Children of War: The Long-Run Effects of Large-Scale Physical Destruction and Warfare on Children*

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Abstract

This paper provides causal evidence on the long-term consequences of large-scale physical destruction on educational attainment, health status and labor market outcomes of German children. I combine a unique dataset on city-level destruction in Germany caused by the Allied Air Forces bombing during WWII with individual survey data from the German Socio-Economic Panel (GSOEP). I find that exposure to destruction had significant, long-lasting detrimental effects on the human capital formation, health and labor market outcomes of Germans who were at school-age during WWII. The important channel for the effect of destruction on educational attainment appears to be the destruction of schools and absence of teachers, while malnutrition during WWII seems to be important for the estimated impact on health.

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Key words: physical destruction, human capital formation, health status, earnings, children

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I. Introduction

Large and aggregate shocks caused by natural disasters and armed conflicts have devastating consequences for a country, including loss of lives, displacement of people, destruction of physical capital and public infrastructure, and reduced economic growth. Evidence from macro-level studies predicts rapid recovery after these large physical shocks such that physical capital and other macroeconomic outcomes return to their steady state within 20-25 years (Edward Miguel and Gerard Roland, 2005; Steven Brakman, Harry Garretsen and Marc Schramm, 2004; Donald Davis and David Weinstein, 2002; Dan Ben-David and David Papell, 1995). However, natural disasters and armed conflicts still inflict direct and external long-term costs on survivors which can last longer and be as detrimental as physical impacts.[1]

Among survivors, children may be especially adversely affected by the armed conflicts given the age-specific aspect of human capital investments (Richard Akresh and Damien de Walque, 2008; Olga Shemyakina, 2006; Andrea Ichino and Rudolf Winter-Ebmer, 2004). Armed conflicts and the associated physical destruction can interrupt a child's human capital accumulation through demolition of schools and missing teachers or through the change in the household composition and income. Similarly, exposure to armed conflicts worsens the child's long-term health status through famine, malnutrition, post-war trauma, pollution, lack of clean water and destruction of health facilities (Tom Bundervoet, Phillip Verwimp and Richard Akresh, 2009; Richard Akresh, Phillip Verwimp and Tom Bundervoet, 2007; Harold Alderman, John Hoddinott and Bill Kinsey, 2004). Given well documented empirical evidence on the causal association between human capital and earnings, destruction of physical capital can even have longer-term effects on children via future labor market outcomes.

[1] For detailed information on armed conflicts, see Christopher Blattman and Edward Miguel (2010).

This paper provides causal evidence on long-term consequences of large-scale physical destruction on the educational attainment and future health and labor market outcomes of children. Specifically, I use city-by-cohort variation in destruction in Germany arising from the Allied Air Forces (hereafter, "AAF") bombing throughout World War II (hereafter, "WWII") as a unique quasi-experiment. During WWII, more than one and a half million tons of bombs were dropped in AAF aerial raids on German cities, destroying about 40 percent of the nationwide total housing stock (Jeffry Diefendorf, 1993). Since WWII was a major, transformative event in modern history, it is important to understand its long-term effects. Moreover, armed conflicts seem to have become more common and more physically destructive in the last few decades (Paul Collier, Anke Hoeffler and Dominic Rocher, 2008), making it policy-relevant to understanding the long-run effects of armed conflicts and the mechanisms through which they impact children. Findings in this paper provide insights to policymakers on curbing the long-term adverse effects of large-scale physical destruction as recently experienced in 50 countries around the globe, including Iraq and Afghanistan.

My analysis combines a unique dataset on the city's wartime physical destruction with individual-level data from the German Socio-Economic Panel (GSOEP), a nationally-representative survey.[2] As a measure of war devastation, I use rubble in m^3 per capita in German cities by the end of WWII. Previous work by Steven Brakman, Harry Garretsen and Marc Schramm (2004) estimate the long-term effects of WWII destruction on city population growth in Germany using a similar measure of war devastation. They explore the cross-city variation in war shock as an instrument for the city population growth during WWII years and find no long-

[2] The analysis is restricted to former West Germany. West Germany comprises of 75 German Regional Policy Region (Raumordnungsregionen, hereafter, "ROR", "region" or "city"). RORs are analogous to metropolitan statistical areas (MSAs) in the U.S., though, in contrast to MSAs, RORs also encompass rural areas; that is, all of Germany, regardless of urbanicity, belongs to an ROR.

run impact on city size in post-war Germany due to WWII. Historical accounts, however suggest that not only larger cities but also cities closer to airfields in England were more likely to be targets of air raids. Thus, relying only on cross-city variation in destruction renders it difficult to isolate the effects of destruction from other city-specific characteristics in the analysis of micro-level outcomes.

These concerns lead me to use a difference-in-differences type strategy which exploits within-cohort cross-city variation. The "treatment" variable in difference-in-difference estimation is an interaction between city-level intensity of WWII destruction and a dummy variable for being school-aged during WWII, and where I always control for city fixed effects and year of birth fixed effects. On the one hand, as aforementioned, some cities experienced greater destruction than others and intensity of WWII destruction depended on fixed city characteristics. On the other hand, only individuals who were at school-age during WWII would have had their human capital formation affected by WWII destruction; the human capital of cohorts born after WWII would not be affected by this destruction.[3] *The identifying assumption is that had the WWII destruction not occurred, the difference in schooling, health and labor market outcomes between the affected cohorts and the cohorts born after WWII would have been the same across cities with varying intensity of destruction.* In addition, for robustness, I use an alternative strategy and instrument the city-level war destruction with distance to London where AAF airfields were mainly located.

This paper makes several contributions. First, I have collected very detailed data on rubble per capita and bombing intensity from historical and military archives for each of Germany's 75 cities, enabling me to quantify the *realized* wartime destruction. In contrast, the

[3] As explained in Section IV, I will use individuals born between 1951 and 1960 as the control group. As reconstruction did not occur in the short term, individuals born 1940 and 1950 are dropped since their exposure to WWII destruction is not clear; though they would have started school after WWII ended.

other studies use a measure of exposure to war that has limited spatial variation (only across countries, or across a few regions within a country), and they have limited or no information on the intensity of exposure to war. Having measures of exposure to war at a lower level of aggregation enables me more accurately to match the treatment to each individual and form more plausible control groups.[4] Second, the paper compiles a unique dataset on number of schools and teachers and postwar education and health expenditure from German archives. Together with a wide range of war-related questions in GSOEP, this data enables me to rigorously investigate the potential mechanisms through which war destruction affected the long-term outcomes of school-age children. Lastly, the paper considers longer-run outcomes than other studies, including adult mortality, health satisfaction and earnings; the conflicts studied in other papers are more recent, so very long-run outcomes are yet to be realized.

To preview my results, I find that large-scale physical destruction had detrimental effects on education, health and labor market outcomes even after 40 years. First, children who were school-aged during WWII have 0.4 fewer years of schooling on average in adulthood, with those in the most affected cities completing 1.4 fewer years. Second, these children are about a half inch shorter and report lower health satisfaction in adulthood. Third, exposure to war deteriorates future labor market earnings of the children from disadvantageous families by 14 percent on average. The destruction of schools and the missing teachers are mainly responsible for the reduction in educational attainment, while given the sizable impact on height; it is likely that malnutrition is an important mechanism for the estimated effects on health. Finally, I find that exposure to wartime destruction impacted both educational attainment and health status of

[4] It is worth noting that Edward Miguel and Gerard Roland (2006) measure bombing intensity in Vietnam at the district level, which is even, lower a level of aggregation than I use here. However, their analysis is not at the individual level (it is at the district level) and they only examine the fraction of the adult population that is literate as human-capital-related outcome.

children in the long-run and these are likely to have separate direct effects on the future labor market earnings. Exposure to war, natural disasters and macroeconomic crises are widely used as instruments of education to estimate the causal effect of education on earnings. However, my analysis shows that these instruments may also have a direct impact on other forms of human capital such as health raising the question of whether these instrumental-variables satisfy the exclusion restrictions.

The remainder of the paper is organized as follows. Section II reviews the related literature. Section III provides a brief background of AAF bombing in Germany during WWII. Section IV discusses the identification strategy. Section V describes the city-level destruction data and individual-level survey data used in the analysis. Section VI presents the main results, extensions and robustness checks. Section VII concludes.

II. Literature Review

An extensive literature examines from a macro perspective the association between armed conflicts and countries' economic performance. One set of studies has focused on the impact of U.S. bombing on postwar macroeconomic outcomes at the city or regional level. Studies that examine the long-run effects of U.S. bombing during WWII-including in Japan (Donald Davis and David Weinstein, 2002) and in Germany (Steven Brakman, Harry Garretsen and Marc Schramm, 2004)-find no evidence for persistent impacts of bombing on city population growth. Using the extensive U.S. bombing campaigns in Vietnam, Edward Miguel and Gerard Roland (2005) provide similar evidence suggesting that U.S. bombing did not have long-lasting effects on physical infrastructure, local population, or literacy and poverty levels, 25 years after the Vietnam War. Thus, this strand of the literature finds that war impacts are mainly limited to the temporary destruction of physical capital, in line with the predictions of the neoclassical economic growth models.

With the increasing availability of micro-level data in the recent years, a new and growing literature on the economic legacies of armed conflicts has emerged (Christopher Blattman and Edward Miguel, 2010).[5] Olga Shemyakina (2006) examines the effects of civil conflict in Tajikistan and finds that adolescent girls residing in conflict areas are less likely to complete secondary school education. Rubiana Chamarbagwala and Hilcias E. Moran (2009) provide further evidence from Guatemala on the adverse effects of armed conflict on human capital formation. Similarly, Richard Akresh and Damien de Walque (2008) find that school-aged children exposed to the genocide in Rwanda attain 0.5 fewer years of schooling and are less likely to complete third or fourth grade. Joshua Angrist and Adriana Kugler (2008) show that an increase in coca prices and cultivation escalated the conflict activities in Colombia and decreases teenager boys' school enrollment. Using WWII as an instrument to estimate the causal effect of education on earnings, Andrea Ichino and Rudolf Winter-Ebmer (2004) find that individuals who were 10 years old during or immediately after WWII acquire less education and earned significantly less in adulthood than other cohorts within Germany and Austria as well as individuals of the same cohort born in non-war countries (Switzerland and Sweden). They argue that WWII exposure affects earnings of these individuals only through deteriorating their human capital formation.[6] Florence Kondylis (2010) examines effects of conflict-induced displacement

[5] An extensive prior literature has focused on the impact of military service on the human capital accumulation and later labor market outcomes of combatants in US, Europe and Africa (Joshua Angrist, 1990, 1998; Joshua Angrist and Alan Krueger, 1994; Christopher Blattman and Jeannie Annan, 2009). However, veterans are likely to be impacted by the war in different dimensions than the rest of the population who are not involved in the war, particularly children.

[6] In addition to armed conflicts, there is an extensive literature looking at the long-term effects of plausibly exogenous interruptions in education. Xin Meng and Robert Gregory (2007) find that the Chinese Cultural Revolution severely deteriorated human capital accumulation among Chinese college students.

on postwar labor market outcomes in Bosnia and Herzegovina and finds that displaced Bosnians are less likely to be in work, particularly women.

As a shock to early childhood environment, exposure to armed conflict provides a valuable experiment to study the long-term impacts of malnutrition during early childhood on health outcomes, which was first put forward with the fetal origins hypothesis (David J.P Baker, 1992).[7] For example, Harold Alderman, John Hoddinott and Bill Kinsey (2004) find in Zimbabwe that exposure to civil war in early childhood is associated with lower height and education in adolescence. Similarly, Richard Akresh, Phillip Verwimp and Tom Bundervoet (2007) find that such exposure leads to a shorter height later in childhood in Rwanda. Tom Bundervoet, Phillip Verwimp and Richard Akresh (2009) show that in Burundi children in conflict areas have substantially lower height-for-age than children in other regions.

To summarize, there are very few papers on the effects of wartime physical destruction on children's educational, health and labor market outcomes. This paper adds new evidence to this growing literature. First, I use a source of variation in armed conflict that others have not used before-the variation in physical destruction caused by bombing during WWII across German cities. Second, I am able to measure exposure to armed conflict at a lower level of aggregation than other micro-level studies have done. Additionally, I look at longer-run outcomes than other papers including labor market earnings, adult mortality and self-rated health satisfaction. Conflicts in Africa, South America, former Soviet Union and former Yugoslavia are more recent, so very long-run outcomes are yet to be realized.

[7] In accordance with the fetal origins hypothesis (David J.P Baker, 1992), literature looking at long-term effects of early childhood environment documents that malnutrition and poor living conditions in-utero and during early childhood deteriorate the adulthood outcomes including health status and height (Abhijit Banerjee, Esther Duflo, Gilles Postel-Vinay and Tim Watts, 2009; Xin Meng and Nancy Qian, 2006), educational attainment and labor market earnings (Douglas Almond, 2006; Anne Case and Christina Paxson, 2008; Xin Meng and Nancy Qian, 2006) and life expectancy (Gerard van den Berg, Maarten Lindeboom and France Portrait, 2006).

III. Background on Allied Bombing of German Cities during WWII[8]

During WWII, German cities experienced the widespread bombardment of the AAF. More than one-half million tons of bombs were dropped in aerial raids on German cities, destroying or heavily damaging 40 percent of the total housing stock nationwide and 45 percent of the housing stock in large cities (Jeffry Diefendorf, 1993). Though most of the destroyed buildings were apartment buildings; schools, hospitals and other kinds of public buildings were also demolished in every city. An overwhelming majority of the AAF's aerial attacks consisted of night time "area bombing" rather than "precision bombing". Sir Arthur Harris, the commander chief of the Royal Air Force (RAF), regarded area bombing as the most promising method of aerial attacks. The aim of area bombing was to start a fire in the center of the each town, which would consume the whole town. At the same time, Sir Harris and his staff had a strong faith in the morale effects of bombing and thought Germany's will to fight could be destroyed by the destruction of German cities (USSBS, 1945).

During area bombings, AAF went on to attack almost every major and minor German city, though the number of bombs dropped and the intensity of destruction varied substantially across cities (the shaded area in Figure 1 shows the share of dwellings destroyed in German cities by the end of WWII). It is evident from Figure 1 that the targeted cities were not necessarily selected because they were particularly important for the war effort, but also for their visibility from the air, depending for example on weather conditions or visibility of outstanding landmarks such as cathedrals (Joerg Friedrich, 2002). Further, those cities most easily reached from the air fields in England in northern and western parts of Germany suffered the most

[8] Information presented in this section is mainly gathered from the following historical sources: (i) the United States Strategic Bombing Survey (USSBS) (1945); (ii) Jeffry Diefendorf (1993) "In the Wake of War: The Reconstruction of German Cities after World War II; and (iii) Anthony Grayling (2006) "Among the Dead Cities: Was the Allied Bombing of Civilians in WWII a Necessity or a Crime?"

destruction. Berlin, which was nearly twice as far away as the cities in Ruhr Area, was not hit as hard until the end of 1943 because of its great distance from British bomber airfields (Jeffry Diefendorf, 1993; Anthony Grayling, 2006).

The foregoing discussion of the historical accounts of the attacks on German soil suggest that the degree of destruction in German cities depended on fixed city characteristics (e.g., larger cities, cities closer to England and with more visible landmarks and were more likely to be targets of air raids) and chance (due to the technology and weather, only part of the time the intended exact target was hit and the maximal damage caused). In my main analysis, I will take the cross-city variation in intensity of WWII destruction as exogenous once I control for fixed city characteristics.

IV. Identification Strategy

In this section, I describe my strategy for identifying the causal effect of WWII destruction on education, health and labor market outcomes of German children. This strategy exploits the plausibly exogenous city-by-cohort variation in destruction intensity. This is a difference-in-differences-type strategy where the "treatment" variable is an interaction between city-level intensity of WWII destruction and dummy for being school-aged during WWII.[9] In particular, the proposed estimate of the average treatment effect is given by β in the following baseline city and year of birth fixed effects equation:

$$\mathrm{Y}_{irt} = \alpha + \beta\,(Destruction_r \times WWII\_Cohort_{it}) + \delta_r + \gamma_t + \pi'\mathbf{X}_{irt} + \varepsilon_{irt} \qquad (1)$$

[9] This paper provides evidence on the impact of wartime physical destruction using city-by-cohort variation in destruction within Germany; therefore this approach may yield to lower bound estimates for the aggregate nation-wide effects of WWII on German children’s human capital formation and labor market outcomes.

where Y_{irt} is the outcome of interest for individual *i*, in city *r*, born in year *t*. $Destruction_r$ is the measure of war damage in the city *r*. $WWII\_Cohort_{it}$ is a dummy variable that takes a value of 1 if individual *i* was born between 1927 and 1939 and zero otherwise.[10] Individuals born between 1927 and 1939 were 18 and younger when WWII ended in 1945; thus it is unlikely that they were drafted in WWII. Therefore, their schooling has the potential to be affected by WWII destruction.[11]

The human capital accumulation of individuals born after WWII would not have been impacted by this destruction; hence later birth cohorts are in the control group.[12] δ_r is city-specific fixed effects, controlling for the fact that cities may be systematically different from each other. γ_t is the year of birth fixed effects, controlling for the likely secular changes across cohorts. Since I will be using a single cross section, γ_t accounts not only for year of birth but also for age effects. $\mathbf{X}_{irt}$ is a vector of individual characteristics including gender and rural dummies as well as family background characteristics (e.g., parental education). ε_{irt} is a random, idiosyncratic error term. Following Marianne Bertrand, Esther Duflo and Sendhil Mullainathan (2004), the standard errors are clustered by city to account for correlations in outcomes between individuals in the same city.

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[10] Additional analyses where the affected cohorts are limited to individuals born between 1930 and 1939 yield similar results to the baseline specification. Results are presented in Appendix Table 2. I also find quantitatively similar results if the affected cohorts include individuals born between 1925 and 1939. This additional analysis is available upon request.

[11] When height is the outcome of interest, the affected cohorts are defined differently. Previous research has shown that adult height is largely determined by age 2 or 3 and is significantly influenced by the diet and health conditions in early childhood years (Elizabeth Brainerd, 2008). Guided by this research, when I look at height, the treatment group is restricted to individuals born between 1937 and 1945. Therefore, for height regressions, dummy variable $WWII\_Cohort_{it}$ takes a value of 1 if individual *i* was born between 1937 and 1945, and zero otherwise.

[12] As I explain below, I will use individuals born 1951-1960 as the control cohorts. Individuals born 1940-1950 are dropped since their exposure to WWII destruction is not clear; hence the reconstruction did not occur overnight. The empirical findings are qualitatively similar if 1940-1950 cohorts are added to the control group. The results are presented in Appendix Table 1. Moreover, Figure 4 and Figure 5 provide further evidence suggesting that the schools were indeed rebuilt and number of teachers reached to the prewar levels in the early 1960s.

In order to interpret β as the effect of war destruction, we must assume that *had WWII destruction not occurred, the difference in schooling, health and labor market outcomes between the affected cohorts and cohorts born after WWII would have been the same across cities with varying intensity of destruction.* I assess the plausibility of this assumption below by performing a falsification test/control experiment where I repeat the analysis using only cohorts already beyond school age.

Equation (1) assumes that the wartime physical destruction affected the human capital formation of the German school-aged children born between 1927 and 1939 and has no impact on the later birth cohorts' educational attainment. To provide more formal evidence on cohort-specific effects of wartime destruction and test the aforementioned identifying assumption, identification strategy presented in Equation (1) can be generalized as follows: [13]

$$Y_{irt} = \alpha + \beta_c\,(Destruction_r \times Cohort_{itc}) + \delta_r + \gamma_t + \pi'\mathbf{X}_{irt} + \varepsilon_{irtc} \qquad (2)$$

where Y_{irtc} is the outcome of interest for individual *i*, in city *r*, born in year *t*. $Cohort_{itc}$ is a dummy variable that indicates, whether individual *i* was born in cohort *c* (a cohort dummy). To increase statistical precision, birth cohorts are grouped into 5-year groups starting from 1920. Individuals born between 1955 and 1960 form the control group, and this cohort dummy is omitted from the regression. These unrestricted estimates in Equation (2) present the cohort-specific impacts of the wartime destruction. Thus, each coefficient β_c can be interpreted as an estimate of the effects of wartime destruction on a given cohort. For the validity of identifying assumption above, the effects of wartime destruction should be zero or negligible for the cohorts that completed their education before the outbreak of WWII (i.e., born between 1920 and 1924)

[13] In this identification strategy, I follow Esther Duflo (2001).

and for cohorts starting their education after the reconstruction of school inputs was completed in late 1950s (i.e., born between 1951 and 1960).

V. Data and Descriptive Statistics

The measure of WWII destruction intensity I use for my main analysis is from Friedrich Kaestner (1949), who reports the results of a survey undertaken by the German Association of Cities ("Deutscher Staedtetag"). Friedrich Kaestner (1949) provides city-level information on the aggregate residential rubble in m^3 per capita in German cities by the end of WWII, which is what I use as a measure of a city's overall wartime destruction.[14] In order to examine prewar city conditions and assess the mechanisms through which WWII destruction might have affected children's long-run outcomes, I gathered a unique data from various years of the German Statistical Yearbooks. First, I assembled city-year data on the number of schools and teachers; of particular interest is the change in the number of schools and teachers immediately after the war because this would be the change in school inputs available to the affected cohorts. Second, I collected city-year data on education and health expenditure per capita from various years of the German Statistical Yearbooks to analyze the postwar government spending. Additionally, I compiled data from 1939 German Statistical Yearbook on prewar city characteristics including average income per capita, city area and population density.

The data on individual and household characteristics come from the confidential version of German Socio-Economic Panel (GSOEP). GSOEP is a household panel survey representative of the entire German population residing in private households. It provides a wide range of information on individual and household characteristics as well as parental background and the

[14] Rubble arising from destruction of industrial buildings, inventories, machines and traffic facilities was not included into the calculations.

childhood environment. The GSOEP also incorporates war-related questions including whether an individual's father was involved in WWII and whether his\her parents died during the war years. I restrict the empirical analysis to individuals born between 1927 and 1960. I dropped individuals born between 1940 and 1950 from the analysis since their exposure to WWII destruction is not as clear.[15]

I consider WWII destruction impacts at the Regional Policy Regions (RORs) level which are spatial units defined by the Federal Office for Building and Regional Planning (Bundesamt fuer Bauwesen und Raumordnung, BBR), to differentiate between areas in Germany based on their economic interlinkages. Germany has 75 different regional policy regions in Germany (see Figure 2 for detailed information on RORs). The GSOEP reports households' ROR information starting from 1985; thus I conduct the empirical analysis with the 1985 wave of GSOEP. For height estimations, however I utilize the 2002 wave since GSOEP reports the individuals' height starting from 2002. The GSOEP provides information on cities where individuals are residing in 1985 onwards.[16] The GSOEP also asks respondents whether they still live in the city or area where they grew up.[17] This question helps me identify whether individuals still reside in their

[15] The results for entire sample, where these 1940-1950 cohorts are added to the control group, are presented in Appendix Table 1. Point estimates tend to be smaller; this is not surprising since the control group now includes some cohorts that may have received partial treatment since reconstruction occurred slowly.

[16] It is well documented that Germany has historically low levels of geographic mobility in comparison to the U.S. and the U.K. Mobility is particularly low during childhood and early adulthood (Helmut Rainer and Thomas Siedler, 2005; Steve Hochstadt, 1999). For example, mobility rates were very low during the period 1950-1970 among native Germans in former West Germany, with an annual interstate migration rate of around 2 percent, defined as the ratio of number of migrants to or from a state within one year by the population of that state (Steve Hochstadt, 1999). At times of heavy aerial bombing, the urban population may have fled into the countryside; nonetheless, historical accounts document that wartime displacement was temporary. By 1948, the urban population had reached 90 percent of prewar levels (Steve Hochstadt, 1999).

[17] The GSOEP question based on which the movers are identified in this paper is "Do you still live in the city or area where you grew up until age 15?" with three possible responses "yes, still", "yes, again", and "no". I have coded individuals who answered this question as "yes, still" and "yes, again" as non-movers. The interpretation of city or area was left to the perception of the respondents; therefore it is likely that individuals are coded as movers even though they relocated within the same ROR rendering their exposure to WWII destruction unchanged.

childhood city or area. I also restrict my analysis to West Germany, for which I have the war destruction data.

To form the final dataset used in the analysis, I recoded the raw data on war destruction using German regional boundaries (ROR) employed by GSOEP in 1985 and then merged it by ROR with the individual-level data from the GSOEP. Table 1 presents the descriptive statistics for population-weighted city-level war destruction measures and variables measuring city's prewar conditions. Table 1 shows that the average West German lived in a city that had a great deal of destruction-12.18 rubble in m^3 per capita and 37 percent of total housing units destroyed. There was variation across cities in destruction intensity; people in cities with above-average destruction had around three times the rubble per capita as people in cities with below-average destruction. Table 1 makes clear that highly destroyed cities are different than less destroyed cities. For example, highly destroyed cities are larger in area and have higher population density and average income per capita before WWII. This highlights the fallacy of relying only on cross-city variation in destruction to identify the effects of destruction; it is likely incorrect to attribute all differences in children's outcomes between highly destroyed and less destroyed cities to war destruction because there are other differences between these cities that are correlated with the outcomes too. The difference-in-differences strategy I propose uses within-city cross-cohort variation to identify the effects of destruction, and controls for fixed differences between birth cohorts.[18]

Table 2 shows the descriptive statistics of the outcomes and the main individual-level control variables I will use in my estimation. One of the main outcomes of interest is years of

[18] There is a concern that the observed differences in levels of population density, city size and per capita income suggest possible differences in trends in children's outcomes. Below, I assess whether there are differential trends by doing a falsification test/control experiment using data on cohorts who would have completed their schooling before WWII.

schooling completed. The GSOEP asks respondents about educational attainment; then in the data files maps these attainment categories into years of schooling. While most of my regression analysis is with the years-of-schooling measure, I will also present results using the attainment categories. I will also analyze health and labor market outcomes. I use three measures of adult health including height, mortality and self-reported health satisfaction and logarithm of hourly wage as a labor market outcome. These outcomes are measured four decades after WWII, and reflect the outcomes of WWII survivors who lived to 1985 or late.

VI. Estimation Results

A. Estimates of War Destruction on Children's Educational Attainment

Table 3 reports the results of estimating Equation (1) where the dependent variable is completed years of schooling. Each column is from a separate regression that controls for city and birth year fixed effects along with female and rural dummies. The difference-in-differences estimate, β, is reported in the first row. It is negative and significant at the 95 percent level of confidence in every specification. Column (1) displays the difference-in-difference estimate for the entire population. Column (1) has an estimated β of -0.027 which suggests that WWII destruction caused school-age children to attain on average 0.4 fewer years of schooling (this is the coefficient multiplied by the mean intensity of destruction). To gain a better understanding on the magnitude of β, we can also compare the educational attainment of school-aged children who were in Cologne (a heavily destroyed city with 25.25 m^3 rubble per capita) to children that were in Munich (a less destroyed city with 6.50 m^3 rubble per capita) during WWII.[19] Using this

[19] These two cities were very similar in terms of their prewar characteristics, but Cologne was closer to bomber aerial fields in London and therefore exposed to higher levels of destruction during WWII.

comparison, column (1) suggests that children in Cologne had 0.5 fewer years of schooling compared to children in Munich as a result of higher wartime destruction.

Columns (2)-(4) of Table 3 present the analysis incorporating family background characteristics, such as father's and mother's education which are likely to serve as a proxy for parents' economic status. Columns (2)-(4) are from separate regressions where the difference-in-difference coefficient varies by parental human capital. The first row in columns (2)-(4) reports the estimation results for children whose parents had basic school degree (Hauptschule) or less.[20] Results summarized in columns (2)-(4) reveal that children with less educated parents have a greater reduction in their educational attainment (first row). On the other hand, interaction terms suggest that the negative effects of war damage are mitigated for children whose parents have more than basic education (second and third rows). This differential effect may work literally through parental education (e.g., more educated parents value education more, and so ensure their children are educated too even if negative shocks occur) or through other channels correlated with parental education such as family income or wealth (e.g., rich families can afford to educate their children, and can hire private tutors or send children to boarding schools when necessary).

Table 4 presents the cohort-specific impacts of the wartime destruction which enable us to identify the birth cohorts mostly impacted from the wartime destruction. Additionally, Table 4 allows us to formally test the identifying assumption in Equation (1) which assumes that the negative effects of wartime destruction are only present for the birth cohorts that acquired their education during the war years. To increase statistical precision, in Table 4, birth cohorts are grouped into 5-year groups starting from 1920. Individuals born between 1955 and 1960 form

[20] The basic school diploma (Hauptschule) is granted after 9 years of schooling in Germany. As shown in Table 2, the majority of children have parents with basic education or less (82 percent of fathers and 87 percent of mothers in my sample completed basic education or less).

the control group, and this cohort dummy is omitted from the regression. Table 4 shows that exposure to destruction has substantially deteriorated the human capital formation of cohorts born between 1925 and 1934. Cohorts born between 1925-1929 and 1930-1934 had 0.5 and 0.4 fewer years of schooling on average, respectively due to the war devastation. Table 4 further reveals that the adverse effects of war shock are also present for cohorts born between 1935 and 1939; though it seems that this younger cohort is more resilient to wartime destruction and partially recovered after WWII. Additionally, Table 4 reports that wartime destruction has no effect on the human capital formation of earlier and later birth cohorts. This supports the aforementioned identifying assumption and suggests that the estimation results presented in Table 3 are not confounded by the city-specific prewar and postwar cohort trends.

Table 3 shows that war exposure decreases children's years of schooling by 0.4 years. It is also useful to estimate the effect of destruction on educational attainment, i.e., probability of completing certain degrees. For example, does the effect in Table 3 come from a reduction in middle school, secondary school or college completion? To assess the level of education at which the adverse effect of a war shock is present, I estimate the following baseline specification:

$$Y_{irtm} = \alpha + \beta_m \, (Destruction_r \times WWII\_Cohort_{it}) + \delta_r + \gamma_t + \pi' \mathbf{X}_{irmt} + \varepsilon_{irtm} \qquad (3)$$

where the outcome of interest, Y_{irtm} is a dummy variable that indicates whether the individual *i* born in year *t*, in city *r*, completed *m* years of schooling or more. β_m, for m=7 to 18, is the estimated effect of the WWII destruction on probability of completing each levels of education. The estimation results for difference-in-difference estimates are plotted in Figure 3 (the 95 percent confidence interval is also shown). Each point in Figure 3 is from a separate regression where the outcome is a dummy variable that takes a value of 1 if the individual completed *m* years of schooling or more and zero otherwise. Figure 3 reports that the affected cohorts were 7 percent less likely to finish Gymnasium[21] (12 years of schooling), 6 percent less likely to have some college (13-14 years of schooling) and 3 percent less likely to have college degree (16 years of schooling) because of war devastation. Taken together, Figure 3 suggests that the adverse effects of war are more severe for young adults who were about to complete 12-18 years of schooling which is associated with Gymnasium and college completion. Had the WWII destruction not occurred; these children might at least have finished high school or even have some college education but instead dropped out of school. By the time the war ended, they would have been young adults of the age when it is customary to work and therefore too old to return to school.

Threats to Validity

A potential confounding factor for results summarized in Table 3 is the probability of the nonrandom migration across regions. People residing in heavily destroyed regions are likely to be displaced to less destroyed regions during heavy aerial attacks. Alternatively, highly destroyed regions may have attracted a large number of post-war economic migrants seeking to take part in reconstruction efforts. Both types of migration may induce selection bias in the analysis of WWII destruction effects on children's long-term outcomes. To address whether individual's migration decision is based on the regional destruction, I estimate Equation (1) using the probability of moving as the dependent variable. Results are reported in Table 5, Panel A.

[21] Gymnasium is the academic track, required of those intending to attend college, preparing students for the university entrance exam (Abitur) after grade 12 or giving them a chance to take a lower level qualification after grade 11, called Fachhochschulreife, allowing drop outs to attend a polytechnic.

Individuals are coded as movers if they report that they no longer reside in their childhood city or area in 1985. Treatment and control groups for this specification are the same as in the Table 3 education analysis. The difference-in-difference estimates for probability of moving are close to zero and statistically insignificant in every specification. This finding suggests that individuals did not choose their final destination according to the destruction level of regions.[22]

Panel B in Table 5 provides further evidence on nonrandom migration. The analysis in Panel B is restricted to individuals who still live in the city or area where they grew up (hereafter, "non-movers"). The difference-in-difference estimates for non-movers are very similar to the estimates for the entire population (difference-in-difference estimates for the entire population and non-movers lie within each other's 95 percent confidence intervals). The empirical evidence presented in Panel B supports previous findings that non-movers are not differentially impacted by the war shock and suggests that the non-random migration is unlikely to be a concern.

Results presented in Table 3 rest on the assumption that in the absence of the WWII, the difference in educational attainment between the affected group and the later birth cohorts would have been similar across regions (known as the parallel trend assumption). That is, the coefficient for interaction between being born 1927-1939 and city-level rubble in m^3 per capita would be zero in the absence of WWII destruction. However, if there were differential cohort trends in educational attainment between more destroyed and less destroyed cities, then it would not be possible to interpret the difference-in-differences estimates as due to WWII destruction. To assess the validity of the identifying assumption, I perform the following falsification

[22] An additional concern related to mobility is refugees or people fleeing from the former parts of Germany and Soviet Zone/GDR. As an attempt to address this potential concern, I use official 1961 city-level refugee data provided by Stephen Redding and Daniel M. Sturm (2008) and estimate the baseline specification separately for cities with refugees above or below median. I find similar effects for both samples.

test/control experiment. I restrict the empirical analysis to older cohorts who would have completed their schooling at the outset of WWII. The oldest cohorts (i.e. those born between 1904 and 1913) are coded as the "Placebo" affected cohort and cohorts born between 1914 and 1923 as the "Placebo" control cohort though of course there is no true treatment here. If there are no differential trends, then the difference-in-differences estimates should be zero, which is indeed what I find (see Panel C in Table 5). These results lend credence to the identification assumption in Equation (1) and support the interpretation of the difference-in-difference estimates as due to WWII destruction as opposed to some city-specific cohort trend.

An additional concern for the parallel trend assumption is that WWII destruction may be endogenous to trends in education, or the post-war reconstruction effort may be endogenous. That is, it is possible that the post-war reconstruction effort were unevenly allocated towards regions with better growth prospects. To address this potential concern, I employ an instrumental-variable strategy. The instrumental variable that I use for a city's wartime physical destruction is the city's distance to London obtained using the Geographic Names Information System (GNIS). As stated in Section III, cities in the northern and western parts of Germany suffered the most from the AAF aerial bombing. Table 6 reports instrumental-variable estimates.[23] The lower panel in Column (1) shows that the first-stage estimates are statistically significant at 1 percent significance level suggesting that cities closer to London indeed experienced more destruction as a result of AAF aerial raids, consistent with the foregoing historical records. The results from estimating Equation (1) using two-stage least squares are given in upper panel of Column (1). The 2SLS estimate indicates that on average children completed 0.7 fewer years of schooling as a result of WWII devastation; this is almost twice the

[23] First, to assess whether the proposed instrumental-variable satisfies the exclusion restrictions, I compared cities closer to and far away from London in terms of their prewar city characteristics. I find no meaningful variation in prewar city characteristics by distance to London.

size of the difference-in-difference estimates though of course the standard errors for the 2SLS estimates are large. This finding further bolsters our credence that city's war damage is exogenous once I control for city fixed characteristics.

As summarized in Table 6, German cities closer to airfields in England suffered most from AAF bombing campaign during WWII, which may raise potential concerns on postwar differential cohort trends in educational attainment across cities with varying distance to London. That is, German states (Lander) closer to England such as Schleswig-Holstein, Hamburg, Lower Saxony and North Rhine-Westphalia were mainly occupied by British forces and may have experienced different postwar educational policies compared to German states in the south and southwest occupied by the US and French forces. The extent of such potential bias is largely mitigated by the fact that I use a lower level of aggregation than the state in estimating the long-term effects of wartime destruction which allows me to explore within state variation in wartime destruction. Thus, I can account for differences in postwar state-specific education policies in my analysis. Additionally, in Appendix Table 3, I divide the sample into 5-year birth cohorts and examine whether cohort's educational attainment vary by distance to London. Appendix Table 3 demonstrates that distance to London has similar and negligible effect on educational attainment of all birth cohorts in the sample. As further evidence on postwar time trends in education, I compiled city-level data on post-war education expenditure per capita from various years of German Statistical Yearbooks. Analysis using this data reveals no postwar differential time trends in per capita education expenditure for control cohorts residing in more destroyed cities as well as in cities closer to London (see Figure 6 and Figure 7). Taken together, these additional analyses suggest that postwar differential time trends in educational attainment are unlikely to be a concern and further supports the parallel trend assumption in Equation (1).

Potential Mechanisms

In this subsection, I provide formal evidence on the mechanisms through which war destruction affected the school-aged children's educational attainment. In contrast to recent micro-level studies, the availability of prewar and postwar city-level data on school inputs and a wide range of war-related questions in GSOEP enable me to rigorously investigate the heterogeneity in the effects of WWII destruction and the potential channels. The results are summarized in Table 7. In the second column, I allow the difference-in-difference estimate to vary by child's gender. I find no heterogeneity along gender suggesting that boys and girls have suffered equally from war destruction. On the other hand, Column (3) considers whether the war effect is higher for individuals residing in urban areas by allowing the main effect to vary by urban status. I find that school-aged children in rural areas suffered from wartime destruction as much as children in the urban areas. This can be due to the several reasons. First, at times of heavy aerial bombing, the urban population may have fled into the countryside, seeking shelter, food, and protection. This temporary displacement may have overcrowded the schools in the countryside making education prohibitively difficult. Second, even though schools in rural areas were less likely to be destroyed by AAF raids, school teachers in rural areas were as likely to be recruited by the German army as teachers in urban areas which amplify the adverse effects of the war in the rural areas too. Third, most of the high-schools and universities would be located in urban areas making it difficult to prolong education in rural areas.

Additionally, one may expect the effect of war destruction to be non-linear, e.g., when destruction surpasses a certain level then otherwise modest or negligible the detrimental effects become especially large. To explore whether the adverse effect of war devastation is more pronounced in most destroyed cities, I divide the destruction intensity measure into quartiles, results are reported in Column (4). This analysis shows that children in most hard-hit cities attain 1.4 fewer years of schooling relative to control group; this effect is twice as large as for the second and bottom quartiles.

In columns (5) and (6), to account for family's firsthand experience with the consequences of the war, I introduce war-related controls to the baseline specification such as whether father actively fought in the war and loss of parent during the war. The results are basically unchanged controlling for parent fighting in WWII or dying during WWII years, which suggests that it is not direct family experience in WWII combat that is responsible for the effects on children's schooling. A more likely mechanism seems to be the destruction of schools and the disruption in schools left standing. Figure 4 and Figure 5 show the change in number of schools and teachers over time by city's destruction intensity. From these figures, it appears that cities with more rubble per capita also had a greater decline in both the number of schools (because schools were also destroyed as part of the AAF bombing) and the number of teachers (some teachers had to perform military service, and a significant number were Jewish).

In columns (7) and (8), I formally disentangle to what extent the difference-in-difference estimates can be explained by the supply side of education production function such as school destruction and absence of teachers or demand side factors such as the income shocks to the households. In these columns, I use the changes in number of schools and number of teachers as alternative measures of war devastation, respectively. To interpret the difference-in-difference estimates in columns (7) and (8), I use Cologne and Munich comparison mentioned earlier. In Table 3, I find that children in Cologne had 0.5 fewer years of schooling compared to children in Munich as a result of higher wartime destruction. Columns (7) and (8) suggest that 40 percent of this difference is due to physical destruction of schools and 10 percent to due to absence of teachers. Cologne lost 38 percent more of its schools and 29 percent more of its school teachers compared to Munich during WWII. This suggests that 40 percent of the total effect can be explained by school destruction (i.e., this is 38 percent multiplied by difference-in-difference estimate in column (7) and divided to the total difference-in-difference effect, 0.5). Similarly, 10 percent of the total wartime destruction effect is associated with missing teachers (i.e., this is 29 percent multiplied by difference-in-difference estimate in column (8) and divided to the total difference-in-difference effect, 0.5). Taken together, the last two columns evidently point out that the destruction of schools and the absence of teachers have enduring effects four decades after the WWII. Thus, findings in this paper clearly propose that amelioration of school inputs should be one of top priorities after large-scale physical destruction in countries like Iraq and Afghanistan to limit the long-term consequences of the current wars.

B. Estimates of War Destruction on Health Outcomes

Now, I turn to estimating the impact of WWII destruction on individuals' adult health outcomes. The health outcomes I will measure are height, mortality and health satisfaction. The *fetal origins hypothesis* suggests that malnutrition and poor living conditions in-utero and during early childhood may have adverse effects on outcomes later in life (David J. Baker, 1992). Therefore, it is of important to explore whether war destruction affects the long-run health outcomes of individuals who were children during WWII. A mediator for these long-run health effects, especially height in adulthood, is childhood nutritional status. WWII created food shortages and changes in the composition of food eaten which could have had especially detrimental effects on young children.

Table 8 reports the difference-in-difference estimates for adult health outcomes. The treatment and control groups described above for the education analysis apply just as well for these outcomes, with the exception of height. Previous research has established that adult height is largely determined by age 2 or 3 and is significantly influenced by diet and health conditions in early childhood years (Elizabeth Brainerd, 2008). Thus, for height regressions, the treatment group is restricted to individuals who were born between 1937 and 1945, that is, dummy variable $WWII\_Cohort_{it}$ takes a value of 1 if individual *i* was born between 1937 and 1945, and zero otherwise.

Panel A examines the effect of WWII destruction on individual's height (measured in inches). All specifications show that wartime destruction had a long-lasting, detrimental effect on adult height that is significant at the 5 percent significance level. In column (1) of Panel A, the difference-in-difference estimate is -0.0425 indicating that individuals who experienced WWII are on average more than half inch shorter in adulthood than the others. Alternatively, in a comparison of Cologne and Munich, WWII cohorts residing in Cologne had 0.8 inches lower height in their adulthood relative to the same cohorts in Munich. This is a sizable effect since average height grew by only 0.8 inches in the entire 19th century (Abhijit Banerjee, Esther Duflo, Gilles Postel-Vinay and Tim Watts, 2009). This finding suggests that height growth during the entire 19th century in Germany was wiped out by exposure to WWII destruction. On the other hand, in contrast to education analysis, difference-in-difference estimates summarized in columns (2)-(4) point out that war devastation severely impacts all the young children in the most-hit cities regardless of their parental background.

Panel B presents the results for the mortality of WWII survivors. To the best of my knowledge, the present paper is first to assess the impact of wartime physical destruction on individual's mortality. For this analysis, I take advantage of the panel structure of GSOEP which enables me to analyze the longer-run consequences of warfare. The mortality variable is a dummy variable that takes a value of 1 if an individual has a recorded death year sometime between 1985 (the beginning of my sample) and 2006, and zero otherwise.[24] The first column of Panel B provides weak evidence that WWII destruction caused Germans who were school-aged during WWII to die sooner; however, none of the effects are statistically significant in Panel B.

Finally, Panel C estimates the effect of war destruction on self-reported health satisfaction. Health satisfaction is often considered to have significant explanatory power in predicting future mortality and is therefore a useful measure of morbidity (Ellen Idler and Yael Benysmini, 1997; Paul Frijters, John Haisken-DeNew and Michael Schields, 2010). Health satisfaction in the GSOEP is measured on a scale from 0 to 10. Individuals are coded as satisfied with their current health if their response is 6 and above. The results in Panel C are negative and significant, suggesting that children exposed to war devastation are 8 percent less likely to be satisfied with their current health, as reported in column (4). Thus, war destruction does worsen long-run health status, which is undoubtedly a reason for the higher mortality shown in Panel B.[25]

Table 9 presents the analysis allowing for heterogeneity in the impact of physical destruction on children's long-term health outcomes. I find no evidence for heterogeneous destruction effects along gender and urban status for height and health satisfaction, results are

[24] Information on individual’s death year in GSOEP comes from official vitality records.

[25] The recent work by Hartmut Lehmann and Jonathan Wadswarth (2009) find that the adverse health effects of Chernobyl radiation fallout in Ukraine are limited to self-reported health measures, and exposure to radiation has no effect on objective measures of individual's health such as height and BMI. This suggests that self-reported health measures may not be necessarily good indicators of individual's actual health status. However, in Table 8, I find that wartime destruction has enduring effects on both objective and subjective measures of health, which evidently implies that the negative health effects are not merely driven by individual's perception, but based on tangible health measures.

summarized in columns (2)-(3) in Panel A and Panel C. However, Panel B points to differential mortality effects by gender and urban status. First, column (2) shows that wartime destruction has increased the mortality rates among males and decreased the female mortality. Second, it appears that the adverse mortality effects are disproportionally borne by the individuals in the urban areas (column (3) in Panel B).

Specification in column (4) allows war destruction to be non-linear and reports the estimation results for children residing in cities with the most destruction. It seems that for all health measures, the long-term detrimental effects of wartime destruction are three times larger in magnitude for children residing in most hard-hit cities. Additional analysis in Table 9 incorporates war-related variables in GSOEP such as loss of parent during war years or father's involvement in WWII. The impact of destruction remains virtually unchanged when I incorporate these additional controls, which mimics the findings in the previous education analysis. While there are many mechanisms through which exposure to war and physical destruction might impact health status (e.g., trauma, air pollution and lack of clean water in heavily bombed cities, disruption of breast feeding), given the sizable impact on height, it is likely that malnutrition is an important mechanism.[26]

C. Estimates of War Destruction on Labor Market Outcomes

In this subsection, I analyze the effects of WWII devastation on individual's future labor market outcomes. Given well-established empirical evidence on the causal association between individuals' human capital and labor market outcomes (David Card, 1999; Anne Case and

[26] W. Aldoori, N. Armijo-Hussein, W. W. Fawzi and M. Guillermo Herrera (1994) examine the nutritional effects of the Iraq-Iran War (1980-1988) and Gulf War (1991) in the Basrah region. They compare children's height-for-age, weight-for-age in Basrah region before and after these wars. They show that 24 percent of the children were stunted after the armed conflicts. In addition, stunting and low weight-for-age were significantly higher among children of low-socio-economic households.

Christina Paxson, 2008), wartime physical destruction can impact individuals' future labor market outcomes through reduction in educational attainment (summarized in Table 3) or through other channels, including deterioration in adulthood health (reported in Table 8).

The outcome of interest in Table 10 is the logarithm of hourly wage. This analysis is restricted to individuals with positive labor market earnings. Females have significantly lower labor force participation rates than males in Germany (Holger Bonin and Rob Euwals, 2005; Steinar Strøm and Gerhard Wagenhals, 1991); so I allow the treatment effect to differ by gender in Table 10. Following this specification, the first row shows the difference-in-difference estimates for males, the group on which I will focus. Column (1) of Panel A shows that the difference-in-difference estimate for logarithm of hourly wage is -0.007. This suggests that children who were exposed to large-scale physical destruction earn about 9 percent less in adulthood on average. Similar to the previous educational attainment and health analyses, I allow the destruction effect to vary by parental background. The difference-in-difference estimates in Columns (2)-(4) are statistically significant at 5 percent significance level and point out that WWII destruction caused substantially higher earnings loss for children from less favorable backgrounds. The difference-in-difference estimate for this group is 14 percent- twice the size of estimates for the entire population in column (1).

Having shown that school-aged children have lower future labor market earnings due to exposure to WWII destruction, it is of interest to explore the channels underlying this causal association. Are the estimated effects of physical destruction on future earnings working through decline in educational attainment or are there other channels at work, including the deterioration in adulthood health? To investigate whether WWII damage has effects on earnings besides through education channel, I estimate the same specification as in Panel A but add years of schooling as a regressor. Results are presented in Panel B of Table 10. This analysis suggests that although reduction in educational attainment explains a considerable part of the earnings loss, the significant effects of war devastation remains implying that decline in educational attainment is not the only channel for earnings loss, leaving room for other channels such as deterioration in adult health and social capital.

Previous papers have used exposure to war, other childhood shocks, natural disasters and macroeconomic crises to generate an instrumental variable of education to estimate the causal effect of education on earnings. The analysis in Panel B of Table 10 suggests that these instrumental-variables may have direct effects on individual's earnings working through other forms of human capital such as health. Therefore, the analysis presented in Panel B raises the question of whether these instrumental-variables indeed satisfy the exclusion restrictions.

VII. Conclusion

This paper presents causal evidence on the long-run socioeconomic consequences of large-scale physical destruction arising from world's most costly and widespread global military conflict, World War II. The findings in this paper shed light on the potential long-term legacies of large-scale physical destruction that could be caused by hurricanes, earthquakes, floods and recent armed conflicts. I combine a unique dataset on city-level WWII destruction with individual-level data from the German Socio-Economic Panel (GSOEP) to study the long-run effects of wartime physical destruction on children's education, health and labor market outcomes. The identification strategy exploits plausibly exogenous city-by-cohort variation in the intensity of WWII destruction. I find that WWII destruction caused Germans who were school-aged during WWII to complete fewer years of schooling, be shorter in height, report lower satisfaction with their health, die sooner and have lower labor market earnings in the future. The detrimental, long lasting effects of WWII destruction is faced disproportionately by people living in the most-hard hit regions, and whose parents were less educated.

Taken together, these findings suggest that even though severely hit regions rapidly return to their prewar patterns in terms of local population and macroeconomic indicators, consequences of wars along human dimensions are more substantial and persistent. Given that the detrimental effects of WWII are still present four decades after WWII, these results underline the importance of policies targeting primarily school-age children after large-scale physical destruction.

Additionally, the formal analysis of mechanisms suggests that the destruction of schools and decline in number of teachers are important channels for the reduction in education, whereas malnutrition during WWII appears to be responsible for the estimated impacts on health. Findings in this paper clearly propose that amelioration of school inputs along with in-cash transfers should be top priorities after large-scale physical destruction experienced in countries such as Iraq and Afghanistan.

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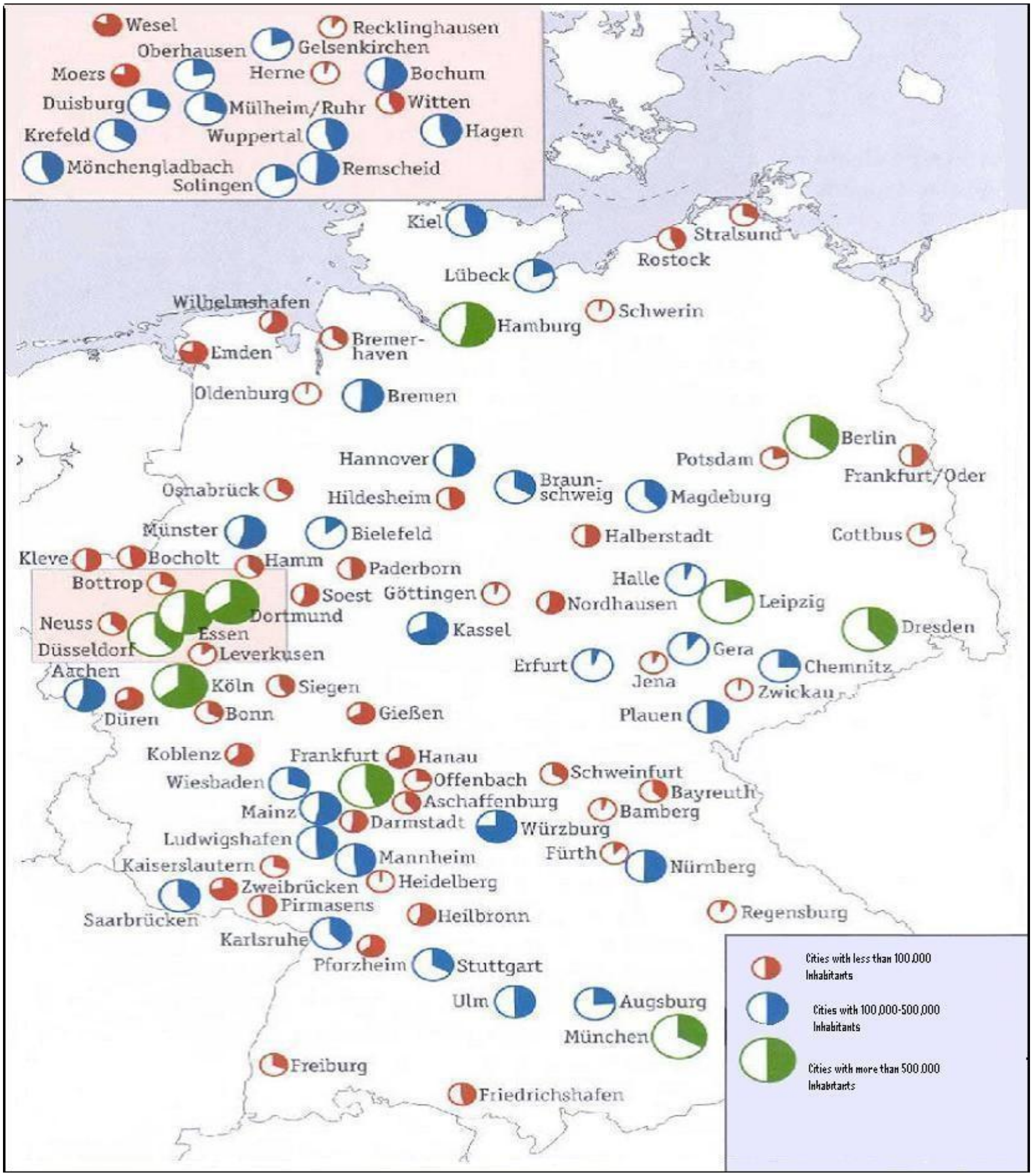
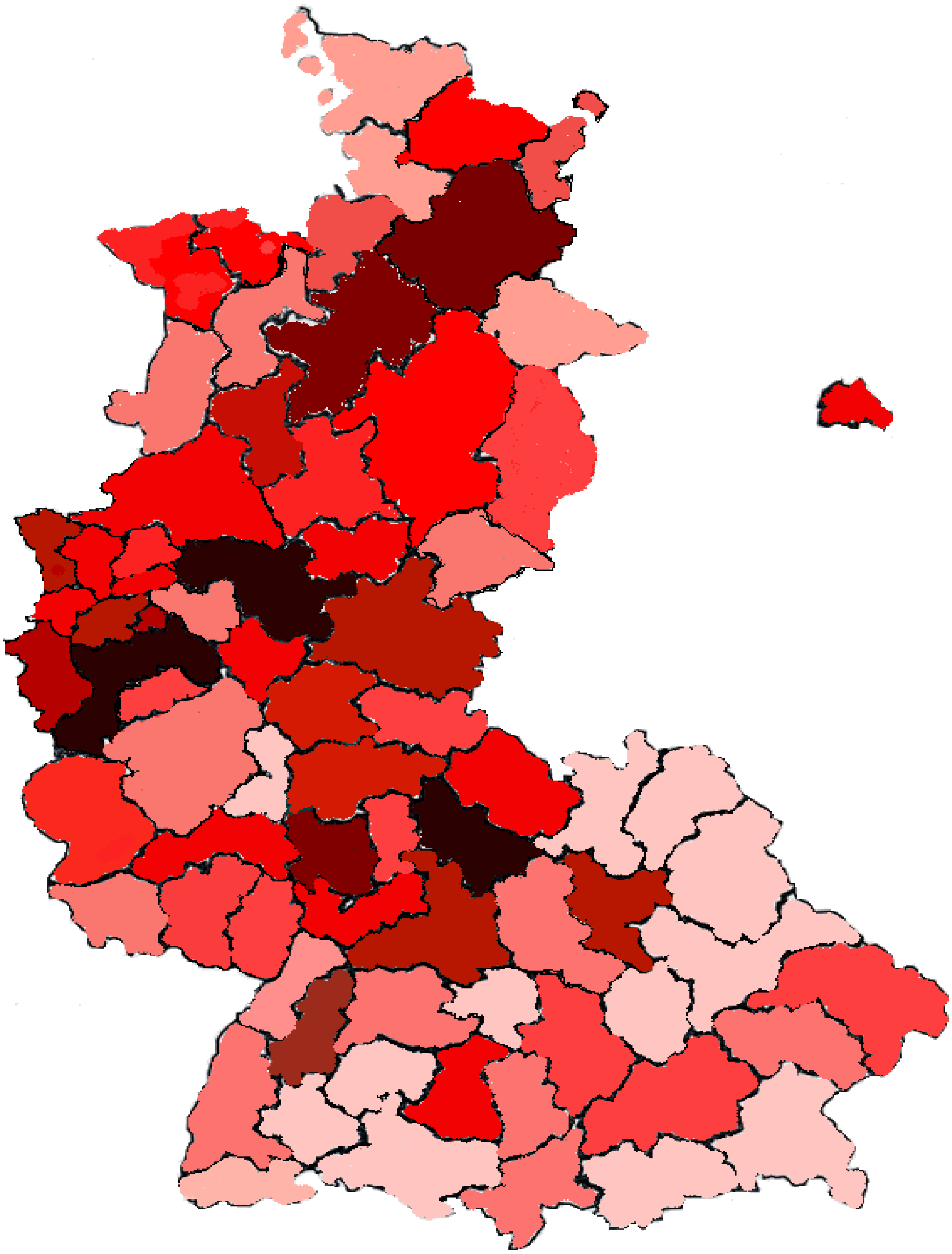
Figure 1: Share of Dwellings Destroyed in German Cities by 1945



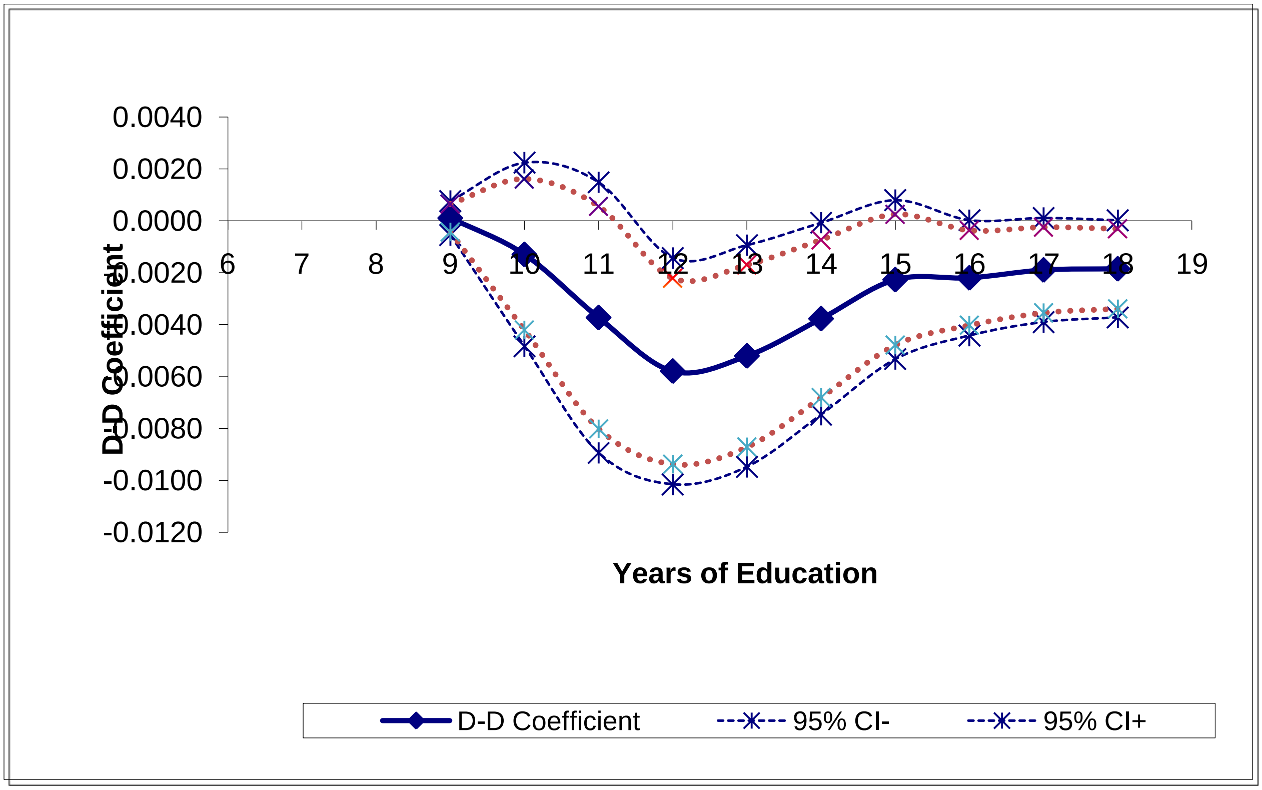
Source: Knopp (2001). The size of the circle shows the city size in 1939, where the largest circle refers to cities with more than 500,000 inhabitants; middle-size circle, cities with between 100,000 and 500,000 inhabitants and smallest circle, cities with less than 100,000 inhabitants. The shaded area in these circles is the share of the dwellings destroyed in the city by the end of WWII.

Figure 2: Map of Regional Policy Regions (*Raumordnungsregionen*, ROR) in Former West Germany



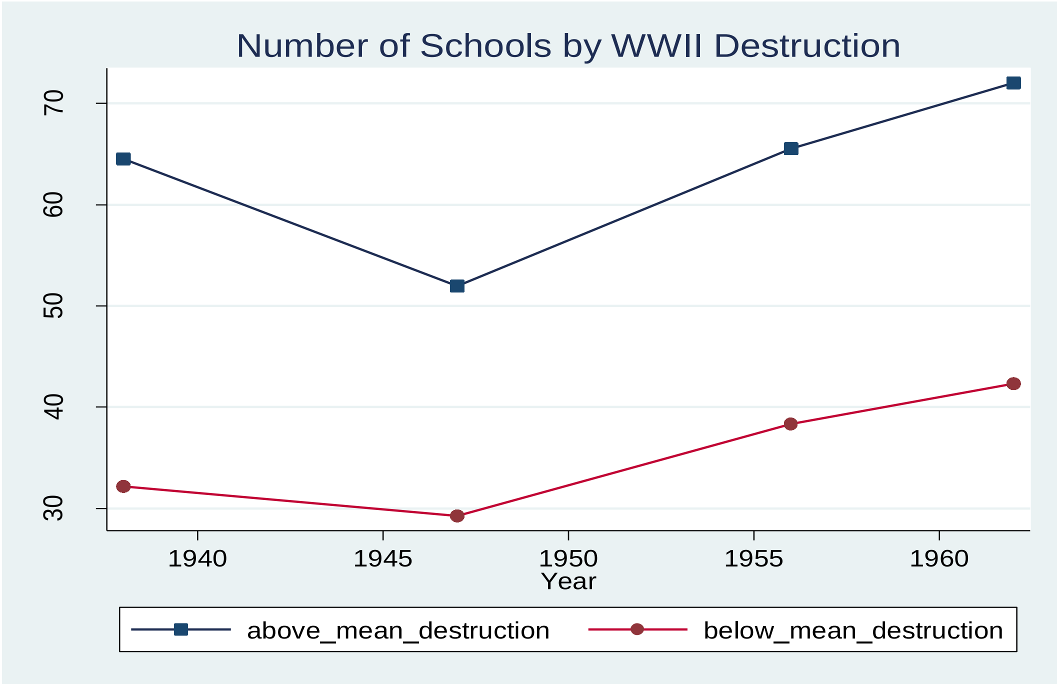
Source: Federal Office for Building and Regional Planning (*Bundesamt für Bauwesen und Raumordnung*, BBR). There are 75 regional policy regions (RORs) in former West Germany. The darker the region, the more wartime destruction it experienced.

Figure 3: Estimated Effect of Destruction on Full Distribution of Education



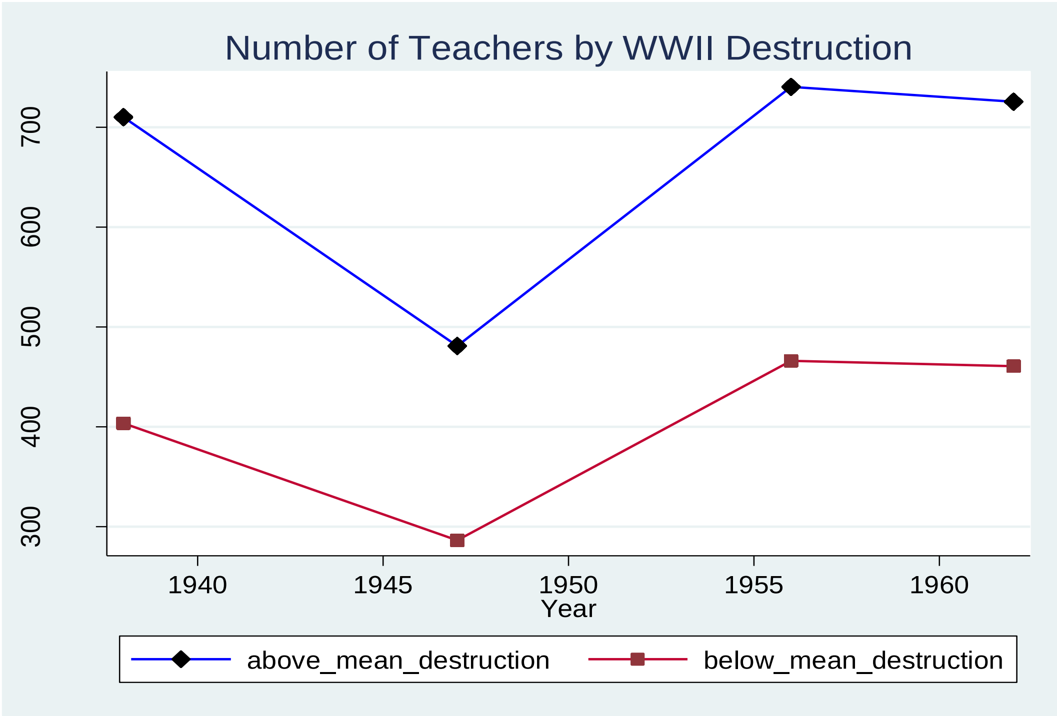
Notes: Each point in this figure is difference-in-difference estimate from a separate regression where the outcome is a dummy variable that takes a value of 1 if individual completed *m* years of schooling or more and zero otherwise. In my sample, individuals complete between 7 and 18 years of schooling.

Figure 4: Number of Schools by City-Level WWII Destruction



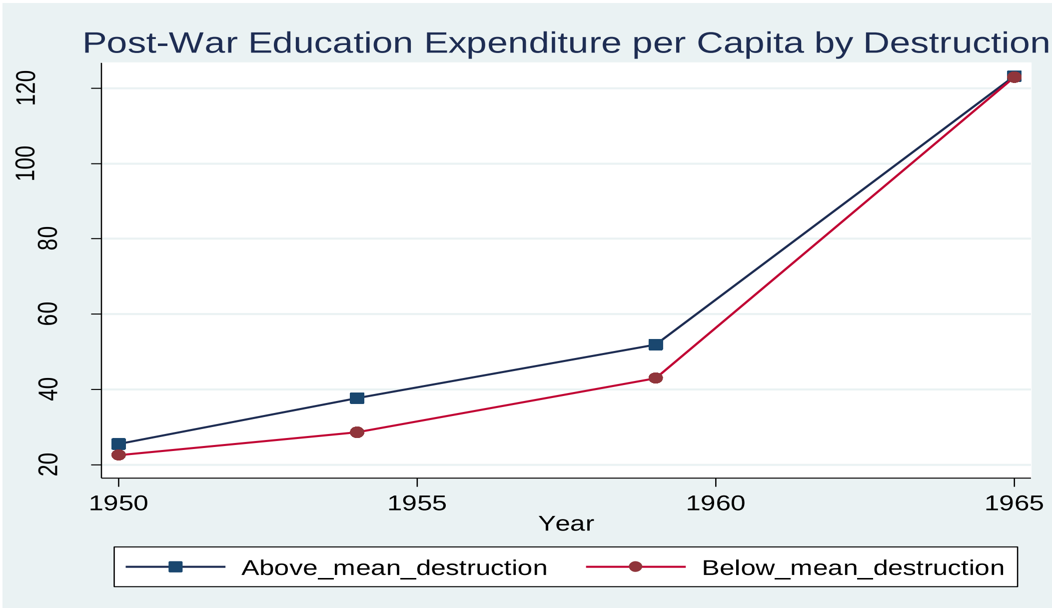
Source: Various years of German Statistical Yearbook.

Figure 5: Number of Teachers by City-Level WWII Destruction



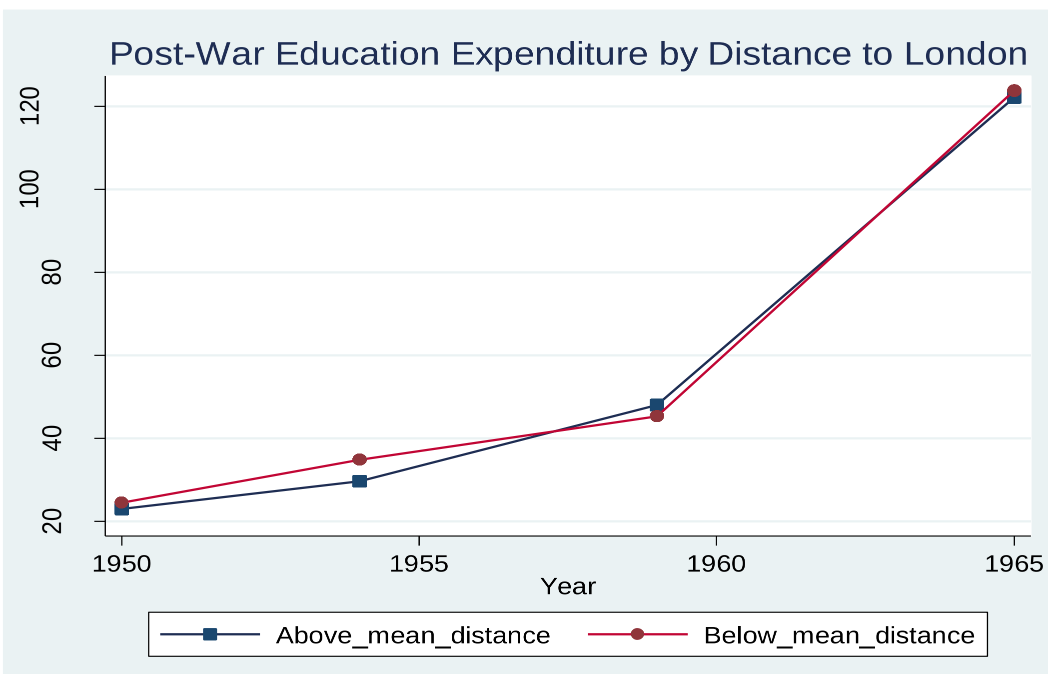
Source: Various years of German Statistical Yearbook.

Figure 6: Postwar Education Expenditure per Capita by WWII Destruction



Source: Various years of German Statistical Yearbook.

Figure 7: Postwar Education Expenditure per Capita by Distance to London



Source: Various years of German Statistical Yearbook.

Table 1. Descriptive Statistics for WWII Destruction

	All	RORs with Above avg. Destruction	RORs with Below avg. Destruction	Difference s.e (Difference)	
	(1)	(2)	(3)	(4)	
Rubble in m^3 per Capita	12.183	18.487	6.425	12.062	***
	(7.201)	(4.446)	(3.419)	(0.133)	
Housing Units Destroyed (%)	37.224	49.706	25.823	23.882	***
	(18.557)	(12.143)	(15.874)	(0.479)	
Total bombs dropped in tons	25,036	36,333	14,717	21,616	***
	22,508	25,566	12,223	665	
Area in km^2 in 1938	253.296	359.747	156.060	203.687	***
	(238.281)	(292.370)	(103.811)	(7.255)	
Population density in 1939	2,011	2,218	1,821	397	***
	(909.237)	(946.585)	(829.899)	(29.881)	
Income per Capita in RM	467.317	501.933	432.556	69.377	***
in 1938	(106.305)	(68.110)	(124.841)	(3.760)	
Distance to London in miles	419.062	394.324	441.657	-47.333	***
	(88.413)	(82.205)	(87.854)	(2.869)	
N Max.	3536	1688	1848	3536	

Notes: The sample consists of 75 Regional Policy Regions (Raumordnungsregionen, ROR) in the former territory of West Germany. The means for destruction measures are weighted by population. Standard deviations are in parentheses. The sample is divided as above and below destruction using rubble in m^3 per capita as a measure of war destruction.

Table 2. Descriptive Statistics, GSOEP Data

	All	RORs with Above avg. Destruction	RORs with Below avg. Destruction
	(1)	(2)	(3)
Years of Schooling	11.333	11.477	11.201
	(2.315)	(2.413)	(2.214)
Has Gymnasium Diploma or More	0.240	0.268	0.214
	(0.427)	(0.443)	(0.410)
Has Any College or More	0.177	0.200	0.155
	(0.381)	(0.400)	(0.362)
Height	170.493	170.900	170.129
	(8.725)	(8.671)	(8.763)
Mortality	0.106	0.107	0.105
	(0.308)	(0.309)	(0.307)
Self-Rated Health Satisfaction	0.714	0.701	0.725
	(0.452)	(0.458)	(0.447)
Log of Hourly Wage	8.937	8.978	8.900
	(0.997)	(0.991)	(1.001)
Mother with Basic Education	0.880	0.860	0.898
	(0.325)	(0.348)	(0.303)
Father with Basic Education	0.826	0.803	0.846
	(0.379)	(0.398)	(0.361)
Age	40.665	40.622	40.703
	(11.666)	(11.642)	(11.692)
Female	0.497	0.491	0.504
	(0.500)	(0.500)	(0.500)
Urban	0.585	0.650	0.526
	(0.493)	(0.477)	(0.499)
N max.	3536	1688	1848

Notes: Data are from 1985 GSOEP. For height, 2002 GSOEP is used. The sample consists of individuals born between 1927 and 1960. Individuals born between 1940 and 1950 are dropped from the analysis since their exposure to the WWII destruction is not as clear. Standard deviations are presented in parentheses.

Table 3. Effect of WWII Destruction on Years of Schooling

	(1)	(2)	(3)	(4)
Rubble per Cap.X Born btw.1927-1939	-0.0266**	-0.0268**	-0.0207**	-0.0233**
	(0.0114)	(0.0122)	(0.0104)	(0.0104)
Rubble per Cap.X Born btw.1927-1939		0.0453**		0.0341
X Mother has more than Basic Education		(0.0186)		(0.0259)
Rubble per Cap.X Born btw.1927-1939			0.0278	0.0084
X Father has more than Basic Education			(0.0176)	(0.0217)
R^2	0.1373	0.2302	0.2578	0.2763
N	3489	3075	3040	2990

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. Each column is from a separate regression where main treatment effect varies by parental education in columns (2)-(4). Each column controls for city and birth year fixed effects. Columns (2)-(4) also control for main effects of parental human capital. Other controls in each regression are gender and rural dummies.

Table 4. Effect of WWII Destruction on Years of Schooling by Cohorts

Rubble per Cap.X Born btw.1920-1924	-0.0268	
	(0.0164)	
Rubble per Cap.X Born btw.1925-1929	-0.0369	**
	(0.0149)	
Rubble per Cap.X Born btw.1930-1934	-0.0317	**
	(0.0151)	
Rubble per Cap.X Born btw.1935-1939	-0.0160	
	(0.0140)	
Rubble per Cap.X Born btw.1940-1944	-0.0142	
	(0.0149)	
Rubble per Cap.X Born btw.1945-1949	-0.0123	
	(0.0166)	
Rubble per Cap.X Born btw.1950-1954	-0.0092	
	(0.0166)	
R^2	0.1361	
N	5609	

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote (*=.10, **=.05, ***=.01). The control cohort is individuals born between 1955 and 1960. The analysis controls for city and year of birth fixed effects. Other controls are gender and rural dummies.

Table 5. Validity Checks

	(1)	(2)	(3)	(4)
Panel A: Effect of WWII Destruction on Probability of Moving				
Rubble per Cap.X Born btw.1927-1939	0.0015	0.003	0.0033	0.0029
	(0.0030)	(0.0029)	(0.0028)	(0.0028)
Rubble per Cap.X Born btw.1927-1939 X Mother has more than Basic Education		-0.0040		-0.0046
		(0.0039)		(0.0037)
Rubble per Cap.X Born btw.1927-1939 X Father has more than Basic Education			-0.0031	-0.001
			(0.0036)	(0.0036)
R^2	0.0903	0.1032	0.1091	0.1110
N	3486	3074	3040	2990
Panel B: Non-movers Only				
Rubble per Cap.X Born btw.1927-1939	-0.0308**	-0.0310**	-0.0228*	-0.0257**
	(0.0122)	(0.0123)	(0.0122)	(0.0123)
Rubble per Cap.X Born btw.1927-1939 X Mother has more than Basic Education		0.013		0.0171
		(0.0281)		(0.0311)
Rubble per Cap.X Born btw.1927-1939 X Father has more than Basic Education			0.0008	-0.0085
			(0.0253)	(0.0271)
R^2	0.1570	0.2360	0.2523	0.2768
N	1963	1716	1697	1665
Panel C: Control Experiment				
Rubble per Cap.X Born btw.1904-1913	0.0016	0.0061	0.0115	0.008
	(0.0147)	(0.0134)	(0.0140)	(0.0141)
Rubble per Cap.X Born btw.1904-1913 X Mother has more than Basic Education		-0.0139		-0.0184
		(0.0495)		(0.0626)
Rubble per Cap.X Born btw.1904-1913 X Father has more than Basic Education			0.0117	0.0259
			(0.0271)	(0.0405)
R^2	0.2210	0.3160	0.3600	0.3690
N	1315	1086	1082	1066

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). In Panels A and B, the control group is individuals born between 1951 and 1960. In Panel C, sample consists of older cohorts who were born between 1904 and 1913 who would have completed their schooling at the outset of WWII. In Panel C, "Placebo" affected group is individuals born between 1904 and 1913 and "Placebo" control group is individuals born between 1914 and 1923. Each column is from a separate regression where main treatment effect varies by parental education in columns (2)-(4). Each column controls for city and birth year fixed effects. Columns (2)-(4) also control for main effects of parental human capital. Other controls in each regression are gender and rural dummies. Individuals are coded as movers if they report that they no longer reside in their childhood city or area.

Table 6. The Effect of WWII Destruction on Years of Schooling

Instrumental Variable Strategy

	Second-Stage	**Reduced-Form**
	(1)	(2)
Rubble per Cap. X Born btw.1927-1939	-0.0587 **	
	(0.0268)	
Distance to London X Born btw.1927-1939		0.0017 **
		(0.0009)
	First-stage	
Dependent Variable: Rubble per Capita X Born btw. 1927 and 1939		
Distance to London (in miles) X Born btw.1927-1939	-0.0329 ***	
	(0.0013)	
F-Statistic for first-stage	174.45	
R^2	0.8216	
N	3579	

Notes :Standard errors adjusted for cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05,***=.01). The control group is individuals born between 1951 and 1960. The identifying instrument for city's war destruction is city's distance to London. Each column controls for city and year of birth fixed effects. Other controls in each regression are gender and rural dummies.

Table 7. Heterogeneity in the Effects of WWII Destruction on Years of Schooling

		Source of Heterogeneity					Destruction Measure	
	Base Results	Female	Urban Area	Top Quartile Destruction	Parent Died during WWII	Father Fought in WWII	Change in Schools (%)	Change in Teachers (%)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rubble per Cap.X Born btw.1927-1939	-0.0266**	-0.0261**	-0.0294**	-1.3993***	-0.0272**	-0.0224**		
	(0.0114)	(0.0134)	(0.0144)	(0.3233)	(0.0113)	(0.0110)		
Rubble per Cap.X Born btw.1927-1939 X Source of Heterogeneity		-0.0040	0.0050					
		(0.0134)	(0.0111)					
Mother died during WWII					-0.5552***	-0.5991**		
					(0.2069)	(0.2430)		
Father died during WWII					-0.0974	-0.1120		
					(0.1167)	(0.1339)		
Father fought in WWII						-0.5961***		
						(0.1419)		
Destruction Measure X Born btw.1927-1939							-0.0051**	-0.0017
							(0.0024)	(0.0030)
R^2	0.1373	0.1476	0.1374	0.1240	0.1381	0.1406	0.1365	0.1356
N	3489	3489	3489	3489	3489	3224	3493	3493

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. Columns (2)-(6) are from a separate regression where main treatment effect varies by source of heterogeneity. Columns (7) and (8) employ different measures of war devastation. In Column (4), "Top Quartile Destruction" is a dummy variable which takes a value of 1 for interaction of being in cities with most destruction during WWII and being born between 1927-1939. Each column controls for city and birth year fixed effects. Other controls in each regression are gender and rural dummies.

Table 8. Effects of WWII Destruction on Adult Health Outcomes

	(1)	(2)	(3)	(4)
Panel A: Height				
Rubble per Cap.X Born btw. 1937-1945	-0.0425**	-0.0379**	-0.0420**	-0.0387**
	(0.018)	(0.018)	(0.020)	(0.019)
Rubble per Cap.X Born btw.1937-1945 X Mother has more than Basic Education		-0.0033		-0.0031
		(0.032)		(0.028)
Rubble per Cap.X Born btw.1937-1945 X Father has more than Basic Education			-0.0109	-0.0067
			(0.022)	(0.021)
R^2	0.5340	0.5390	0.5390	0.5380
N	1318	1262	1229	1216
Panel B: Mortality				
Rubble per Cap.X Born btw.1927-1939	0.0002	0.0009	0.0016	0.0014
	(0.0014)	(0.0017)	(0.0017)	(0.0017)
Rubble per Cap.X Born btw.1927-1939 X Mother has more than Basic Education		-0.0048***		-0.0025
		(0.0017)		(0.0026)
Rubble per Cap.X Born btw.1927-1939 X Father has more than Basic Education			-0.0043*	-0.0031
			(0.0022)	(0.0030)
R^2	0.1306	0.1369	0.1361	0.1379
N	3536	3104	3070	3017
Panel C: Self-Rated Health Satisfaction				
Rubble per Cap.X Born btw.1927-1939	-0.0032	-0.0063***	-0.0062***	-0.0066***
	(0.0024)	(0.0023)	(0.0023)	(0.0023)
Rubble per Cap.X Born btw.1927-1939 X Mother has more than Basic Education		0.0081***		0.0046
		(0.0025)		(0.0032)
Rubble per Cap.X Born btw.1927-1939 X Father has more than Basic Education			0.0092***	0.0069**
			(0.0026)	(0.0033)
R^2	0.0937	0.1032	0.1042	0.1054
N	3522	3093	3061	3008

Notes : Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. For height regressions, the treatment group is individuals born between 1937 and 1945. Mortality measure is a dummy variable that takes a value of 1 if individual has recorded death year from 1985 (first year of survey) until 2006 and zero otherwise. Health satisfaction is a subjective and scaled measure of health that ranges between 0 and 10. Individuals are coded as satisfied with their current health if their response is 6 and above. Each column controls for city and birth year fixed effects. Other controls in each regression are gender and rural dummies.

Table 9. Heterogeneity in the Effects of WWII Destruction on Adult Health Outcomes

	Base Results	Source of Heterogeneity: Female	Urban Area	Top Quartile Destruction	Parent Died during WWII	Father Fought in WWII
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Height						
Rubble per Cap.X Born btw. 1937-1945	-0.0387**	-0.0423**	-0.0398**	-1.3807**	-0.0377**	-0.0366*
	(0.019)	(0.0192)	(0.0187)	(0.5466)	(0.0196)	(0.0199)
Rubble per Cap.X Born btw. 1937-1945 X Source of Heterogeneity		0.0155	0.0048			
		(0.0195)	(0.0247)			
Mother died during WWII					-0.3700	-0.3820
					(0.8194)	(0.8206)
Father died during WWII					-0.4464*	-0.4210*
					(0.2483)	(0.2459)
Father fought in WWII						-0.6755*
						(0.3996)
R^2	0.5380	0.5383	0.5382	0.5391	0.5391	0.5389
N	1216	1216	1216	1216	1216	1215
Panel B: Mortality						
Rubble per Cap.X Born btw.1927-1939	0.0014	0.0046**	-0.0001	0.3023***	0.0013	0.0013
	(0.0017)	(0.0018)	(0.0017)	(0.0606)	(0.0017)	(0.0017)
Rubble per Cap.X Born btw.1927-1939 X Source of Heterogeneity		-0.0065***	0.0029**			
		(0.0012)	(0.0015)			
Mother died during WWII					-0.0462	-0.0457
					(0.0607)	(0.0616)
Father died during WWII					-0.0047	-0.0067
					(0.0231)	(0.0234)
Father fought in WWII						0.1065***
						(0.0404)
R^2	0.1379	0.1445	0.1391	0.1381	0.1382	0.1413
N	3017	3017	3017	3017	3017	2983
Panel C: Self-Rated Health Satisfaction						
Rubble per Cap.X Born btw.1927-1939	-0.0066***	-0.0071***	-0.0080***	-0.3042***	-0.0065***	-0.0067***
	(0.0023)	(0.0024)	(0.0026)	(0.0804)	(0.0023)	(0.0023)
Rubble per Cap.X Born btw.1927-1939 X Source of Heterogeneity		0.0009	0.0028			
		(0.0017)	(0.1060)			
Mother died during WWII					0.0973	0.0960
					(0.0867)	(0.0866)
Father died during WWII					-0.0035	-0.0029
					(0.0369)	(0.0370)
Father fought in WWII						-0.0578
						(0.0521)
R^2	0.1054	0.1055	0.1008	0.1056	0.1060	0.1037
N	3008	3008	3008	3008	3008	2974

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. Columns (2)-(6) are from separate regression where the main treatment effect varies by source of heterogeneity. In Column (4), "Top Quartile Destruction" is a dummy variable which takes a value of 1 for interaction of being in cities with most destruction during WWII and being born between 1927 and 1939. Each column controls for city and birth year fixed effects. Other controls in each regression are gender and rural dummies.

Table 10. Effect of WWII Destruction on Labor Market Earnings

	(1)	(2)	(3)	(4)
Panel A: Logarithm of Hourly Wage				
Rubble per Cap.X Born btw.1927-1939	-0.0067	-0.0119**	-0.0133**	-0.0131**
	(0.0058)	(0.0053)	(0.0059)	(0.0056)
Rubble per Cap.X Born btw.1927-1939	0.0118	0.0138	0.0151*	0.0139
X Female	(0.0090)	(0.0088)	(0.0089)	(0.0087)
Rubble per Cap.X Born btw.1927-1939		0.0280***		0.0191*
X Mother has more than Basic Education		(0.0096)		(0.0097)
Rubble per Cap.X Born btw.1927-1939			0.0199***	0.0105
X Father has more than Basic Education			(0.0073)	(0.0068)
R^2	0.3371	0.3556	0.3574	0.3583
N	2350	2087	2058	2029
Panel B: Logarithm of Hourly Wage, Controlling for Education				
Rubble per Cap.X Born btw.1927-1939	-0.004	-0.0095**	-0.0109**	-0.0108**
	(0.0060)	(0.0047)	(0.0049)	(0.0049)
Rubble per Cap.X Born btw.1927-1939	0.0122	0.0147*	0.0164*	0.0153*
X Female	(0.0088)	(0.0087)	(0.0087)	(0.0087)
Rubble per Cap.X Born btw.1927-1939		0.0234**		0.016
X Mother has more than Basic Education		(0.0095)		(0.0101)
Rubble per Cap.X Born btw.1927-1939			0.0172**	0.0094
X Father has more than Basic Education			(0.0067)	(0.0065)
R^2	0.3693	0.3858	0.3846	0.3853
N	2338	2077	2048	2019

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The analysis is restricted to individuals with positive labor market earnings. The control group is individuals born between 1951 and 1960. Each column is from a separate regression where main treatment effect varies by parental education in Columns (2)-(4). Each column controls for city and year of birth fixed effects. Columns (2)-(4) also control for main effects of parental education. Other controls in each regression are gender and rural dummies. Panel B controls for individual's years of schooling.

Appendix Table 1. Effects of WWII Destruction on Children's Outcomes

	Years of Schooling	Adult Height	Adult Mortality	Health Satisfaction	Log(Hourly Wage)
	(1)	(2)	(3)	(4)	(5)
Rubble per Cap.X Born btw.1927-1939	-0.0172*	-0.0327*	0.0005	-0.0061***	-0.0020
	(0.0091)	(0.0176)	(0.0017)	(0.0020)	(0.0047)
Rubble per Cap.X Born btw.1927-1939					-0.0038
X Female					(0.0053)
Rubble per Cap.X Born btw.1927-1939	0.0337	0.0069	-0.0025	0.0023	0.0133
X Mother has more than Basic Education	(0.0242)	(0.0239)	(0.0025)	(0.0035)	(0.0097)
Rubble per Cap.X Born btw.1927-1939	0.0042	-0.0072	-0.0031	0.0065*	0.0043
X Father has more than Basic Education	(0.0203)	(0.0192)	(0.0029)	(0.0033)	(0.0063)
R^2	0.2713	0.546	0.0890	0.0860	0.3494
N	4139	1661	4176	4164	2828

Notes : Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). For all outcomes, the control group is individuals born between 1940 and 1960. For height regressions, the treatment group is individuals born between 1937 and 1945 and control group is individuals born between 1946 and 1960. Each column controls for city and year of birth fixed effects. Other controls in each regression are gender and rural dummies and parental education.

Appendix Table 2. Effect of WWII Destruction on Years of Schooling

	(1)	(2)	(3)	(4)
Rubble per Cap.X Born btw.1930-1939	-0.0248**	-0.0262**	-0.0216**	-0.0236**
	(0.012)	(0.012)	(0.011)	(0.011)
Rubble per Cap.X Born btw.1930-1939		0.0505**		0.0311
X Mother has more than Basic Education		(0.020)		(0.029)
Rubble per Cap.X Born btw.1930-1939			0.0328*	0.0145
X Father has more than Basic Education			(0.020)	(0.025)
R^2	0.1360	0.2300	0.2580	0.2770
N	3118	2753	2718	2673

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. Each column is from a separate regression where main treatment effect varies by parental education in columns (2)-(4). Each column controls for city and birth year fixed effects. Columns (2)-(4) also control for main effects of parental human capital. Other controls in each regression are gender and rural dummies.

Appendix Table 3. Effect of WWII Destruction on Years of Schooling by Cohorts

	First-Stage:	Reduced-Form:
	Rubble per Capita X Born btw. 1927 and 1939	Years of Schooling
	(1)	(2)
Distance to London X Born btw.1920-1924	-0.0010	0.0018
	(0.0011)	(0.0016)
Distance to London X Born btw.1925-1929	-0.0235 ***	0.0018
	(0.0065)	(0.0015)
Distance to London X Born btw.1930-1934	-0.0321 ***	0.0004
	(0.0091)	(0.0015)
Distance to London X Born btw.1935-1939	-0.0314 ***	0.0015
	(0.0096)	(0.0012)
Distance to London X Born btw.1940-1944	-0.0015	0.0008
	(0.0010)	(0.0015)
Distance to London X Born btw.1945-1949	-0.0019	0.0009
	(0.0010)	(0.0014)
Distance to London X Born btw.1950-1954	-0.0004	-0.0007
	(0.0009)	(0.0012)
R^2	0.7944	0.1290
N	5609	5609
	Second-Stage:	
	Dependent Variable: Years of Schooling	
Rubble per Cap.X Born btw.1920-1924	-0.0764	
	(0.0402)	
Rubble per Cap.X Born btw.1925-1929	-0.0672 *	
	(0.0357)	
Rubble per Cap.X Born btw.1930-1934	-0.0237	
	(0.0431)	
Rubble per Cap.X Born btw.1935-1939	-0.0672 *	
	(0.0365)	
Rubble per Cap.X Born btw.1940-1944	-0.0538	
	(0.0399)	
Rubble per Cap.X Born btw.1945-1949	-0.0459	
	(0.0451)	
Rubble per Cap.X Born btw.1950-1954	0.0101	
	(0.0430)	
R^2	0.1366	
N	5609	

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (*=.10, **=.05, ***=.01). The control group is individuals born between 1951 and 1960. The identifying instrument for city's war destruction is city's distance to London. Each column is from a separate regression which contols for city and year of birth fixed effects. Other controls in each regression are gender and rural dummies.