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# The Effects of World War II on Economic and Health Outcomes across Europe

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## Abstract

In this paper, we investigate the long-run effects of World War II on socio-economic status (SES) and health of older individuals in Europe. Physical and psychological childhood events are important predictors for labor market and health outcomes in adult life, but studies that quantify these effects in large samples that cover entire diverse populations are still rare. We analyze data from SHARELIFE, a retrospective survey conducted as part of the Survey on Health, Aging, and Retirement in Europe (SHARE) in 2009. This survey provides detailed data on events in childhood including those during the war as well as several measures of exposure to war shocks such as experience of dispossession, persecution, combat in local areas, and hunger periods for over 20,000 individuals in 13 European countries. We find that exposure to the war itself, and even more importantly to individual-level shocks caused by the war such as hunger periods, significantly predict economic and health outcomes at older ages.

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## 1. Introduction

The Second World War (WWII) was one of the major transformative events of the 20th century, with 39 million deaths in Europe alone. Large amounts of physical capital were destroyed as well through six years of constant ground battles and bombing. Many individuals were forced to abandon or give up their property without compensation and to move on to new lands. Periods of hunger become more common even in relatively prosperous Western Europe. Families were separated for long periods of time especially from their fathers. Many including young children would personally witness the horrors of War as battles and bombing took place in the very areas where they lived. Horrendous crimes against humanity were committed. Due to WWII, political and economic systems in many countries would be permanently altered.

In this paper, we investigate long-run effects of World War II on late-life economic and health outcomes in Western continental Europe (health, education, labor market and marriage). We identify several channels of how this war might have affected individual lives, and document which groups of the population were most affected. Our research relies on retrospective life data from the European Survey of Health, Aging, and Retirement in Europe (SHARE) that have recently become available. SHARE covers representative samples of the population aged fifty and over in 13 European countries, with a total of about 20,000 observations. We also collected external data on casualties, combats, nutrition, population movements, and male-female population ratios. Our individual-level analysis of the multidimensional effects of a major shock that affected life circumstances in several countries and for all socio-economic groups, we add new dimensions to a rapidly increasing literature in labor and health economics (see, *inter alia*, Smith, 2009a; Heckman, 2012).

This paper is divided into six sections. The next sets the context of the paper by measuring the scale of WWII using casualty statistics due to the war that include military, civilian, and holocaust related deaths by country; we also review the long-run economic effects of the war across Europe. Section 3 highlights the main attributes of the SHARE data. SHARE not only measures the salient economic and health outcomes of adults over age fifty in these countries, but also includes retrospective modules meant to capture salient parts of early life including those events related to the War. The forth section summarizes statistical models that

capture the impact of the experience of WWII on individual adult labor market, demographic, and health outcomes. Section 5 complements this analysis by modeling the influence of the war on some of the primary pathways through which it had long lasting impacts—hunger, dispossession, the absence of a father, and marriage. The final section highlights our main conclusions.

## **2. The effects of WWII in Europe: casualties and long-run macro effects**

### **2.1 Casualties**

Unlike many earlier wars, which consisted mainly of soldiers meeting and dying in battlefields, civilians were also heavily affected by warfare with about half of the WWII European casualties being civilians. Among the civilian deaths, between 9.8 and 10.4 million civilians were murdered for political or racial reasons by the Nazi regime (Auerbach 1992, Pohl 2003). The distributions of deaths due to the War were very unequally distributed across countries, whether they were military deaths due to combat, civilian deaths or the holocaust. Figure 1 displays the fraction of the 1939 population who died in a large array of countries. Among the European countries covered by our data, Germany and Poland borne the brunt of these casualties. In contrast, American casualties in the European and Asian theatres combined were a bit over 400 thousand, the overwhelming majority of whom were soldiers. Similarly, total deaths in the UK are estimated to be about 450 thousands, 15% of whom were civilians.

While we will concentrate for data reasons primarily on the effects of World War II in continental Western Europe, the War's impact was just as stark in the Asian theatre. The two countries most directly affected in terms of number of casualties were Japan and China. About two million Japanese soldiers died in the war alongside up to a million Japanese civilians—about 4% of the pre-war Japanese population. The total number of deaths in China is believed to range between 10 and 20 million, with more than 70% being civilians. The other country that stands out are those that would comprise most of the Soviet Union, where one in seven perished in the war with about 10 million military deaths and 13 million civilian deaths. In 1939, there were about 2 billion people in the world. The best estimates indicate that between 62 and 78 million of them would die due to the WWII—more than 3% of the world's population.

Figure 2 displays number of deaths by type in countries in our SHARE data. In these countries deaths were highly concentrated in Germany and Poland with deaths measured around five million in both countries. In Germany, there were almost as many civilian deaths as military ones while in Poland civilian deaths including the holocaust are by far the dominant ones. In many of the remaining countries in our data, deaths due to WWII are measured instead in the hundreds of thousands, but still often amount to a large fraction of the pre-war populations in several other countries, particularly Austria and the Netherlands.

## **2.2 The economic effects of WWII**

This paper is primarily about long-term micro effects of WWII, but in this section we briefly discuss possible long-term macro-effects of the War on demographic and economic trends. While there remain ripple demographic effects of the War, particularly on the aging of populations, if WWII were to alter long-run population growth the main mechanisms would have to be through future fertility rates and migration patterns. Despite the scale of the damage done by WWII on the size, age, and gender composition of populations in the countries involved, these effects will mostly pass in a generation and certainly in two generations as post WWII population structures were eventually replaced by new birth cohorts with more standard age and gender compositions. If WWII permanently altered fertility rates, it would have to have operated through the baby boom and/or the subsequent baby bust, but there is little scientific evidence that long-term future fertility rates of the countries more affected by WWII were affected differentially.

Similarly, long-term migration patterns could have been altered, but that would seem to largely depend on whether the war was to be associated with future conflicts, civil strife (as often occurs in persistent civil wars), and unpleasant political and social environments. But with a few exceptions (Hungary, East-Germany until the fall of the Berlin wall ), WWII, especially for continental Western European countries, was transformative partly in the sense that it helped settle long disputed geographic boundaries, re-united ethnic groups within a single geographic entity, and led to a period of significant economic growth that lasted for decades. This transformation, however, took place in two distinct phrases—the immediate post war period and the end of the cold war almost fifty years later which lead to another era of

significant migration from East to West especially to Germany of some remaining German ethnic groups. In spite of the death of substantial number of civilians in WWII, the existing evidence also indicates that cities went back to old population growths paths in Western Germany and Japan (Brakman et al., 2004), while city growth, but also economic growth was permanently depressed in Eastern Germany and the Soviet Union (Acemoglu et al., 2011 and Brakman et al., 2004). Beyond these important relocations, there is little reason to think that WWII lead to large migrations of populations decades removed from the war. Combined, these comments on fertility and migration suggest that the long-run demographic changes induced by WWII are not large.

If wars alter long-term economic growth, it would permanently depress the economic prospects of future generations. Warfare reduces capital stock through the destruction of infrastructure, productive capacity and housing through bombing and fighting, and results in a relocation of food and other production into military production. It destroys human capital—but will there be catch-up growth, or will the destruction show up many decades later?

Based on Harrison (1998), Table 3 displays GPD per capita of some of the major countries involved in the War relative to that of the United States at some key illustrate dates. The immediate impact of WWII was apparently quite destructive for the countries involved especially so for those on the losing side—Germany, Japan, and Italy—presumably reflecting their much large losses in both physical and human capital during the war. However, by 1973 and certainly by 1987, with the exception of the USSR relative to the US, the European ‘losers’ actually had higher per capita growth than the European ‘winners’. What turned out to be essential in the long-term was not whether a country was on the winning or losing side, but whether or not they transited to democracy and open-market economies. Waldinger (2011) demonstrated one micro channel on human capital, the loss of Jewish university professors in Germany due to WWII. He shows that the productivity of those departments in Germany which lost a relatively high share of their professors was permanently lowered, while shocks to physical capital due to Allied bombing had returned to their old growth path by the 1960s. More generally, investments in human capital take years through schooling alone while plants and factories can be repaired and replaced much more quickly.

The large military mobilizations and the fact that virtually all soldiers and most pre-war workers were men has been recently used to study the impact of the war on women's labor supply on the structure of wages in the labor market. Goldin's (1991) research suggests that half the entry of women into the labor force during the war remained at the war's end providing an arguably exogenous increase in female labor supply. Acemoglu, Autor and Lyle, 2004 use WWII military mobilization by state and show that these exogenous increases in female labor supply lowered both female and male wages with more of an effect on the former and increased the wage gap between college and high school male grads. Finally, Akbulut-Yuksel (2009), Ichino and Winter-Ebmer (2004), and Jürges (2011) study the impact of WWII on educational and future labor market outcomes. While these studies use individual level outcome data, they can only condition on temporal, and to some extent regional, variation in whether individuals were affected by the war, a point to which we return below.

Given the scale of the War and the number of ways it fundamentally changed the world, the existing economic literature using the Second World War as a natural experiment is surprisingly thin. Moreover, the literature that does exist using WWII is relatively recent and more American in context than European. This may reflect the fact that the popularity of the 'natural experiments' framework in economics itself post-dated WWII by many decades. Still, it does suggest that excellent research opportunities remain especially given the wide diversity of European experiences in the WWII. When it comes to the present paper, the availability of retrospective early-life data in SHARELIFE allows us to analyze specific channels by which the war affected long-run outcomes, and therefore to open the black box of how the shock of WWII affected long-run health and SES outcomes.

### **3. Data**

#### **3.1 SHARE and retrospective early-life data from SHARELIFE**

SHARE is a multidisciplinary and cross-national panel interview survey on health, socio-economic status and social and family networks of individuals aged 50 or over in continental Europe. The original 2004/2005 SHARE baseline included nationally representative samples originally in 12 European countries (Denmark, Sweden, Austria, France, Germany, Switzerland, Belgium, Netherlands, Spain, Italy, and Greece) drawn from population registries, or from multi-

stage sampling (<http://www.share-project.org/>). For these countries, a second wave of data collection took place in 2006, and the third wave of data collection (4<sup>th</sup> wave of data collection) on this panel was completed in 2011.

In addition to a standard set of demographic attributes (age, marital status, education), Share data include health variables (self-reported health, health conditions, physical functioning, health behaviors), psychological variables (e.g., depression and well-being) economic variables (current work activity, sources and composition of current income, and net wealth (including housing and financial assets)).

SHARE's third wave of data collection, SHARELIFE, collected detailed retrospective life-histories in thirteen countries (Poland was added) in 2008-09. SHARELIFE was based on life history calendar (LHC) methods. The interview starts with the names and birth dates of the respondent's children (and other information about them), which is followed by the partner and residential history. This information is used to aide in the dating of events.

The information in the life history includes family composition and type of home (running water, toilet, etc) number of books, occupation of father, and school performance all at age ten. A childhood health history is also included based on the Smith module included in the PSID and HRS that queries about individual specific diseases and an overall subjective evaluation of childhood health status. In addition, respondents are asked about childhood immunizations and hunger during childhood. Adult health histories and job and income histories were also collected during childhood. Moreover, SHARELIFE provides detailed data on region of residence and housing during the whole life (childhood and adulthood).

There is of course concern about the quality of recall data, particularly for time periods decades in the past. However, that concern has been lessened by a realization that recall of events during childhood is better than for other periods of life, particularly if the events are very salient as they certainly are in this application. Smith (2009) investigated several quality markers and showed that the instrument was successful in matching known secular trends in childhood illnesses. There was no evidence of backwards attribution of new episodes of adult health problems into a reevaluation of childhood health. Adult respondents whose health deteriorated between PSID waves were no more likely than before to say their childhood health



was not good or to cite additional childhood health problems. We will provide evidence in this paper that these recalled events match the historical record.

One aim of the paper is to illustrate how such retrospective life data can further our understanding of effects of early-life conditions as affected by large external shocks, such as a War. The existing literature measuring impacts of macro-events mostly used “natural experiments” such as wars or famines to study effects of early-life conditions at the aggregate level. However, largely due to data reasons beyond their control, the studies of which we are aware could not use individual-level measures of whether a particular person was affected by the war and through which channel. Retrospective life data such as those from SHARE contain such detailed information and provide the opportunity of opening the black box of effects of early-life conditions.

Analyzing different outcomes is the first step in understanding the channels and mechanisms by which wars affect people’s lives. Another possibility is using different measures of war exposure such as the closeness of combat—are individuals from a more severely bombed city worse off, because its industry has been destroyed, or because of psychological traumata? In the SHARE data, retrospective questions provide information on several channels of war exposure hunger, the absence of the father, dispossession, and persecution.

### **3.2 Other data sources**

In addition to SHARE data, we also use external data sources to identify aggregate channels of war-affectedness. Since WWII affected not only countries differentially, but also regions within countries, we constructed data on combat operations using sources from military history (Ellis, 1994). We used maps of within country regions and for each year within the war we documented whether armies engaged in battle. We combine these data with information about the region in which the respondents lived during each year of WWII and use it as a measure of individual war exposure.

Since we analyze data over a time period of 50 years, we also have to account for country-specific economic performance that may have affected childhood circumstances differently. We therefore use yearly GDP data, which are available for each European country

(Maddison, 2011). For each respondent we identify the GDP value at age 10 and at age 60 and merge it to the main data.

#### **4. Channels of influence**

This section presents descriptive data on some of the major channels through which WWII might have affected peoples' lives well into their older adult years. These channels include periods of hunger, changing sex ratios, the absence of a father, migration, dispossession and persecution.

##### **4.1 Hunger**

One channel by which the Second World War might have affected long-run adult outcomes is hunger. World War II caused several severe hunger crises which led to many casualties, and may have had long-term effects on the health of survivors. For example, since the beginning of the German occupation in Poland, the nutritional situation of the non-German population was poor. The average caloric intake for the Polish population was about 930 calories in 1941. The situation was worst in the Warsaw Ghetto with where average food rations were limited to about 186 calories per day in 1941.

Similarly, in the fall and winter 1941/ 1942, Greece was struck by a severe famine with about 100,000 to 200,000 deaths (Hionidou 2006). In WWII, Greece was under Bulgarian, German and Italian occupation. The famine was mainly caused by three factors: First, the occupiers imposed a naval blockade. Second, prices to farmers were fixed at such low levels that they were not willing to market their produce any more. Third, mobility between different regions of the country was largely reduced due to the occupation. The nutritional situation returned to acceptable levels towards the end of 1942. Neelson and Stratman (2011) use Cohort Data to show that undernourishment of those children who were 1 or 2 years old at the time of the famine had a significantly lower probability of being literate or to complete upper secondary education.

The nutritional situation in the Netherlands under German occupation had been adequate up to October 1944 (Trienekens 2000). As retaliation for a railway strike to hamper German troop movements, Germany blocked food supplies to the parts of the Netherlands that were still occupied. Even though the blockade was lifted in November 1944, the harshness of

the winter made it impossible to transport food to the affected regions. The combination of the food blockade and the harsh winter led to a severe hunger crisis in winter 1944/ 1945. About 20,000 deaths, mainly among elderly men, are attributed to this famine. The famine ended with the German occupation in May 1945.

The Dutch famine has been extensively studied because it affected an otherwise well-nourished population at a very specific time and region. The datasets used include military records, psychiatric registers, and follow-ups of infants from birth records of clinics in the affected area (Lumey et al., 2007). Individuals exposed to this famine in utero are shown to suffer from cognitive and mental problems and addiction (Neugebauer et al.; 1999, Rooij et al., 2010), diabetes and coronary heart disease, but they also perform worse regarding anthropometric and socio-economic indicators (Almond and Curie, 2011).

Germany suffered from hunger between 1945 and 1947 when the food supply from the occupied countries had ceased. International aid was at this time not given to Germany. The Office of Military Government for Germany established a goal of 1550 calories per day in 1945. However, in the first months of occupation, this goal could often not be met. There were regions where average calories per day were around 700 (Gimbel, 1968). Death rates raised by the factor 4 for adults, and by the factor 10 for infants during this period. With a good harvest and the currency reform of 1948, nutritional shortages were overcome (Zink, 1957).

Do these known well-documented hunger periods show up in the retrospective data? The descriptive data we present in this section show that they do. Using individual-level data is particularly useful since as will become clear, there is heterogeneity in how individuals were affected by hunger within countries and over time. In contrast, the aggregate measures we presented above—for instance, whether an individual lived in a region where combat action took place—mask potentially important heterogeneity.

The existing literature could only use time and perhaps regional information on such hunger episodes, and researchers merged this information with individual-level data on health and economic outcomes. In contrast, SHARE respondents provided individual-level information on whether and when they suffered from hunger in their lives.

Figure 3 demonstrates that hunger episodes during the time period of the war were much more severe in war countries than in those countries that did not participate in the war. We also see that there was a great amount of diversity in periods of hunger amongst the war countries. Hunger appears to also be more common in regions where combat took place within war countries. Finally and not surprisingly, the experience of hunger was far more common among those of low socio-economic background as a child. With respect to hunger, our analysis shows that the individual-level reports in SHARE match the information on the timing and location of hunger episodes we collected from historic sources well. To illustrate, in Figure 2 the Greek spike hunger occurred in 1941-1942, the Dutch in 1944-45, and the German in 1946-1947.

#### **4.2 Sex ratios and absence of father**

Largely men died during the war, producing very low male/female ratios in Europe after the war. Since this male bias in deaths was concentrated among soldiers as the civilian and holocaust fatalities were largely gender neutral, it is the countries in figure 2 who experienced many military deaths that were most affected. With 3 million military deaths, the most affected country in our data was Germany. In Germany, the sex ratio dropped from 0.98 in 1939 to 0.72 men per women in the 15–45 age group right after the war in 1946. Consequently, many women did not marry, and many children grew up without a father. Even after the war, about 4 of the 11 million German prisoners of war remained in captivity and the last 35,000 German soldiers returned from the Soviet Union in 1955 which further compounded the problem of absent fathers.

Table 2 shows the immediate demographic consequences of the war by listing by country and period of birth the percent of individuals who had a father absent when they were ten years old. Once again, the largest effects took place in the war ravaged countries of Austria, Germany, and Poland. In Austria and German, one in four children lived without their fathers when they were ten during the war. In Germany, this was twice the rate observed both in the pre-war and post-war (after 1955) periods in Table 2. In Poland, the rate of absent fathers during the war is lower (about 15%) since many of the deaths are civilians, but this rate was still twice that of the pre- and post-war periods. We observe war spikes in other countries as well

(Italy, France, Denmark, and Belgium), but the contrasts with the pre and post war years are not as dramatic.

### **4.3 Dispossession and persecution**

SHARE documents the extent of the experience of dispossession of property linked to WWII and its aftermaths.<sup>1</sup> This dispossession was often associated with persecution and resulted in significant geographic displacement of populations during and after the war. A further advantage of SHARE is that we can observe where and when individuals moved during their lifetimes, including the war time period. Figure 4 shows that inflows of people into countries that largely stemmed from war displacement including dispossession of property.

There were three principal periods during which people were forced to flee their homelands. During WWII, millions of Jews, but also opponents of the Nazi regime, were expropriated, and often sent to concentration camps and died there. Second, the end of WWII was associated with dramatic border changes in Eastern Europe. These border changes often induced millions of individuals to leave their places of residence and flee to other parts of Europe. The Soviet Union annexed territory from some of its neighboring countries, inter alia from Czechoslovakia, Germany and Poland. Poland in turn received one part of Germany in compensation. Those Poles having lost their homes in the part occupied by the Soviet Union were moved to the new part, so Poland and with it millions of people were moved westwards.

Figure 4 shows the inflow of populations towards and after the end of WWII into the new states in their new borders. Germany lost about one quarter of its territory. About two million people have been estimated to have died on the flight. After the war, the remaining territory of Germany was divided into four occupational zones. About 4 million people fled from the approaching Soviet armies to the British and US zone where the occupation was less severe. In Germany, destroyed cities had to accumulate millions of ethnic Germans from other parts of Europe. A further wave of dispossessions happened in Eastern countries after WWII when private property was nationalized in the socialist and communist economies. Even in France, there was a wave of nationalizations at the end of WWII. Mainly banks, energy and transport

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<sup>1</sup> The specific question is “There may be cases when individuals and their families are dispossessed of their property as a result of war or persecution. Were you or your family ever dispossessed of any property as a result of war or persecution?”

firms were nationalized, but there were also some expropriations which happened as penalty for cooperation with the Nazi regime.

Figure 5 shows the percentage of dispossessed individuals in SHARE. In the Czech Republic, Germany and Poland more than 5% of the respondents experienced dispossession during their lifetime. For respondents living in Germany and Poland, dispossession happened during the war period, while they happened later in Czechoslovakia. Dispossessed individuals in our sample are over proportionally born outside of the current borders of their country. Analyzing countries of origin, many of them came from Eastern Europe, thus they most probably lost their property with the big wave of nationalizations after WWII.

## **5. WWII and individual outcomes: Analysis of the SHARELIFE data**

### **5.1 Measures of war exposure**

To analyze the long-term impacts of WWII on individual health and economic outcomes, we proceed as follows. Our analysis first makes use of the fact that different countries in Europe were differentially affected by WWII at different points in time, which yields our aggregate measures of war exposure. These results are presented in section 4.2. We then go one step further and analyze the various channels outlined above through which these war effects are most likely to have occurred. These results are presented in section 4.3.

To study the effects of war on adult outcomes, we use the following indicator of being affected by World War II- that is one lived in a war country during the war period. Thus, our war dummy is equal to zero for everybody in a non-war country (Denmark, Switzerland, and Sweden), and for everybody born after the war period. Alternatively, it is equal to one for everybody who was alive in a war country (Austria, Belgium, Czech Republic, France, Germany, Greece, Netherlands, and Poland) during the war period. The war period ends in 1945 for all occupied countries, while it includes 1946 to 1948 in Germany and Austria, when they were under allied occupation. For these countries, the war period ended with the currency reform in Germany in 1948.<sup>2</sup> Individuals could certainly have been affected by the War even if they were born after the War, but the channels that we emphasize in this paper—combat, hunger,

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<sup>2</sup> We leave out Spain from our regressions, because of the Spanish Civil War of 1936 to 1939.

dispossession, and the absence of a father—were much more likely to have affected those who lived during the War.

To gain an understanding of what might underlie any effects of WWII on adult outcomes, we then construct a variable indicating whether there were combats and how many combats occurred in the region in which the individual lived during WWII. Thus, in the war countries, we create two dummy variables based on the number of months of exposure the respondent had to combat in the place they lived during the war—0 to 2 months of exposure to combat and 3 or more months of exposure to combat. The purpose of this variable was to test whether actual exposure to combat was an important mechanism for the War effects that we estimate below.

## **5.2 Micro-level regressions of adult health and SES outcomes on the aggregate war measure**

We next turn to the question of whether individuals' experiences during and after WWII predict their health and socio-economic status in their later adult life. Individuals in our analysis sample are those who are still alive in 2009 so they are a selected sample of the population that experiences the WWII shock. To the extent that those more affected are less likely to have survived, our results should underestimate the full effects of the war on long-term health and SES outcomes.

We consider several adult dependent variables, all of which are measured in 2009, the year of the SHARELIFE survey. Health outcomes include the prevalence of diabetes and heart disease, body height in centimeters (an important summary measure of early-life health conditions), whether an individual is depressed, and self-reported health status. Self-reported health status is recorded on a scale from one to five with five being the best health status. Our adult economic outcomes include years of completed education, the log of household net worth, whether the individual was ever married, and life-satisfaction in 2009<sup>3</sup>. For each of these dependent variables, we present predictive regressions that use only either the aggregate measures of war exposure or a measure that distinguishes between very limited exposure to combat (two months or less, including zero) or an more extensive exposure (three or more

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<sup>3</sup> Respondents are asked "On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?" We model this outcome as a score from 0-10.

months). Our individual-level regressors include indicators of SES when a child (separated into three groups—low, middle, and high),<sup>4</sup> whether the respondent was male, and Ln GDP per capita in respondents' country of residence at age 10.

We begin with predictive regressions that use only the aggregate measure of war exposure. Table 4 summarizes results obtained for adult health outcomes and Table 5 does the same for adult SES outcomes. There are no real surprises for variables other than war exposure which produce standard types of estimates. Compared to those in the highest childhood SES group, those in the lowest childhood SES group have higher levels of adult diabetes and heart disease, are smaller in stature as adults, experience higher levels of adult depression and self-rate themselves in worse adult subjective health. The middle childhood SES group consistently lies between the bottom and top in terms of these adult health outcomes. These results conform to the general finding in the literature that childhood economic circumstances are very predictive of later life adult economic and health outcomes (Currie, 2009, Case et al., 2002, and Smith, 2009.) Consistent with the epidemiological literature, men have higher levels of adult diabetes and heart disease, lower levels and depression, and report themselves in better subjective health than woman do (Banks et al., 2010, Smith, 2007). Individuals who lived in countries with higher GDP per capita when they were ten years old are taller as adults, have lower levels of heart disease and better self-reported adult health in 2009 (Deaton, 2007).

Our principal concern involves the estimated impact of the aggregate War variable. Living in a war country during the period of the Second World War is consistently associated with poorer adult health for all outcomes in Table 4 except adult height. Individuals exposed to WWII have higher levels of adult diabetes and heart disease, are more depressed, and report their subjective health as worse. In the sixth column of Table 4, we include one additional model that predicts whether a respondent received immunizations as a child. This model shows that the experience of war was associated with a lower probability of immunization as a child

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ARE<sup>4</sup> For childhood SES, we construct an index using information about the socio-economic background of the respondents when they were ten years old. The variables contributing to our SES measure are: A dummy indicating whether the father was a white collar worker; the logarithm of the number of books in the household; the logarithm of the proportion of individuals in the household who shared a room; information on whether the house had a bathroom, hot and cold water supply, central heating and an inside toilet. The respective weights of the different factors are determined through factor analysis. Mazzonna (2011) shows that the distribution of this index is consistent with historical information on the wealth distribution within these countries.



which is not surprising given that this was war time. This immunization result may be one pathway through which adult health would eventually suffer.

Table 5 repeats the same type of models for adult economic outcomes in 2009. Not surprisingly, higher childhood SES is associated with much higher levels of adult education, net worth and life satisfaction, another indication of the strong economic transmission across generations in these outcomes. Similarly, the male advantage in these adult SES outcomes is consistently found. Our measure of country-year War exposure is strongly negatively related to education and life satisfaction as an adult. War exposure is associated with about six tenths of a year less education. In contrast, In household net worth is not associated with the war time experience suggesting that this outcome mainly depends on post-war savings behavior and trends in asset prices. The marriage effect of war is statistically significant for women only consistent with the sharp decline in the male/female adult sex ratio documented above.

Tables 6 and 7 show results obtained from an parallel set of models with the same adult health and SES outcomes and the same set of right hand side variables with the exception of the war exposure measure. The estimated effects of all non-war variables are essentially the same as in tables 4 and 5. In Tables 6 and 7, our war exposure measure consists of two variables which measure the number of months of exposure the respondent had to combat in the place they lived during the war in war countries—0-2 months of exposure to combat and 3 or more months of exposure to combat. The purpose of this variable was to test whether the actual exposure to combat was an important mechanism for the War effects that we estimated below. With the sole exceptions of adult depression (Table 6) and live satisfaction (Table 7), the worse adult SES and health outcomes appear to be about the same amongst those with large or small exposures to combat. This suggests that having combat and battles close by to where you lived during the war are not mechanism by which these war effects operate. The exceptions are of interest since it is reasonable that exposure to frequent exposure to combats is associated with adult depression and lower levels of life satisfaction as the vivid memories of war linger long into adulthood.

### 5.3 Models of channels of war

We next turn to our estimates of how the micro pathway channels we highlighted above—hunger, dispossession, persecution, and the absence of father are related to the experience of WWII. SHARE respondents were asked ‘Looking back on your life was there a period of time during which you were hungry?’ If the answer was yes, they were asked when this occurred. In SHARE, individuals are also asked “whether they or their family were ever dispossessed of any property as a result of war or persecution”, and if yes the date of that dispossession. They were also asked whether they had ever been victims of persecution because of their political beliefs, religion, nationality, ethnicity, sexual orientation or their background. Finally, the absence of the father is defined as the absence of the biological father at the age of ten. About 8% of our respondents experienced a period of hunger, 9% have lived without their father at age 10, and 5% suffered from persecution and dispossession, respectively.

Table 8 shows how these micro channels are related to the experience of war. Having experienced WWII increases the likelihood of experiencing hunger by 5 percentage points, persecution by 1 percentage point and the absence of the father by 4 percentage points. These estimates are large relative increases given the baseline risks. Low childhood SES increases the probability of suffering from hunger, while it decreases the probability to be dispossessed. The latter is logical, because the prerequisite for dispossession is that there has to be something to be dispossessed of. The experience of war makes these results even stronger. Males are both more likely to suffer from hunger, but also to be persecuted. The latter is again what we expected given that mainly men were politically active during this period of time.

In table 9, our interest lies again in whether it is the experience of combats is the mechanism that leads to our War effects. The experience of hunger and the absence of the father is somewhat stronger for our respondents who lived in a region strongly affected by combats (3-10 months of combats) then for those in regions with none or only mild experience of combats. However, the differences are not large. In fact, we expect the death of men during wartime to not necessarily happen in their region of residence. Persecution is expected to war per se, but not to an increased experience of combats. Thus, combats do come with an increased likelihood of hunger as for example was the case in the Dutch hunger winter. It can

also be due to other aspects of war, as was the case for the Greek and German experience with hunger during WWII. Also, combats lead to local deaths of the civilian population, but military casualties often occur far from the families affected by it.

#### **5.4 The uneven consequences of war**

In addition to the models summarized in Tables 4-9, we also estimated models that included interactions of the War variable with SES as a child. These results are contained in Table 10. In these models, we include both main effects for the war and childhood SES status as well as interactions of the war with childhood SES. For these SES interactions, among the health variables, we find the strongest SES war interactions with heart disease, possibly reflecting the role of lifetime stress with that disease. However, we find very strong interactions of SES and war for adult education, adult depression, and adult life satisfaction. The negative impact of war on all three of these outcomes is much larger among those in the low and middle SES childhood groups. The bottom panel of Table 10 shows that some of the pathways through which War operates are concentrated among the poorest households (i.e., hunger and immunizations) and some are concentrated among the highest SES households (dispossession).

### **6. Conclusions**

In this paper, we present a micro analysis of the effects of WWII on some of the principal SES and health outcomes of those who experienced the war. To conduct this analysis we use new data—SHARELIFE—that records not only the adult outcomes in 2009, but also the salient aspects of the war time experiences of these respondents. Our analysis shows that experiencing war increased the probability of suffering from heart disease, diabetes, and also depression. Individuals experiencing war or combat have significantly lower self-rated health, and they are smaller. Experiencing war is also associated with lower years of education and life satisfaction, and it decreases the probability of ever being married for women, while increasing it for men. We also analyze the pathways through which these War time effects took place. We found strong effects for our four pathways we explored—hunger, dispossession, persecution, and having an absent father.

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**Table 1**  
**Number of Observations Available in SHARELIFE; by Country**

<b>Country</b>	<b>Observations</b>
Austria	759
Germany	1,755
Sweden	1,800
Netherlands	2,032
Spain (excluded due to the Civil War)	1,731
Italy	2,354
France	2,252
Denmark	1,990
Greece	2,689
Switzerland	1,176
Belgium	2,655
Czech Republic	1,732
Poland	1,648
<b>Total</b>	<b>24,573</b>

*Note:* The countries are defined as of 2009 when the SHARELIFE data were collected.

*Source:* SHARELIFE; own calculations.

**Table 2**  
**Percent of SHARELIFE Respondents with Father Absent at Age 10; by Time Period**

<b>Country</b>	<b>Pre-1939</b>	<b>1939-1955</b>	<b>After 1955</b>
Austria	0.198	0.244	0.151
Germany	0.113	0.279	0.099
Sweden	0.114	0.130	0.123
Netherlands	0.076	0.073	0.045
Spain	0.118	0.089	0.055
Italy	0.045	0.070	0.046
France	0.109	0.131	0.055
Denmark	0.073	0.105	0.077
Greece	0.019	0.053	0.013
Switzerland	0.068	0.039	0.046
Belgium	0.048	0.082	0.055
Czechia	0.081	0.100	0.081
Poland	0.080	0.153	0.082

*Note:* The countries are defined as of 2009 when the SHARELIFE data were collected.

*Source:* SHARELIFE; own calculations.



**Table 3**  
**GDP per Head Relative to US GDP per Head**

<b>Country</b>	<b>1938</b>	<b>1950</b>	<b>1973</b>	<b>1987</b>
UK	.98	.72	.72	.73
Germany	.84	.45	.79	.82
France	.72	.55	.78	.78
Italy	.53	.36	.63	.70
Japan	.38	.20	.66	.77
USSR	.35	.30	.36	.33

*Source:* Harrison (1998), Table 1-10.

**Table 4**  
**Adult Health Outcomes Associated with World War 2**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Diabetes	Heart	Height	Depression	Self-reported Health	Childhood Immunizations
War	0.035*** [0.007]	0.020*** [0.007]	-0.232 [0.147]	0.028** [0.011]	-0.081*** [0.024]	-0.025*** [0.006]
Childhood SES low	0.034*** [0.006]	0.020*** [0.006]	-1.825*** [0.127]	0.030*** [0.009]	-0.331*** [0.020]	-0.029*** [0.004]
Childhood SES med	0.019*** [0.005]	0.015*** [0.005]	-0.923*** [0.107]	0.008 [0.008]	-0.182*** [0.017]	-0.014*** [0.003]
Male	0.015*** [0.004]	0.044*** [0.004]	11.616*** [0.089]	-0.167*** [0.007]	0.110*** [0.014]	-0.002 [0.003]
Ln GDP age 10	-0.008 [0.015]	-0.047*** [0.016]	1.365*** [0.299]	0.017 [0.022]	0.169*** [0.046]	0.022* [0.013]
Constant	0.136 [0.126]	0.600*** [0.138]	150.330*** [2.507]	0.326* [0.185]	1.134*** [0.384]	0.647*** (0.111)
Observations	19,687	19,687	19,704	19,704	19,695	19,511
R-squared	0.019	0.053	0.515	0.067	0.137	0.075

OLS models including country dummies and ten year age bands.

Robust standard errors in brackets.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 5**  
**Adult Economic Outcomes Associated with World War 2**

VARIABLES	(1) Education	(2) Ln Net Worth	(3) Ever Married	(4) Life Satisfaction
War	-0.569*** [0.105]	0.000 [0.035]	-0.017*** [0.006]	-0.118*** [0.039]
Childhood SES low	-4.053*** [0.089]	-0.659*** [0.031]	0.011** [0.005]	-0.421*** [0.034]
Childhood SES med	-2.480*** [0.078]	-0.313*** [0.025]	0.006 [0.004]	-0.160*** [0.027]
Male	1.060*** [0.063]	0.223*** [0.021]	-0.017*** [0.005]	0.189*** [0.023]
Ln GDP age 10	1.019*** [0.201]	0.158** [0.072]	-0.016 [0.010]	0.052 [0.078]
Currently married		0.884*** [0.041]		
War male			0.024*** [0.007]	0.189*** [0.023]
Constant	2.761* [1.670]	8.548*** [0.613]	1.083*** [0.086]	7.044*** [0.657]
Observations	12,676	18,964	19,704	18,127
R-squared	0.363	0.368	0.008	0.127

OLS models including country dummies and ten year age bands

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6**  
**Adult Health Outcomes Associated with Months of World War2 Combat Experience**

VARIABLES	(1) Diabetes	(2) Heart	(3) Height	(4) Depression	(5) Health	(6) Childhood Immunizations
War Combat 0-2 months	0.038*** [0.007]	0.018** [0.007]	-0.274* [0.154]	0.020* [0.012]	-0.079*** [0.025]	-0.025*** [0.005]
War combat 3 or more months	0.026*** [0.009]	0.022*** [0.010]	-0.116 [0.184]	0.049*** [0.014]	-0.086*** [0.030]	-0.024*** [0.006]
Childhood SES low	0.034*** [0.006]	0.020*** [0.006]	-1.821*** [0.127]	0.030*** [0.009]	-0.332*** [0.020]	-0.029*** [0.004]
Childhood SES med	0.019*** [0.005]	0.015*** [0.005]	-0.916*** [0.107]	0.008 [0.008]	-0.182*** [0.017]	-0.013*** [0.003]
Male	0.015*** [0.004]	0.044*** [0.004]	11.613*** [0.089]	-0.166*** [0.007]	0.110*** [0.014]	0.001 [0.003]
Ln GDP age 10	-0.009 [0.015]	-0.048*** [0.016]	1.384*** [0.300]	0.019 [0.022]	0.170*** [0.046]	0.022* [0.013]
Constant	0.143 [0.126]	0.603*** [0.138]	150.059*** [2.511]	0.312* [0.185]	1.125*** [0.384]	0.646*** [0.110]
Observations	19,675	19,675	19,692	19,692	19,683	19,503
R-squared	0.020	0.053	0.515	0.067	0.137	0.075

Models include Country dummies and ten year age bands

Robust standard errors in brackets.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 7**  
**Adult Economic Outcomes Associated with Months of World War2 Combat Experience**

VARIABLES	(1) Education	(2) Ln Net worth	(3) Ever Married	(4) Life Satisfaction
War combat 0-2 months	-0.586*** [0.109]	0.021 [0.036]	-0.015* [0.007]	-0.072* [0.041]
War combat 3 or more months	-0.529*** [0.130]	-0.054 [0.047]	-0.020* [0.008]	-0.234*** [0.050]
War combat 0-2 months * Male			0.022*** [0.007]	
War combat 3 or more months * Male			0.028*** [0.009]	
Childhood SES low	-4.054*** [0.089]	-0.657*** [0.031]	0.011** [0.005]	-0.421*** [0.034]
Childhood SES med	-2.477*** [0.078]	-0.312*** [0.025]	0.006 [0.004]	-0.161*** [0.027]
Male	1.059*** [0.063]	0.222*** [0.021]	-0.017*** [0.005]	0.188*** [0.023]
Ln GDP age 10	1.019*** [0.201]	0.157** [0.072]	-0.016 [0.010]	0.045 [0.078]
Currently married		0.885*** [0.041]		
Constant	2.773* [1.673]	8.554*** [0.613]	1.087*** [0.086]	7.098*** [0.658]
Observations	12,672	18,955	19,692	18,117
R-squared	0.362	0.369	0.008	0.128

Models include Country dummies and ten year age bands.

Robust standard errors in brackets.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 8**  
**Channels of War Associated with World War2**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Hunger	Hunger	Dispossession	Dispossession	persec	persec	Dad Absent	Dad Absent
War	0.052*** [0.005]	0.047*** [0.008]	0.004 [0.004]	0.014** [0.007]	0.010** [0.004]	0.016** [0.007]	0.037*** [0.006]	0.032*** [0.009]
Childhood SES low	0.013** [0.005]	0.001 [0.004]	-0.017*** [0.004]	-0.013*** [0.004]	-0.015*** [0.004]	-0.011** [0.005]	-0.003 [0.005]	0.006 [0.007]
Childhood SES med	-0.004 [0.004]	-0.002 [0.003]	-0.017*** [0.003]	-0.011*** [0.004]	-0.012*** [0.003]	-0.010** [0.004]	0.005 [0.005]	-0.003 [0.006]
War kid SES low		0.025** [0.011]		-0.010 [0.008]		-0.010 [0.008]		-0.016 [0.011]
War kid SES med		-0.003 [0.009]		-0.016** [0.007]		-0.007 [0.007]		0.019* [0.010]
Male	0.015*** [0.003]	0.015*** [0.003]	0.003 [0.002]	0.003 [0.002]	0.008*** [0.003]	0.008*** [0.003]	-0.002 [0.004]	-0.002 [0.004]
Ln GDP age 10	-0.018 [0.015]	-0.018 [0.015]	-0.002 [0.009]	-0.002 [0.009]	0.005 [0.008]	0.005 [0.008]	-0.021 [0.014]	-0.020 [0.014]
Constant	0.290** [0.123]	0.293** [0.123]	0.090 [0.073]	0.085 [0.073]	-0.008 [0.071]	-0.011 [0.071]	0.355*** [0.120]	0.356*** [0.120]
Observations	19,693	19,693	19,693	19,693	19,695	19,695	19,703	19,703
R-squared	0.076	0.077	0.041	0.041	0.016	0.016	0.031	0.031

Models include Country dummies and ten year age bands

Robust standard errors in brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 9**  
**Channels of War Associated with Months of World War2 Combat Experience**

VARIABLES	(1) Hunger	(2) Dispossession	(3) Persecution	(4) Dad Absent
War combat 0-2 months	0.046*** [0.005]	0.004 [0.004]	0.012*** [0.005]	0.032*** [0.007]
War combat 3 or more months	0.066*** [0.007]	0.002 [0.005]	0.005 [0.005]	0.049*** [0.009]
Childhood SES low	0.013** [0.005]	-0.016*** [0.004]	-0.015*** [0.004]	-0.003 [0.005]
Childhood SES med	-0.004 [0.004]	-0.017*** [0.003]	-0.013*** [0.003]	0.005 [0.005]
Male	0.015*** [0.003]	0.003 [0.002]	0.008*** [0.003]	-0.002 [0.004]
Ln GDP at age 10	-0.017 [0.015]	-0.003 [0.009]	0.004 [0.008]	-0.020 [0.014]
Constant	0.277** [0.123]	0.091 [0.073]	0.000 [0.071]	0.346*** [0.120]
Observations	19,683	19,683	19,685	19,693
R-squared	0.077	0.041	0.016	0.031

Models include Country dummies and ten year age bands.

Robust standard errors in brackets.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 10**  
**Interaction Models**

	<b>Health Outcomes</b>			
	<b>Heart</b>	<b>Diabetes</b>	<b>Self-Reported Health</b>	<b>Height</b>
War	0.001	0.028**	-0.029	-0.203
SES low	0.009	0.034**	-0.344**	-1.896**
SES middle	0.005	0.014**	-0.136**	-0.87**
War × SES low	0.026*	0.002	0.001	-0.124
War × SES middle	0.025*	0.012	-0.113**	-0.127

	<b>SES Outcomes</b>	
	<b>Education</b>	<b>Life Satisfaction</b>
War	-0.088	0.032
SES low	-3.787**	-0.320***
SES middle	-2.176**	-0.091**
War × SES low	-0.577**	-0.237***
War × SES middle	-0.672**	-0.180***

	<b>Channels</b>				
	<b>Hunger</b>	<b>Dispossession</b>	<b>Persecution</b>	<b>Dad Absent</b>	<b>Immunizations</b>
War	0.047***	0.014**	0.016**	0.032***	-0.005
SES low	0.001	-0.013***	-0.001**	0.006	-0.012***
SES middle	0.002	-0.111***	-0.010**	-0.003	0.006*
War × SES low	0.025**	-0.010	-0.010	-0.016	-0.039***
War × SES middle	-0.003	-0.16**	-0.007	0.019	-0.001***



Figure 1

WWII casualties as percent of the population

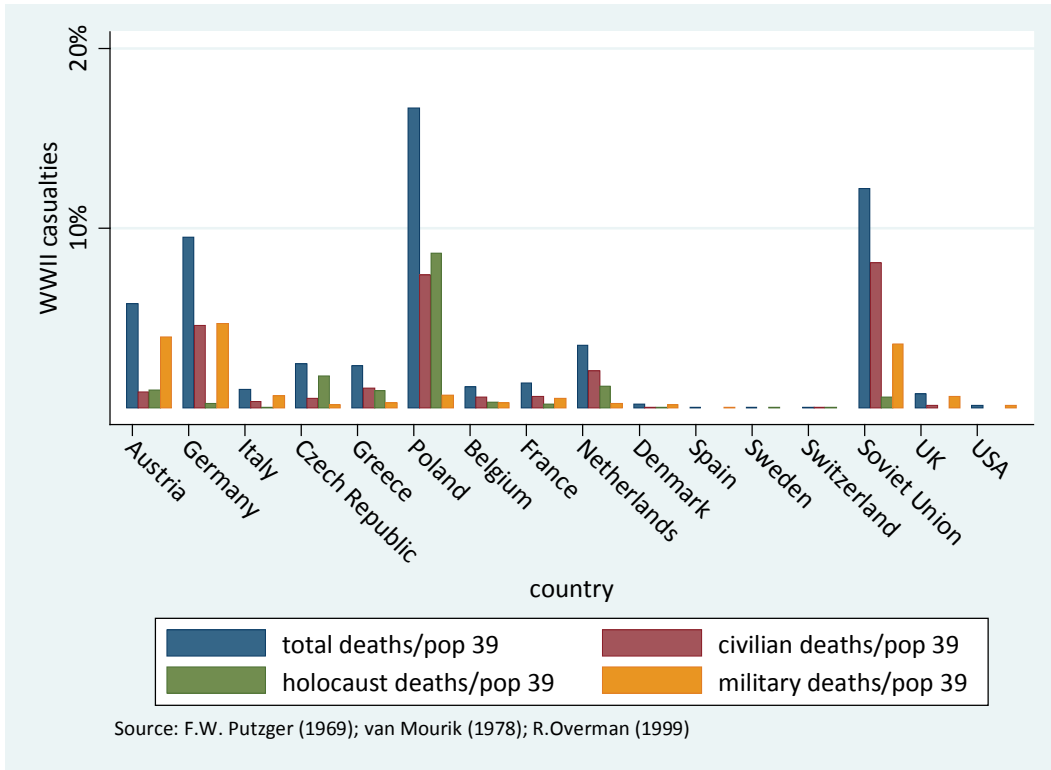


Figure 2

Number of WWII casualties in the SHARE countries

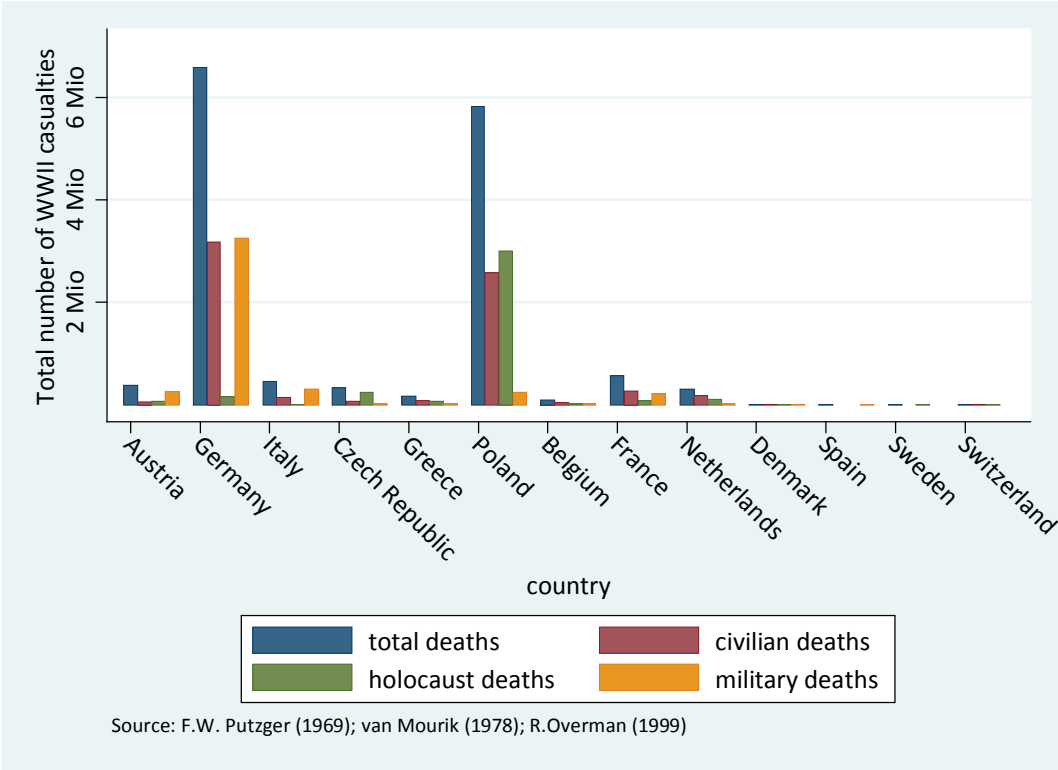


Figure 3

Percentage of SHARE respondents suffering from hunger; war versus non-war countries

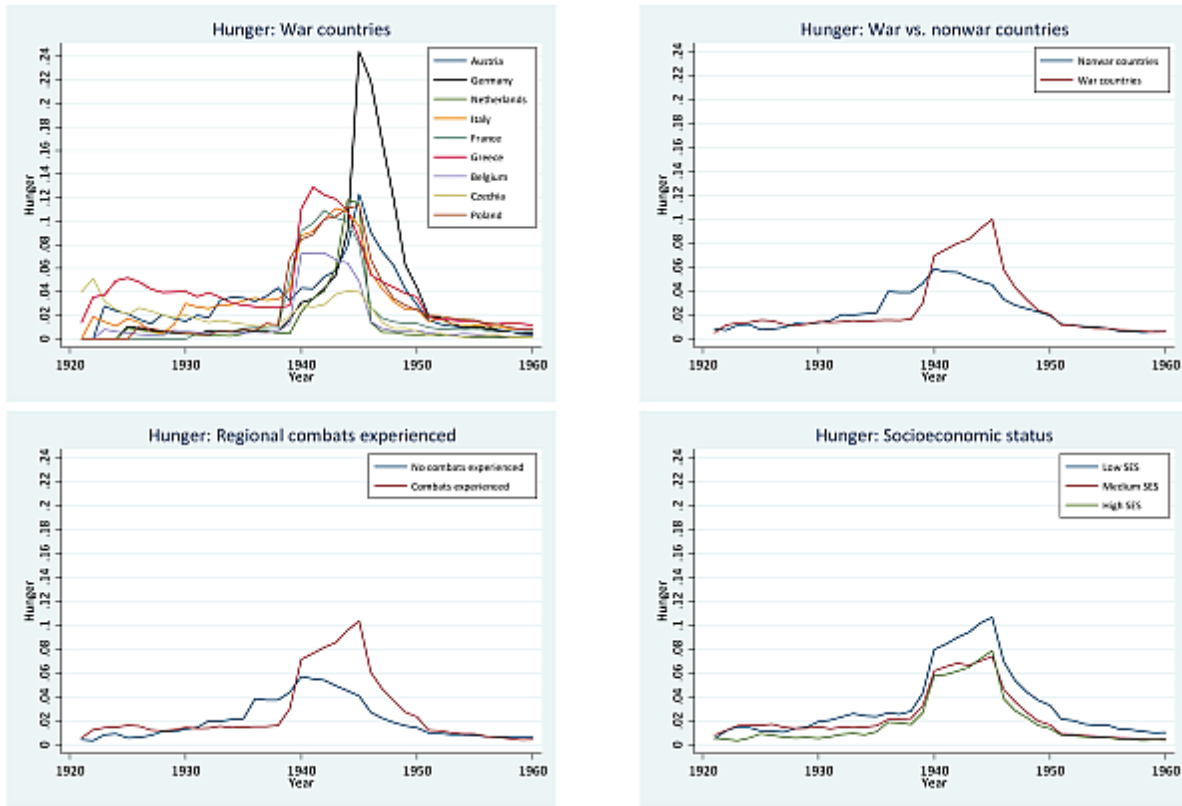


Figure 4

Total inflow of population due to displacements after WWII

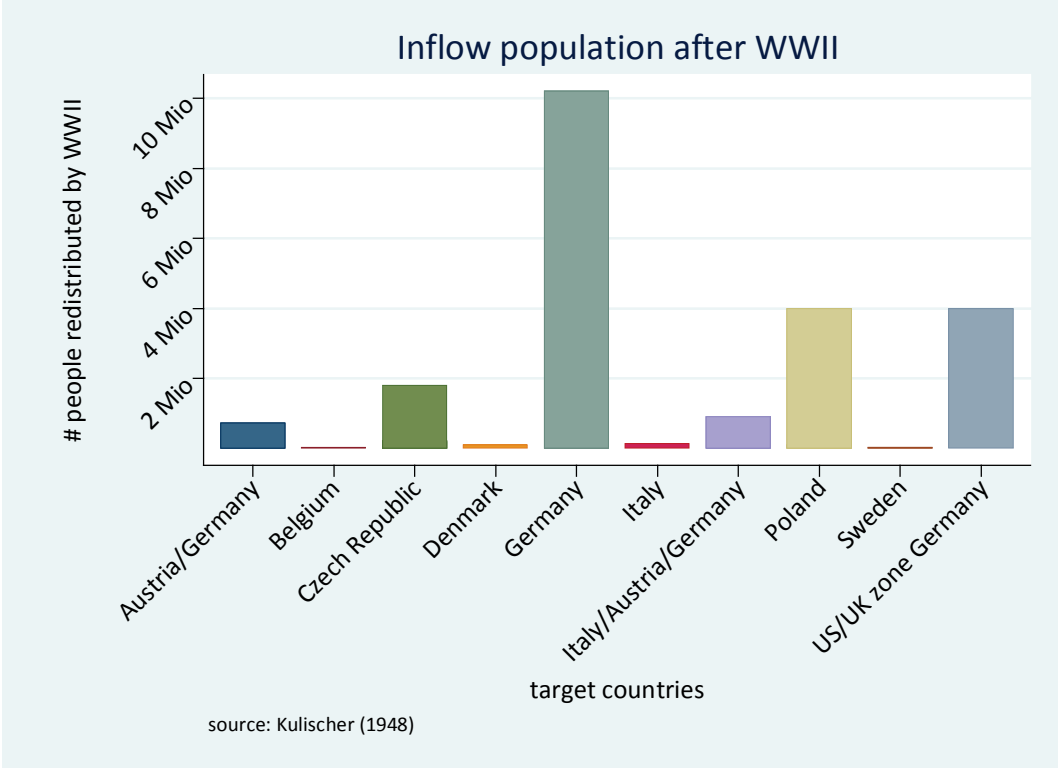


Figure 5

Dispossession of population in WWII

