Scars of War: the local legacy of WWI deaths on British soldiers

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Abstract

We study the local legacy of the WW1 mortality shock and its effects on British soldiers' behaviour in WW2. Using parish-level data, we show that those places suffering more losses in WW1 also experienced more deaths in WW2. For identification, we rely on instrumenting WW1 deaths with predicted deaths constructed by aggregating battalion-level mortality rates. We then turn to individual level data from military records to show that WW2 soldiers born in hard-hit parishes and households are more likely to be awarded gallantry honours and to die in battle in WW2, respectively. We present further evidence that the legacy of the Great War may run through and be amplified by a civic capital channel that is fostered by the process of the remembrance and commemoration of fallen soldiers.

Keywords: World War, Communities, Motivation, Conflict

JEL classification: D74, D91, O15, Z10

Preliminary and Incomplete

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In trench and field, and many seas we lie,
We, who in dying shall not ever die,
If only you, in honour of the slain,
Shall surely see we did not die in vain.

War Memorial, Downham Market, Norfolk

1. Introduction

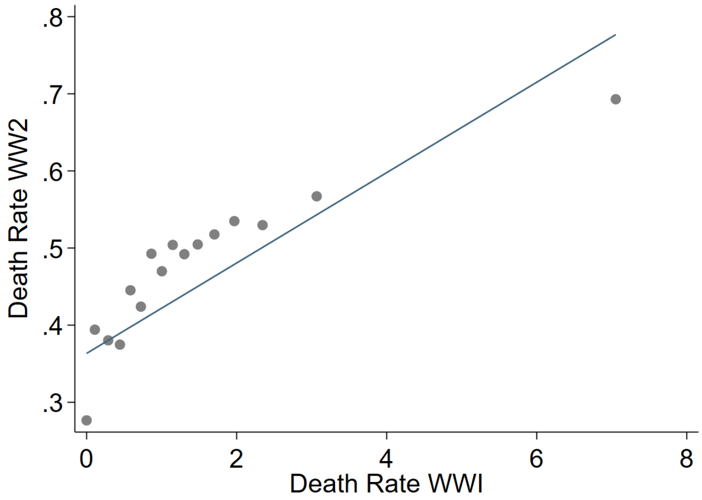
The willingness of men and women to risk their lives in combat is essential in war: without it, military action is often impossible. What makes this sacrifice paradoxical, from an economic point of view, is the apparent tension with self-interest: Combat represents a topical example of a collective action problem, whereby any benefits from fighting accrue to a third-party – e.g. the nation – and costs fall squarely with those who fight and, particularly, those who die (Campante and Yanagizawa-Drott, 2016). Yet many nations have for generations found thousands willing to sacrifice themselves in combat. To understand why, we need to engage with the notions of loyalty and patriotism that are discussed in most studies of soldier motivation.[1] If loyalty and a sense of service motivates soldiers, how are these values created and sustained?

We turn to this question by studying the British military effort in the World Wars. Specifically, we look at how the impact of WW1 in British communities shaped the behaviour of British soldiers from those communities in WW2. Our analysis begins by highlighting a hitherto undocumented fact about British soldiers killed in the World Wars: locations where a high proportion of men died in the Great War also lost a high proportion of men in World War 2. This relationship is illustrated graphically in Figure 1. The correlation is remarkably strong: WW1 deaths per capita explain between 5 and 10 percent of the variance in WW2 deaths.

To investigate the origins of this correlation and to explore other legacies of Great War deaths on WW2, we exploit detailed individual-level data covering over three million British servicemen serving in either of the wars, combined with local characteristics of 14,000 parishes in England and Wales. This data allows us to deploy three different empirical strategies when estimating the effect of WW1 deaths on different WW2 outcomes. In the first place, we propose a streamlined linear specification that relies on a strong but plausible assumption of conditional exogeneity of WW1 deaths. The exogeneity of war deaths is frequently invoked, for instance, in the literature studying the effect of wars on marriage markets – e.g., Abramitzky, Delavande and Vasconcelos (2011), Brainerd (2017) and Boehnke and Gay

[1] See for example Wong (2003), Costa and Kahn (2003), Rodgers (2005), Kellett (2013), Voth, Caprettini and Schmidt-Fischbach (2020), Campante and Yanagizawa-Drott (2016).

Figure 1
Death Rates in WW1 and WW2



Notes: Binned scatter plot of the death rate in WW1, defined as the number of dead men during the war period and the population at the parish level, and the death rate in WW2, defined analogously. Both variables represented as percentage points of local population.

(2020).[2] The unpredictable nature of warfare - i.e. the 'fortunes of war' - suggest such an assumption may be non-perilous in some contexts. Next, we propose an instrument based on battalion-level variation in death rates that helps to deal with idiosyncratic and persistent factors driving differences in behaviour across different communities in both wars. Our parameter of interest is then identified from variation induced by arguably unpredictable events taking place during the war rather than from individual soldiers' decisions, attitudes and disposition in battle. Finally, we use an individual-level specification which allows us to control for army unit effects and thus deal with selection of servicemen from different locations to different fighting units.

Using these strategies, we confirm that the correlation illustrated in Figure 1 masks a plausible causal relationship. Baseline and IV estimates indicate that a 1% percent increase in WW1 deaths in a parish translates into an increase of between 0.2 and 0.3% in WW2 deaths. We then use individual level data to show this effect is driven – at least in part — by differences in attitudes and behaviour in the battlefield. WW2 soldiers coming from towns with a high rate of WW1 deaths are more likely to be commended with medals and other honours. This is telling because it is consistent with the legacy of WW1 being one that induces men to act in a way that incurs private risk for social gains, and it is unlikely to be driven by other possible explanations that could explain our main result such as WW1 deaths reducing the quality of WW2 recruits.

[2] Studies relying on the exogeneity of war related destruction in other literatures include for example Davis and Weinstein (2002), Dericks and Koster (2021) or Acemoglu et al. (2020).

Finally, we show communities hit harder by WW1 shocks were more likely to raise sufficient local donations to fund the construction of lasting and historically significant war memorials in the inter-war period. This is meaningful because it suggests that wartime losses and the subsequent remembrance of the dead fostered civic capital i.e., “shared values and beliefs that help a group overcome the free rider problem in the pursuit of socially valuable activities” (Guiso, Sapienza and Zingales, 2011). In turn, these memorials may have spurred future generations to similar feats of selfless behaviour.

To further investigate the mechanisms behind our findings for WW2 deaths, we explore the role of intergenerational transmission within British families. To this end, we merge individual-level data on children aged 0-4 from the de-anonymised 1911 Census to war records in order to identify WW2 soldiers who had a father who fought and died in WW1. Using this census-based sample, we first confirm the strong positive association between being from a parish heavily hit in WW1 and WW2 mortality. More importantly, we show that having lost a father in WW1 increases the probability of dying in WW2 by 30%, while losing another close family member has a negligible impact on this outcome. These effects are amplified by being from a parish that built a WW1 memorial, further evidence that commemoration played an important role in motivating soldiers to fight more bravely or take more risks.

We then perform additional analyses to rule out alternative channels. To start, we rule out that our main effect is driven by an increase in WW2 mobilisation by showing that there is no effect of WW1 deaths on WW2 mobilisation, as measured in electoral records of 1945. We then regress a battery of economic and demographic outcomes measured in inter-war years on WW1 deaths and show that there is no relation, suggesting that the effect of WW1 mortality on WW2 behaviour is not the result of changes in economic incentives or demographic factors at the local level.

The results of our parish-level analysis are robust to the spatial unit of analysis, as we obtain similar estimates when aggregating observations to the level of 1911 districts. We also show robustness of the main results both at the parish and individual servicemen levels when using only soldiers dying in 1917-1918 (where the Army was composed almost entirely of conscripts) to construct the instrument. Alternatively, we use the deaths of privates to build our instrument. Reassuringly, in both cases we obtain IV estimates that are very similar to our baseline regression results.

A sprawling literature in economics has studied the causes and consequences of war.[3] The paper contributes to a recent strand of quantitative studies in economics investigating individual behaviour in the military. An early example can be found in Costa and Kahn (2003), which studies how company characteristics and, in particular, socio-economic and cultural homogeneity affected desertion in the US Civil War. Closer to our study, Campante and

[3]The theoretical game theory literature on conflict has been an active area of enquiry for over half a century (see Kimbrough, Laughren and Sheremeta 2017 for a review). See also Sandler and Hartley (2007).

Yanagizawa-Drott (2016) show that war service by parents increases the propensity to serve by their offspring using census data on US men throughout the 20^{th} century. They present evidence arguing that this inter-generational transmission operates through cultural factors and parenting style of men with military service. While we also study the transmission of attitudes towards military service across generation, we depart from this paper by i) looking specifically at communities as sources of transmission and, ii) shifting the focus from the effect on serving to studying the effect of war deaths on risk-taking behaviour and mortality, conditioning on serving. This links our paper with Voth, Ager and Bursztyn (2021), who study how social image concerns motivated Luftwaffe pilots to take additional risks. As the authors show, this competition for honours led average pilots to die at a higher rate. Other papers look at other drivers of combat motivation such as propaganda (Barber IV and Miller, 2019) and religiosity Beatton, Skali and Torgler (2019). We study another possible channel, related to the commemoration of war losses, on combat behaviour and mortality.

Naturally, our paper also relates to the literature studying the consequences of war. Much work in this literature has focused on the local economic and demographic consequences of war related destruction, (see for example Davis and Weinstein 2002; Brakman, Garretsen and Schramm 2004; Riaño and Valencia Caicedo 2020; Ciccone 2021). We relate the most to recent research studying how individual experiences of conflict shape social preferences and behaviour. War experience has been show to either foster pro-social behaviour and risk-taking attitudes (Voors et al., 2012), or, on the contrary, erode political trust and promote anti-social or even repugnant behaviours (Grosjean, 2014; Cage et al., 2020). We contribute to this line of work by documenting a strong inter-temporal transmission of war-related deaths via changes in the behaviour of servicemen in the battlefield.

Finally, we contribute to the literature studying how collective memory is formed and how it impacts behaviour by presenting evidence of long lasting effects of the "scars of war" and the amplifying effect of making it more salient through commemoration. Fouka and Voth (2021) show that places hit hard by WW2 German reprisals, especially those recognized as "martyr towns", reduce purchases of German cars substantially during the debt crisis, when memory of past wrongs is made salient again. Ochsner and Roesel (2019) show that Austrian villages pillaged by Turks over 500 years ago started showing more aversion to Muslims only after populists brought it back to the public attention during their electoral campaign.

2. Background

2.1. Enlisting into the army

In the early 20^{th}Century, the British army was a small and mobile professional force designed to work in tandem with a dominant naval fleet to maintain an empire covering a quarter of the globe. By 1914 Britain did not have a system of national conscripted service, and service was entirely voluntary. Shortly after the declaration of war, Secretary of State for War Kitchener issued a call for volunteers that substantially increased the size of the army. 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. In May, the age requirement was dropped to 18 and married men were included too. Ultimately, slightly more than half of all British wartime enlistees were recruited after conscription began.

During the volunteering phase, doctors were paid only for successful recruits, so nearly everyone passed the medical exams (Winter, 1980). Although some centralised efforts were made to prevent recruitment from industries like mining and shipbuilding, these were often ignored by local recruiters or circumvented by volunteers. This led to shortages of men in some industries supplying the army with equipment, resulting in the Shell Crisis of May 1915. In the conscription phase the process of determining who was enlisted was made stricter: medical examinations became more rigorous and men working in "reserved occupations" were exempted. Reserved occupations were those deemed vitally important for war work and other essential requirements. This category included occupations engaged in the production or transport of munitions, mining of coal and certain other minerals, the operation and maintenance of railways, agriculture, and food and clothing production. Besides this, conscientious objectors could be exempted from service on the grounds of political, religious, or moral beliefs at the discretion of a military tribunal.

From the outset of war, the British War Office believed that morale and cohesion would benefit if men could join and fight alongside their friends and peers. To this end, local committees were permitted to raise "pals" battalions, i.e., units of men from the same locality, employment, or social club. Later in the war, Army Council Instructions indicated that casualty replacement and reinforcements should preserve regimental and territorial connections where possible (Hine, 2016). An unfortunate side effect of this strategy was that the fate of local areas in Britain became entwined with the fortunes of the locally raised units on the battlefield. Several - such as the Accrington Pals - would be decimated in the course of the war, leading to devastating losses in the corresponding local communities back home.

2.2. Main battles

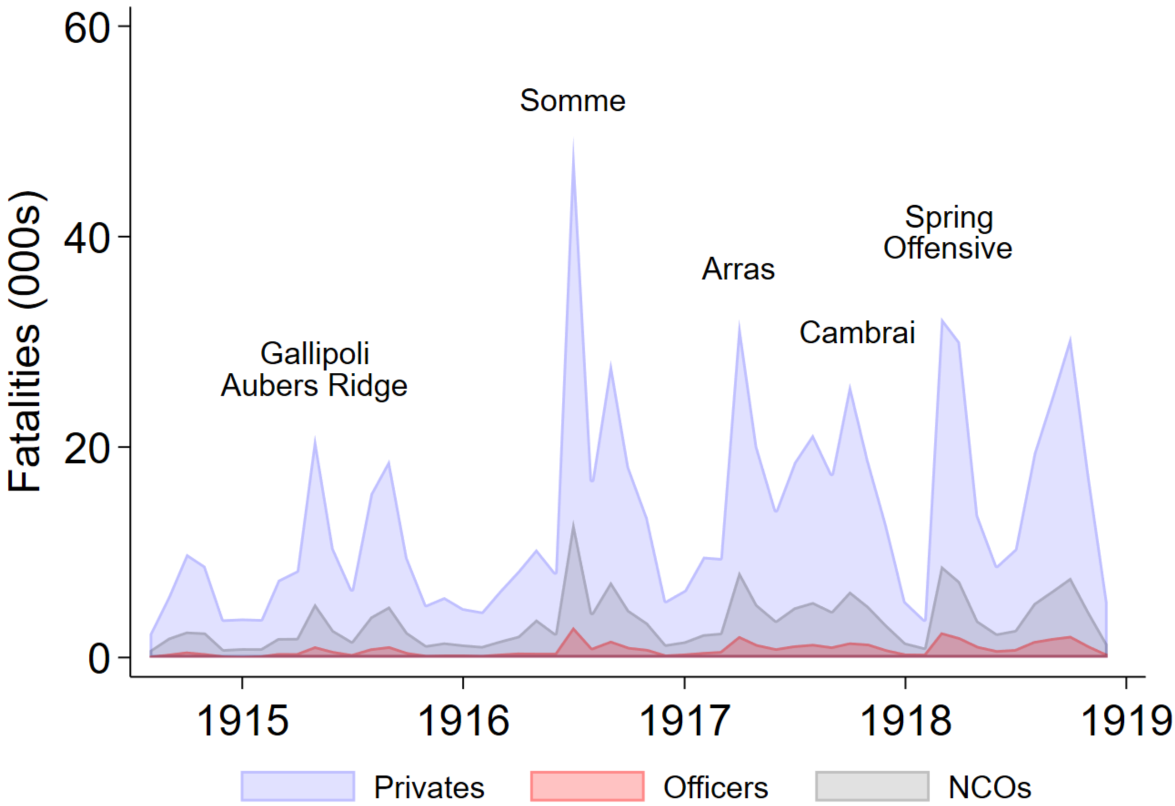
After a first phase, during 1914, in which the British army joined the French in an attempt to halt the German invasion of Flanders and France, the war began to be fought in trenches. The most costly battles of this period in terms of casualties were those fought in April and May 1915 in Ypres and especially in Aubers, which caused a total of over 20,000 fatalities.

By far the most dramatic and bloodiest battle of the First World War was the one fought over the Somme river in France between July and November 1916. Over 3 million men participated, and a third of them were wounded or killed. In the first day alone, over 19,000 British soldiers were killed, making it the worst day in the history of the British army. By the end of the battle, Britain alone had 400,000 wounded and 100,000 killed soldiers.

In the following months and through 1917, the British continued assisting the French offensive at Arras, which proved to be particularly costly. Later in the same year, the town of Cambrai – then an important German supply point – was attacked. After a successful first day for the British, a powerful German counter-attack caused once again a large number of casualties.

In 1918, the German realized that their victory depended on being able to defeat the Allies before the United States could deploy their resources completely, and launched a series of attacks over the whole Western Front. After an initial success – though at the cost of heavy losses – the German advancement was contained. In July, the arrival of the American army gave the Allies the numerical advantage they needed to launch a counter-attack, regaining all lost ground. This battle caused the German line to collapse and essentially ended the hopes of victory for the German army, which surrendered just a few months later.

FIGURE 2
TIMELINE OF WW1 DEATHS IN BRITISH ARMY



Notes: Number of British army and navy servicemen fatalities in each month during the WW1 period, overlaid with five main battles: Aubers Ridge, on May 9, 1915. Somme, on July 16, 2016. Arras, April 1917. Cambrai, on November 17, 1917. Spring Offensive, March 18, 1918. Source: elaboration based on Commonwealth War Grave Commission data.

2.3. WW1 aftermath and remembrance

Fighting ceased on 11 November 1918, but it was not until June 1919 that the war officially ended. Britain commemorated the Armistice Day on 11 November 1919 by observing a two minute silence with bowed heads to reflect on the fallen. This ritual was repeated annually for the next 20 years and from 1921 all were expected to purchase and wear an artificial poppy in support of former servicemen. Many other traditions of remembrance were adopted. For example, large numbers made "battlefield pilgrimages" to northern France and Belgium and an unknown serviceman entombed in Westminster Abbey in 1920 was visited by more than a million people in the first week.

Another important and widespread form of remembrance that we will use in our later empirical work is the memorialisation of local war dead through the construction of war memorials. These memorials were funded locally, through voluntary donations and from money-raising activities organised by local committees. As a result of this, as many as 50,000 war memorials were created throughout England and Wales. Around 1 in 10 of these memorials have subsequently been designated as Listed Buildings, indicating they are legally preserved because of their special architectural or historical interest. Because building memorials that are worthy of Listing will only have been possible where donations were sufficiently large, they arguably represent a good measure of a high level of local civic capital i.e. "values and beliefs that help a group overcome the free rider problem in the pursuit of socially valuable activities" (Guiso, Sapienza and Zingales, 2011).

2.4. British armed forces in 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. War was declared on September 3. At this time there were some 200,000 men in the the Regular British Army. Conscription was quickly introduced. The National Service (Armed Forces) Act – passed on the day war was declared – required all males aged between 18 and 41 to register for conscription. Registration began in October 1939. Men aged 18 and above were then conscripted by age cohort, starting with the youngest from January 1940. In December 1941 the call up age was increased to 50.

As in WW1, those medically unfit were exempted and conscientious objectors could seek an exemption before a tribunal. The government had detailed plans to balance manpower across the armed forces and industry, which again relied on reservation by occupation. This was in place until 1942 when scarcity of manpower necessitated moving to a system of individual deferment. At the start of WW2, the assignment to men to roles in the services was *ad hoc*, being largely determined by a recruiting officer's recommendation and the War Office's manpower requirements (Crang, 1999). Men were routinely assigned to unsuitable roles. This problem was widely acknowledged and as the war wore on more systematic assessment and allocation systems were introduced.

3. Data and Descriptives

3.1. Data

In order to estimate the impact of the deaths of fighting men in the Great War on the actions taking place in WW2, we assemble a large database combining information at the level of individual servicemen from both wars with harmonized data at the level of 1911 parishes. We use these sources to create our two main estimation datasets: one at the parish level, using 1911 historical parishes as geographical unit; and another one, at the level of individual WW2 soldiers.

Data Sources

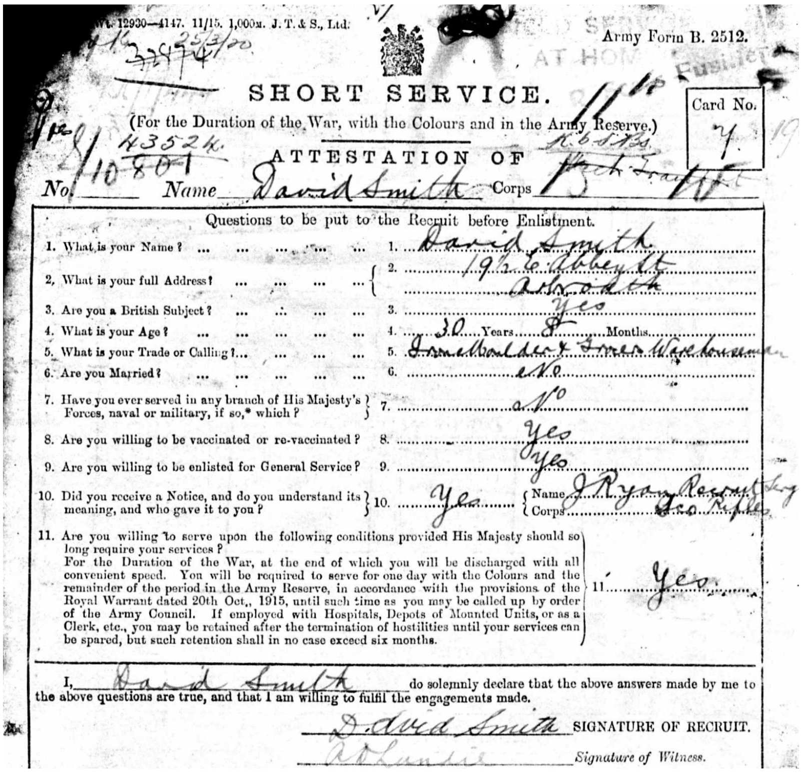
Data on British servicemen killed in both World Wars is obtained from the Commonwealth War Graves Commission (CWGC). The CWGC is an intergovernmental organizations dedicated to marking, recording and maintaining the graves, memorials and memories of the men and women of the Commonwealth forces who died in both World Wars. This source contains individualized data on servicemen names, time of death, rank, regiment, honours (e.g., medals) and – for a large sub-sample – complementary data on age at the time of death and a string from which we can extract data on locations. This information is augmented using data on residence and birthplace of deceased soldiers from Forces War Records (FWR), a military genealogy specialist website.

Data on WW1 mobilisation – the number of servicemen participating in the war effort – by location is obtained from *FamilySearch*, a non-for-profit organization which offers access to large genealogical datasets. FamilySearch draws its information from the British Army Service Records for 1914 to 1918. These records contain information on enrolled soldiers, including their place of residence at the time of enrollment. An example of one of these records can be found in Figure 3.[4] The FamilySearch source allows us to access the number of servicemen coming from each location. We use this source to obtain mobilisation at the parish level, which can readily be aggregated to other geographies. This source also contains information on soldiers' regiment and battalion of service which we use to construct our instrument (see section 0). When processing this information, we use the Table of Organization of each regiment as detailed in James (2012).

In order to validate the information from CWGC and *FamilySearch*, we use two additional sources. Data on the names, rank and service number of soldiers are obtained from the Lives of the First World War, an online data initiative of the Imperial War Museum in London. This dataset is created as an amalgam of several data sources and includes records of up to 6.5 million people who participates in the War effort, mostly servicemen. In addition, we use

[4]Digitized versions of these records can be consulted in Ancestry.co.uk. The original source of these are the "Burnt documents" (record code WO 363) which are kept in the National Archives at Kew in London. The Burnt documents are roughly 2.5 million records which survived the fire resulting from an incendiary bomb hitting the War Office Record Store in 1940.

FIGURE 3
BRITISH ARMY WW1 SERVICE RECORD - EXAMPLE


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

Army Form B. 2512.

SHORT SERVICE.

Card No. 7.

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

ATTESTATION OF

No. 10801 Name David Smith Corps

Questions to be put to the Recruit before Enlistment.

1. What is your Name? ... 1. David Smith
2. What is your full Address? ... 2. 19½ E. Abbey St, Arbroath
3. Are you a British Subject? ... 3. Yes
4. What is your Age? ... 4. 30 Years 8 Months
5. What is your Trade or Calling? ... 5.
6. Are you Married? ... 6. No
7. Have you ever served in any branch of His Majesty's Forces, naval or military, if so,* which? 7. No
8. Are you willing to be vaccinated or re-vaccinated? 8. Yes
9. Are you willing to be enlisted for General Service? 9. Yes
10. Did you receive a Notice, and do you understand its meaning, and who gave it to you? 10. Yes Name J Ryan Recruit Sergt Corps
11. Are you willing to serve upon the following conditions provided His Majesty should so long require your services? For the Duration of the War, at the end of which you will be discharged with all convenient speed. You will be required to serve for one day with the Colours and the remainder of the period in the Army Reserve, in accordance with the provisions of the Royal Warrant dated 20th Oct., 1915, until such time as you may be called up by order of the Army Council. If employed with Hospitals, Depots of Mounted Units, or as a Clerk, etc., you may be retained after the termination of hostilities until your services can be spared, but such retention shall in no case exceed six months. 11. Yes

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

David Smith SIGNATURE OF RECRUIT.

Signature of Witness.

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

data on Naval and Military Voters from the 1918 document on Parliamentary and Local Government Electors to validate the mobilisation data obtained from *FamilySearch*.

We complete our dataset with individual-level information obtained from the 1911 Census of population. We use this data both at the individual level or to construct aggregates at the 1911 parishes level, which constitute our unit of observation for the first part of the empirical analysis. In this way, we obtain parish-level information on the occupational composition of the population and several income proxies including the number of servants and the number of rooms per household. We also use 1911 aggregates as well as suitable 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.

Geo-locating Servicemen

The CWGC data includes 796,601 men from the British armed forces who died during WW1.[5] Given that our analysis will focus on England and Wales only, we remove 75,000 Scottish servicemen from the sample. Information for residence or birthplace (or both) of the

[5] This number is in line with the 702,410 men born in the British Isles killed as reported by the British government after the war (BWO, 1922). The discrepancy between both figures emerges because the CWGC data occasionally includes data on men from British dominions and Commonwealth countries participating in the war effort.

remaining serviceman are obtained by combining the information provided by CWGC with that present in FWR. This information comes in the form of strings designating individual locations for about 525,000 men. We convert this information to latitudes and longitudes using a batch geolocating service.[6] We are able to locate over 74% of WW1 dead in terms of birthplace or residence (or both). We end with location (birthplace or residence) data for a total of 515,578 servicemen killed in WW1 coming from England or Wales.

The CWGC source also includes information for British citizens killed in WW2. The dataset has information on 441,110 deaths (of which 67,591 civilians) during 1939-1945. For about 340,000 of them (78% of total), some additional information is provided in the form of a short text. Using this information, we were able to geolocate about 250,000 (60%) soldiers to one 1911 historical parish in Britain or Wales.[7]

Data Assembly

Our main analysis is based on a parish-level dataset covering England and Wales. Parishes are administrative units corresponding to the lowest level of local government in the United Kingdom.[8] In 1911, the territories of England and Wales were divided into 14,664 parishes, of which 13,415 in England and 1,246 in Wales. We take 1911 as our reference year because it is the last Census year before the onset of the Great War in 1914. We occasionally use information at other levels of aggregation (e.g. the much larger districts) or for other periods.

In order to aggregate observations or impute information across geographies corresponding to different periods, we use a spatial matching procedure based on assumptions of uniform population distribution within small spatial units.[9] Digitized maps on administrative units for this period are obtained from VoB.

3.2. Descriptives

Mobilisation and fatalities

Figure 4 is a map of 1911 parishes and shows the level of spatial variation that we use in the analysis. Panel A is provided for reference and plots population densities, with darker colours corresponding to denser parishes. We can observe the high density agglomeration of London to the South East, the populous areas around Liverpool and Manchester near

[6]We use a service provided by *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 in nearby areas. hence, we conclude that the geolocation process based in this method is reliable for our purposes, resulting in a limited amount of measurement error.

[7]Given that we do not geolocate soldiers born in Ireland, Scotland, or abroad, this means that we managed to geolocate the majority of soldiers with information.

[8]Civil parishes evolved from ecclesiastical parishes during the 19th century. By 1880, civil parishes had no religious or ecclesiastical duties.

[9]This allows re-aggregating information or imputing across periods when boundaries overlap. Because parishes are relatively small (10 sq. km on average), and boundaries are often quite stable, we expect the measurement error induced by making this assumption to be limited.

the West coast north of Wales and the city of Yorkshire to the North East. The geolocation process described in the previous section allows us to represent aggregates mobilisation and death rates at the level of these geographies. The British army at its maximum strength counted approximately 3,820,000 soldiers in 1918. As illustrated in Panel B of Figure 4 all regions of Britain contributed with recruits, with mobilisation rates – the ratio of enlisted over population – above 10% in some parishes. Substantial variation also exists in WW1 dead rates across parishes, as can be seen in panel C. We will show below that there is substantial correlation between mobilisation and death rates in the Great War. Finally, substantial spatial variation can also be observed in WW2 dead rates, illustrated in Panel D.

We can use alternative data sources in order to validate the data on WW1 deaths and mobilisation used in our main analysis. To validate mobilisation rates, we use electoral registry data assembled ahead of the 1918 United Kingdom general elections, which took place immediately after the end of the War in December. This data includes a count of mobilised men by electoral constituency of origin. To make the two sources comparable, we aggregate our parish-level mobilisation figures to the constituency level. The positive correlation between log mobilisation rates is illustrated in the binned scatter plot in the left panel of Figure 6. The correlation is not perfect because the electoral data only covers men still mobilised in 1918 yet it serves as validation for our mobilisation data.

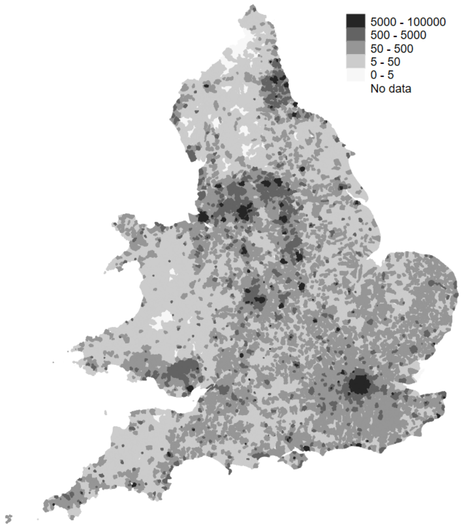
In order to validate data on deaths by parish of residence, we use data on the number of servicemen listed on all WW1 memorials built after the war at the parish level obtained from the Imperial War Museum. We plot the log death rate of this number against the log dead rate from our CWGC source in the right-panel of figure 6. We observe a tight positive relationship, as expected, which we take as evidence that our CWGC are reliable. The same exercise for WW2 deaths, reported in the lower left panel, yields very similar conclusions.

Throughout the paper, our main measure of the WW1 mortality shock will be the logged number of dead soldiers born in a given parish. Another possibility would be to use the place of residence at the time of enlisting, when that information is available. We expect the two alternatives to yield very similar variables. This is exactly what we observe in the binned scatter plot represented in Panel D of Figure 6.

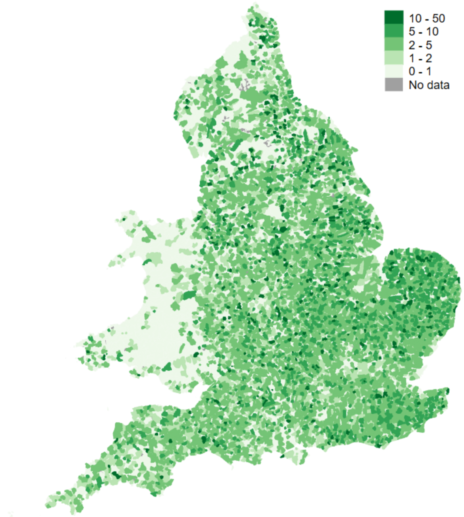
A key determinant of deaths at the parish-level in the Great War was, of course, the mobilisation throughout the period. The number of mobilized men was determined by the presence of volunteers as well as by the population and occupational structure of localities, given that only men employed in certain activities were drafted. The left-most panel of Figure 8 illustrates the positive relationship between mobilisation and the number of deaths, both in rates for illustration purposes. While the correlation is strong – a univariate regression yields a t-statistic of about 20 – there is substantial unexplained variation in death rates after controlling for mobilisation rates.[10]

[10]The R-squared of the univariate regression is only 3%.

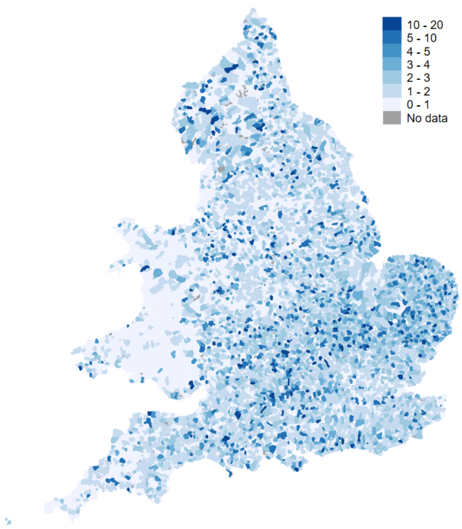
Figure 4
Density, Mobilisation & War Deaths



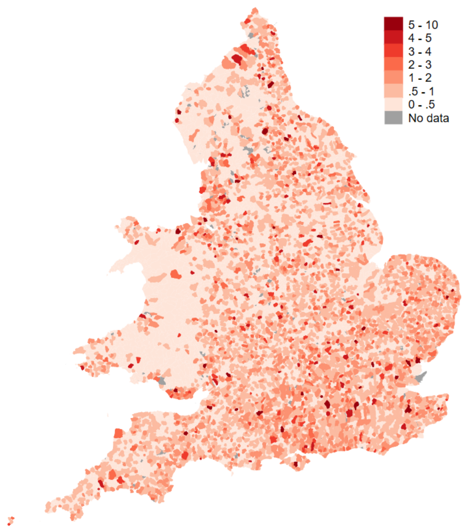
(a) Population Density



(b) Mobilisation per capita in WW1



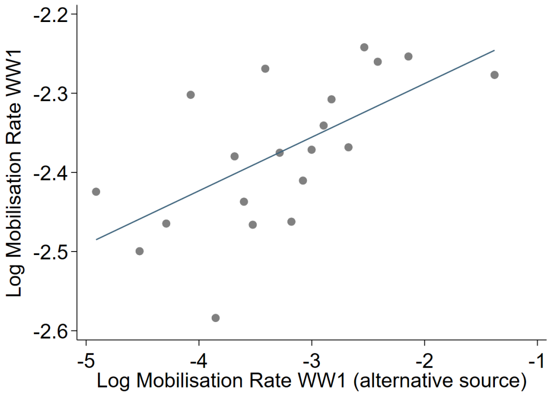
(c) Deaths per capita in WW1



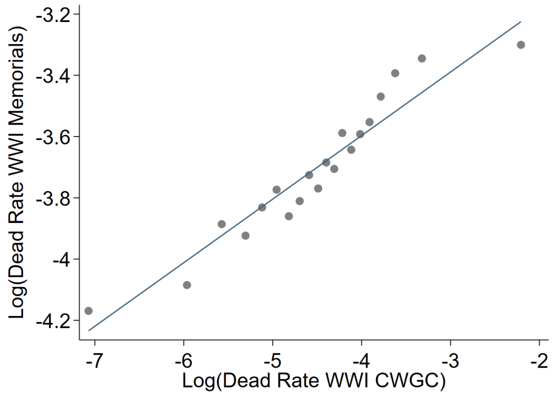
(d) Deaths per capita in WW2

Notes: All four maps correspond to parishes in England and Wales. Panel A represents population density measured in population per squared kilometre. Panel B shows mobilisation per capita, measured as a percent of total population. Panels C and D represent the deaths per inhabitant in World War I and World War II, respectively.

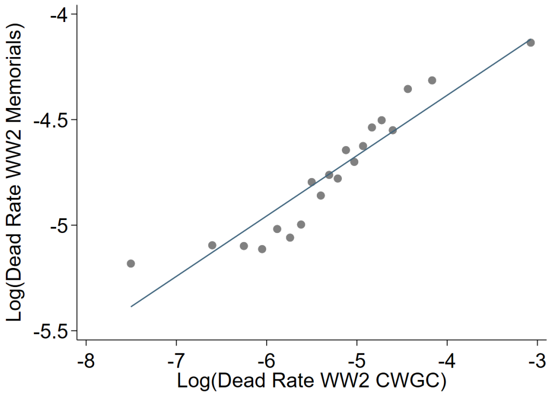
FIGURE 5
VALIDATION: MOBILISATION AND DEATH RATES



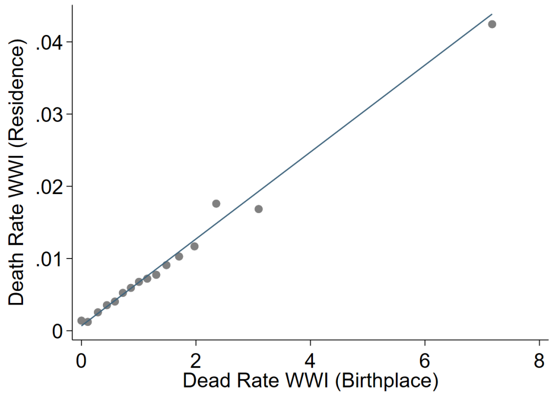
(A) MOBILISATION RATE



(B) DEATH RATE WW1



(C) DEAD RATE WW2

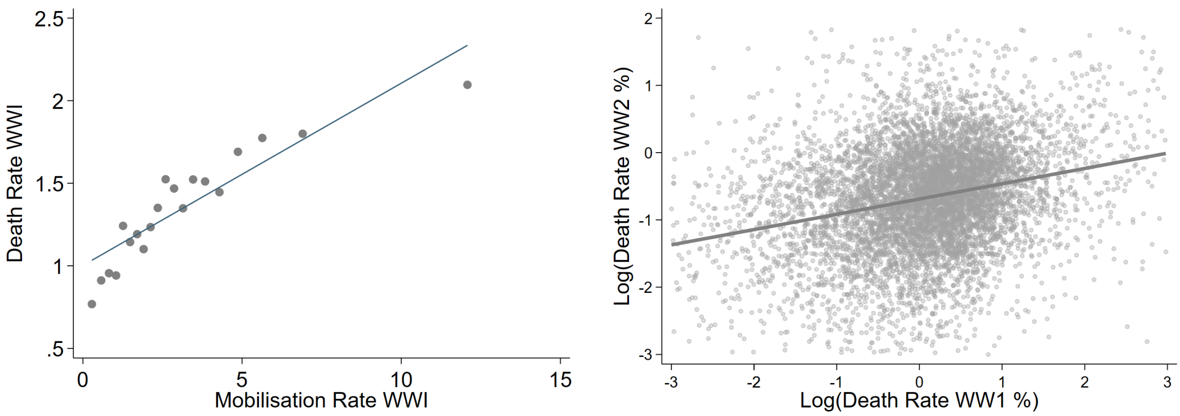


(D) DEATH RATE WW1 – BIRTH & RESIDENCE

Notes: **Panel A**: binned scatter plot of the relationship between mobilisation rates from the "burnt documents" (obtained from *FamilySearch*) and mobilisation rates obtained from the 1918 electoral register. Underlying data aggregated at the 1918 constituency level. Fitted line corresponds to OLS estimates over the underlying data. **Panel B**: binned scatter plot of the relationship between log death rates for WW1 calculated from the CWGC source in the horizontal axis and from WW1 memorials at the parish level. **Panel C**: binned scatter plot of the relationship between log death rates for WW2 calculated from the CWGC source in the horizontal axis and from WW2 memorials at the parish level. **Panel D**: binned scatter plot of the relationship between death rates for WW1 servicemen calculated at the parish level based on birthplace data (horizontal axis) and residence data (vertical axis).

Much of the subsequent analysis will attempt to study how the deaths taking place during WW1 affected behaviour of enrolled servicemen in WW2. The relationship between death rates in both wars is illustrated in the right-panel of Figure 8. This is the scatter plot of (log) death rates at the parish level in both wars, so it represents a similar relationship to the one reported in Figure 1. The positive correlation is again apparent and strong – the linear correlation is 31%. In the next sections, we will dissect this correlation in an effort to investigate its causal nature.

Figure 6
Mobilisation Rates and Death Rates in Both Wars



Notes: Left-panel represents a binned scatter plot of the relationship between parish-level WW1 mobilisation rates and death rates (both per capita). Right-panel is a scatter plot illustrating the relationship between death rates by parish in both wars, with each point corresponding to one parish. Fitted line estimated by OLS.

Descriptive Statistics

We use two main datasets in estimation. Our parish-level dataset is constructed at the level of 1911 parishes and includes parish characteristics from the 1911 Census as well, the number of dead in both wars coming from each parish and mobilisation from World War I. Descriptive statistics for this dataset can be found in Panel A of Table 1. The average parish had a population of about 2500 in 1911 and an area of 10.5 square kilometres. The average number of servicemen from a parish taking part in WW1 was 171, which puts the average mobilisation rate at 1.68%. The average death rate was 0.74% in WW1 and just under 0.5% in WW2.

Our second dataset is constructed using CWGC data on servicemen who died in WW2. The average age at death was 27 years old, and the average soldier died about three years from the time in which they could first enlist. Roughly 48% of servicemen who died in the War were privates. It is worth noting that WW1 death rates in the origin parishes of servicemen dying in WW2 was roughly 1.6%, over twice the death rate in the average parish. Only a small fraction of men – about 3% – received any particular honours such as medals or mentions in WW2.[11]

4. Empirical strategy

Our main analysis exploits information on British army soldier deaths taking place during the Great War to understand the long-term effects of these deaths on the behaviour of

[11]Examples of honours that appear in the data are the Victoria Cross (the highest honour awarded to fighting servicemen), the George Cross (its equivalent for non-combat acts), Distinguished Service Order, the Military Cross, Distinguished Flying Cross (for the Royal Air Force), and being “mentioned in despatches”.

Table 1
Descriptive statistics

	Mean	Std. dev.	Min	Max
A. Parish-level Data				
Population 1911	2,463.50	13527.53	3	392244
Area (sq. km)	10.54	11.19	0	245
Mobilisation WW1	51.37	159.89	1	2055
Mobilisation Rate WW1 (%)	3.17	2.80	0	23
Number WW1 Dead	28.64	194.72	0	8117
Death Rate WW1 (%)	1.21	1.80	0	20
WW1 Memorial Dummy	0.23	0.42	0	1
Death Rate WW2 (%)	0.44	0.66	0	6
Observations	14577			
B. WW2 Soldier Level				
Age of Soldier at Death	27.36	7.83	14	91
Received honours (dummy)	0.03	0.17	0	1
Days in war (from enlisted)	1,155.71	564.73	0	2311
Private (dummy)	0.48	0.50	0	1
Mobilisation Rate WW1 in origin parish (%)	3.90	4.63	0	32
Death Rate WW1 in origin parish (%)	1.45	1.76	0	24
Memorial in origin parish (dummy)	0.67	0.47	0	1
Observations	373519			

Notes: Panel A provides descriptives for the parish-level dataset. Panel B provides descriptives for the soldier-level dataset of all British and Wales WW2 fatalities.

soldiers during the Second World War. For this purpose, we will look at different outcomes. To start, we consider WW2 mortality, measured at the parish level. To study the effect of civic capital, we look at the construction of WW1 War memorials in the parish. Finally, as a measure of bravery, we use the award of medals (or other distinctions) by individual soldiers for actions in WW2.

When considering the effect of WW1 mortality on WW2 mortality, the estimating equation takes the form:

$$Log(\mathrm{d}_i^{WW2}) = \alpha + \beta Log(\mathrm{d}_i^{WW1}) + \gamma' X_i + FE + e_i, \tag{1}$$

where d_i^{WW2} is the number of deaths of soldiers in WW2 who come from parish i, d_i^{WW1} is the number of deaths of soldiers in WW1 from parish i, and, finally, X_i is a set of controls.[12] The parameter β can be interpreted as the conditional elasticity of deaths in WW2 to deaths in WW1. We start by estimating the model by OLS and then move on to an instrumental variable (IV) strategy, based on variation in death rates at the battalion level.

[12]Throughout this section we consider models in logarithms for reasons that will be clear shortly. We provide results for models in death rates – defined as the number of deaths per 1911 population – in section 0.

Mortality in WW1 is likely to be endogenous for several reasons. For instance, poorer parishes may be more likely to be hit by higher mortality in WW1 simply because they sent proportionately more soldiers to the front, and this propensity may persist in WW2. If this were the case, estimates of β would be upward biased. For this reason, when estimating our baseline equation 1, we generally include as controls the logarithm of mobilisation (that is, the number of mobilised soldiers coming from a given parish) and population. Controlling for mobilisation is crucial to attenuate concerns about omitted variables due to differences between parishes in the propensity to participate in the war effort. We then consider richer specifications where X includes i) variables that affect mobilisation, such as the 1911 fraction of employment in military occupations in each parish, and ii) socio-economic variables from the 1911 Census.[13]

Causal interpretation of the OLS estimates requires assuming that, controlling for population, WW1 mobilisation, parish-level controls, and different sets of fixed effects, the number of deaths in WW1 is exogenous. While certainly not innocuous, this assumption is commonly made is a variety of recent papers that use soldier deaths as sources of exogenous variation – see, e.g,. Abramitzky, Delavande and Vasconcelos (2011), Brainerd (2017), Boehnke and Gay (2020), Acemoglu et al. (2020) – or bombings (Davis and Weinstein 2002, Dericks and Koster 2021). The unpredictable nature of warfare – i.e., the "fortunes of war" – justifies the validity of this assumption, at least in some contexts.

However, our research question differs somewhat from that of other papers that assumed exogeneity of war destruction. In our case, there are reasons to worry about the presence of persistent unobservables that affect death rates in both wars, because the nature of the variables is similar. Thus, any variable that systematically affects death rates and is spatially persistent in time – such as income, attitudes towards risk or ideology – could in principle affect deaths in both wars.

Our first proposed solution to this identification problem is to instrument actual WW1 deaths with a measure of "expected" deaths. This instrument is constructed using only the variation in death rates across parishes that is due to the different riskiness of the various battalions. To create the instrument, we use information on WW1 fatalities to estimate the death rate in each battalion, $\hat{\delta}_j$. Then, we obtain the fraction of soldiers from each parish going to each battalion, α_{ij} and the mobilisation from each parish, m_i. These three components are then used to calculate a parish-level prediction of the expected number of WW1 deaths that can be used as instrument for the actual number of deaths.

[13] Mobilisation controls include the number of mobilised soldiers per 1911 inhabitant, the fraction of men of military age, 1911 population (in logs), the fraction of inhabitants employed in the army in 1911, and a set of 23 variables measuring the share employed in each sector, such as agriculture, building, fishing, food provision. Socio-economic controls include population density (in logs), the shares of households with 1, 2 or more servants, the share of white collar workers, the mean number of rooms in each home, and a proxy for unemployment rate.

Formally, we instrument $Log(\mathrm{d}_i^{WW1})$ with

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

where $\hat{\delta}_j = \dfrac{d_j - d_{ij}}{m_j - m_{ij}}$ is battalion j's death rate, calculated excluding soldiers coming from parish i. The choice of this particular form for the instrument is motivated by an analytic decomposition of the number of WW1 deaths shown in Appendix 0. As shown in the Appendix, the instrument is unaffected by parish-level idiosyncratic differences in deaths, such as differences in values or attitudes towards risk. The instrument has one important limitation though. Through its reliance on α_{ij}, z_i could be affected by endogenous selection of servicemen to different battalions. This would happen if, for instance, the bravest men from a parish are systematically sorted into more dangerous battalions in both wars.

To mitigate this concern, we discuss a set of balancing tests when discussing the first-stage in the next section. Additionally, we construct a variable z_i^r exactly as z_i but using, instead of battalions, the death rates in the much larger regiments. This variable is then include as a control in our IV specifications, so that our instrument only relies on the variation in deaths at the battalion level that remains after controlling for regiment-level mortality. This approach mitigates endogeneity concerns deriving from soldiers potentially selecting into regiments by effectively controlling for it.

A secondary, complementary empirical strategy is also available to us and relies on using soldier-level data. This approach allows us to control for a range of soldier characteristics – including, importantly, the battalion or unit servicemen are fighting in or, in some models, the parish of birth. This helps us deal with the selection concerns present when using parish-level data. We will use this strategy when studying the effect of Great War deaths on the frequency of WW2 honours received by each soldier and on the effect of losing a close relative.

5. The legacy of WW1 deaths

5.1. Great War deaths increase deaths in WW2

We start by estimating the effect of Great War deaths on WW2 mortality (β in equation 1) by OLS, showing results in Table 2. Each column corresponds to a different set of controls/fixed effects as indicated in the table foot. A 1% increase in the deaths in WW1 is associated to an increase in the deaths in WW2 of about 0.17-0.2%. This effect is sizeable, suggesting that there is a strong correlation in how localities contribute to the Wars effort. Estimates are also remarkably stable to controlling for mobilisation (col. 2), adding socio-economic controls (col. 3), and county fixed effects (col. 4). In column 5, we add modal regiment fixed effects and estimates do not vary significantly.[14]

[14] These fixed effects are indicators for the identity of the "modal regiment" – the regiment where most soldiers from a given parish are assigned.

TABLE 2

OLS RESULTS – EFFECT OF WW1 DEATHS ON WW2 DEATHS

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$	(5) $Log(d^{WW2})$
$Log(d^{WW1})$	0.206***	0.165***	0.168***	0.169***	0.168***
	(0.016)	(0.018)	(0.018)	(0.017)	(0.018)
Obs.	7480	5881	5870	5870	5737
R2	0.65	0.70	0.70	0.72	0.72
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment	N	N	N	N	Y

Notes: OLS estimation results of the effect of WW1 deaths on WW2 deaths at the parish level. Different sets of controls are used in each column (see text for details). In column 5 we include a fixed effect for the "modal regiment", i.e. the regiment where most citizens in the parish enlisted in. Standard errors clustered at the county level.

TABLE 3

IV RESULTS – EFFECT OF WW1 DEATHS ON WW2 DEATHS

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.342***	0.324*	0.337*	0.375*
	(0.055)	(0.185)	(0.185)	(0.210)
First stage F-stat	279.7	27.7	30.7	23.1
Obs.	5267	5230	5222	5222
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: IV estimation results of the effect of WW1 deaths on WW2 deaths at the parish level. Different sets of controls are used in each column. In columns 2-5 we include, as control, z_i^r, the logged expected number of deaths, calculated using regiment-level death rates (see text for details). Standard errors clustered at the county level.

In Table 3, we report IV estimates using z_i, the (logged) predicted number of WW1 deaths as instrument for the actual deaths. The relevance condition for the instrument is satisfied and the instrument is strong, with F-statistics for all estimated specifications well above 20. In all columns but the first we include, as control, z_i^r, the (logged) predicted number of WW1 deaths in the parish constructed regiment-level death rates. This variable is constructed in the same way as our instrument z_i but uses death rates at the regiment (as opposed to the smaller battalion) level and is meant to control for differences in mortality across regiments.

Results for estimating the first-stage are reported in Appendix Table 1. As expected, the instrument has a positive and large effect on instrumented variable $Log(\mathbf{d}_i)$.

In Figure 1 in the Appendix, we report a series of balancing checks obtained by regressing the instrument z_i on different normalized outcomes. We keep the set of controls to a minimum and only include the log of 1911 population and WW1 mobilisation. The first from the left corresponds to the (standardized) first-stage coefficient which, as expected, is positive and significant. All other coefficients are close to 0, and statistically insignificant at conventional levels, indicating that the instrument is not correlated with observable characteristics that could affect deaths in WW2. The identifying assumption in our IV strategy is that this is also the case for unobservable factors.

Instrumental variable estimates for the effect of Great War deaths on deaths in WW2 are reported in panel B of Table 3 and are similar but larger in magnitude than the OLS ones and range from 0.32 to 0.37. We can interpret this coefficient as indicating that deaths suffered by parishes in the Great War strongly influenced the number of dead in WW2. The results that follow in the next sections will help us interpret this effect.

5.2. Great War Deaths and World War 2 Honours

The IV results discussed above showed a strong and positive association between mortality across the two Wars. The validity of our instrument rests on the assumption that, conditional to being assigned to a given regiment, WW1 mortality at the battalion level is uncorrelated to parish- or soldier-level characteristics. Although most of the geographical selection happens at the regiment level, as soldiers typically enlist in the local regiment according to their "catchment areas", it is ultimately difficult to control for all determinants of war mobilisation, and to account for the possible selection of soldiers to ranks or battalions.

An ideal thought experiment would be to have WW2 soldiers that are comparable with respect to rank, socio-economic background, experience, who serve in the same unit, but come from localities that were randomly exposed to differently mortality shocks from fighting in the Great War. Any difference in the probability of dying in battle could then be attributed to the impact of exposure to local mortality (and, potentially, to its commemoration through memorials, as discussed above). While implementing this experiment in practice is infeasible, it serves as a useful reference to guide our analysis at the soldier-level discussed in the following.

We use data on all Britain and Wales WW2 fatalities from the *Commonwealth War Graves Commission*.[15] The dataset has information on 441,110 deaths (of which 67,591 civilians) during 1939-1945. Our sample in this analysis consists of the roughly 250,000 soldiers that we could match to a 1911 historical parish in Britain or Wales. We complement this dataset with information, for each parish, on several characteristics (as in the main analysis) and, importantly, on death rates in WW1.

[15] At the time of writing (late 2021), records on individuals who served in WW2 and survived are unfortunately not accessible to the general public.

The main limitation of this dataset is that, despite its richness in terms of soldier characteristics, it only contains information on soldiers who died during the war, hence it is unsuited to study the probability of dying in WW2. However, while all soldiers in the dataset eventually died, not all of them did so in the same circumstances. Specifically, we can use information on the honours awarded during service to construct a measure of effort and bravery in battle. In practice, we use an indicator for having being awarded an honour during service or posthumously, and use it as the dependent variable in a soldier-level regression:

$$\text{Pr(Honour)}_{is} = \alpha + \beta Log(\mathbf{d}_i^{WW1}) + \gamma' X_{is} + FE + e_{is}, \tag{2}$$

where s indexes soldiers and i parishes. X_{is} is a vector of parish-level mobilisation and socio-economic controls as before, plus soldier-level characteristics.[16] If soldiers coming from localities that were disproportionately affected by WW1 fight more bravely, we should observe a positive effect of deaths in WW1 on the probability of being awarded an honour.

TABLE 4
OLS AND IV ESTIMATES – EFFECT OF WW1 DEATHS ON WW2 HONOURS

	OLS		IV			
	(1)	(2)	(3)	(4)	(5)	(6)
$Log(d^{WW1})$	0.001	0.001	0.030**	0.031**	0.025**	0.029**
	(0.001)	(0.001)	(0.013)	(0.013)	(0.011)	(0.014)
Kleibergen-Paap test			9.2	9.2	9.4	6.8
Obs.	140999	140961	141012	140999	140961	140999
Full controls	Y	Y	Y	Y	Y	Y
Place of duty FE	Y	Y	N	Y	Y	Y
Regiment FE	N	Y	N	N	Y	N
Regiment Death rate	N	N	N	N	N	Y

Notes: Soldier-level OLS (columns 1 and 2) and IV (columns 3 to 6) estimation results of the effect of WW1 deaths on the probability of receive one or more WW2 honours. Different sets of controls are used in each column (see text for details). Mobilisation controls, socio-economic controls, rank indicators, duty location indicators, age and age squared in 1939 are always included. Only individuals aged 18-60 in 1939. Standard errors clustered at the parish level.

IV results in Table 4 suggest that this is indeed the case. As columns 3-6 show, the coefficient on WW1 deaths is positive and statistically significant at the 5% level. This effect is also not negligible: a soldier coming from a parish with 1% more deaths in WW1 has a 0.25-0.3% higher probability of being awarded a medal, a 15% increase over the baseline probability in the estimation sample (1.6%).[17] In column 4, we add a fixed effect for the lo-

[16] We restrict the sample to individuals who were between 18 and 60 in 1939.

[17] Presumably because of the limited variation in our dependent variable, in this analysis our first-stage is weaker, with Kleibergen-Paap statistics, reported in Table 4's foot, of around 7-9.

cation of duty, i.e., where the soldier was deployed at the time of death. In column 5 we add fixed effects for each of the 132 regiments in the sample. In this specification, we identify our coefficient of interest using variation in parish of birth's deaths for soldiers serving in the same regiment.[18] As such, we are effectively able to control for the selection stage, that is, for all factors determining the regiment each soldier is assigned to. This is particularly important if we believe that, for instance, recruits from poorer localities are disproportionately sent to more dangerous tasks, while richer recruits are reserved for non-combat units or deployed far from the front. Controlling for regiment fixed effects, however, does not alter the main conclusion of this analysis, with the coefficient being slightly lower in magnitude but still precisely estimated. As an alternative to regiment fixed effects, in column 6 we use the imputed number of deaths at the parish level constructed using regiment-level death rates. As expected, results are unaffected by the inclusion of this control.

Table 5

IV Estimates – effect of WW1 deaths on WW2 honours by Rank

	(1) NCO	(2) Private	(3) Officer
$Log(d^{WW1})$	0.016	0.002	0.109**
	(0.014)	(0.004)	(0.044)
Kleibergen-Paap test	8.4	8.9	13.3
Obs.	45303	67748	17331
Full controls	Y	Y	Y
Place of duty FE	Y	Y	Y
Regiment FE	Y	Y	Y

Notes: Soldier-level OLS (columns 1 and 2) and IV (columns 3 to 6) estimation results of the effect of WW1 deaths on the probability of receiving one or more WW2 honours, splitting the sample by rank as indicated in each column. Different sets of controls are used in each column (see text for details). Mobilisation controls, socio-economic controls, duty location indicators, age and age squared in 1939 are always included. Only individuals aged 18-60 in 1939. Standard errors clustered at the district level.

Not all soldiers are eligible for receiving honours. In fact, some medals are exclusively reserved for commissioned officers. In our sample, 15% of officers appear to have received at least one medal, compared to 3% of non-commissioned officers (NCOs) and 0.65% of privates. These differences suggest that officers stand a much higher chance to see their courageous actions rewarded than common soldiers. Their role of responsibility in the army and the prestige that comes with wearing the insignias could also make them more responsive to the Great War mortality in their birthplace.

In Table 5 we estimate the same IV model as before but splitting the sample by rank.

[18] Regiments did not necessarily constitute independent fighting units. For example, machine gun regiments were split over different division according to need. However, conditioning on the regiment mitigates concerns about selection into riskier and more dangerous units being related to parish-level characteristics.

As expected, there is no significant effect of WW1 dead on the probability that a private (col. 2) is decorated. There appears to be a small positive effect for NCOs, but estimates are statistically insignificant. As column 3 shows, however, the effect of officers is very large and equal to five times the overall effect estimated in Table 4. Officers are not only more likely to be decorated, but they appear to be substantially more responsive to WW1 mortality.

In sum, results in this section suggest that WW2 soldiers coming from areas that suffered more losses in the Great War may take greater risks and fight more bravely, as reflected in the higher propensity to be awarded a medal or a recognition.

6. The memory of the Great War and WW2 outcomes

6.1. The effect of commemoration: War Memorials

The positive association between WW1 and WW2 mortality documented above suggests that there might be a causal link between living and growing up in a place that paid a high mortality cost in the Great War and the subsequent behaviour during the Second World War. One possibility is that communities suffering heavier losses in WW1 created a stronger sense of belonging among their citizens. This bond may have persisted over time and caused soldiers who fought in WW2 to be more likely to fight bravely and put their lives at risk.

The community experience of the Great War and its aftermath may also have changed prevailing cultural attitudes, beliefs, and norms. In particular, the way in which communities remembered and commemorated the "glorious dead" may be indicative of the standard of behaviour that would gain social approval (or disapproval) in any subsequent wars.

To shed light on this possible channel, in Table 6 we estimate our baseline IV model using, as dependent variable, the number of WW1 memorials present in the parish. We restrict our attention to *listed* memorials, that is buildings or structures that must be legally preserved because of their historical or architectural significance. As the money to create these was generally raised locally, this measure should capture those places that spent substantial time and effort on the design and build of their memorial.

As Table 6 shows, there is a strong positive association between WW1 deaths and the number of memorials built. About 23% of parishes have built at least one WW1 memorial, and about 3% have 2 or more. To put estimate magnitudes into perspective, column 3 of Table 6 indicates that a 1 standard deviation increase in the number of deaths (equal to a 1.5 increase) is associated to having on average 0.5 more War memorials, an increase of 70% of the baseline. These effects suggest that parishes that lost more soldiers during WW1 are more likely to honour and commemorate them by constructing a memorial.

6.2. Household level effects and the intergenerational transmission of values

So far, the analysis has examined outcomes at the community level or has focused on the impact of an aggregate mortality shock on soldier's bravery. Of course, however, the experience of the Great War will also vary across individual households. The loss of a father, husband, brother or household or family member could have had profound emotional

TABLE 6
EFFECT ON CONSTRUCTION OF MEMORIALS

	(1) N. memor.	(2) N. memor.	(3) N. memor.	(4) N. memor.	(5) N. memor.
$Log(d^{WW1})$	0.307***	0.350***	0.368***	0.364***	0.354***
	(0.036)	(0.098)	(0.099)	(0.103)	(0.100)
Mean of dep.var.	0.46	0.46	0.46	0.46	0.46
Obs.	6521	6448	6439	6439	6437
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	N	Y	Y
Regiment	N	N	N	N	Y

Notes: IV estimate results of the effect of logged WW1 deaths on the number of listed memorials built at the parish level. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.

and economic effects on the surviving household. Consequently, war-related changes to constraints and incentives may vary across households even within the same community. The same applies to changes in attitudes and beliefs. Indeed, 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.

This sub-section aims to shed light on these same forces in our context. To circumvent the fact that the UK authorities do not release information on WW2 service, we generate estimates using a dataset of 1.9 million male children aged 0 to 4 in the 1911 Census in which the children and members of their households have been separately linked to war deaths. In particular, we match fathers and other household members to WW1 deaths and the children to WW2 deaths using the automated matching algorithm developed by Abramitzky, Boustan and Eriksson (2012) (henceforth ABE).[19]

Using this approach, we match 26,800 of the children to a deceased WW2 soldier. We also identify that 18,000 of the boys in the 1911 dataset lost their father and another 46,000 lost a different co-habiting household member in WW1. We then use this dataset to run a series of regressions of the following form:

$$Pr(D_{ic}^{WW2}) \times 100 = \alpha + \lambda_1 D_c^{Father} + \lambda_2 D_c^{Other} + \beta Log(\mathrm{d}_i^{WW1}) + \gamma' X_{ic} + FE + e_{ic}$$

where c indexes children aged 0-4 in 1911 and i parishes. $Pr(D_{ic}^{WW2})$ is an indicator for

[19] We use the ABE matching code from `https://ranabr.people.stanford.edu/matching-codes`. Our matching variables include place of birth or residence, forename and surname, age, and father's initial. See Appendix 0 for details.

whether the child died in WW2, which we multiply by 100 for presentational reasons. D_c^{Father} and D_c^{Other} are indicators for whether the father or another household member co-habiting with the child in 1911 died in WW1. The variable d_i^{WW1} is as above and X_{ic} is a vector of parish-level mobilisation and socio-economic controls as before, plus child level characteristics (categorical variables for age and father's occupation in 1911). Standard errors are clustered at the parish level.[20]

Findings are tabulated in Table 7. We first test in column 1 if the number of WW1 dead in the parish of residence affects subsequent probability of death in WW2 when conditioning on county fixed effects. Consistent with previous results, we obtain a positive coefficient that suggests a 10% increase in the number of WW1 dead increases the probability of dying in WW2 by around 0.03%.[21] We next evaluate if the loss of a co-habiting household member in WW1 leads to a greater likelihood of a child dying in WW2, finding a large and highly significant impact of the loss of the father but no significant impact of losing another household member. The magnitude of the father effect is large and amounts to an increment in the probability of dying in WW2 of 30% over the baseline. Coefficients are essentially unchanged in column 3, suggesting that community wide and household level transmission mechanisms operate side-by-side in this context. In the final two columns we add parish fixed effects to eliminate parish level factors. In column 5 we interact a WW1 memorial indicator with the household-level variables of interest. The parameter estimates suggest that memorialisation and commemoration of the WW1 dead is highly influential in determining the marginal effect of a father's death in WW1.

7. Other channels

In the previous sections we have shown results a strong positive association in mortality across wars, driven, at least in part, by how communities commemorate the dead and by how close the losses are to the soldiers' family. In addition, this remembrance of the fallen appears to affect soldiers' behaviour and bravery in battle, as testified by the results on medals. However, there are other possible channels, related but distinct, that may also explain our results. One possibility is that more WW1 deaths generates more mobilisation in WW2 with no real change in behaviour. This, in turn, would mechanically translate into more deaths. Another possible channel is that Great War losses negatively affect local communities through economic or demographic channels that, in turn, lead to more WW2 fatalities. Below, we show evidence against both of these alternative mechanisms.

[20] While this specification allows us test a number of channels of interest, we do not expect it to yield causal estimates. This is because the ABE matching procedure only considers records to be matched when matches are unique, hence we will only identify a subset of the true matches between children and members of their households to war deaths.

[21] This coefficient is much smaller than our parish-level estimates because here we include *all* male children aged 0-4 in 1911 in estimation. Although a large fraction of them did not fight in WW2, they will still appear as survivors in our estimation, likely attenuating our estimates.

TABLE 7
OLS RESULTS – EFFECTS OF WW1 DEATHS ON WW2 DEATHS OF 1911 CENSUS CHILDREN

	(1)	(2)	(3)	(4)	(5)
$Log(d^{WW1})$	0.026***		0.026***		
	(0.009)		(0.009)		
Father died		0.463***	0.460***	0.467***	
		(0.112)	(0.112)	(0.112)	
Other HH died		0.061	0.057	0.073	
		(0.063)	(0.064)	(0.063)	
Mem'l.=0 × Father died=1					0.289
					(0.230)
Mem'l.=1 × Father died=1					0.515***
					(0.128)
Mem'l.=0 × Other HH died=1					0.117
					(0.111)
Mem'l.=1 × Other HH died=1					0.059
					(0.076)
Mean of dep.var.	1.42	1.42	1.42	1.42	1.42
Obs.	1667008	1696596	1667008	1696496	1696496
R2	0.004	0.004	0.004	0.009	0.009
Full Parish controls	Y	Y	Y	N	N
Individual controls	Y	Y	Y	Y	Y
County FE	Y	Y	Y	N	N
Parish FE	N	N	N	Y	Y

Notes: OLS results of the effect of parish level WW1 deaths, household deaths, and memorial on the probability of WW2 deaths of male children aged 0 to 4 in 1911. Individual level regressions. All regressions include economic and mobilisation controls at the parish level, and fixed effects for age in 1911, father's occupation, and county. Standard errors clustered at the parish level.

7.1. WW2 Mobilisation

The legacy effects of Great War deaths on British communities could operate via changes in WW2 mobilisation. Most mobilised servicemen in the Second World War were conscripts, so effects on mobilisation would be limited to differences in the proportion of ineligible, protected or unreachable candidates in different locations, or to remaining differences in volunteering. Because the effect on mobilisation on deaths is expected to be large and somewhat mechanical – more men go to war, more of them die – it is possible that limited variation in mobilisation is nonetheless important.

To evaluate whether this is the case we use data aggregated at the level of 1945 electoral constituencies. During the election taking place in December 1945, the number of servicemen voting in the election was recorded separately. We use these figures to estimate the following regression relating mobilization in 1945 to WW1 deaths:

$$Log(m_i^{1945}) = \mu Log(\mathrm{d}_i^{WW1}) + \gamma' X_i + e_i$$

OLS estimates of μ are reported in columns 1 through 3 of Table 8. We find generally insignificant coefficients across columns, with all point estimates indicating small elasticities of less than 2%. For comparison purposes, we report the effect of deaths across wars at this level of aggregation in column 4. The associated elasticity is at least 8 times larger that all the point estimates in the other columns.

TABLE 8
OLS RESULTS – EFFECT OF GREAT WAR DEATHS ON WW2 MOBILISATION

	(1) $Log(m^{1945})$	(2) $Log(m^{1945})$	(3) $Log(m^{1945})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	-0.017	-0.009	-0.010	0.134**
	(0.017)	(0.007)	(0.008)	(0.053)
Mean of dep.var.	8.44	8.44	8.44	6.32
Obs.	474	474	474	474
R2	0.81	0.94	0.97	0.74
Mobil. controls	N	Y	Y	Y
Econ. controls	N	Y	Y	Y
County FE	N	N	Y	Y

Notes: OLS results, from equation 1, of the effect of WW1 deaths on WW2 mobilization at the constituency level (columns 1-3) and WW2 deaths, for comparison (column 4). Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.

7.2. *Local economic and demographic impacts*

The toll of the Great War could also affect the subsequent WW2 contribution through economic mechanisms via changing incentives and constraints or through demographic channels. One intuitive explanation might be that locations that are hit the hardest become relatively more impoverished because they lose wage earners and entrepreneurs and hence local spending. This could reduce the employment prospects and the scope to make educational or other investments in children which in turn would lower the opportunity cost of taking risky actions in subsequent wars. Conversely the labour supply shock could result in a tighter labour market and increase the likelihood the remaining population find employment. Besides these, demographics factors could also play a role, for example if WW1 deaths shocks alter local marriage markets or change fertility decisions.

To test whether this is the case we would ideally directly use micro-data in the inter-war period. However the 1921 and 1931 Census micro-data is not yet publicly available and in Britain education was not recorded on the Census until 1951 so in lieu of this we run OLS regressions similar to our main specification but at the district level and now replacing the WW2 dead outcome with a series of economic and demographic measures (in logs) in inter-war years.[22] As previously we control for WW1 mobilisation and the same set of control

[22]These regressions are conducted at the district level because economic variables are not currently available

variables in 1911, but we now also condition on the outcome measure in 1911 and include county fixed effects. Standard errors are clustered on counties.

Columns 1 to 5 of Table 9 tabulates our findings. Our principal measure of local economic conditions is the count of local workers who are unoccupied or work in unclassified occupations. To avoid capturing any change in local population size or demographics we condition on the log total number of workers so results can be interpreted as the effect on the share unemployed. In panel A, which uses this measure in 1921, and in panel B, which uses 1931, we find small positive but not significant effects of the Great War shock on unemployment. In column 2, we replace the dependent variable with the log count of infant deaths in 1922 (data for 1921 is unavailable) and 1931 conditional on the log number of births. Again we find no significant effects.

Columns 3 and 4 use demographic outcomes. In column 3 the outcome is the log count of births out of wedlock in 1922 and 1931 conditional on the total number of births, which likely correlates with parental investments. Results are not significantly different to zero. In column 4 and 5 we examine counts of individuals of all ages and those aged 15-64 (no more granular age splits are available), and again find no significant effects.

One possible concern with these results is that they refer to specific points in time and these particular years may be unrepresentative of the inter-war period as a whole. To address this we use the two outcomes for which annual data is available throughout the pre-WW1 and inter-war period - infant mortality and births outside of wedlock - to generate point estimates for each year. These are plotted in Figure 9 below. In both cases the point estimates indicate no effect of the WW1 shock on the outcome in the pre-war or inter-war period. In summary, although we are limited by imperfect data, we find little support for the idea that the World War I mortality shock significantly affects local economic or demographic conditions in a way that could explain our main findings.

8. Robustness Checks

While results of the previous section show that there is substantial persistence in deaths across generation of British soldiers, one may still have concerns in interpreting this association as the causal effect of remembrance and honouring the losses. One primary concern to overcome relates to the exogeneity of our main variable of interest, the WW1 mortality shock. As discussed earlier, there are a variety of reasons for which some parishes may suffer higher death rates than others that also affect death rate in WW2. One such instance would arise if men in localities with higher unemployment and worse economic conditions were more likely to volunteer, or to be assigned to more dangerous regiments, tasks, or locations. Some of these issues should be addressed by the extensive set of controls and fixed effects, and IV strategy that we employ, but in this section we try to go one step further and use variations of our IV strategy variables.

at the more granular parish level.

TABLE 9

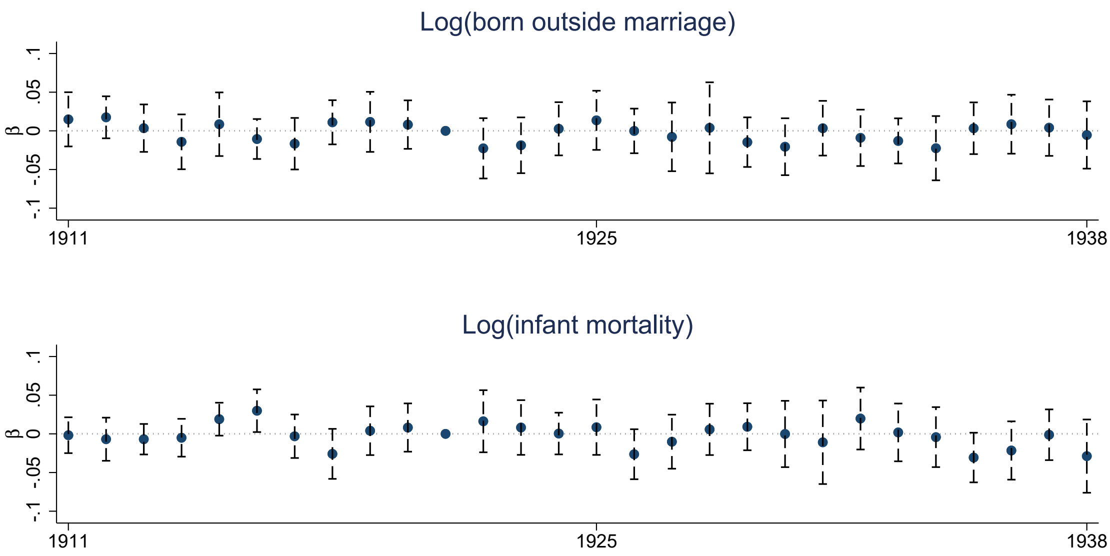
OLS RESULTS – EFFECT OF GREAT WAR DEATHS ON INTER-WAR OUTCOMES

	(1) Unemp.	(2) Inf. deaths	(3) Out wed.	(4) Pop.	(5) Age 15-64
A. 1921 or 1922					
$Log(d^{WW1})$	0.003	0.016	-0.019	-0.010	-0.005
	(0.011)	(0.019)	(0.020)	(0.006)	(0.004)
Mean of dep.var.	5.29	2.57	2.31	9.29	8.86
B. 1931					
$Log(d^{WW1})$	0.012	-0.011	-0.001	0.008	-0.011
	(0.015)	(0.027)	(0.019)	(0.013)	(0.007)
Mean of dep.var.	5.99	2.30	2.11	9.34	8.95
Mobil. controls	Y	Y	Y	Y	Y
Econ. controls	Y	Y	Y	Y	Y
County FE	Y	Y	Y	Y	Y

Notes: OLS results of the effect of WW1 deaths on inter-war economic and demographic outcomes in logs at the district level. Controls are as described in the text. Standard errors clustered at the district level.

FIGURE 7

GREAT WAR DEATHS AND PRE- AND INTER-WAR ECONOMIC OUTCOMES



Notes: Each point is an estimate from a separate district-level OLS regression of the outcome shown on log World War 1 dead, conditional on World War 1 mobilisation, 1911 economic controls, log total births in the year and County fixed effects. No data is available for 1921

One possibility is using, in constructing our instrument, only deaths in WW1 that occurred in 1917 and 1918. At that stage, most of the volunteer army of 1914-1915 had already fallen or were injured, so it is reasonable to assume that most of those who died towards the end of the War were conscripts. Given than conscription is (mainly) due to the age of individual and not to any individual decision, this instrument should be orthogonal to persistent

TABLE 10

IV ESTIMATES I – EFFECT OF WW1 DEATH RATE ON WW2 DEATH RATE – 1917-1918 INSTRUMENT

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.334***	0.335*	0.354*	0.403*
	(0.061)	(0.202)	(0.199)	(0.217)
First stage F-stat	265.7	25.2	28.4	23.6
Obs.	5078	5046	5038	5038
R2	0.69	0.71	0.71	0.65
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: IV estimate results of the effect of WW1 deaths on WW2 deaths, using only deaths in 1917-1918 to construct the instrument. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.

economic and cultural factors at the parish level that correlate with the probability of fighting in the army in both wars. IV results are reported in Table 10. As expected, the first stage is strong, with F-statistics above 20 in all specifications. At the same time, IV estimates are very similar – if slightly larger in magnitude – than our baseline IV ones in Table 3, albeit less precisely estimated.

TABLE 11

IV ESTIMATES II – EFFECT OF WW1 DEATH RATE ON WW2 DEATH RATE – PRIVATES INSTRUMENT

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	0.342***	0.332*	0.343*	0.368*
	(0.055)	(0.186)	(0.187)	(0.208)
First stage F-stat	277.1	29.1	31.7	24.8
Obs.	5267	5230	5222	5222
R2	0.68	0.71	0.71	0.65
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: IV estimate results of the effect of WW1 deaths on WW2 deaths, using only deaths of privates to construct the instrument. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.

Another approach is to use the deaths of privates only to construct the instrument. Our baseline effect could be driven only by celebrated officers' deaths, which could themselves be correlated with pre-existing military traditions at the local level. IV results using this instrument are reported in Table 11, and are once again very close to our baseline estimates, providing some additional evidence in favour of the validity of the empirical approach used in the previous section.

Table 12 estimates our baseline model using death rates instead of levels as measures of WW1 and WW2 mortality. Results are very similar to the estimation in levels, reassuring us about the robustness of the results to model specification.

TABLE 12

ROBUSTNESS: IV ESTIMATES USING RATES

	(1) $D.\ rate^{WW2}$	(2) $D.\ rate^{WW2}$	(3) $D.\ rate^{WW2}$	(4) $D.\ rate^{WW2}$
$Dead\ rate^{WW1}$	0.117** (0.050)	0.103** (0.052)	0.106** (0.051)	0.107* (0.054)
First stage F-stat	52.9	46.2	47.2	45.1
Obs.	7391	7302	7293	7293
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: Instrumental variables estimates of the effect of WW1 death rate on the WW2 death rate. Different sets of controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.

Finally, Table 13 shows estimation results from our baseline IV model but using, as dependent variable, WW2 deaths of civilians only. Since civilians were not directly involved in fighting, the probability that they die in the war should not be related to WW1 mortality in their birthplace. This offers a natural placebo check for our mechanism. Indeed, although the first-stage is in some cases weak, we see no effect of WW1 deaths.

9. 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, the continent was precipitated to war again, with the memories of the Great War still fresh in the nations' memories. In this paper, we show that localities where a high proportion of men died in the Great War also lost a high proportion of men in World War 2. We relate this finding to proxies for bravery and risk-taking behaviour in the battlefield indicating that the effect operates through a change in the subjective value of sacrifice for British soldiers.

Our findings have important implications for the economics of conflict. This literature has typically focused on the incentives of high-level strategic actors such as governments or nations. Our results indicate that the actions of individual servicemen are shaped by the

TABLE 13
PLACEBO: CIVILIAN DEATHS

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$
$Log(d^{WW1})$	-0.162	-0.148	-0.148	-0.084
	(0.105)	(0.417)	(0.379)	(0.390)
First stage F-stat	188.9	3.1	3.4	2.8
Obs.	1853	1849	1846	1841
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: IV estimates of the effect of WW1 deaths on WW2 civilian deaths at the parish-level. different sets of controls and fixed effects are used in each column (see text for details). standard errors clustered at the administrative county level.

history of previous conflicts. This, in turn, could provide an alternative channel through which conflict and its effects may be persistent across generations. If, paraphrasing general George S. Patton, it is the spirit of men who follow that gains the victory, then our results suggest that previous wars create the resources for subsequent conflicts.

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Appendix

A. Derivation of the instrument

We index regiments by $j = 1, ..., J$. Each regiment is divided into smaller battalions, indexed by $b = 1, ..., B_j$. The number of deaths in a parish i can be expressed as either the sum over all regiments or as the sum over all battalions.

Regiment-level derivations

Start by decomposing WW1 deaths by summing over regiments j:

$$d_i^{WW1} = \sum_{j=1}^{J} d_{ij}^{WW1}.$$

Deaths at the regiment level can be decomposed as:

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

$$\implies d_{ij} = \alpha_{ij} m_i [\delta_j + \xi_{ij}].$$

Hence, the number of deaths from parish i can be decomposed as the sum of a "predictable" part, due the mortality of regiments, and an "idiosyncratic" part:

$$d_i^{WW1} = \underbrace{m_i \sum_{j=1}^{J} \alpha_{ij} \delta_j}_{predictable} + \underbrace{m_i \sum_{j=1}^{J} \alpha_{ij} \xi_{ij}}_{idiosyncratic}, \tag{A.1}$$

where:

- m_i – N. mobilized soldiers
- α_{ij} – Fraction of soldiers from i assigned to j
- δ_j – Regiment j death rate
- ξ_{ij} – Parish-specific deviations from mean death rate.

Equation 3 motivates our choice of instrument. We instrument for the number of deaths using its part that is predictable by using regiment-level mortality. These are the deaths that each parish is expected to suffer given the proportion of men who go to each regiment and the corresponding regiment-level mortality. The instrument is unaffected by parish-level idiosyncratic differences in death rates, hence the corresponding IV estimates should be free of the bias generated, for instance, by persistent parish-level characteristics that correlate with death rates in the two wars, such as income, risk attitudes, etc.

As discussed in the paper, however, this instrument does not solve the issue of endogeneous sorting in more or less risky regiments. The reason is that it is constructed using α_{ij}, the fraction of men from parish i fighting in regiment j, which can be endogenous. To mitigate concerns about the endogeneity of the α_{ij}, in the paper we will control for regiment-level mortality and use instead, mortality at the battalion-level, which is more disaggregated. The instrument relies on the fact that battalion-level deaths, once controlling for regiment-level mortality, are orthogonal to parish-level confounders. More precisely, we assume that battalion-level deviations from regiment-level mortalities are uncorrelated to the characteristics of the parish of birth of soldiers. To provide formal background for this choice of instrument, in the following we proceed to decompose the number of deaths using battalion-level death rates.

Battalion-level derivations

An alternative derivation can be obtained by using battalions instead of regiments as units. Start by decomposing deaths by summing over battalions b:

$$d_i^{WW1} = \sum_{j=1}^{J} \sum_{b=1}^{B_j} d_{ijb}.$$

The number of deaths from parish i who fought in battalion b in regiment j can be written as

$$\begin{aligned} d_{ijb} &= m_i \frac{m_{ijb}}{m_i} \frac{d_{ijb}}{m_{ijb}} = m_i \alpha_{ijb} \frac{d_{ijb}}{m_{ijb}} \\ &= m_i \alpha_{ijb} \left[\frac{d_{jb}}{m_{jb}} + \left(\frac{d_{ijb}}{m_{ijb}} - \frac{d_{jb}}{m_{jb}} \right) \right] \\ &= m_i \alpha_{ijb} \left[\delta_{jb} + \xi_{ijb} \right], \end{aligned}$$

where:

- m_i – N. mobilized soldiers
- α_{ijb} – Fraction of soldiers from i assigned to batallion b in regiment j.
- δ_{jb} – Battalion b-specific death rate.
- ξ_{ijb} – Parish-specific deviations from mean battalion death rate.

Hence, the number of deaths from parish i can be decomposed, as before, as the sum of two parts, now depending on battalion-, rather than regiment-level death rates:

$$d_i^{WW1} = m_i \sum_{j=1}^{J} \sum_{b=1}^{B_j} \alpha_{ijb} \delta_{jb} + m_i \sum_{j=1}^{J} \sum_{b=1}^{B_j} \alpha_{ijb} \xi_{ijb}. \tag{A.2}$$

This result shows that an improvement over the instrument that uses only regiment-level information is possible if data on a more disaggregated level, such as the battalion, are available. The decomposition in equation 4 suggests that one can instrument $Log(\mathbf{d}_i^{WW1})$ using $z_i = Log(m_i \sum_{j=1}^{J} \sum_{b=1}^{B_j} \alpha_{ij}\delta_{jb})$, controlling for $z_i^r = Log(m_i \sum_{j=1}^{J} \sum_{b=1}^{B_j} \alpha_{ij}\delta_j)$. This approach uses only variation in deaths due to battalion-level shocks, after controlling for regiment-level mortality. This is desirable because it allows to effectively control for selection into regiments.

B. Details on merging the 1911 Census data with 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 WW1 deaths within households affect the behaviour of men in WW2. The basic idea is that we take all male children in the 1911 Census aged 0-4 (so aged 28 to 32 at the start of WW2), then link these children to WW2 deaths. We separately link WW1 deaths to all the men in the 1911 Census that could have fought in WW1. We then combine this second merge with the children dataset to identify which children had fathers and other household members that died in WW1.

In more detail, we conduct this exercise by the following steps. First, we correct some minor 1911 Census parish errors using a file issued by IPUMS in Dec 2020. We then create two files from the 1911 Census that will be matched to the war dead. The first file, which will be linked to WW1 dead, comprises men aged between 10 and 50 in 1911 (and hence between 17 and 57 by the end of WW1). 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 4 in 1911 which includes the forenames of the boys, the forenames of their cohabiting father, and a household identifier.

We then prepare the war dead data for both WW1 and WW2 for the ABE merge. There are 796,000 WW1 dead in our data, of which some 380,000 are potentially matchable as age, forename, and surname fields are non-missing. There are 440,000 WW2 dead in our data. We only attempt to match the 51,000 or so that are aged between 0 and 4 in 1911. We next run merges using the ABE algorithm. For matching WW1 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 WW1 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 standardized names, and allow the option to use standard nicknames. Note that the ABE matching procedure only considers records to be matched when matches are unique, hence we will only identify a subset of the true matches between the war dead and 1911 Census participants.

In the final step we combine the 1911 Census with the outputs of the ABE merges. We first take all boys aged 0 to 4 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 WW1 merge to create a in indicator for children whose father died in WW1 (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 WW1 (we code non-matched households as 0).

C. Additional Figures and Tables

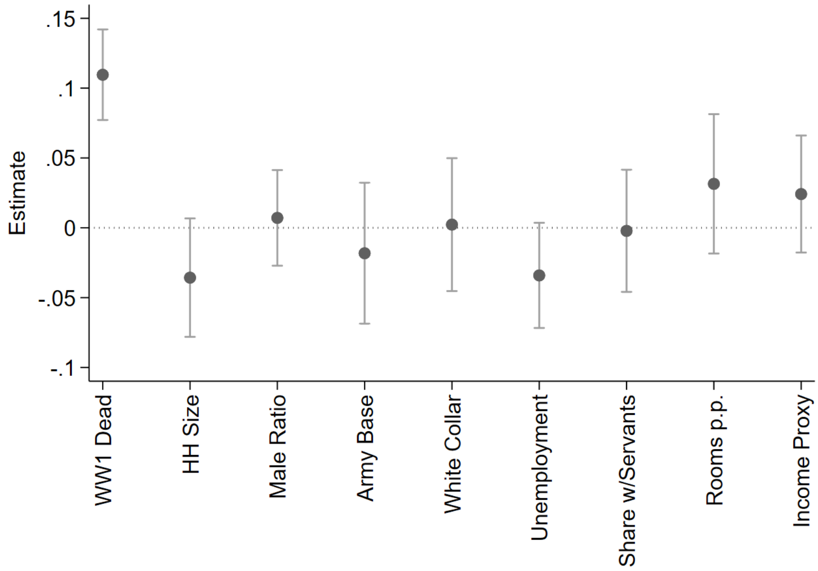
TABLE C.1
FIRST-STAGE RESULTS

	(1) $Log(d^{WW1})$	(2) $Log(d^{WW1})$	(3) $Log(d^{WW1})$	(4) $Log(d^{WW1})$
z	0.395***	0.181***	0.182***	0.157***
	(0.024)	(0.034)	(0.033)	(0.033)
F-stat	279.7	27.7	30.7	23.1
Obs.	5267	5230	5222	5222
R2	0.66	0.67	0.67	0.68
Mobil. controls	N	Y	Y	Y
Econ. controls	N	N	Y	Y
County FE	N	N	N	Y
Regiment	N	Y	Y	Y

Notes: First-stage estimates of the effect of our instrument based on regiment level death rates on WW1 deaths at the parish level. All specifications control for population and mobilisation. Different sets of additional controls and fixed effects are used in each column (see text for details). Standard errors clustered at the county level.

FIGURE C.1

INSTRUMENTAL VARIABLE: BALANCING CHECKS (PARISH-LEVEL)



Notes: OLS estimates of a regression of instrument z_i on different outcomes, together with 95% confidence intervals. All outcomes have been standardized to have mean zero and unit standard deviation. The leftmost coefficient plots the first-stage, that is the regression coefficient of the effect of the instrument on the (standardized) instrumented variable, $Log(\mathbf{d}_i)$. All specifications control for logged 1911 population and WW1 mobilisation. Standard errors clustered at the county level.

Table C.2
Interactions

	(1) $Log(d^{WW2})$	(2) $Log(d^{WW2})$	(3) $Log(d^{WW2})$	(4) $Log(d^{WW2})$	(5) $Log(d^{WW2})$
A. OLS					
$Log(d^{WW1})$	0.150***	0.126***	0.129***	0.128***	0.149***
	(0.018)	(0.020)	(0.019)	(0.019)	(0.020)
$Log(d^{WW1}) \times mem'l.$	0.120***	0.092***	0.090***	0.095***	0.090***
	(0.018)	(0.020)	(0.020)	(0.020)	(0.022)
Obs.	7480	5881	5870	5870	5272
R2	0.65	0.70	0.71	0.72	0.73
B. IV					
$Log(d^{WW1})$	0.325	0.330	0.351	0.419	0.488
	(0.264)	(0.301)	(0.296)	(0.375)	(0.440)
$Log(d^{WW1}) \times mem'l.$	-0.021	-0.025	-0.035	-0.068	-0.092
	(0.138)	(0.157)	(0.155)	(0.197)	(0.224)
First stage F-stat	25.8	20.1	21.0	12.8	12.3
Obs.	5266	5230	5222	5222	4775
R2	0.69	0.71	0.71	0.64	0.65
Mobil. controls	N	Y	Y	Y	Y
Econ. controls	N	N	Y	Y	Y
County FE	N	N	Y	Y	Y
Regiment FE	N	N	N	N	Y

Notes: Baselines estimates with interactions of the effect of WW1 deaths on WW2 deaths at the parish level. All specifications control for population and mobilisation. Different sets of additional controls and fixed effects are used in each column (see text for details). Standard errors clustered at the district level.