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 considerably more likely to die or to win gallantry awards for valour in WW2. To rationalise these findings, we show that the mortality shock increased communities' civic capital in the inter-war period: Great War deaths spur the creation of new charities, veterans' associations, and historically significant memorials as well as promoting charitable donations and voter participation. Our results highlight the importance of the memory of past conflicts in fostering the creation of socially-oriented activities that, in turn, can shape the behaviour of soldiers in future wars.

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1. Introduction

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. What, then, 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. Recent research indicates that war exposure can also promote pro-social and cooperative behaviours and attitudes.[1] Concurrently, models of social or civic capital and cultural transmission suggest mechanisms through which these shared community values may be passed along and 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 do this, we construct a new dataset combining individual-level war records and community-level characteristics for British parishes 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 parish 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 across the two wars. Our main result is that soldiers hailing from parishes suffering heavier WWI losses were considerably more likely to win gallantry awards for acts of valour or die in combat in WW2. To rationalise this effect, we show that parishes with high WWI mortality build more war memorials and accumulate more civic capital in the inter-war period. A mediation analysis shows that a sizeable part of the effect of WWI mortality on WW2 behaviour of soldiers can be attributed to civic capital accumulated between the two wars.

The historical setting we consider is well-suited to study how exposure to past war violence shapes the subsequent behaviour of soldiers. The human cost of WWI on British communities was both large and heterogeneous. Seven hundred thousand members of the British Armed Forces died, making it the deadliest war in British history. The war was never fought on British soil, so the exposure of communities to the violence of the conflict was mainly shaped by the

[1] Studies 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.

experiences and sacrifices of servicemen. That said, the shadow of the war extended beyond its human toll: in media and political discourse, arts and literature, in the construction of numerous memorials, and the collective consciousness of millions of veterans. Only 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] The close proximity of the wars presents an opportunity to examine how communities respond to wartime deaths and to evaluate how this reaction affects the next generation of soldiers in battle.

Our empirical analysis uses spatial variation in WWI mortality across local communities. We gather and geolocate individual-level data covering over four million British soldiers serving in the two wars as well as detailed characteristics of over 14,000 parishes in England and Wales. We first document a strong positive association between parish-level mortality 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 this endogeneity problem, we use a decomposition of WWI deaths to show that observed deaths can be instrumented with deaths predicted by the mortality rates of different battalions in which soldiers served. Servicemen were assigned arbitrarily to these military 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 that support this assumption, and we find that results are robust to a battery of alternative specifications and definitions of the instrument.

[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". On the same day, the Daily Mail quoted 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. Studies relying on the exogeneity of war related destruction in other settings include Davis and Weinstein (2002) and Acemoglu et al. (2022). There are reasons to be sceptical about exogeneity in our case, however. For example, using data on British servicemen, Bailey, Hatton and Inwood (2023) report that area and household characteristics predict being killed in action in WWI.

The central result of this analysis is that exposure to WWI deaths has large positive effects on soldier mortality and the award of gallantry medals during WW2. Estimates imply that a 1% increase in parish WWI deaths increases WW2 deaths by between 0.2% and 0.5% and the probability of at least one gallantry medal by between 0.1% and 0.2%. We interpret this as evidence that exposure to past war deaths and the subsequent remembrance of these deaths motivates individuals to undertake and engage in combat in service of their country.[4] Reassuringly, our parish-level results for gallantry medals are confirmed in a soldier-level analysis that uses information on all soldiers who were killed in WW2. In particular, we show that coming from a parish with higher WWI mortality increases the probability of being awarded an honour for bravery even when controlling for age, rank, and regiment fixed effects.

To investigate whether the cultural transmission of values is driving our primary results, we collect data on a wealth of proxies for local-level civic capital in the inter-war period, such as the creation of new charities and mutual societies, the local funding of a historically significant war memorial, the formation of a branch of the British Legion, donations to voluntary hospitals, and voter turnout in national elections. Across the board, we find that WWI deaths positively affect all of these outcomes. This suggests that exposure to war deaths increase communities' civic capital in the inter-war period, but does not clarify the extent to which this channel drives soldier behaviour observed in WW2. To further investigate, we implement an IV mediation analysis using the method proposed by Dippel et al. (2019). Estimates indicate that a large fraction – between one- and two-thirds – of the total effect of WWI deaths on WW2 behaviour is driven by the indirect effect operating through changes in civic capital. The response within 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.

We present several additional analyses to further delve into the mechanisms at play and rule out alternative explanations. To start, we show that our main effect is unlikely to be driven by WWI deaths fuelling higher mobilisation during WW2. We then provide evidence that our main results are unlikely to be driven by specific grievances against Germany, nor by soldiers reciprocating localised governmental support after WWI (Caprettini and Voth, 2023). To un-

[4]The award of gallantry medals for acts of bravery and valour represents an unambiguous measure of combat motivation (Caprettini and Voth, 2023), although medals were relatively few in number. Excess wartime mortality provides a valuable and complementary measure because of contextual details in our WW2 setting. Although Britain introduced conscription in WW2, men were granted a "significant degree of freedom and flexibility in the way they chose to engage with the war effort" (Fennell, 2019, p.65). At least 4% avoided military service on the grounds or hardship or conscience, and upwards of 6% applied to defer service on employment grounds. Should they have wished to minimise personal risks, the small share of men who ultimately ended up in fighting units had many opportunities to do so, for example by deserting, surrendering, straggling behind the action, or in extreme cases by self-inflicting wounds.

derstand whether our results are specific to combat and to men, we examine the effect of the WWI death shock on pre-WW2 volunteering for civil defence, where we find positive results for both genders that are consistent with our main estimates. We next explore the role of vertical value transmission within British families by linking individualised data from the 1911 Census to soldiers serving in either of the wars. Here, we continue to find positive effects from community-level WW1 deaths but also find support for a complementary direct channel that goes from father to son. Using data on a battery of economic and demographic outcomes in the inter-war years, we show that there is no detectable effect of WWI deaths on these potential mediators, suggesting that the effect of WWI mortality on WW2 behaviour does not operate via these channels.[5]

Our main estimates 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 our parameters of interest 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 from infantry regiments only. Reassuringly, in all of these exercises, we obtain IV estimates that are very similar to those in our baseline analysis. 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

[5]Previous work for France and Russia has found that war losses can affect communities' demographic and economic conditions including female labour force participation and marriage and fertility Boehnke and Gay 2020; Abramitzky, Delavande and Vasconcelos 2011; Brainerd 2017. However in Britain there were more modest impacts, possibly because, as argued by Winter (2003), the loss of men in WWI was proportionately smaller. For example Hatton and Bailey (2001) shows evidence that female labour force participation was essentially unchanged in Britain until after WW2 and Winter (2003) concludes that the marriage market was far less disturbed in Britain than in France.

2021). 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 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 of servicemen.

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, Ochsner and Roesel 2019 and Masera, Rosenberg and Walker 2024).

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

[6]Exposure to conflict can also have other 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). De Juan et al. (2021) find that war fatalities in Germany in WWI increased support for right wing nationalist parties. The results of Jha and Wilkinson (2012) suggest that combat experience gained by South Asians in WW2 fostered organisational skills that facilitated collective action.

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 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). While these papers stress the importance of contemporaneous factors, we study the role of commemoration of war losses and civic capital, hence focusing specifically on how persistent factors 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, while an additional 200,000 served with the British Navy (Winter, 1977). 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

[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. Conscientious objectors could also be exempted from service on the grounds of political, religious, or moral beliefs at the discretion of a military tribunal.

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 B.1 in the Appendix 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.3 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 battalions 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 was followed by 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. In 1921, 9 million remembrance poppies – artificial silk flowers that could be pinned on a lapel –

were sold for the first time to raise funds for disabled ex-soldiers. These rituals were sustained throughout inter-war Britain and remain closely observed today.

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. Their creation was funded through private voluntary donations and through fund-raising activities of local parish committees (King, 2014; Winter, 1998), with the only government-led memorials being the Cenotaph and the Tomb of the Unknown Warrior in London (Brooke-Holland, 2015). It is estimated that as many as 50,000 WWI war-related memorials of one type or another were built in England and Wales. Around 1 in 10 of these memorials have subsequently been added to the National Heritage List as Listed Buildings, meaning they are legally preserved because of their special architectural or historical interest. Listed memorials represent a good proxy for civic capital – i.e., those values and beliefs that help a group deal with collective action problems in pursuing socially valuable activities (Guiso, Sapienza and Zingales, 2011) – because they were built to high quality standards and largely funded by public contributions.[8]

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 manned by those compelled to serve. Those medically unfit were excused and men could also seek exemptions on the grounds of conscientious objection, serious personal hardship, or employment vital to the community.

One important difference between the British Armies of WWI and WW2 is that the death

[8]We have sponsorship information for around 1000 listed and 7000 non-listed WWI memorials that memoralise more than one person. Around 86% of the Listed memorials were funded by donations from the general public. For non-listed memorials that share is much lower, at around 33%.

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 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 the Allies turned the tide of war to victory in 1945. 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 initiated 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 (VC), which was awarded by the monarch to just 627 servicemen in WWI and 181 in WW2. The George Cross (GC) was the equivalent for acts of bravery not in presence of the enemy. Just below in terms of importance was the Distinguished Service Order (DSO) and its equivalent for non-officers, the Distinguished Conduct Medal (DCM). Unlike the Victoria Cross and George Cross, these medals could not be awarded posthumously. Other gallantry awards that were given for less impactful acts of bravery include 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 combat behaviour, hence we exclude them entirely from our analysis.

3. Data and Descriptives

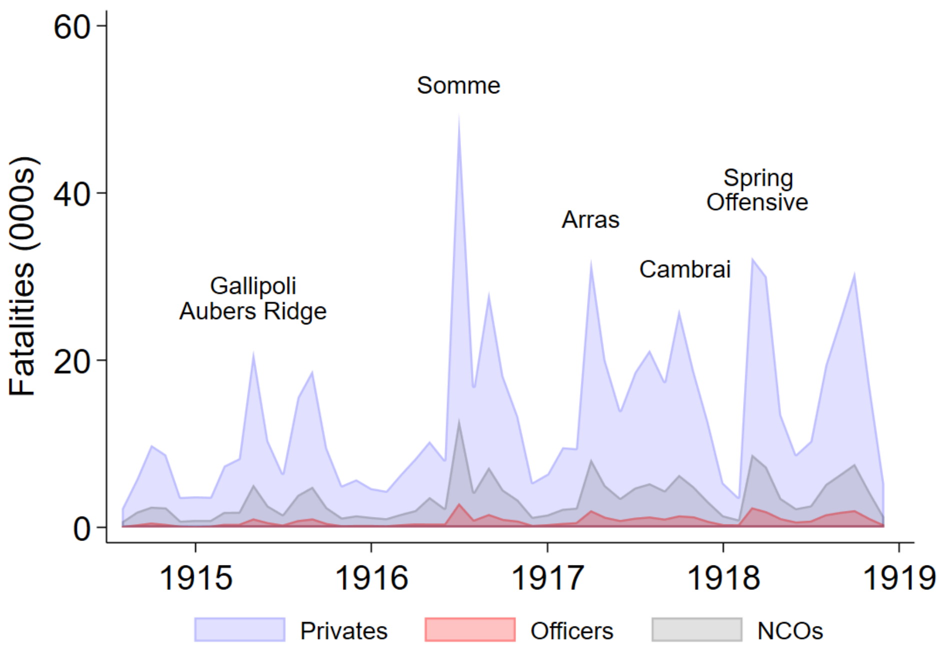
3.1. Data Sources and Assembly

The bulk of our empirical analysis relies on parish-level data covering England and Wales. In this section, we give an overview of the sources and dataset assembly procedures used to create this dataset; Appendix A provides a more comprehensive account of these particulars.

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 website Forces War Records (FWR). Figure 1 is built using data from the CWGC and illustrates the timing of death of British soldiers throughout WWI. The main battles are clearly recognizable from the figure, which also illustrates the composition of war deaths by rank.[9]

FIGURE 1

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.

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. These individual-level sources are then combined with Census information aggregated at the level of parishes, districts or constituencies obtained from the website "A Vision of Britain through Time" (VoB). We identify parishes which hosted men that were awarded the highest ranked gallantry medals (VC, GC, DSO, DCM) in WW2 using the CWGC data and by collecting further information from the British Newspaper Archive and other online sources. Finally, we identify

[9]The time-line of deaths during WW2 can be found in Appendix Figure B.2.

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 most of our analysis 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 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 around it.[10] We further exclude ten parishes which have names that are often repeated – such as Bury – as well as parishes with no residents in 1911, 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. We give priority to place of residence at enlistment in the geolocation. When this is not available, we use place of birth instead. 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 studying the effects of WWI deaths on variables for which information is not available at the parish level (see Section 5). 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 2 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

[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.

previous section allows us to represent aggregate mobilisation and death rates at the level of these geographies. As illustrated in Panel B of Figure 2 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 dataset includes parish characteristics from the 1911 Census, the number of soldiers coming from each parish and killed in each war, gallantry medals, as well as the number of mobilised soldiers during WWI. Descriptive statistics for this dataset can be found in 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. Approximately 1 in 20 parishes could claim at least one WW2 gallantry medal. One-quarter of parishes had a WWI memorial that would later be added to the Heritage List built within their boundaries after the war.

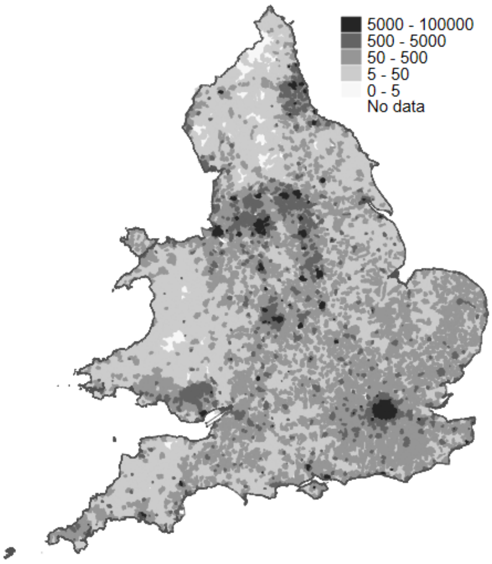
4. The Legacy of WWI Deaths on British Communities

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 the accumulation of local civic capital in the inter-war period and the behaviour of those who fought in WW2. As an initial outcome measuring differences in combat behaviour, we study the mortality of soldiers in WW2. Deaths during war are, naturally, shaped by individuals' behaviour in action. 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). As a second – and possibly more direct – measure of bravery in combat, we use information of gallantry awards awarded for courage in WW2. Example of previous studies in economics and political science using war decorations as a measure of combat motivation include Barber IV and Miller (2019) and Caprettini and Voth (2023).

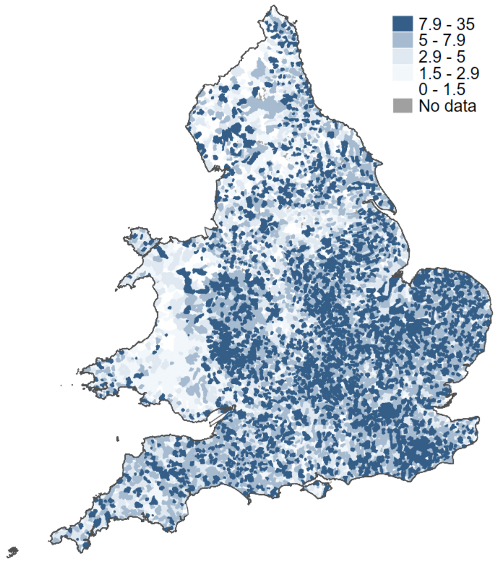
Next, we study how WWI deaths impacted the accumulation of civic capital during the inter-war period. The remembrance and commemoration of the members of a community fallen while serving may foster a stronger sense of shared values (Voors et al., 2012). We document that WWI deaths affect local civic capital by analysing their effect on measures of the intensity

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

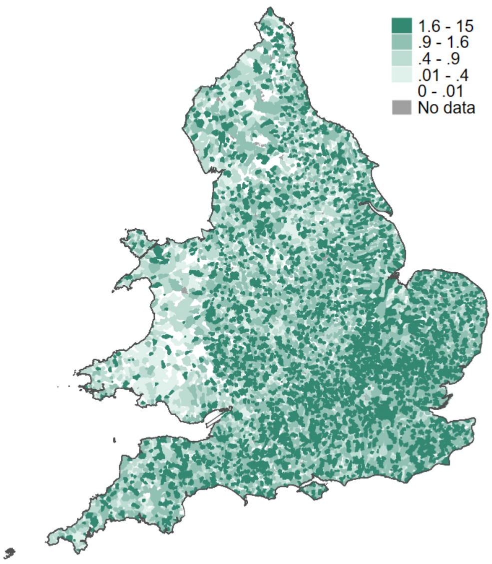
Figure 2
Density, Mobilisation and War Deaths



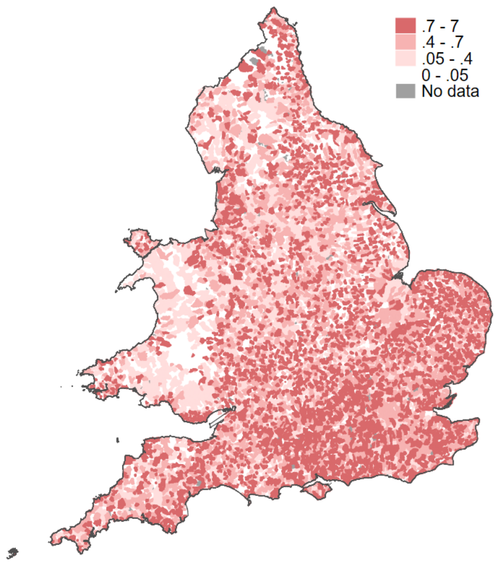
(A) Population Density (pop./km^2)



(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
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	199.56	4456.31	0	503386
Mobilisation Rate WWI (%)	5.19	4.73	0	58
Number WWI Dead	38.63	785.83	0	87917
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
Gallantry Medal WW2 (indicator)	0.05	0.22	0	1
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			

Notes: Descriptive statistics for the parish-level dataset. Share in a reserved occupation is the share of men in the 1911 Census who report an occupation listed as reserved. Mobilisation is the number of soldiers who served from a given parish. Rates are constructed using 1911 population (for WWI figures) and 1939 population (for WW2 figures). Gallantry Medals are defined here as VC, GC, DSO, and DCM (see text for details)

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 behaviour 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. In Section 5, we discuss the plausibility of alternative channels, such as the impact of local economic and demographic conditions, the marriage market, and the mental health conditions of veterans.

4.1. Empirical Strategy: Specification and Validation

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

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

where d_i^{WWI} is the number of servicemen from parish i who died in WWI, y_i is an outcome of interest – for instance the (log) number of servicemen from parish i who died in WW2 or an indicator for a serviceman from the parish being awarded a medal for bravery in WW2. X_i is a vector of controls, and $\mathbb{FE}$ refers to different sets of fixed effects as described below. The specification in logarithms has the advantage of yielding a parameter β that can be readily interpreted as an elasticity. It also leads to estimates that are less sensitive to outliers relative to specifications in levels or rates per capita while retaining a sample of parishes covering 88% of the total 1911 population.[12]

The vector of controls X includes (log) population of the parish in 1911 in all specifications, to account for cross-sectional differences in parish size. In many specifications, we also include variables related to mobilisation in WWI or its determinants.[13] We add to these a range of proxies for local economic conditions.[14]

To account for persistent factors that cause men from the same local community to serve in the same units in both wars, we occasionally include fixed effects at the level of the historic county each parish belonged to. The boundaries of the 52 historic counties in England and Wales often coincide with the regimental recruitment areas (see Figure B.1 in the Appendix). 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. As an alternative way to control for the possibly endogenous allocation of soldiers to different regiments, we include shares for the fraction of soldiers in each of the British Army regiments that was mobilised by the parish. We cluster standard errors at the historic county level throughout.

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 and Vasconcelos (2011), Brainerd (2017), Boehnke and Gay (2020), Acemoglu et al. (2022). The unpredictable nature of warfare

[12]The distribution of d_i^{WWI} and its equivalent for WW2, d_i^{WW2} are highly asymmetric, exhibiting a heavy right-tail which is absent in the distribution of the variables in logarithms. For completeness, we provide robustness checks using a specification in death rates – defined as the number of deaths over total population – in Section 6. A graphical illustration of the bivariate relationship between $Log(d_i^{WW2})$ and $Log(d_i^{WWI})$ can be found in Appendix Figure B.4.

[13]These include the total number of men mobilised in WWI, obtained from aggregating data from FamilySearch. From the 1911 census, we 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.

[14]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.

– i.e., the "fortunes of war" – justifies the validity of this assumption in some contexts. Yet it is reasonable to worry about the presence of unobservable drivers of combat motivation that influence behaviour in both wars.

There are at least three reasons why conditional exogeneity of our variable measuring WWI deaths is unlikely to hold in this context. In the first place, unobserved cultural factors may persist across generations and shape combat behaviour in both wars. For instance, certain communities might provide more courageous soldiers in both wars because they are historically more favourable towards service in the army. In addition, it is likely that other parish characteristics are correlated with both WWI deaths and our outcomes of interest. For example, during WWI, men from more deprived backgrounds were often barred from serving in combat roles because of their poor health conditions (Winter, 1980). While we include several proxies for the pre-war local economic conditions in equation 1, it is difficult to argue that we are able to control precisely for all confounders. A final reason is related to measurement. The number of WWI deaths per parish is drawn from individual-level records that do not always include information on the parish of origin (see Appendix A.3), so the resulting variable may include a moderate amount of measurement error.

To circumvent these issues, in the following we propose an instrument that exploits variation in WWI mortality that is unrelated to parish-level characteristics. Specifically, this variation stems from the difference in mortality across parishes due to the exogenous assignment of servicemen to battalions of different riskiness.

Instrumenting WWI Deaths

To instrument for WWI deaths, we construct a measure of predicted deaths at the parish level 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:

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

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. The use of the logarithm in the definition of z_i is consistent with the specification in 1 and has the added advantage of allowing to easily separate the variation in mortality induced by differences in mobilisation from that owing to serving in battalions with different levels of risk.

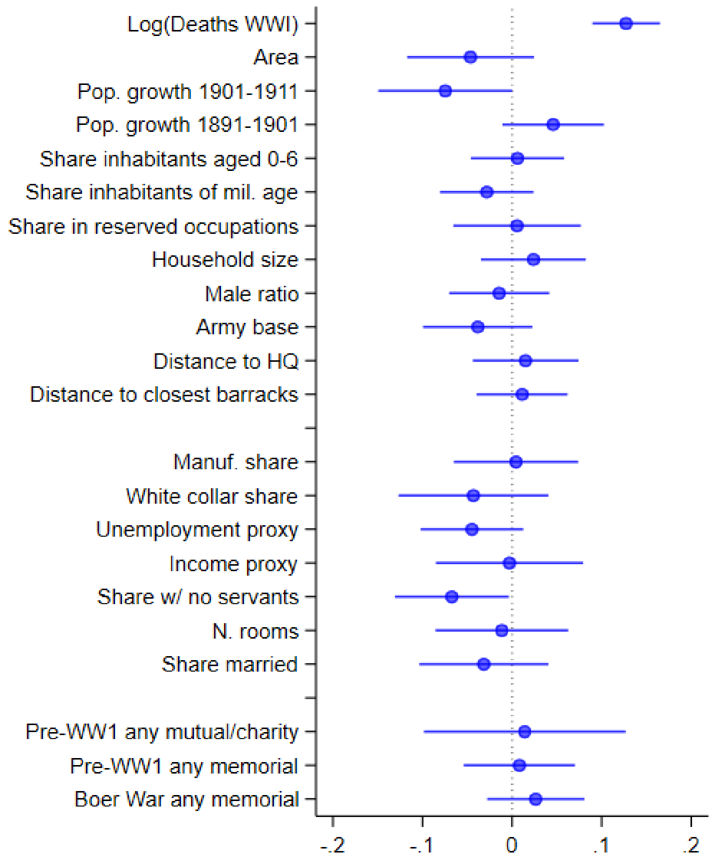
This instrument has a shift-share structure, with shares α_{ij} and shocks δ_j, estimated by the leave-out means $\tilde{\delta}_j$. Identification can thus be achieved by assuming that either the shares or the shocks are exogenous (see, e.g., Goldsmith-Pinkham, Sorkin and Swift 2020). Given that the 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 identification assumption is that our measures of battalion-level mortalities are conditionally uncorrelated to other parish-level determinants of soldier mortality.

These battalion-level mortalities are unlikely to be affected by parish-level confounders such as local economic conditions or the presence of a persistent culture of military service. In addition, by relying on geolocated *mobilisation* data to calculate the α_{ij} terms above, our instrument avoids the measurement error induced by an imperfect geolocation of WWI deaths. 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 above 30 in all specifications.

In Figure 3, 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 shares. The first estimate from the top corresponds to the (standardised) first-stage coefficient which, as expected, is positive and significant. Most of all the 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.

FIGURE 3
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 the logs of 1911 population and WWI mobilisation, regiment mobilisation shares and historic county fixed effects. Standard errors clustered at the historic county level.

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.5 that results from battalion-level balancing checks are analogous to those reported in this section.[15]

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

We study the effect of WWI deaths on WW2 mortality by estimating equation 1 using as outcome the logarithm of deaths by servicemen from a given parish in WW2. OLS estimates are reported in panel A of Table 2, where 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 controls (col. 2), county fixed effects (col. 3) and regiment mobilisation shares (col. 4) has modest impacts on point estimates. In column 5 we add a measure of predicted deaths using regiment-level death rates (z_r), with no impact on the magnitude of the estimate.

In Panel B, we report IV estimates. The resulting elasticities vary between 0.35 and 0.49 depending on the specification. The fact that estimates are largely unaffected by the inclusion of controls, fixed effects, and measures of both mobilisation and mortality at the regiment level 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, 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). 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.

4.3. Results: Legacy Effect of WWI Deaths on Medals in WW2

We then turn to studying the effect of local WWI deaths on another measure of bravery in combat: military honours awarded in WW2. Specifically, we use geolocated data on the places

[15] 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 equal to 202, suggesting that shocks are well dispersed and our setup is appropriate to rely on the asymptotic results derived in the paper.

Table 2

Effect of WWI deaths on WW2 deaths – OLS and IV Estimates

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$	(5) $Log(d^{WW2})$
A. OLS Estimates					
$Log(d^{WW1})$	0.222***	0.179***	0.176***	0.163***	0.163***
	(0.015)	(0.017)	(0.017)	(0.017)	(0.017)
Obs.	6349	6349	6349	6349	6349
R2	0.72	0.73	0.74	0.75	0.75
B. IV Estimates					
$Log(d^{WW1})$	0.351***	0.394***	0.494***	0.474***	0.410**
	(0.040)	(0.151)	(0.164)	(0.175)	(0.204)
First stage F-stat	454.8	46.6	67.3	46.6	34.1
Obs.	5380	5380	5380	5380	5380
Controls	N	Y	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment mob. shares	N	N	N	Y	N
Pred. regiment deaths	N	N	N	N	Y

Notes: OLS (panel A) and IV (panel B) estimates 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 4 we include regiment mobilisation shares whereas in column 5 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.

of origin of decorated servicemen to complement the results for deaths with an outcome that can be more directly linked to soldier motivation and behaviour. Our dataset includes information on 4 different decorations, arguably the most salient and distinguished gallantry awards: the Victoria Cross, the George Cross – where awarded to a member of the military –, the Distinguished Service Order, and its equivalent for non-officers, the Distinguished Conduct Medal for service during WW2.[16]

We use the same IV strategy described in Section 4.1 to study how the legacy of WWI deaths affected the probability that a parish was home to one of the servicemen decorated with a gallantry medal in WW2. Our outcome here is constructed as an indicator taking value 1 if a parish was the origin of a serviceman who obtained one of the honours described above.

Results in Table 3 show that communities that lost more men in WWI are more likely to

[16]For some of these decorations we have rather incomplete coverage, as the official records from the British Armed forces are still subject to restricted access conditions. For details on the data sources and coverage for different decorations, see Appendix A.

produce soldiers that are rewarded for their bravery in WW2. Point estimates are between 0.11 and 0.2, indicating that a doubling in the number of WWI deaths is, all else equal, associated to an increase in the probability of having a decorated soldier during WW2 of between 8 and 14 percentage points. The reaction of the community to the losses inflicted by the war thus appear to have changed the behaviour of the future generation of soldiers, promoting gallantry in service and enhancing motivation. These findings complement the results for deaths in the previous section by being more tightly linked to a specific behavioural mechanism.

Section 6 discusses a series of robustness checks for these results by using alternative definitions of the instrument, changes to the log specification and alternative methods of inference. In the following, we provide a separate analysis that uses individual-level data on servicemen who died during WW2 to present additional evidence linking the legacy of WWI deaths with servicemen motivation. This approach allows us to better control for individual characteristics and also deals with the incomplete coverage of gallantry awards in the parish-level analysis.

TABLE 3
EFFECT OF WWI DEATHS ON WW2 MEDALS – IV ESTIMATES

	(1) Medal WW2	(2) Medal WW2	(3) Medal WW2	(4) Medal WW2
$Log(d^{WW1})$	0.184***	0.190***	0.111***	0.196***
	(0.043)	(0.042)	(0.043)	(0.053)
Mean of dep. var.	0.10	0.10	0.10	0.10
First stage F-stat	46.6	67.3	46.6	34.1
Obs.	6572	6572	6572	6572
Controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. shares	N	N	Y	N
Pred. regiment deaths (z^r)	N	N	N	Y

Notes: IV estimates results of the effect of WWI deaths on an indicator equal to one if at least one soldier in the parish received a medal for bravery during WW2. Control and fixed effects included in each specification as indicated in the table foot. Standard errors clustered at the historic county level in parentheses.

Individual-level Analysis of WW2 Gallantry Awards It is possible that mechanisms other than civic capital could explain the effect of WWI on military honours. For example, WWI deaths may affect demographic and social conditions in parishes and these influence the composition of soldiers that serve in WW2 in terms of their age, rank, or regiment. Gallantry medals in WW2 may have been systematically awarded on the basis of these characteristics, for instance, if officers were more likely to be decorated. Our analysis at the parish level prevents us from controlling for these factors because we lack detailed information on all mobilised soldiers in

WW2.

To overcome this limitation, we use a soldier-level dataset, containing detailed information on the population of British soldiers who died in WW2. We regress an indicator for having been awarded one or more gallantry awards during service (or posthumously) on WWI deaths, our parish-level set of controls and fixed effects capturing the serviceman's age, regiment, and rank. For this sample, we have excellent coverage in terms of military honours, which is another advantage relative to our parish-level analysis. Results are reported in Table B.2 of Appendix B. We find WWI deaths are positively related to the probability of receiving a medal. Specifically a soldier coming from a parish with twice as many deaths in WWI has a 4-9 percentage points higher probability of being awarded at least one medal with respect to the baseline probability in the estimation sample (3.2 percentage points). OLS and Poisson estimates obtained using the number of honours as an outcome lead to similar qualitative results. Importantly we find that our results are robust to the inclusion of age, regiment, and rank fixed effects. We interpret these results as indication that the honours results reported in Table 3 are not driven by differences in soldier demographic and unit-type characteristics induced by the WWI mortality shock.

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

We hypothesise that the causal link of localised war deaths in WWI on outcomes during 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.[17] 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 during the inter-war period.

We begin by studying whether the number of WWI deaths affected the presence of co-operative and charitable organizations in a community. To do this, we collect parish-level information on the presence of mutuals and charities created in the inter-war period. Mutuals are co-operative organisations that are owned and democratically controlled by their members and usually aim to benefit those who are affiliated or the broader community. Charities are typically institutions with philanthropic aims involving members of the community as providers of

[17]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). Kosse et al. 2020 highlight how role models and social environments can determine pro-sociality. In our setting, all these mechanisms may be at play.

funding or management services.

Next, we use information on memorials commemorating WWI soldiers in a community. We restrict attention to listed memorials, i.e., buildings or structures that are legally protected because of their historical or architectural significance. The funding to create these memorials was raised locally, so listed memorials will be present in communities that spent substantial time and effort on their design and construction. Using listed memorials also deals with the concern that more war deaths could be mechanically related to our measure civic capital.[18]

Finally, 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.

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 increasing the number of deaths by 10%, on average, increase the probability that a mutual or charity was created in the parish during the inter-war period by approximately 2.3%. Similar effects are found for the probability of having a listed memorial and for the probability of finding a branch of the British Legion in the parish. OLS and Poisson regression results for these outcomes are qualitatively comparable and reported in Table B.3 of Appendix B.

As a second piece of evidence, we test for the effect of WWI deaths on civic capital using time-varying data on charitable donations to voluntary hospitals.[19] The data we use records voluntary gifts to hospitals in a subset of years in the period 1906-1938. In this analysis, we rely on an event-study approach in which we attribute to each hospital the number of WWI deaths and mobilization in its parish. Specifically, we estimate the following specification at the

[18]We focus only on memorials that were relevant in the inter-war period by excluding 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. We show that this restriction has little qualitative impact on our results in Table C.1 in Appendix C. In Appendix C Table C.2 we also show that findings are essentially unchanged if we regress the number of listed memorials on war dead controlling for the total number memorials in the parish, confirming that our results are not driven by a mechanical relationship between deaths and memorial creation.

[19]These were independent hospitals funded by donations and worker contributory schemes that provided general and acute health services for free or at reduced costs prior to the National Health Service in 1948. See Appendix A for further details.

Table 4
Effect of WWI deaths on Civic Capital – IV Estimates

	(1) Mutuals/Char.	(2) Memorials	(3) Legions
$Log(d^{WW1})$	0.231***	0.181***	0.118**
	(0.085)	(0.062)	(0.052)
Mean of dep.var.	0.48	0.16	0.18
First stage F-stat	30.42	30.42	30.42
Obs.	5466	5466	5466

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

hospital level:

$$Log(\text{donations}_{ht}) = \alpha_h + \delta_t + \sum_{j=1906}^{1938} \mathbb{1}\{j = t\} \times \left(\tau_j Log(\mathrm{d}_{i(h)}^{WWI}) + \eta_j Log(\mathrm{m}_{i(h)})\right) + \varepsilon_{ht} \quad (2)$$

where α_h is a hospital fixed effect, δ_t is a time effect and $Log(\text{donations}_{ht})$ is the log of donations for hospital h in year t. Estimates for the different τ_js, along with the corresponding 95% confidence intervals, are reported in Figure 4.[20] We find that WWI deaths are positively associated with a post-war increase in voluntary gifts (top panel), while no association is found – as expected – in pre-war years. On the other hand, there is no evidence that WWI deaths lead to an increase in the total number of in- and out-patients (bottom panel), suggesting that donations in the inter-war period stemmed from altruism rather than insurance motives.

Taken together, the findings reported in this section show a large and positive impact of WWI mortality on all our parish-level measures of civic capital. The WWI mortality shock thus appears to have triggered a strong community-level response, through the increase in commemorative activities, the formation of socially oriented associations, and charitable donations.

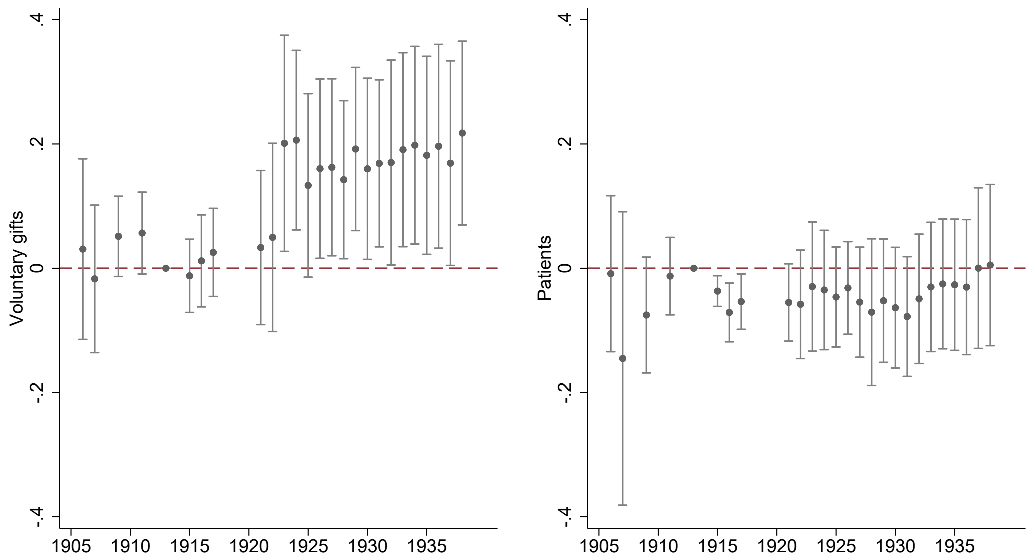
4.5. Mediation: The Effect of Civic Capital on WW2 Deaths

The results in the previous sections document that communities with high WWI mortality are more likely to commemorate deaths and accumulate civic capital. Taken together, these

[20] Equation 2 is estimated on a sample that covers the 98 parishes outside of London that were home to one of these hospitals. In this restricted sample, our instrument is not strong enough to implement the IV strategy we used earlier. Identification here relies on the use of parish fixed effects to deal with pre-determined variables affecting both donations to hospitals and WWI deaths.

FIGURE 4

EVENT-STUDY GRAPHS: DONATIONS TO VOLUNTARY HOSPITALS



Notes: Dots represent estimates corresponding to each of the interactions of the (log) number of WWI deaths with year dummies. All specifications include hospital fixed effects, year effects and interactions between year dummies and the log of WWI mobilisation. Standard errors clustered at the district level in parentheses.

results suggest that civic capital might be a channel through which WWI mortality affects the behaviour of soldiers in WW2. WWI deaths can affect WW2 deaths either directly or indirectly through civic capital (which in this case would be a "mediator").

To separately identify the importance of the direct and indirect effects, 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 the source of endogeneity cannot lie in 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 other words, conditional on civic capital (and its unobserved determinants), WWI deaths are required to be exogenous in a regression of WW2 deaths on WWI deaths. 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.

Table 5 reports IV results obtained by applying the method by Dippel et al. (2019) and using as potential mediator the first principal component of the three main measures of civic capital used above. Estimates in panel A 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-quarter – by a direct effect of WWI mortality, and in part by an indirect effect of these deaths that goes through the civic capital. Panel B shows results are similar when using as outcome an indicator for the parish being home to a decorated soldier. In this case, the indirect effect of civic capital appears to be driving all of the effect of WWI deaths on WW2 honours. Overall, the results from this mediation analysis indicate that a significant part of the effect of WWI mortality is due to civic capital, supporting our proposed mechanism.[21]

5. Additional Evidence on Mechanisms

In this section, we provide additional evidence in support of the role that the legacy of WWI deaths played in shaping the behaviour of soldiers during WW2. In doing so, we test for the presence of alternative mechanisms of interest operating via channels different than the response of civic capital in British communities. These complementary pieces of evidence use data at different levels of aggregation and information from other sources. As such, we sometimes resort to alternative empirical strategies to the one employed earlier. We discuss the specific empirical approaches used in each case.

Section 5.1 is devoted to testing for alternative channels that could also explain the legacy of WWI deaths on soldier motivation. Specifically, we discuss the role of differential WW2 mobilisation rates, grievances against Germany and reciprocity for government policy in shaping WW2 mortality. In Section 5.2, we present additional evidence showing an effect of WWI deaths on communities' social and civic capital in the inter-war period by documenting responses of electoral turnout and volunteering. Finally, in section 5.3 we provide evidence that rules out the primacy of other channels, such as inter-generational transmission of values within the family, local economic and demographic factors, and effects that go through an impact of war trauma on mental health.

5.1. Soldier Behaviour

Mobilisation The legacy effects of WWI deaths on WW2 deaths could in part be explained by WW2 mobilisation if WWI mortality causes higher mobilisation in WW2 which, in turn, mechanically leads to more deaths. The potential relevance of this channel is somewhat limited by the fact that mobilisation in WW2 was carried out via mass conscription. That said, differences in mobilisation could explain our earlier findings as a significant share (about 20%) of men were rejected for military service on medical grounds (Ellis, 1980), while 4% avoided enlistment for

[21] 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 association between WWI and WW2 outcomes that we are unable to explain using this proxy.

Table 5

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

	(1)	(2)	(3)	(4)
A. Outcome: $Log(d^{WW2})$				
total effect	0.394***	0.494***	0.474***	0.410**
	(0.151)	(0.164)	(0.175)	(0.204)
direct effect	0.124***	0.100***	0.095***	0.113***
	(0.031)	(0.031)	(0.034)	(0.040)
indirect effect	0.270	0.394*	0.378*	0.297
	(0.178)	(0.202)	(0.222)	(0.245)
Obs.	5380	5380	5380	5380
F-stat $Log(d^{WW1})$ on Z	30.65	38.39	28.81	24.64
F-stat M on $Z\|Log(d^{WW1})$	9.50	9.36	8.59	9.00
B. Outcome: Any WW2 medal				
total effect	0.184***	0.190***	0.111***	0.196***
	(0.043)	(0.042)	(0.043)	(0.053)
direct effect	0.002	-0.003	0.007	-0.005
	(0.013)	(0.012)	(0.010)	(0.014)
indirect effect	0.183**	0.193**	0.105	0.201*
	(0.087)	(0.085)	(0.066)	(0.104)
Obs.	6572	6572	6572	6572
F-stat $Log(d^{WW1})$ on Z	46.60	67.25	46.56	34.06
F-stat M on $Z\|Log(d^{WW1})$	13.26	14.01	12.12	10.49
Controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. shares	N	N	Y	N
Pred. regiment deaths (z^r)	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 dummies for 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 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.

reasons of personal hardship or conscience, and upwards of 4 million men successfully applied to defer military service (with support from employers) on the grounds that their employment was vital to the war effort.

To evaluate whether there is a mobilisation channel linking deaths in both wars, we use data on the number of mobilised servicemen aggregated at the level of 1945 electoral constituencies to estimate the following regression:

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

where c indexes constituencies and controls X_c are the same as in our parish-level analysis, now aggregated at the constituency level. Regiment-specific mobilisation shares from WWI are also included in some specifications. Variable $Log(\text{electors}_c^{1945})$ is the log number of eligible voters in constituency c.[22]

Columns 1 through 4 of Table 6 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 and comparable to baseline estimates reported in Table 2. These results lead us to conclude that there was no discernible effect of WWI deaths on WW2 mobilisation, and our baseline results are unlikely to be due to the impact of mobilisation.

TABLE 6
EFFECT OF WWI DEATHS ON WW2 MOBILISATION

	(1) $Log(m^{1945})$	(2) $Log(m^{1945})$	(3) $Log(m^{1945})$	(4) $Log(m^{1945})$	(5) $Log(d^{WW2})$
$Log(d^{WW1})$	0.007	-0.007	-0.015	-0.002	0.423*
	(0.028)	(0.019)	(0.011)	(0.019)	(0.230)
Mean of dep.var.	8.43	8.43	8.43	8.43	6.29
Obs.	500	500	500	500	500
R2	0.80	0.88	0.94	0.97	0.84
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.

Grievances Another channel that could link the legacy of WWI deaths to changes in behaviour of WW2 soldiers is the desire for revenge. The majority of the fighting carried out by

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

British servicemen in both wars was against the German Army, and Germany was perceived – for good reason – as the most important adversary in both wars. Therefore, grievances held specifically against Germany could have been consequential for behaviour in WW2, and it is possible that the changes in combat behaviour that we document are in part driven by an anti-German sentiment. To investigate this possibility, we use the fact that a significant part of the fighting took place in campaigns that did *not* involve the German forces, but were led against the Japanese Imperial Army and the Italian Army. 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.[23] We then use this variable as the 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. However, as we show in Table B.4 of Appendix B, estimates are in line with those reported in Table 2. We thus conclude that it is unlikely that the our estimates for WW2 deaths are driven by grievances of servicemen against the German Army.

Reciprocity for public good provision Another potential explanation for our main results is reciprocity. In this interpretation, the reported effects on soldiers behaviour in WW2 could reflect an attempt to pay back governments for targeting inter-war support to communities that paid the most in terms of mortality in WWI. This hypothesis is motivated by Caprettini and Voth (2023)'s findings. In the US context, areas that received more New Deal support showed higher war bonds purchases, volunteering, and medal recipients in WW2. While appealing, the historiography does not support such a mechanism in our case. Fennell (2019), for example, argues that British WW2 soldiers felt overwhelmingly that the WWI generation had been betrayed by the failure of successive governments to deliver the 1918 promise of a land "fit for heroes". Moreover, major policy innovations in this period were national or regional rather than targeted to specific cities or towns.[24] The main interventions that could have been deployed at a local level to communities to compensate for war losses were the provision of new public housing and/or better transport infrastructure. We examine both variables in Appendix Table

[23] We include in this group soldiers fighting in the North Africa campaign before the arrival of the Afrika Korps, as well as the East Africa and South-East Asia campaigns. We count as soldiers killed fighting in the South-East Asia campaign all of those in the CWGC dataset who were buried in Asian countries east of (and including) modern-day 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 Libya before February 1941.

[24] For example, the expansion of unemployment insurance was national, and industrial support under the 1934 Special Areas Act was at the level of broad regions (e.g. South Wales; North East England), while an Industrial Transference policy helped young people to relocate away from areas of high unemployment and deprivation.

B.5. In columns 1 and 2 we find that WWI deaths do not predict new housing construction in between 1921 and 1931 — a period of rapid policy-driven growth in housing stocks -– nor do they predict the establishment of new rail stations. When adding these variables as controls in our main specification, our coefficient of interest remains unchanged.[25] Together, these results indicate that our main findings cannot be explained as being caused by a response of servicemen to the provision of public goods in their communities.

5.2. *Civic and Social Capital*

Bonding and Bridging Social Capital Previous research distinguishes social capital that bonds pre-existing groups and communities together and social capital that bridges or links individuals from different social groups (Putnam, 2000). The proxies we use for civic capital in Section 4.4 are arguably weighted towards the former as they mainly capture activities taking place within local communities. It is therefore instructive to examine the effects of the WWI mortality shock on civic engagement in national issues. Turnout in elections provides a useful proxy for this wider civic participation. For this purpose, we study the effect of WWI deaths on electoral turnout in national elections for the period December 1910 – November 1935.[26] Data are reported for electoral constituencies so we aggregate all variables to this level. We then estimate the following model:

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

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. We also include regiment mobilisation shares constructed as before. Controls and county fixed effects are included in all specifications. Panel B additionally conditions on December 1910 turnout. Standard errors clustered at the historic county level are in parentheses.

Estimates of the effect of WWI deaths on different general elections are reported in Table 7. Results show that, as expected, WWI deaths are uncorrelated with election turnout in 1910. Estimates in other columns indicate a positive effect of WWI deaths on turnout in elections in the

[25] Note that the coefficients on housing construction and new railway stations indicate these are significant determinants of WW2 deaths, suggesting that reciprocity may play a separate role by shaping WW2 behaviours in our context.

[26] We exclude the 1918 election due to the unusual circumstances - it was held only days after the end of the war on a rainy Saturday close to Christmas and turnout was unusually low.

inter-war period. Estimates are more precise when controlling for election turnout in December 1910 in panel B and again provide evidence that deaths during the Great War positively impacted bridging civic capital in the most affected communities. Additional analyses indicate that WWI deaths did not have a detectable impact on the vote shares of major political parties – see Table B.6 of Appendix B for results on votes for the Conservative party for an illustration.

TABLE 7

EFFECT ON ELECTION TURNOUT

	(1) 1910	(2) 1922	(3) 1923	(4) 1924	(5) 1929	(6) 1931	(7) 1935
A. Baseline							
$Log(d^{WW1})$	0.010	0.034	0.042	0.045*	0.045**	0.067**	0.050**
	(0.026)	(0.021)	(0.025)	(0.023)	(0.021)	(0.032)	(0.022)
Mean of dep.var.	0.86	0.74	0.73	0.79	0.78	0.78	0.73
Obs.	494	460	468	475	497	458	471
B. Conditional on 1910 turnout							
$Log(d^{WW1})$		0.037**	0.043**	0.044**	0.042**	0.057***	0.046***
		(0.016)	(0.018)	(0.017)	(0.016)	(0.020)	(0.016)
Mean of dep.var.		0.74	0.73	0.79	0.78	0.78	0.73
Obs.		455	465	469	491	452	466

Notes: OLS results of the effect of WWI deaths on national election turnout at the constituency level. All specifications include the full set of controls described in Section 4.1 and historic county fixed effects. Panel B additionally conditions on December 1910 turnout. Standard errors clustered at the historic county level in parentheses.

Volunteering for Civil Defence The mechanism we propose to explain the causal connection between WWI deaths and WW2 outcomes entails a greater willingness to participate and take personal risks in military situations. A common way to to contribute to social aims involving individual costs is through volunteering. As noted above, the introduction of national conscription in 1939 precluded large scale volunteering for military service in WW2. However, we can examine the relationship between WWI deaths and volunteering for civil defence services in the pre-WW2 period. The outcomes we use are (log) counts of volunteers in the Air Raid Precautions (ARP) service in June 1939, measured separately for men and women. The ARP would become the largest civil defence service in the war with 1.7 million volunteers at its peak. We examine the effect of WWI deaths on both the total number of volunteers by gender and the counts of ARP wardens. These wardens would be responsible for helping people to shelters and patrolling the streets during air raids, taking significant personal risks relative to other ARP roles such as messengers and first aid personnel.

The data we use are recorded for 143 spatial units which comprise a mix of large districts and counties. The aggregation means we are unable to control for county fixed effects but we otherwise use our baseline empirical specification. Results are reported in Appendix Table B.7. We find a positive effect of WWI deaths on the number of ARP volunteers, with estimates that are of similar magnitude for men and women. Effects on the number of ARP wardens are larger and more precisely estimated. These findings are consistent with our parish-level results for civic capital, and also suggest that WWI deaths have similar effects across genders.

5.3. Alternative Mechanisms

Inherited Values Our analysis thus far has focused on the impact of community-wide mortality shocks but, of course, the experience of war varies across individual households as the loss of a father, husband, brother, friend, could have had profound emotional and economic consequences on those who survived at home. We next examine the extent to which our results are driven by community factors or passed on through families. That is, we attempt to distinguish between "oblique" (or "horizontal") transmission and "vertical" transmission, using the terminology by Bisin and Verdier (2001).[27] We match 3.4 million male children that were aged 0 to 8 in the 1911 Census, their fathers and other household members to WWI and WW2 military deaths.[28] This dataset is then used to run a series of individual-level regressions using variants of the following specification:

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

where D_{ik}^{WW2} is an indicator for whether child k residing in parish i died in WW2, and D_k^{Father} and D_k^{Other} are indicators for whether the father or another household member co-habiting with the child in 1911 died in WWI. Variable d_i^{WWI} and the fixed effects are the same as above, while X_{ik} includes the same parish-level mobilisation and socio-economic controls as above, 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 with coefficient β multiplied by 100 for presentational

[27] 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 carry over to our setting and if they translate into changes in actual behaviour in battle.

[28] All matches are performed using the automated matching algorithm developed by Abramitzky, Boustan and Eriksson (2012) (henceforth ABE). 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. 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 as well as about 27,400 children in the Census who are recorded to have been killed in WW2. See Appendix A.5 for details.

purposes. 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 WW2. 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 increase 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. 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. Overall these results indicate that community-wide and household-level transmission mechanisms operate side-by-side in this context, and that our main finding on deaths cannot be fully explained by inherited traits.

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

	(1)	(2)	(3)	(4)
$Log(d^{WW1})$	0.056***	0.056***	0.026*	0.026*
	(0.019)	(0.019)	(0.015)	(0.015)
Father died		0.306***		0.301***
		(0.084)		(0.084)
Oth.HH died		-0.009		0.001
		(0.028)		(0.028)
Mean of dep.var.	0.75	0.75	0.75	0.75
Obs.	3033004	3033004	3033004	3033004
R2	0.003	0.003	0.003	0.003
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 the full set of controls at the parish level. Individual controls are fixed effects for age in 1911 and father's occupation. Standard errors clustered at the parish level in parentheses.

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 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. Most of the available evidence on these channels is for France and Russia, where the impact of the war on the male population was much greater (see e.g. Abramitzky, Delavande and Vasconcelos 2011; Brainerd 2017). Instead, as Winter (2003) discusses, "the marriage market was much less disturbed in Britain than in France or elsewhere on the Continent" (p. 247), and "[regarding the issues of] fertility and mortality in Britain in the period of the First World War, we see the continuation of pre-war trends rather than any major discontinuities" (p. 257).

Notwithstanding these considerations, we proceed to test for the effects of the war on local economic and demographic conditions using district-level data from the 1921 and 1931 Censuses and report these in Table B.8 (in the Appendix). Columns 1 and 2 examine economic outcomes. We find insignificant effects on 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), and the female labour force participation rate.[29] 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 during and 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 effects of WWI deaths on these measures of demographic structure, which suggests war losses had at most small effects on subsequent demographic composition at the local level.

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. 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

[29]This contrasts with evidence that war losses stimulated female labour force participation in other countries (Boehnke and Gay, 2020), but is consistent with female labour force participation being essentially unchanged until after the end of WW2 in Britain as highlighted by Hatton and Bailey (2001).

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.

Resulting estimates are plotted in Appendix Figure B.6. 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.

Other Mortality Shocks: the Spanish Flu Epidemic Another possibility we consider is that the observed effect on WW2 deaths is simply the result of a generic local mortality shock, of which WWI deaths is just 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.9 we provide a series of estimates obtained using data on Spanish flu deaths at the district level.[30] 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 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.

[30]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. Given the relatively small sample we do not use county fixed effects in these specifications.

Mental Health The final possibility that we consider is that our results are driven by war trauma and mental health. Recent studies have found negative long-term socio-economic effects of losing a father in war, and that a father's war trauma can be transmitted to children (e.g., Costa, Yetter and DeSomer 2018; Dupraz and Ferrara 2023). Such factors are unlikely to explain the award of medals and soldier deaths in WW2 because, among other reasons, WW2 recruits were subject to a medical examination that included an assessment of mental health conditions, with those considered unsuitable on these grounds for service either rejected or else assigned to non-combat positions (Ellis, 1980). However, they could plausibly feed through to at least some of the other outcomes we consider. For example, it may be that greater war trauma leads to the creation of more charities.

To assess the relevance of this potential channel, we obtain data on male suicides in 1919 as a district level proxy for mental health in the inter-war period and regress various measures constructed from this data on our WWI deaths and controls. Results are reported in Table B.10 of Appendix B. Although we are limited by the available data, we do not find any evidence that WWI deaths predict male suicides in 1919.

6. Robustness Checks

In this section, we present different sets of results to illustrate the robustness of our empirical findings. In particular, we show our results are robust to using death rates instead of logarithms; to alternative definitions of the instrument; to accounting for the problem of taking the logarithm of zero; and to using standard errors that explicitly account for spatial dependence in our outcome and explanatory variables. Additional robustness checks, pertaining to sample restrictions, data imputation and other methodological choices are discussed and presented in Appendix C.

Robustness of the results on WWI deaths We start by estimating our baseline model using death rates – i.e., deaths per population in 1911 – instead of logged deaths as measures of mortality. Appendix Table B.11 shows that OLS and IV results are qualitatively analogous to those reported in Section 4.2, reassuring us that these results are robust to different specification of the model.

Then, we explore robustness to alternative definitions of the instrument, particularly to try to address remaining concerns about its exogeneity. One 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 for evidence from the US setting) – that persisted into WW2. Including volunteers when constructing our instrument could then induce omitted variable bias if, for example, battalions formed by volunteers have higher average death rates.

In an attempt to rule out this possibility, we start by re-constructing our main variables (instrument, mobilisation and WWI mortality) excluding soldiers who served in one of the Pals battalions – units made of men who came from the same community or workplace and who volunteered to serve together.[31]

In a second exercise, we construct our instrument and WWI mortality only using deaths that occurred in 1917 and 1918. At that stage of the conflict, mass conscription was in full force and most of the volunteer army of 1914-1915 had been put out of action. Hence, those who died towards the end of the war were in large part conscripts. Because conscription left limited room for individual choice over when and where to enlist, using only deaths later in the war helps mitigate the potential confounding effect of persistent differences in the propensity to volunteer.

Finally, a remaining reason for concern may arise if some soldiers were able to self-select into less risky units based on their individual characteristics. One such instance would occur if, for example, better fit or more educated men enlisted in battalions that were deployed far from the front-line. We re-calculate 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.[32] In Appendix Table B.12, we show IV estimates using these three alternative approaches. In all cases, point estimates are very similar in magnitude to those in the baseline, with precisely estimated coefficients across all specifications.

We then turn to the 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. In Table B.13 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.

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

[31]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 roughly 9% of fatalities in WWI.

[32]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.

to biased estimates (Chen and Roth, 2023). 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.14, we implement the iOLS estimator, showing results for different choices of the hyper-parameter δ. Except for very low values of δ, results are very similar to our baseline ones.[33]

In most of our empirical analysis we have calculated standard errors clustering at the level of historic counties, of which there are 52. However, it is possible that spatial correlation in the unobserved term 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. Because dependence is probably stronger between locations that are closer together within the 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 for our baseline estimates of the effect of WWI deaths on WW2 deaths using this method are reported alongside point estimates and traditional (clustered) standard errors in Appendix Table B.15. This method yields standard errors that are very close to those obtained using clustering.

Robustness of the results on medals To investigate whether the results on WW2 medals displayed in Table 3 hold using different specifications, we begin by estimating the effect of WWI mortality on the number of soldiers awarded a medal for bravery in the parish using our alternative instruments that only use Pals' battalions, 1917-18 deaths, or infantry battalions. A summary of these results is reported in Appendix Table B.17. Estimates are very similar to those reported using the full-sample instrument. Tables B.16 shows that both OLS and IV results on medals are robust to adding a constant to all variables before taking logarithms. Once again, estimates are in line with those reported in the main analysis both in sign and magnitude. Standard errors robust to spatial correlation for estimates of the effect on medals are similar to the clustered ones we use in the main analysis. These results are available on request but are not reported for brevity.

Robustness of the results on civic capital We start by using our alternative instruments that only use Pals' battalions, 1917-18 deaths, or infantry battalions to estimate the effect of WWI

[33] 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.

deaths on our measures of civic capital. Results are reported in Appendix Table B.18. Once again, estimates are analogous to those reported using the full-sample instrument in Section 4.4. Tables B.19 and B.20 show OLS and IV results on civic capital are robust to adding a constant to all variables before taking logarithms. Once again estimates are in line with those reported in the main analysis both in terms sign and of magnitude. Finally, standard errors robust to spatial correlation for estimates of the effect on civic capital are analogous to the clustered ones (not reported for brevity).

7. 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 and civic capital as key factors 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 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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Online Appendix

A. Data

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), 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 information on names, time of death, rank, fighting unit, honours (e.g., gallantry medals), age and a string from which we can extract the location of origin of dead soldiers. Data on locations is augmented using information 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. [34] 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 and Higgs (2014) and is distributed by IPUMS (Minnesota Population Center, 2019). We use this data both at the individual level in Section 5.3 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

[34] 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.

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.[35]

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 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). Data on financial contributions to voluntary hospital schemes comes from the Voluntary Hospital Database (see `http://www.hospitalsdatabase.lshtm.ac.uk/the-voluntary-hospitals-database-project.php`). We transcribe information on volunteers for ARP (Air Raid Precaution) duties as at June 1939 that are held in file HO 186/1 of the National Archives in Kew.

Our work also relies on a number of other ancillary sources. Because information from CWGC on medal recipients is limited to soldiers who lost their lives, we also collect and geolocate data on *all* military recipients of the Victoria Cross (with year of award). These are 1,354, of which we are able to geolocate 665 to England and Wales' parishes. Data on recipients of the George Cross (only those awarded to soldiers and during WW2) are from Wikipedia. These are 107, of which we can geolocate 80. Complete records on DSO and DCM recipients are not publicly available. By combining data from website www.tracesofwar.com, Forces War Records (collection *UK, WWII, Recipients of the DCM 1939-1945*) and the British Newspaper Archive (range Dec. 1938 – Dec. 1947), we successfully geolocate 577 DCM and 271 DSO recipients.

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 parish. A Parliamentary return provides counts of mobilised soldiers 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 from Historic England (Historic England, 2021). We do likewise for distance to Regimental Headquarters after geolocating them manually. We obtain 1918-1919 influenza deaths by district from

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

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 within the same county. After applying these restrictions and grouping parishes as described Section 3, 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 requires adequately geolocating soldiers based on information on their place of birth and residence from the 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.[36] Given that our analysis will focus on England and Wales only, we remove servicemen born in Scotland, Ireland,

[36]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.

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 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.[37] 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

[37]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.

have enough observations to construct the shares serving in each battalion, 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.1. We can observe a clear positive relationship, which is what we would expect given the nature of the mobilisation 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.1. 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.

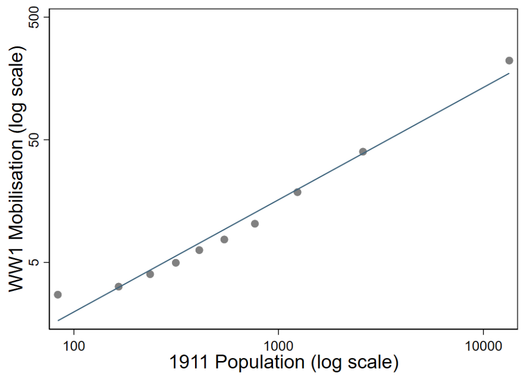
To validate the geolocation procedure for deaths we can use figures for death rates at the parish level constructed using two different sources of the underlying location of origin data: the "additional information" string in the CWGC data and data on birthplace or residence in the FWR records. The corresponding binned scatter plot is shown in Panel C of Figure A.1. There is clearly a positive and close to linear relationship between dead rates from both sources. The associated univariate regression yields an R-squared of 0.37 and a slope coefficient of 0.68.

Finally, we can also compare death rates calculated from data on either birthplace or residence from FWR. 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.1 and shows a clearly positive and linear relationship. The univariate regression yields an R-squared of 0.65 and a slope coefficient of 0.84.

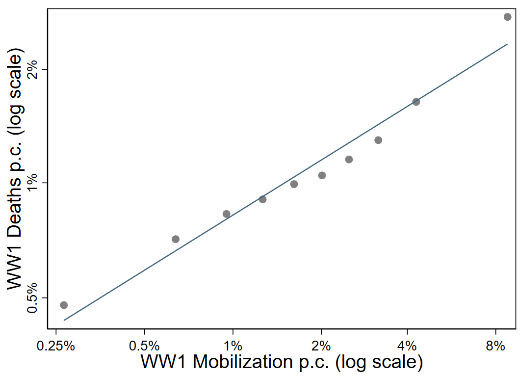
We can further validate the baseline measure of WWI deaths used in the paper with one constructed using the number of dead commemorated in local memorials. As discussed in Section 2, memorials often include a list of names of the local servicemen who lost their lives in

FIGURE A.1

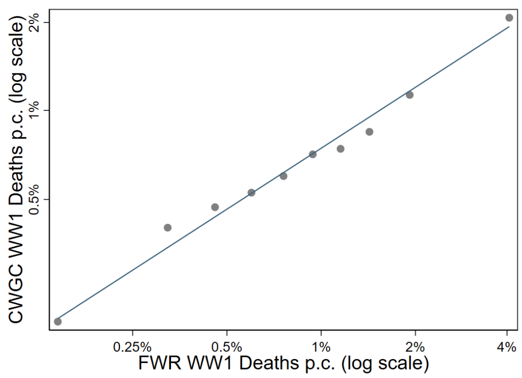
VALIDATION: MOBILISATION AND DEATH RATES



(A) POPULATION & MOBILISATION



(B) MOBILISATION & DEATH RATES WWI



(C) DEATH RATES WWI – FWR & CWGC

(D) DEATH RATES WWI – RESIDENCE & BIRTH

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

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.2. The depicted relationships are positive and close to linear. The associated univariate regressions yield elasticities of over 0.2, significant at all conventional levels.

A.4. Details of Civic Capital Measures

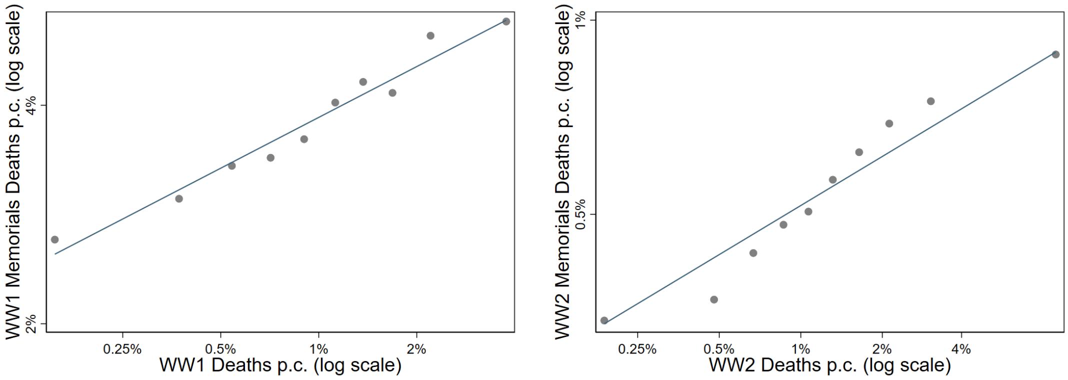
We use data from a number of sources to create measures of civic capital in the pre-WWI and inter-war periods. Our approach to measure civic capital is to examine results across several distinct measures to provide a comprehensive picture and assess robustness.

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. The data on war memorials chiefly comes from

Figure A.2

Validation: Death rates WWI and WW2



(a) WWI Dead Rate: Memorials & CWGC (b) WW2 Dead Rate: 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). **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 correspond to OLS estimates using the underlying data.

Historic England and Cadw - the public bodies responsible for caring for and promoting historic and heritage assets in England and Wales respectively 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. 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. 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",[38] 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 the governing

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

document description data field. We obtain a year for more then 90% of charities in this way. We then restrict attention to the approximately 48,500 entries present 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.

A.4.3. Additional Measures of Civic Capital

We use three additional measures of civic capital in our analysis. The first corresponds to contributions to voluntary hospital schemes. Voluntary hospitals were independent hospitals that, prior to the advent of the National Health Service (NHS) in 1948, provided general and acute services at low or reduced costs. They largely relied on donations and philanthropic funding and were typically staffed by unpaid doctors. The source of our data is the Voluntary Hospital database. We use information on all voluntary hospitals in the database in the period 1906-1939. The information changes over time as in some years a “voluntary gifts” total is recorded whereas for other years more disaggregated categories are reported instead. We compute a consistent measure of voluntary gifts by summing income from donations, collection boxes, church collections, annual subscriptions, and worker contributions and verify this matches total “voluntary gifts” in cells that have both variables available. We link hospitals to parishes using the spatial coordinates recorded in the original dataset.

A second alternative measure of civic capital used in the analysis corresponds to counts of volunteers to serve in the Air Raid Precautions (ARP) civil defence service on June 1939. The ARP was the largest civil defence service in WW2 and was set up by the Air Raid Precautions Act that came into effect on 1 January 1938. The ARP was largely run by volunteers and various local and national recruitment initiatives ran in 1938 and then throughout the war to encourage participation. By September 1939, some 1.6 million men and women had volunteered. Our source of data on ARP volunteers is official statistics held in the National Archives that tabulate returns from local authorities in June 1939 and record male and female volunteer counts for 83 large local authorities (County Boroughs) and 62 County remainders (which are aggregations of smaller districts).

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 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. 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.

We follow the following steps: First, we correct some minor 1911 Census parish errors using a file issued by IPUMS in December 2020. We 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 including 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 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.

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

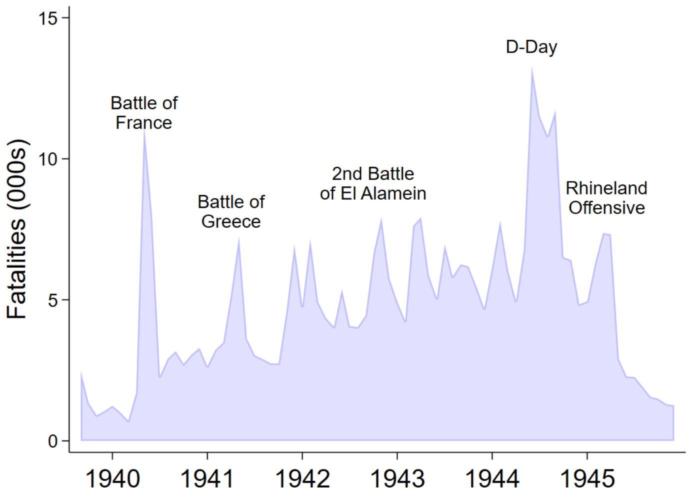
Figure B.1

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.

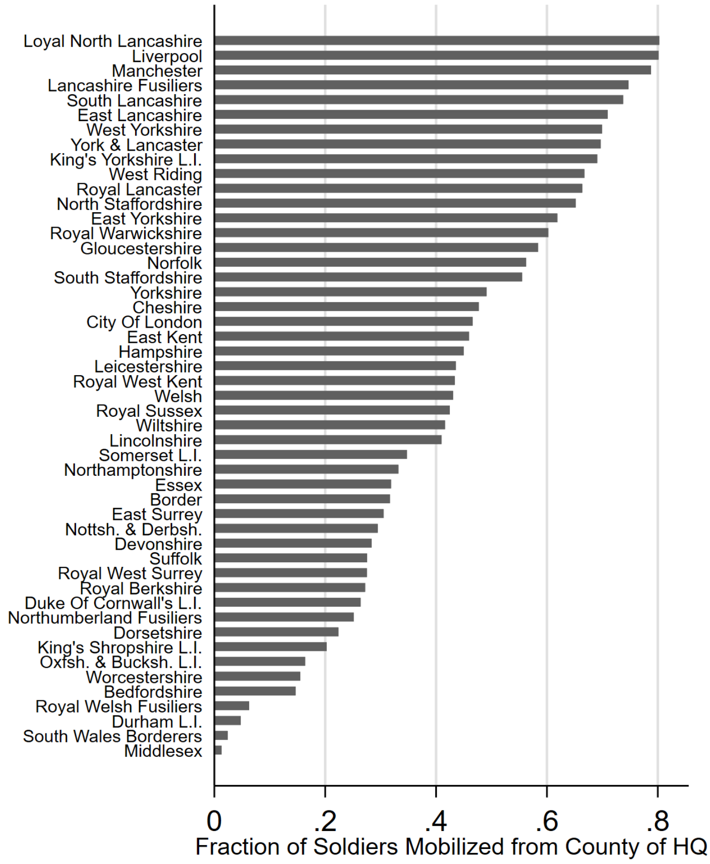
Figure B.2

Timeline of WW2 Deaths of British Servicemen



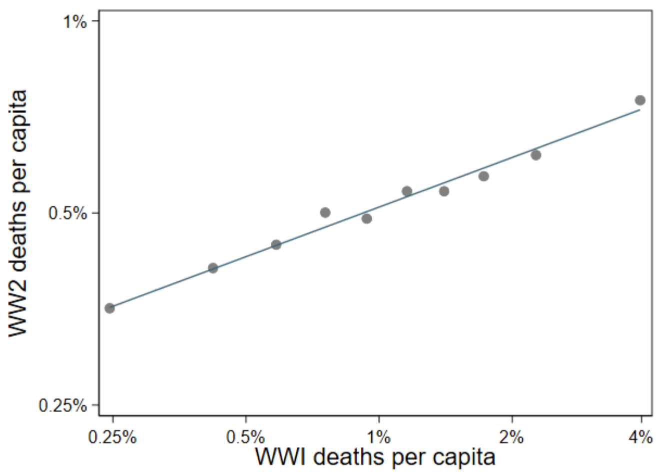
Notes: Number of British Army, Navy and Air Force servicemen fatalities in each month during WW2. Overlaid text indicates the name of five key battles: Battle of France (May 1940), Battle of Greece (April 1941), 2nd Battle of El Alamein (October 1942), D-Day (June 1944), and Rhineland Offensive (February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

Figure B.3
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.

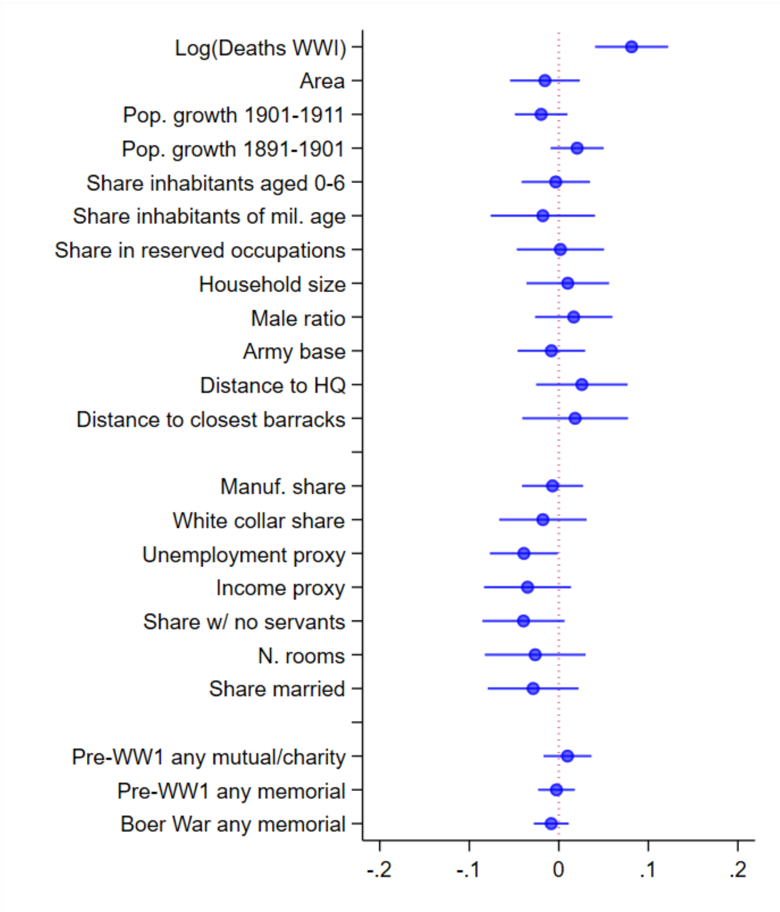
Figure B.4
Death Rates in WWI and WW2



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).

Figure B.5

Instrumental Variable Balancing Checks – Shock-level Regressions



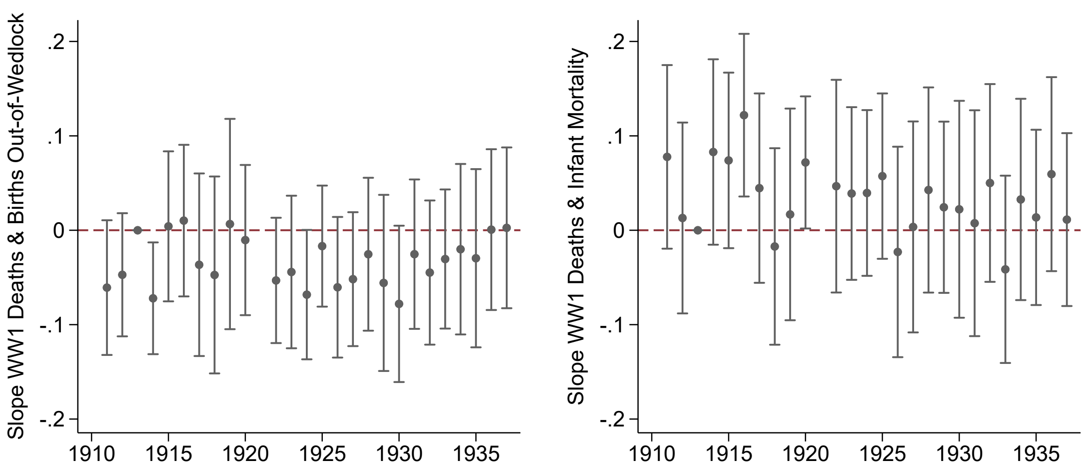
Notes: OLS estimates from individual regressions of instrument z_i on different variables, together with 95% confidence intervals. All variables have been aggregated at the battalion level using the *ssaggregate* command in Stata following Borusyak, Hull and Jaravel (2022) and then standardised to have 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.1
First-stage Results

	(1) $Log(d^{WW1})$	(2) $Log(d^{WW1})$	(3) $Log(d^{WW1})$	(4) $Log(d^{WW1})$	(5) $Log(d^{WW1})$
z	0.464***	0.137***	0.132***	0.119***	0.118***
	(0.022)	(0.020)	(0.016)	(0.017)	(0.020)
F-stat	454.8	46.6	67.3	46.6	34.1
Obs.	6572	6572	6572	6572	6572
R2	0.78	0.80	0.81	0.81	0.81
Controls	N	Y	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment mob. shares	N	N	N	Y	N
Pred. regiment deaths	N	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.6
Event-Study Graphs: 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 text). Standard errors clustered at the historic county level. No data available for 1921

Table B.2

Effect of WWI deaths on WW2 honours

	(1)	(2)	(3)	(4)
A. OLS: Medal WW2				
$Log(d^{WW1})$	0.004***	0.004***	0.003***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.032	0.032	0.032	0.032
Obs.	200363	200363	190008	190008
B. OLS: N. Medals WW2				
$Log(d^{WW1})$	0.005***	0.004***	0.004***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.035	0.035	0.035	0.035
Obs.	200363	200363	190008	190008
C. Poisson: N. Medals WW2				
$Log(d^{WW1})$	0.005***	0.005***	0.004***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)
Mean of dep.var.	0.035	0.035	0.035	0.035
Obs.	200363	200363	188507	188507
Parish controls	Y	Y	Y	Y
Age FE	N	N	Y	Y
Rank FE	N	N	N	Y
Regiment FE	N	N	Y	Y

Notes: Soldier-level analysis 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 (Panels B and C). Sample restricted to servicemen who died in WW2 and whose origin was successfully geolocated. Estimation is carried out using OLS in Panels A and B and a Poisson model in Panel C. Different sets of controls are used in each column as indicated in the table foot. Parish controls are identical to those used in our parish-level analysis. Age fixed effects are dummies for age in 1939 (with catch-all dummies for individuals 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.

Table B.3

Effect of WWI Deaths on Memorials and Civic Capital Measures

	(1) Mutuals/Char.	(2) Memorials	(3) Legions
A. LPM (dummy outcome)			
$Log(d^{WW1})$	0.035***	0.032***	0.013**
	(0.009)	(0.006)	(0.006)
Mean of dep.var.	0.48	0.16	0.18
Obs.	5466	5466	5466
B. Poisson (count outcome)			
$Log(d^{WW1})$	0.236***	0.020*	0.008
	(0.041)	(0.012)	(0.012)
Mean of dep.var.	1.31	0.20	0.24
Obs.	5454	5461	5376

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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.4

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***	0.087***	0.520**	0.606*
	(0.022)	(0.022)	(0.229)	(0.346)
First stage F-stat			55.9	24.6
Obs.	2886	2863	2886	2863
Pred. regiment deaths (z^r)	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.

Table B.5
Reciprocity

	(1) $\Delta houses$	(2) New station	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$	(5) $Log(d^{WW2})$
$Log(d^{WW1})$	-0.060	-0.004	0.163***	0.164***	0.164***
	(1.006)	(0.004)	(0.016)	(0.018)	(0.017)
$\Delta houses 1921-31$			0.003***		0.003***
			(0.000)		(0.000)
$Newstation 1918-39$				0.193***	0.167***
				(0.049)	(0.048)
Mean of dep.var.	21.84	0.06	1.69	1.69	1.69
Obs.	6349	6349	6349	6349	6349

Notes: Parish level OLS estimates to assess the role of reciprocity. Columns 1 and 2 regress changes in housing between 1921 and 1931 and an indicator for a new rail station between 1918 and 1939 on WWI deaths. Columns 3 to 5 regress WW2 deaths on WWI deaths and these variables. The full set of controls and county fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.6
Effect on election Conservative vote share

	(1) 1910	(2) 1922	(3) 1923	(4) 1924	(5) 1929	(6) 1931	(7) 1935
A. Baseline							
$Log(d^{WW1})$	0.002	0.002	0.014	-0.009	-0.023**	-0.042	-0.050*
	(0.020)	(0.028)	(0.021)	(0.014)	(0.010)	(0.029)	(0.027)
Mean of dep.var.	0.45	0.41	0.39	0.47	0.38	0.55	0.47
Obs.	494	460	468	475	497	458	471
B. Conditional on 1910 vote share							
$Log(d^{WW1})$		-0.002	0.017	-0.008	-0.023**	-0.044	-0.056**
		(0.027)	(0.023)	(0.014)	(0.011)	(0.028)	(0.026)
Mean of dep.var.		0.41	0.39	0.47	0.38	0.55	0.47
Obs.		455	465	469	491	452	466

Notes: OLS results of the effect of WWI deaths on national election Conservative vote share at the constituency level. The full set of controls and fixed effects is included in all specifications. Panel B additionally conditions on December 1910 Conservative vote share. Standard errors clustered at the historic county level in parentheses.

Table B.7

Effect of WWI Deaths on Air-Raid Precaution (ARP) volunteers as at June 10 1939

	All ARP volunteers		ARP Wardens	
	Log Volunteers	Log Volunteers	Log Volunteers	Log Volunteers
A. Males				
$Log(d^{WW1})$	0.133**	0.285*	0.219***	0.375**
	(0.066)	(0.151)	(0.063)	(0.157)
Mean of dep.var.	8.04	8.04	7.46	7.46
Obs.	144	144	144	144
R2	0.96	0.99	0.95	0.98
B. Females				
$Log(d^{WW1})$	0.147*	0.192	0.195***	0.212
	(0.081)	(0.187)	(0.066)	(0.243)
Mean of dep.var.	7.36	7.36	6.04	6.04
Obs.	134	134	134	134
R2	0.94	0.99	0.95	0.98
Controls	Y	Y	Y	Y
Regiment mob. shares	N	Y	N	Y

Notes: OLS estimation results of the effect of WWI deaths on the log number of ARP volunteers in service in June 1939. Sample is composed of a mix of County Boroughs and Counties in line with source data. Panel A counts male ARP volunteers and Panel B females. Panel B excludes a small number of districts that do not provide counts of female ARP wardens. Controls and fixed effects included as indicated in the table foot. Standard errors clustered at the level of the spatial unit (County Borough or County) in parentheses.

Table B.8

Effect of WWI Deaths on Inter-War Outcomes

	(1) Unempl.	(2) Fem.LFP	(3) Pop.Growth	(4) Working Age	(5) Children
A. 1921					
$Log(d^{WW1})$	-0.055	0.082	-0.665	-0.115	0.068
	(0.077)	(0.193)	(1.215)	(0.114)	(0.044)
Mean dep.var.	7.80	28.81	7.76	65.61	8.48
Observations	1699	1699	1699	1699	1699
B. 1931					
$Log(d^{WW1})$	-0.073	0.002	5.011	-0.128	0.058
	(0.068)	(0.186)	(3.700)	(0.107)	(0.044)
Mean dep.var.	5.79	29.74	22.10	67.86	7.28
Observations	1700	1700	1700	1700	1700

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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.9
1918 Flu

	(1) $Log(d^{Flu})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.006	0.268**		0.269**
	(0.047)	(0.118)		(0.120)
$Log(d^{Flu})$			-0.042	-0.047
			(0.165)	(0.179)
Mean of dep.var.	5.39	5.50	5.50	5.50
Obs.	262	262	262	262
R2	0.90	0.77	0.76	0.77

Notes: District-level OLS regression estimation results on 1918 flu deaths. The full set of controls is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.10
Effect of WWI deaths on male suicides in 1919

	(1) Suic./pop %	(2) Suic./death %	(3) N Suic. (Poisson)
$Log(d^{WW1})$	-0.000	-0.008	0.066
	(0.000)	(0.031)	(0.059)
Mean of dep.var.	0.01	0.47	3.99
Obs.	1681	1681	1636

Notes: OLS estimation results of the effect of WWI deaths on the number of male suicides per capita and per death multiplied by 100 (columns 1 and 2) , and Poisson estimation results using the count of male suicides (column 3). The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.11

Robustness: Effect of WWI deaths on WW2 deaths – Estimates using Rates

	(1) $D.rate^{WW2}$	(2) $D.rate^{WW2}$	(3) $D.rate^{WW2}$	(4) $D.rate^{WW2}$	(5) $D.rate^{WW2}$
A. OLS Estimates					
$Death\ rate^{WWI}$	0.066***	0.102***	0.074***	0.068***	0.056***
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)
Obs.	14036	14036	14036	14036	9046
R2	0.11	0.04	0.08	0.10	0.09
B. IV Estimates					
$Death\ rate^{WWI}$	0.176**	0.176**	0.153*	0.147*	0.148
	(0.079)	(0.079)	(0.085)	(0.087)	(0.108)
First stage F-stat	27.2	27.2	29.0	26.9	22.4
Obs.	9029	9029	9029	9029	9029
Controls	N	Y	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment mob. shares	N	N	N	Y	N
Pred. regiment death rate	N	N	N	N	Y

Notes: Panel A: OLS estimates 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).Panel B: IV estimates 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). The lower number of observations included in column 5 of Panel A is due to the fact that the predicted death rate based on regimental allocations is only available for parishes with at least some mobilised men in the FamilySearch dataset.

Table B.12

Robustness: Alternative definitions of IV – Effect of WWI Deaths on WW2 Deaths

	(1)	(2)	(3)	(4)
	$Log(d^{WW2})$	$Log(d^{WW2})$	$Log(d^{WW2})$	$Log(d^{WW2})$
A. IV Using 1917-1918 Deaths				
$Log(d^{WW1})$	0.459***	0.591***	0.561***	0.524***
	(0.118)	(0.126)	(0.133)	(0.139)
First stage F-stat	50.0	58.8	43.7	40.6
Obs.	5032	5032	5032	5032
R2	0.73	0.72	0.73	0.73
B. IV Excluding Pals Battalions				
$Log(d^{WW1})$	0.411***	0.466***	0.434***	0.405**
	(0.133)	(0.149)	(0.164)	(0.182)
First stage F-stat	32.2	37.3	27.9	26.4
Obs.	5257	5257	5257	5257
R2	0.73	0.73	0.75	0.74
C. IV Using Infantry Battalions				
$Log(d^{WW1})$	0.405***	0.472***	0.444**	0.416*
	(0.146)	(0.156)	(0.173)	(0.223)
First stage F-stat	31.8	36.8	28.0	19.5
Obs.	5244	5244	5244	5244
R2	0.73	0.73	0.74	0.74
Controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. shares	N	N	Y	N
Pred. regiment deaths (z^r)	N	N	N	Y

Notes: IV estimation results of the effect of WWI deaths on WW2 deaths. Mobilisation is constructed using all soldiers (Panel A), only soldiers serving in Pals (Panel B), or infantry battalions (Panel C). The number of WWI deaths and the instrument are constructed using only deaths occurring in 1917-18 (Panel A), deaths of soldiers from Pals (Panel B), or from infantry battalions (Panel C). 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.13

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

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. OLS				
$Log(d^{WW1}+c)$	0.163***	0.220***	0.253***	0.292***
	(0.017)	(0.017)	(0.018)	(0.019)
Obs.	6349	14448	14448	14448
R2	0.75	0.69	0.72	0.73
B. IV				
$Log(d^{WW1}+c)$	0.466***	0.762***	0.810***	0.840***
	(0.138)	(0.101)	(0.083)	(0.070)
Obs.	5466	14448	14448	14448

Notes: OLS (panel A) and IV (panel B) estimation results of the effect of WWI deaths on WW2 deaths. 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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.14

Robustness: 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
$Log(d^{WW1})$	-0.038	0.059	0.086***	0.129***	0.151***
	(0.055)	(0.036)	(0.032)	(0.026)	(0.026)
Obs.	14448	14448	14448	14448	14448
λ stat.	1.058	1.069	1.073	1.077	1.077

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

TABLE B.15

ROBUSTNESS: SPATIAL HAC STANDARD ERRORS

	OLS		IV	
	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.150***	0.158***	0.474**	0.410*
HAC Errors:	(0.018)	(0.018)	(0.207)	(0.210)
Clustered Errors:	(0.02)	(0.019)	(0.175)	(0.204)
Obs.	5380	5380	5380	5380
Regiment mob. shares	Y	N	Y	N
Pred. regiment deaths (z^r)	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 shares 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.16

ROBUSTNESS: EFFECT OF WWI DEATHS ON WW2 HONOURS – LOG OF ZERO

	(1) no const.	(2) c = 0.5	(3) c = 1	(4) c = 2
A. OLS				
$Log(d^{WW1}+c)$	0.023***	0.028***	0.033***	0.041***
	(0.006)	(0.007)	(0.008)	(0.009)
Obs.	5380	5380	5380	5380
R2	0.29	0.29	0.29	0.30
B. IV				
$Log(d^{WW1}+c)$	0.118**	0.148***	0.169***	0.196***
	(0.058)	(0.052)	(0.049)	(0.046)
Obs.	5380	5380	5380	5380

Notes: OLS (panel A) and IV (panel B) estimation results of the effect of WWI deaths on an indicator equal to one if at least one soldier in the parish received a medal for bravery during WW2. 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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.17

Robustness: Alternative definitions of IV – Effect of WWI Deaths on WW2 Honours

	(1) $Medal^{WW2}$	(2) $Medal^{WW2}$	(3) $Medal^{WW2}$	(4) $Medal^{WW2}$
A. IV Using 1917-1918 Deaths				
$Log(d^{WW1})$	0.220***	0.247***	0.148***	0.258***
	(0.051)	(0.052)	(0.049)	(0.057)
First stage F-stat	50.0	58.8	43.7	40.6
Obs.	5032	5032	5032	5032
B. IV Excluding Pals Battalions				
$Log(d^{WW1})$	0.227***	0.236***	0.174***	0.270***
	(0.055)	(0.059)	(0.055)	(0.075)
First stage F-stat	32.2	37.3	27.9	26.4
Obs.	5257	5257	5257	5257
C. IV Using Infantry Battalions				
$Log(d^{WW1})$	0.164***	0.183***	0.117**	0.222***
	(0.048)	(0.048)	(0.049)	(0.076)
First stage F-stat	31.8	36.8	28.0	19.5
Obs.	5244	5244	5244	5244
Controls	Y	Y	Y	Y
County FE	N	Y	Y	Y
Regiment mob. shares	N	N	Y	N
Pred. regiment deaths (z^r)	N	N	N	Y

Notes: IV estimation results of the effect of WWI deaths on an indicator equal to one if at least one soldier in the parish received a medal for bravery during WW2. Mobilisation is constructed using all soldiers (Panel A), only soldiers serving in Pals (Panel B), or infantry battalions (Panel C). The number of WWI deaths and the instrument are constructed using only deaths occurring in 1917-18 (Panel A), deaths of soldiers from Pals (Panel B), or from infantry battalions (Panel C). 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: Alternative IV Definitions – Effect of WWI Deaths on Civic Capital

	(1) Memorial	(2) Legion	(3) Mutual/char.
A. IV Using 1917-1918 Deaths			
$Log(d^{WW1})$	0.127***	0.060	0.174***
	(0.043)	(0.049)	(0.066)
First stage F-stat	53.9	53.9	53.9
Obs.	5062	5062	5062
B. IV Excluding Pals Battalions			
$Log(d^{WW1})$	0.147**	0.114**	0.168**
	(0.060)	(0.054)	(0.077)
First stage F-stat	41.3	41.3	41.3
Obs.	5330	5330	5330
C. IV Using Infantry Battalions			
$Log(d^{WW1})$	0.175***	0.104**	0.161**
	(0.052)	(0.051)	(0.069)
First stage F-stat	42.0	42.0	42.0
Obs.	5320	5320	5320

Notes: IV estimation results of the effect of WWI deaths on proxies for civic capital measures in the inter-war period. 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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.19

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				
$Log(d^{WW1} + c)$	0.026***	0.021***	0.029***	0.040***
	(0.005)	(0.003)	(0.004)	(0.006)
Obs.	8255	14448	14448	14448
R2	0.21	0.19	0.19	0.19
B. Outcome: Legion Branch Dummy				
$Log(d^{WW1} + c)$	0.016***	0.022***	0.031***	0.042***
	(0.005)	(0.002)	(0.003)	(0.004)
Obs.	8255	14448	14448	14448
R2	0.24	0.22	0.22	0.23
C. Outcome: Charity/Mutual Dummy				
$Log(d^{WW1} + c)$	0.033***	0.039***	0.050***	0.062***
	(0.008)	(0.005)	(0.006)	(0.008)
Obs.	8255	14448	14448	14448
R2	0.26	0.28	0.28	0.28

Notes: OLS estimates of the effect of WWI deaths on proxies for civic capital measures in the inter-war period. 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).The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

Table B.20

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

	(1)	(2)	(3)	(4)
	no const.	c = 0.5	c = 1	c = 2
A. Outcome: Listed Memorial Dummy				
$Log(d^{WW1} + c)$	0.163***	0.069*	0.115***	0.144***
	(0.039)	(0.039)	(0.037)	(0.034)
Obs.	6751	9365	9365	9365
R2	0.15	0.19	0.18	0.18
B. Outcome: Legion Branch Dummy				
$Log(d^{WW1} + c)$	0.112***	0.105*	0.116***	0.106***
	(0.041)	(0.054)	(0.045)	(0.038)
Obs.	6751	9365	9365	9365
R2	0.20	0.19	0.20	0.22
C. Outcome: Charity/Mutual Dummy				
$Log(d^{WW1} + c)$	0.188***	0.129*	0.139**	0.123***
	(0.071)	(0.070)	(0.058)	(0.047)
Obs.	6751	9365	9365	9365
R2	0.22	0.25	0.25	0.27

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. The full set of controls and fixed effects is included in all specifications. Standard errors clustered at the historic county level in parentheses.

C. Additional Robustness Checks

In this Appendix we present a series of robustness checks, which supplement those described in Section 6 in the text. We first provide estimates of the effect of WWI deaths on the presence of listed memorials by including in our set of memorials also those listed after the centenary anniversary of the beginning of WWI in 2014. OLS and IV estimates including or excluding memorials listed post-2014 are reported in Table C.1 together with the baseline ones and show that the inclusion of these memorials have little effect qualitatively in the OLS estimates. IV estimates, instead, become smaller and somewhat more imprecise.

TABLE C.1

ROBUSTNESS: EXCLUDING MEMORIALS LISTED AFTER THE WWI CENTENARY COMMEMORATIONS

	Excluding Listed post-2014		Including Listed post-2014	
	Memorial	Memorial	Memorial	Memorial
$Log(d^{WW1})$	0.026***	0.163***	0.031***	0.073
	(0.005)	(0.039)	(0.007)	(0.064)
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 memorials 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, fixed effects for historic county and mobilisation shares. Standard errors clustered at the historic county level in parentheses.

We next conduct a second robustness check for memorials in which we regress the count of listed war memorials on WWI deaths controlling for the total number of public WWI memorials in the parish. This is designed to probe whether our main results are driven by a mechanical relationship between WWI deaths and memorials. We define public WWI memorials as the number of all memorials in the parish excluding corporate memorials, those that are gravestones, or otherwise commemorate only a single death. OLS and IV estimates are in Table C.2 show that results are robust to controlling for the number of all public group memorials, suggesting our findings are not driven by a mechanical relationship between deaths and memorials.

Our results are also robust to dropping the grouped parish comprising London from the estimation sample. This unit comprises several parishes roughly corresponding to the London conurbation in 1911. As shown in the summary results provided in Table C.3, the exclusion of London 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.[39]

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

TABLE C.2

ROBUSTNESS: CONTROLLING FOR THE NUMBER OF ALL WWI MEMORIALS

	Excluding Listed post-2014		Including Listed post-2014	
	Memorials	Memorials	Memorials	Memorials
$Log(d^{WW1})$	0.018**	0.191***	0.031***	0.222***
	(0.007)	(0.052)	(0.008)	(0.086)
Obs.	8255	6751	8255	6751
Estimator	OLS	2SLS	OLS	2SLS

Notes: OLS and IV estimates of the effect of WWI deaths on the count of Listed WWI memorials in the parish, controlling for the count of all public group memorials. In all columns the outcome is the count of listed memorials in the parish. All specifications include the count of all public group war memorials as a control, the full set of controls, fixed effects for historic county and mobilisation shares. In columns 1 and 2, this definition excludes memorials 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. Standard errors clustered at the historic county level in parentheses.

TABLE C.3

ROBUSTNESS: DROPPING LONDON

	(1) $Log(d^{WW2})$	(2) Memorial	(3) Legion	(4) Mutual/char.
A. OLS Estimates				
$Log(d^{WW1})$	0.163***	0.026***	0.016***	0.033***
	(0.017)	(0.005)	(0.005)	(0.008)
Obs.	6348	8254	8254	8254
B. IV Estimates				
$Log(d^{WW1})$	0.466***	0.162***	0.112***	0.188***
	(0.138)	(0.038)	(0.040)	(0.071)
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.

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 for which we observe not only the location of origin 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 analysis on the effect of across wars using the log of total mobilisation to measure mobilisation. Results are reported in C.4 and yield elasticities in line with those reported in Section 4.2.

Table C.4

Robustness: Control for Alternative Measure of Mobilisation

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$
A. OLS Estimates			
$Log(d^{WW1})$	0.223***	0.210***	0.194***
	(0.016)	(0.016)	(0.015)
Obs.	7669	7669	7669
B. IV Estimates			
$Log(d^{WW1})$	0.624***	0.508***	0.464***
	(0.142)	(0.125)	(0.118)
Obs.	5482	5482	5482
Controls	Y	Y	Y
County FE	N	Y	Y
Regimental shares	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.

We conduct a final robustness check in which we apply as few restrictions and manipulation 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.5. Once again, point estimates are very similar to the ones reported in the paper in Sections 4.2 and 4.4.

D. Analysis of compliers

The different magnitude of 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. 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, we characterise the set of compliers in our setting, following Imbens and Rubin (1997).

The original method assumes there is a binary "treatment" variable and a binary instrument. In our setting, both our treatment variable $log(d_i^{WWI})$ and the instrument z_i are continuous, so we discretise them 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.

The population can then be partitioned in four groups: the *never-takers*, units that are never

TABLE C.5

ROBUSTNESS: NO IMPUTATION OF WWI MOBILISATION OR DEATHS

	(1) $Log(d^{WW2})$	(2) Memorial	(3) Legion	(4) Mutual/Charity
A. OLS Estimates				
$Log(d^{WW1})$	0.180***	0.024***	0.015***	0.038***
	(0.016)	(0.005)	(0.004)	(0.007)
Obs.	6365	8276	8276	8276
	$Log(d^{WW2})$	Memorial	Legion	Mutual/Charity
B. IV Estimates				
$Log(d^{WW1})$	0.476***	0.151***	0.105***	0.176***
	(0.135)	(0.038)	(0.037)	(0.065)
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. 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.

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

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 them to – have much higher population and density than always- and never-taker. They also have slightly lower mobilisation per capita than the average parish, and lower mortality than both always-takers and never-takers.

These results suggest that our IV estimates predominantly use variation from relatively large and densely populated parishes. Individuals living in large villages and cities may be more exposed to the commemoration of the War. The visibility of memorials in densely populated areas will 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 means that a given WWI mortality shock could plausibly lead to greater accumulation of civic capital in more dense communities. This hypothesis is consistent with finding IV estimates that are larger than those obtained using OLS.

Table D.1

Descriptives statistics by complier group

	Full sample	**Always T.**	**Never T.**	**Compliers**
Population 1911	2485.28	1180.98	879.60	3699.33
Density 1911	268.09	152.38	155.83	363.89
Share in reserved occupations	0.39	0.35	0.38	0.40
Male ratio	0.50	0.50	0.50	0.50
Mobilisation WW1	72.13	44.64	56.53	90.53
Mobilisation Rate WW1 (%)	4.96	5.63	8.25	3.37
Number WW1 Dead	38.63	13.25	3.38	63.84
Death Rate WW1 (%)	0.92	1.76	0.80	0.59
Death Rate WW2 (%)	0.40	0.51	0.44	0.34
Listed WW1 Memorial indicator	0.23	0.34	0.27	0.17
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.

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