173	14173
R2	0.02	0.08	0.14	0.15	0.21
	Outcome: Charity/Mutual Dummy				
Death rate^{WWI}	7.666***	4.556***	3.737***	3.314***	1.697***
	(0.638)	(0.481)	(0.481)	(0.457)	(0.439)
Obs.	14304	14173	14173	14173	14173
R2	0.03	0.13	0.19	0.21	0.25
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	N	Y	Y
Regiment mob. FE	N	N	N	N	Y

Notes: OLS estimation results of the effect of WWI death rate (number of deaths over 1911 population) on several civic capital measures. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level.

Table B.16

Robustness: Civic Capital – Spatial HAC Standard Errors

	OLS			IV		
	(1) Memorial	(2) Mutual/Char.	(3) Legion	(4) Memorial	(5) Mutual/Char.	(6) Legion
Log(d^{WW1})	0.025***	0.029***	0.019***	0.135*	0.282**	0.232***
HAC Errors:	(0.006)	(0.008)	(0.005)	(0.073)	(0.122)	(0.071)
Clustered Errors:	(0.005)	(0.009)	(0.005)	(0.068)	(0.102)	(0.076)
Obs.	6751	6751	6751	6751	6751	6751

Notes: Estimates of the effect of WWI deaths on WW2 deaths. In all columns standard errors are computed incorporating spatial dependence in the error term using a spatial heteroskedasticity and autocorrelation robust standard errors following Conley (1999), using a Bartlett kernel with a 50km bandwidth to model dependence. Columns 1 and 2 show OLS estimates obtained using the *reg2hdfespatial* Stata command by Fetzer (2020), which is itself based on the previous implementation by Hsiang (2010). Columns 3 and 4 show IV estimates obtained using the *spatial_hac_iv* Stata command created by Foreman (2020). All specifications include mobilisation and economic controls, as well as regiment mobilisation fixed effects.

Table B.17

Robustness: IV using 1917-1918 Deaths – Effect of WWI deaths on WW2 Deaths

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.452***	0.563***	0.643***	0.530***
	(0.106)	(0.110)	(0.167)	(0.147)
First stage F-stat	59.9	71.9	28.4	38.0
Obs.	5062	5062	5062	5030
R2	0.73	0.67	0.67	0.68
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: IV estimation results of the effect of WWI deaths on WW2 deaths, using only deaths in 1917-1918 to construct the instrument. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level.

Table B.18

Robustness: IV using Infantry Regiments – Effect of WWI Deaths on WW2 Deaths

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.411***	0.466***	0.479**	0.415*
	(0.115)	(0.122)	(0.230)	(0.230)
First stage F-stat	39.0	45.4	15.2	17.3
Obs.	5326	5326	5326	5248
R2	0.73	0.69	0.69	0.69
Mobil. controls	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. FE	N	N	Y	N
Regiment instr.	N	N	N	Y

Notes: IV estimation results of the effect of WWI deaths on WW2 deaths. Instrument and mobilisation variables built using only soldiers from infantry regiments. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the historic county level.

Table B.19

Robustness: Alternative IV Definitions – Effect of WWI Deaths on Civic Capital

	(1) Memorial	(2) Legion	(3) Mutual/char.
A. IV Using 1917-1918 Deaths			
$Log(d^{WW1})$	0.079	0.204***	0.183**
	(0.055)	(0.070)	(0.087)
First stage F-stat	28.4	28.4	28.4
Obs.	6124	6124	6124
B. IV Excluding Pals Battalions			
$Log(d^{WW1})$	0.122*	0.231***	0.204**
	(0.067)	(0.075)	(0.093)
First stage F-stat	23.4	23.4	23.4
Obs.	6533	6533	6533
C. IV Using Infantry Battalions			
$Log(d^{WW1})$	0.138**	0.223***	0.209**
	(0.067)	(0.077)	(0.096)
First stage F-stat	20.1	20.1	20.1
Obs.	6552	6552	6552

Notes: IV estimation results of the effect of WWI deaths on proxies for civic capital measures in the inter-war period using parish-level data. Estimates obtained using modified versions of the instrument described in the main text. In Panel A, we build our instrument by calculating death rates using only deaths taking place in 1917 and 1918. In Panel B, the instrument is built excluding Pals' Battalions (see Section 2). In Panel C, the instrument is built using only infantry regiments. Outcomes are a dummy indicating whether a WWI listed memorial (col. 1), a branch of the British Legion (col. 2) or a mutual or charity (col. 3) were established in the parish in the inter-war period. Associated first-stage F-statistics indicated in each panel foot. All specifications include the full set of controls.

C. Additional Robustness Checks

In this Appendix we present a series of robustness checks, which supplement those described in Section 7 in the text.

We first provide estimates of the effect of WWI deaths on the presence of WWI listed memorials obtained by including in memorials listed after the centenary anniversary of the beginning of WWI in 2014 in our set of listed memorials. There was a substantial effort to expand listings precisely because of the WWI centennial, leading to the listing of memorials that in many cases were in a state of disrepair. These memorials are disproportionately located in smaller parishes: the average 1911 population of parishes with at least one memorial listed before 2014 was 12,204 while the average population of parishes with memorials listed in or after 2014 was 2,919.

OLS and IV estimates of the effect of WWI deaths on the presence of WWI listed memorials obtained with both definitions (i.e., excluding and including listed post-2014) are reported in Table C.1. Columns 1 and 2 correspond to estimates in which the outcome dummy excludes memorials listed in or after 2014, so is the same definition used in the body of the paper. In columns 3 and 4 we change that definition to include memorials listed in or after 2014. Columns 1 and 3 report OLS estimates and columns 2 and 4 report IV estimates.

In all cases, we are estimating a linear probability model, so coefficients can be directly interpreted from the table. In the OLS case, the effects of interest are positive and significant at conventional levels, regardless of the definition used. In the 2SLS case, the effect is more than twice the size than for OLS regardless of the definition used. That said, the coefficient is insignificant at conventional levels when including memorials listed post-2014 (see column 4). We maintain our main interpretation that WWI deaths have a positive effect on the presence of listed memorials, because even in column 4 the point estimate is large (larger than OLS) and because memorials listed after 2014 may be listed for reasons different from those listed before the centennial of the onset of WWI and are, therefore, less likely to measure civic capital accumulation in the inter-war period.

Our second robustness check is obtained by dropping the grouped parish comprising London from the estimation sample. This unit comprises several parishes roughly corresponding to the London conurbation in 1911. The reason why we exclude London is that it is an outlier in most variables (population, deaths, mobilisation) and we want to avoid results being unduly affected by this single observation. As shown in the summary results provided in Table C.2, the exclusion of this observation has virtually no effect on our point estimates and, as a result, has no impact on the qualitative conclusion of the analysis, either for deaths or civic capital.[42]

We conduct an additional robustness check by using an alternative measure of mobilisation. The measure of WWI mobilisation used throughout the paper is based on servicemen

[42]Similarly, the exclusion of London has no impact on the soldier-level results from Section 5. Results available upon request.

Table C.1

Robustness: Excluding Memorials listed after the WWI Centenary Commemorations

	Excluding Listed post-2014		Including Listed post-2014	
	Memorial	Memorial	Memorial	Memorial
$Log(d^{WW1})$	0.020***	0.135*	0.032***	0.077
	(0.005)	(0.068)	(0.006)	(0.108)
Obs.	8255	6751	8255	6751
Estimator	OLS	2SLS	OLS	2SLS

Notes: OLS and IV estimates of the effect of WWI deaths on various indicators for the presence of war memorials in the parish. In all columns the outcome is an indicator taking value one if there is a listed memorial in the parish. In columns 1 and 2, this definition excludes memorial listed after the centenary of the beginning of the war in 2014. In columns 3 and 4, these are included in the set of memorials when building the outcome. All specifications include the full set of controls, as well as fixed effects for historic county and regiment mobilisation. Standard errors clustered at the historic county level in parentheses.

Table C.2

Robustness: dropping London

	(1) $Log(d^{WW2})$	(2) Memorial	(3) Legion	(4) Mutual/char.
A. OLS Estimates				
$Log(d^{WW1})$	0.156***	0.020***	0.017***	0.030***
	(0.017)	(0.005)	(0.005)	(0.008)
Obs.	6348	8254	8254	8254
B. IV Estimates				
$Log(d^{WW1})$	0.508**	0.137*	0.236***	0.291***
	(0.228)	(0.069)	(0.077)	(0.103)
Obs.	5465	6750	6750	6750

Notes: Results dropping the grouped parish of London. Panel A corresponds to OLS estimates. Panel B corresponds to 2SLS estimates. Standard errors clustered at the historic county level.

for which we observe not only the location of origin – which is essential to attribute a location to each soldier – but also the battalion of mobilisation. This choice reflects that we wish to use the same set of soldiers to create our mobilisation control and to build our instrument. In that way, we ensure that we appropriately account for m_i in the expression for the instrument derived in Section 4.1. However, we may be concerned that this variable measures mobilisation with error. To provide reassurance on this point, we replicate our main analysis on the effect of WWI deaths on WW2 deaths using the log of total available mobilisation as our measure of mobilisation both for our OLS and IV estimates. Results are reported in C.3 and yield elasticities which are in line with those reported in Section 4.2.

We conduct a final robustness check in which we apply as fewer restrictions and manip-

TABLE C.3

ROBUSTNESS: CONTROL FOR ALTERNATIVE MEASURE OF MOBILISATION

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$
A. OLS Estimates			
$Log(d^{WW1})$	0.226***	0.210***	0.178***
	(0.016)	(0.016)	(0.016)
Obs.	7669	7669	7669
B. IV Estimates			
$Log(d^{WW1})$	0.624***	0.513***	0.489**
	(0.142)	(0.126)	(0.211)
Obs.	5472	5472	5472
Mobil. controls	Y	Y	Y
Econ. controls + County FE	N	Y	Y
Regiment mob. FE	N	N	Y

Notes: OLS and IV estimates of the effect of WWI deaths on WW2 deaths at the parish level. Mobilisation variable built using all available geolocated soldiers in the FamilySearch data source. Panel A corresponds to OLS estimates. Panel B corresponds to 2SLS estimates. Sets of controls and fixed effects in each specification as indicated in the table foot. Standard errors clustered at the historic county level in parentheses.

ulation to the data as possible. Specifically, we do not drop parishes with duplicate names or with zero population. Also, we do not replace outliers in mobilisation and deaths (see Appendix A.3). A summary of results for the main estimates in the paper obtained when not imputing these variables is reported in Table C.4. Comparing point estimates with those reported in Sections 4.2 and 4.3, we can see that results are very similar.

D. Analysis of compliers

The difference in the magnitude between our IV and OLS estimates might be due to the fact the treatment effect of WWI deaths is larger in parishes affected by the instrument (the "compliers") than in other parishes. The IV estimates will then be larger because IV in general estimates the average treatment effect only for compliers (Imbens and Angrist, 1994). To investigate this possibility, in this section we start by characterising compliers in our setting, following Imbens and Rubin (1997). The original method described in this paper assumes there is a "treatment" variable and an instrument for this treatment and requires both treatment and instrument to be binary.

In our setting, our treatment variable is $log(d_i^{WWI})$ and the instrument z_i. To implement Imbens and Rubin (1997)'s procedure, we discretise both variables by creating indicators for each variable being above the median, denoted $Z_i = 1(z_i \geq Med(z))$ and $D_i = 1(log(d_i^{WWI} \geq Med(log(d_i^{WWI}))$. Also denote $D_i(0)$ and $D_i(1)$ the values of the treatment for individual i that would be obtained given the instrument $Z_i = 0$ and $Z_i = 1$, respectively.

TABLE C.4

ROBUSTNESS: NO IMPUTATION OF WWI MOBILISATION OR DEATHS

	(1)	(2)	(3)	(4)
	$Log(d^{WW2})$	Memorial	Legion	Mutual/Charity
A. OLS Estimates				
$Log(d^{WW1})$	0.176***	0.018***	0.016***	0.035***
	(0.016)	(0.005)	(0.004)	(0.007)
Obs.	6365	8276	8276	8276
	$Log(d^{WW2})$	Memorial	Legion	Mutual/Charity
B. IV Estimates				
$Log(d^{WW1})$	0.518**	0.125*	0.209***	0.254***
	(0.219)	(0.063)	(0.067)	(0.092)
Obs.	5479	6765	6765	6765

Notes: OLS and IV estimation results of the effect of WWI deaths on different outcomes as indicated in each column header. Data on WWI deaths and mobilisation obtained without any imputation of abnormally high values. Panel A corresponds to OLS estimates. Panel B corresponds to 2SLS estimates. All specifications include the full set of controls, as well as fixed effects for historic county and regiments of mobilisation. Standard errors clustered at the historic county level in parentheses.

The population can then be partitioned in four groups: the *never-takers*, units that are never "treated" irrespectively of the value of the instrument: $D_i(0) = 0, D_i(1) = 0$; *always-takers*, units with $D_i(0) = 1, D_i(1) = 1$, *compliers*, for which $D_i(0) = 0, D_i(1) = 1$. The last group of *defiers*, for which $D_i(0) = 1, D_i(1) = 0$ is ruled out by the usual monotonicity assumption. Let ϕ_n, ϕ_a, ϕ_c be the population frequencies of the three types of individuals. Under the standard assumptions of the LATE theorem (Imbens and Angrist, 1994), we can only learn about the causal effect of D on Y for the sub-population of parishes that are affected by the instrument.

As Imbens and Rubin (1997) discuss, while we cannot in general identify compliers from the data, we can identify some of the non-compliers. For instance, parishes that have $Z_i = 0$ and $D_i = 1$ must be always-takers. Similarly, parishes that have $Z_i = 1$ but $D_i = 0$ must be never-takers (since defiers are ruled out). If one is willing to assume that the instrument is fully independent of the potential outcomes $Y_i(0), Y_i(1)$, one could thus fully characterise the distribution of $Y_i(1)$ for always takers, denoted $g_a(y)$. Analogously, in large samples, we can know the distribution of $Y_i(0)$ for never takers. Because by assumption the instrument is also independent on the type $C_i = a, n, c$, in large samples we can also know the population proportions of each type: $\phi_n = Pr(D_i = 0|Z_i = 1), \phi_a = Pr(D_i = 1|Z_i = 0)$, and hence we can obtain $\phi_c = 1 - \phi_n - \phi_a$.

With a similar procedure, we can calculate averages of several covariates for each group. For instance, the average for some variable W for always-takers can be obtained by the sample equivalent of $E(W_i|C_i = a)$. By the law of iterated expectations, the equivalent for compliers can be found by

$$E(W_i|C_i = c) = \frac{1}{\phi_c}(E(W_i) - E(W_i|C_i = a)\phi_a - E(W_i|C_i = n)\phi_n).$$

Table D.1 below reports sample averages for several parish-level characteristics for each of the three groups, as well as for the full sample. Compliers – parishes that have high WWI mortality when the instrument predicts so and low mortality when it does not – have much higher population and density than always- and never-takers, suggesting they are more likely to be urban centres. Compliers also have slightly lower mobilisation per capita than the average parish, lower mortality than both always-takers and never-takers. WW2 mortality is in line with the average parish, while always-takers again stand out. In terms of civic capital measures, compliers appear to have slightly lower averages than the other groups.

These results overall suggest that our IV estimates predominantly use variation from relatively large and densely populated parishes. It is possible that individuals living in large villages and cities are more exposed to the commemoration of the War. To start, the visibility of memorials in densely populated areas might be higher. Also, ceremonies, parades, and other forms of celebration and remembrance may be easier to organise and be better attended in urban centres than in more dispersed, rural communities. In turn, this could mean that a given WWI mortality shock could plausibly lead to greater accumulation of civic capital in more dense and larger communities.

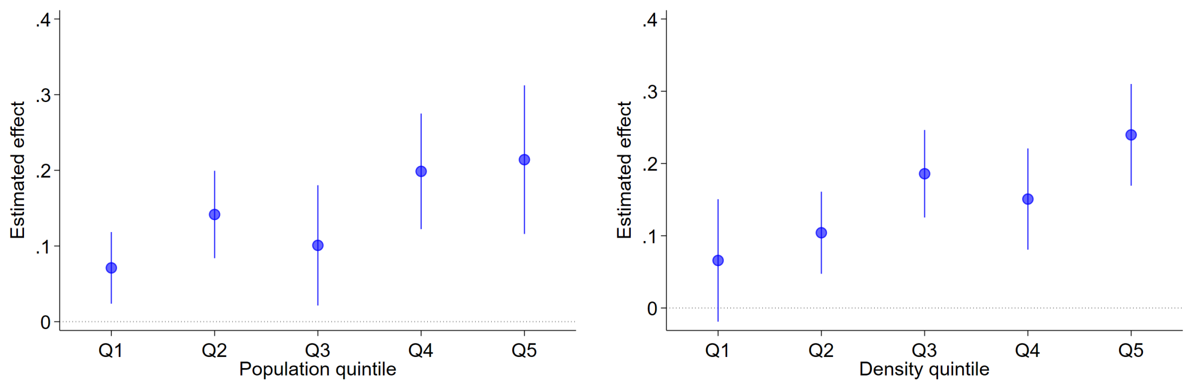
This hypothesis is consistent with finding IV estimates that are larger in magnitude than the OLS ones. To investigate the possibility that the effect of WWI mortality is larger in urban centres, we divide the sample in five quintiles, defined using 1911 population and population density, respectively, and estimate our baseline model in equation 1 restricting the sample to each quantile, reporting results in Figure D.1. Indeed, in panel A we observe that the effect of WWI deaths on WW2 deaths is more than twice as large in parishes in the top quintile of the population distribution. Very similar conclusions can be drawn when using density instead (panel B), providing suggestive evidence that at least part of the difference between our OLS and IV coefficients is due to the latter capturing large treatment effects in urban areas.

Table D.1
Descriptives statistics by complier group

	Full sample	**Always T.**	**Never T.**	**Compliers**
Population 1911	2485.28	1179.84	859.11	3706.92
Density 1911	268.09	152.25	149.16	366.51
Share in reserved occupations	0.39	0.35	0.38	0.40
Male ratio	0.50	0.50	0.50	0.50
Mobilisation WW1	71.96	44.71	55.83	90.46
Mobilisation Rate WW1 (%)	4.97	5.64	8.24	3.38
Number WW1 Dead	38.63	13.24	3.40	63.81
Death Rate WW1 (%)	0.92	1.76	0.81	0.59
Death Rate WW2 (%)	0.40	0.51	0.43	0.34
Listed WW1 Memorial indicator	0.23	0.34	0.27	0.16
British Legion indicator	0.09	0.12	0.08	0.08
Mutual/charity indicator	0.28	0.40	0.33	0.21
Share ϕ	1.00	0.24	0.21	0.54

Notes: Sample averages of several parish-level characteristics for different groups of parishes by complier status. The last row presents estimates for the share of parishes in each group.

Figure D.1
OLS results – heterogeneity by population and density



(A) By population quintiles

(B) By density quintiles

Notes: OLS estimates (and 95% confidence intervals) of the effect of WWI deaths on WW2 deaths at the parish level, restricting the sample to observations with population (panel A) or population density (panel B) in a given quintile of the population (panel A) or population density (panel B) as indicated. For instance, the coefficient displayed under Q1 is the result of estimating equation 1 with the full set of FE and controls, restricting the sample to parishes with population in the first quintile of the 1911 population distribution. Standard errors clustered at the historic county level.