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## ABSTRACT

### **For Better or for Worse: The Long-Term Effects of Postwar Reconstruction on Family Formation<sup>\*</sup>**

This paper provides causal evidence on the long-term legacies of postwar reconstruction and mandatory employment on women's family formation outcomes such as marriage, age at first marriage and divorce. We exploit city-by-cohort variation in the intensity of World War II reconstruction in Germany which determined the mobilization of women in the postwar era. We find that participation in the postwar reconstruction efforts increased the female's probability of being currently and ever married and marrying at younger ages. We also find that postwar mandatory employment had no differential effect on the divorce rates among the affected cohorts of women. These results are robust to the potential changes in the population composition, household income and demand for female labor and state-specific policies in postwar Germany.

JEL Classification: J12, J16, J21, J48

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# 1 Introduction

During World War II, Germany experienced an extensive bombing campaign of Allied Air Forces. More than one-half million tons of bombs were dropped in aerial raids on German cities, destroying about forty percent of the total housing stock nationwide.<sup>1</sup> Germany also lost a substantial fraction of its male population during the war, which left the postwar reconstruction in the hand of women (Meiners 2011). To enforce participation in the reconstruction effort and rubble removal, especially among women, the Allied Control Council launched Command Nr. 3, a mandatory employment law, in postwar Germany in 1946. This mandatory employment law remained in place until 1955 and required all individuals capable of work to register with labor offices for work allocation (Allied Control Authority Germany 1946). For non-registration of individuals, the penalty was to lose the right to receive food ration cards while for employers imprisonment, fines and criminal prosecution were imposed (Meiners 2011). With the passage of the mandatory employment law, therefore, so called "rubble women" (in German *Truemmerfrauen*) entered into the labor force and started to work in professions such as construction and manufacturing which were previously closed to them. These "rubble women" were similar to the "Rosie the Riveter" in the U.S., who was the symbol of the employment of American women during WWII, albeit in the German case, the mobilization of women occurred in the postwar reconstruction period.

The historical debate on the impacts of postwar mandatory employment on emancipation of German women is divided. On the one hand, several historians argue that the immediate postwar period can be seen as "Hour Zero" of the German women's emancipation movement. They find a sustained increase in female labor supply and divorce rates (Hoehn 1997). On the other hand, a second strand of historical research asserts that the rubble women returned back to their kitchens and became housewives again (Meiners 2011) similar to the "Rosie the Riveter" in the U.S. (Goldin 1991). Given the substantial underrepresentation of German women in the top ranks of management and in the labor market in general (New York Times 2011), the debate on the effectiveness of

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<sup>1</sup>For detailed information on the bombing campaign of AAF during WWII, see Akbulut-Yuksel (2009).

the postwar mandatory employment on the liberation of German women still remains at the center of public policy debates and requires further scrutiny.

This paper provides the first causal evidence on long-term effects of postwar mandatory employment on family formation. Our identification strategy exploits the plausibly exogenous city-by-cohort variation in wartime destruction experienced in German cities during WWII which mainly determined the mobilization of the rubble women during the reconstruction period. In cities with higher wartime destruction, rubble women were required to work for a longer time period and more intensively in the rubble removal and reconstruction process relative to women residing in less destructed cities. However, only women who were within the mandatory working age (i.e. 15-50 years of age) and legal marriage age (i.e. 16 years of age) during the reconstruction period had their marriage outcomes affected by the postwar mandatory employment law. Therefore, we use a difference-in-differences strategy in our analysis where the "treatment" variable is an interaction between city-level wartime destruction and a dummy variable for being of working and marriage age during the reconstruction period and where we control for city fixed effects and birth year fixed effects. The identifying assumption is that had the postwar reconstruction not occurred, underlying trends for the marriage outcomes for the rubble women and women entering the labor and marriage market after reconstruction would be similar in cities with varying intensity of wartime destruction.

Our paper is closely related to Goldin (1991), Acemoglu, Author and Lyle (2004) who analyze the effects of U.S. mobilization in WWII on female labor market outcomes in 1950. Goldin (1991) finds a modest effect of WWII on the employment of women in 1950 as the majority of women who entered the labor market during the war years exited by 1950. Contrary to this, Acemoglu, Author and Lyle (2004) draw a different conclusion on the effects of WWII on the labor force participation of American women. They find that the deployment of men during WWII and the related increases of female labor force participation in the war years increased female labor force participation in 1950. This increase in women's labor force participation led to both lower female and

male wages. These studies focus on the short-term effects of WWII mobilization on women's employment and wages while the medium and the long-term effects may be quite different.

In the case of the postwar mandatory employment, female employment and marriage rates may increase or decrease in the long run and hence differ from the short-term mobilization effects. On the one hand, female employment in the postwar era might have altered the perceptions and preferences of women about working and marriage and encouraged them to continue working in the future. On the other hand, increasing demands for marriage and raising kids in the postwar era may have induced women to exit the labor market and become housewives again. Akbulut-Yuksel, Khamis and Yuksel (2011) indeed find that postwar mandatory employment in Germany reduced female labor force participation and hours worked and increased female presence in medium-skill and female-dominated occupations in the long-run. Goldin and Olivetti (2013) provide further evidence on the heterogeneous effects of WWII mobilization on female labor market outcomes in the U.S. using the 1950 and 1960 Censuses. They find that educated white women who were married in the war years without children experienced an increase in their labor force participation and weeks worked in 1950 and 1960. However, WWII mobilization and postwar reconstruction likely have direct effects on women's marriage and fertility decisions; thus, in this paper, we analyze how postwar mobilization of women impacts their family formation outcomes.

This study also contributes to a growing literature on gender impacts of armed conflicts. Shemyakina (2011) and Menon and van der Meulen Rodgers (2011) examine women's employment in Tajikistan and Nepal during and just after the armed conflict, respectively. They find that exposure to conflict increased employment and self-employment among single and married women in Tajikistan and Nepal. On the other hand, Shemyakina (forthcoming) finds that women who were residing in conflict regions in Tajikistan are more likely to postpone their marriage compared to women in non-conflict regions due to the armed conflict. In contrast to these studies, however,

in this study, we quantify the long-term effects of postwar mandatory employment on women's social outcomes. Moreover, our analysis combines a detailed dataset on the extent of WWII destruction for each German Regional Policy Region (hereafter, "ROR" or "city")<sup>2</sup> with individual-level data from the 1978 German Microcensus which enables us to match the treatment to each individual accurately and form plausible control groups. In addition, the availability of postwar city-level data such as the female/male ratio, the German refugee and international migrant ratios, the female employment share and per capita war relief payments received from the government allow us to rigorously investigate potential channels and confounding factors.

We find that the rubble women in highly destroyed cities have a higher propensity to be currently and ever married and marry at younger ages. We also find that postwar mandatory employment has no differential effect on the divorce rates among the rubble women. These results survive after we account for the potential changes in the composition of the population, household income and demand for female labor and state-specific policies in postwar Germany. The remainder of the paper is organized as follows. Section 2 provides a brief background on the postwar reconstruction and the rubble women. Section 3 discusses the identification strategy. Section 4 describes the city-level destruction data and individual-level survey data used in the analysis. Section 5 presents the main results, extensions and robustness checks. Section 6 concludes.

## **2 Background on the Postwar Reconstruction and Rubble Women**

The situation at the end of World War II was dire in Germany. All German cities were destroyed to some extent, about half of the living space was destructed and at times, individuals had no access to food, electricity, water, bathrooms and gas (Meiners 2011;

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<sup>2</sup>The analysis is restricted to former West Germany. Former West Germany was comprised of 38 German Regional Policy Region in 1978, which are similar to MSAs in the U.S.

Delille and Grohn 1985). About 14 million Germans lost their homes (Heineman 1996). In addition to the large-scale physical destruction, there were a large number of war casualties in each German city due to bombings and war combat. About 3.6 million of the civilian population and 3.3 million soldiers had died during WWII (Meiners 2011). 11 million soldiers were prisoners of war by the end of WWII (Meiners 2011).<sup>3</sup> However, the degree of destruction experienced in German cities varied substantially, as the bombing during WWII depended on weather conditions, visibility of landmarks and the distance from the air fields in England (Friedrich 2002; Grayling 2006).<sup>4</sup> Figure 1 shows the percentage of dwellings destroyed in each city by the end of WWII, which shows the variation of destruction across cities.

With a large fraction of the German male population lost, due to war deaths and still being captured as prisoners of war, the burden of the reconstruction process and the removal of rubble had largely fallen on women. To enforce the participation in the rubble removal and reconstruction especially among German women, the Allied Control Council announced Command Nr. 3 on 17th January 1946 (Allied Control Authority Germany 1946). This command required all individuals capable of work to register with labor offices for work allocation. For women, the age range was 15 to 50 years and for men of the ages 14 to 65 years. For non-registration of individuals, the penalty was to lose the right to receive food ration cards while for employers imprisonment, fines and criminal prosecution were imposed. The work placements were made through the Labor offices which had the power to place people compulsory in reconstruction work. In July 1946, Allied Control Council supplemented Command Nr. 3 with Law Nr. 32 which formally allowed female employment in the postwar reconstruction effort. Law Nr. 32 remained in place from July 1946 to February 1955 for West Germany. With the passage of the postwar mandatory employment law, therefore "*rubble women*" entered into the work force in large numbers and started to work in construction and manufacturing

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<sup>3</sup>The prisoners of war were released gradually: by 1948 from the Allied Forces and by the early 1950s from the Soviet camps (Meiners 2011).

<sup>4</sup>See Akbulut-Yuksel (2009) for detailed information on WWII destruction.



sectors which were previously closed to them (Heineman 1996; Meiners 2011). These rubble women were similar to the "Rosie the Riveter" in the U.S. Arnold (1999) provides a detailed account on the rubble women and reconstruction period. She reports that the burden of the rubble removal and reconstruction fell primarily on women and the post-war mandatory employment continued until 1955. In our paper, we will focus not only on the rubble removal procedures but will look at the entire cohort of rubble women, which could have worked either in rubble removal, related activities or other professions now open to women.

Before the WWII, German women were restricted to certain professions such as teaching and working in agriculture. In Nazi Germany, women were seen as mothers and housewives and having children was one of their primary duties. During this time, women benefited from generous family allowances to give up their work and raise their children (Heineman 1996). Contrary to this, during the postwar period due to shortages in the workforce and to rebuild Germany more and more women were needed to work in the reconstruction and the rubble removal. In the immediate postwar period, marriage rates increased as a higher number of marriages were postponed due to the war. The shortage of males and the fear of remaining single were present and women wanted to marry and start a stable family life (Delille and Grohn 1985; Heineman 1996). At the same time, high number of divorces also took place until 1950 (Delille and Grohn 1985).

The puzzle on the role of the rubble women in postwar Germany and long-term consequences of postwar mandatory employment on these women is not settled. On the one hand, historical literature suggests that the emergence of the rubble women could be seen as the "Hour Zero" of the German female emancipation (Unruh 1987; Jenk 1988; Hoehn 1997; Meiners 2011). On the other hand, another strand of historical research argues that these rubble women left the work force after the mandatory employment law was abolished in 1955 and became housewives again (Heineman 1996; Donath 2008; Meiners 2011), similar to the U.S. phenomenon of the Rosie the Riveter (Goldin 1991).<sup>5</sup>

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<sup>5</sup>For further details on the historical debates see Akbulut-Yuksel Khamis and Yuksel (2011).

Given that only 50 percent of women are in the work force in Germany today and very few of them hold top-management positions (New York Times 2011), the effectiveness of postwar mandatory employment on long-term mobilization of German women still remains in the focus of public policy debates and requires rigorous scrutiny. To the best of our knowledge, this paper is the first that quantifies the causal impacts of postwar reconstruction and mandatory employment on the German women’s long-term family formation outcomes such as marriage, age at first marriage and divorce.

### 3 Identification Strategy

Our identification strategy for the causal effects of postwar mandatory employment on the long-term social outcomes of German women is a difference-in-differences-type strategy where the "treatment" variable is an interaction between city-level intensity of wartime destruction and a dummy for being of working- and marriage-age during the implementation of Allied Control Council’s Command Nr. 3 and Law Nr. 32.<sup>6</sup> In particular, the proposed estimate of the average treatment effect is given by  $\beta$  in the following baseline city and birth year fixed effects equation:

$$Y_{irt} = \alpha + \beta \text{Destruction}_r * \text{RubbleWomen}_{it} + \delta_r + \gamma_t + \pi' \mathbf{X}_{irt} + \epsilon_{irt} \quad (1)$$

where  $Y_{irt}$  is the outcome of interest for female  $i$ , in city  $r$ , born in year  $t$ .  $\text{Destruction}_r$  is the measure of war damage in the city  $r$ , which determined the mobilization of the women in the city during the reconstruction.  $\text{RubbleWomen}_{it}$  is a dummy variable that takes a value of 1 if female  $i$  was born between 1920 and 1934 and zero otherwise.  $\delta_r$  is city-specific fixed effects and  $\gamma_t$  is the birth year fixed effects.  $\mathbf{X}_{irt}$  is a vector of individual and household characteristics including a rural dummy, own and household

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<sup>6</sup>This paper provides evidence on the impact of postwar mandatory employment using city-by-cohort variation in reconstruction within Germany; therefore this approach may yield lower bound estimates for the aggregate nation-wide effects of postwar mandatory employment on long-term female marriage outcomes.

head's years of schooling. The standard errors are clustered by the city.

Women born between 1920 and 1934 form the treatment group since they were 21 and older when the mandatory labor law was abolished in 1955; therefore their labor and marriage outcomes have the potential to be affected by postwar mandatory employment. On the other hand, marriage outcomes of women who entered the labor market after the reconstruction period was completed in the late 1950s would not have been impacted by the mandatory employment law; therefore, women born between 1940 and 1954 are in the control group.

In order to interpret  $\beta$  as the effect of working in the postwar reconstruction, we must assume that had WWII destruction not occurred, the difference in marriage outcomes between the affected cohorts and the control cohorts would have been the same across cities with varying intensity of the postwar reconstruction. Using cohort-specific analysis, Akbulut-Yuksel, Khamis and Yuksel (2011) indeed show that participating in the postwar mandatory employment has only affected the employment probability of women born between 1920 and 1934, while postwar reconstruction had no effect on the long-term labor supply of earlier and later birth cohorts.

## 4 Data and Descriptive Statistics

As a measure of war destruction, we use residential rubble in  $m^3$  per capita accumulated in German cities by the end of WWII which was reported in a survey undertaken by the German Association of Cities (Kaestner 1949).<sup>7</sup> In order to examine prewar city conditions and to assess the mechanisms through which post-WWII reconstruction and mandatory employment might have affected long-run outcomes of German women, we gathered unique data from various years of the German Municipalities Statistical Yearbooks. First, we assembled city-level data on the postwar female/male ratio, the female

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<sup>7</sup>Rubble arising from the destruction of industrial buildings, inventories, machines and traffic facilities was not included in the calculations.

employment share and per capita war relief payments received by citizens after WWII. Second, we compiled data from the 1939 German Municipalities Statistical Yearbook on prewar city characteristics including average income per capita, city area and population density.

The data on individual and household characteristics are from the confidential version of the German Microcensus.<sup>8</sup> The German Microcensus includes 1% of the resident population in former West Germany, and is a large, representative sample containing comprehensive information on individual and household characteristics. The German Microcensus also contains information on all household members and has a very high response rate of approximately 97%. We use data from the 1978, which is the first wave that reports female education, the city they reside and whether respondents were residing within the borders of former West Germany in 1939. We restrict the main empirical analysis to women who were born between 1920 and 1954 in Germany. We dropped the women that were born between 1935 and 1939 from the analysis since they were partially exposed to postwar reconstruction. Additionally, in order to capture females that are active in the marriage and labor market, we exclude individuals who are students in 1978 from the analysis.

We consider the WWII reconstruction impacts at the 'Raumordnungsregionen' level ("ROR", or "city"). RORs are "spatial districts" determined by the Federal Office for Building and Regional Planning (Bundesamt fuer Bauwesen und Raumordnung, BBR) based on economic interlinkages and commuting flows of areas. RORs encompass the aggregation of 'Landkreise' and 'kreisfreie Staedte' (administrative districts, which are analogous to counties in the U.S.) and represent the center of the local labor market and surrounding small towns and rural areas (Jaeger et al., 2010). We restrict our analysis to former West Germany, for which we have the wartime destruction data. West Germany had 38 different 'Raumordnungsregionen' in 1978 (see Figure 2 for detailed information

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<sup>8</sup>Research Data Center (RDC) of the Federal Statistical Office of Germany and the Statistical Offices of the Laender, Microcensus 1978, own calculations.

on the RORs). The Microcensus asks respondents whether their residence was within the borders of former West Germany in 1939. We exclude from the analysis individuals who were born outside the former West Germany or residing outside of West Germany in 1939.<sup>9</sup>

Table 1 presents the descriptive statistics for population-weighted city-level war destruction measures and variables measuring city's prewar conditions. In Section 5, we will evaluate the war effects at the average population-weighted rubble in  $m^3$  per capita. Table 1 shows that German cities had 12.9 rubble in  $m^3$  per capita by the end of WWII on average. However, there was variation across cities in the destruction intensity. Table 1 points out those women in cities with above-average destruction were exposed to around three times the rubble per capita compared to women in cities with below-average destruction. Moreover, highly destroyed cities were larger in area and have higher population density and average income per capita before WWII. The difference-in-differences strategy we propose in our study therefore uses within-city cross-cohort variation to identify the effects of postwar mandatory employment on women's long-term family formation outcomes, and controls for differences between birth cohorts that are common across German cities.

Table 2 shows the descriptive statistics for the family formation and the main control variables we use in our estimation. We estimate being currently and ever married, divorced and age at first marriage as family formation outcomes. The entire estimation sample consists of women born between 1920 and 1954. We find that about 80.6 percent of the entire sample is currently married and 4 percent is currently divorced in 1978. These women enter into their first marriage at the age of 23.4 on average and had 10.4 years of schooling.

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<sup>9</sup>The data on rubble in  $m^3$  per capita is available for almost all municipalities with more than 12,000 inhabitants in 1939. To obtain the regional averages of all destruction measures, we merge municipalities in 1939 using the 1978 ROR borders. Each of these municipalities was part of the current-day RORs in 1978.

## 5 Estimation Results

As mentioned in the background section, previous historical research proposes two potential long-term paths for rubble women. The first set of studies asserts that the postwar mandatory employment launched the female liberation process in Germany, which was followed by the continual presence of women in the work force in large numbers and an increase in the divorce rates. On the other hand, a competing story was put forward by other history scholars which argues that the positive effects of postwar mandatory employment on the emancipation of German women was short-lived and the traditional gender roles were restored shortly after the reconstruction was over. Women were married and returned to their kitchens to work at home. Therefore, it is of interest to analyze whether the participation in postwar mandatory employment had an influence on the family formation of German women.

Table 3 reports the results of estimating Equation (1) where the dependent variable is the probability of being currently married. Each column is from a separate regression that controls for city and birth year fixed effects along with a rural dummy. The first row reports the difference-in-differences estimate,  $\beta$ , which shows the effect of postwar mandatory employment on the probability of being currently married. Column (1) presents the positive and significant difference-in-difference estimate of 0.0011, which suggests that rubble women residing in a city with average destruction are 1.5 percentage points more likely to be currently married. This is the difference-in-difference coefficient  $\beta$  (0.0011) multiplied by the average population-weighted rubble in  $m^3$  per capita (12.91  $m^3$ ) in Table 1. Hence, rubble women who lived in a heavily destroyed city such as Cologne during WWII, with 25.25  $m^3$  rubble per capita, have almost 3 percentage points higher probability of being married in 1978 relative to rubble women residing in Munich, a less destroyed city with 6.50  $m^3$  rubble per capita.

Columns (2) and (3) of Table 3 report the analyses incorporating individual and household characteristics, such as own and household head's years of schooling. The difference-in-difference estimates in Columns (2) and (3) are quantitatively similar to the

baseline specification which supports the interpretation of the difference-in-difference estimates as due to postwar mandatory employment as opposed to omitted variables.

In Column (4), we account for the potential factors that might confound the postwar mandatory employment effects. One of the potential confounding factors for the results summarized in columns (1)-(3) is the change in the composition of the population in postwar years. First potential source for this change is war-induced change in the female/male ratio in postwar Germany. As mentioned in the background section, Germany lost a substantial fraction of its male population during WWII, which reduced the number of potential spouses for women. On the other hand, the war casualties increased the need for female manpower in the postwar reconstruction (Heineman 1996; Meiners 2011). We account for the nation-wide decline in the male population in our analysis by controlling for birth year fixed effects. However, some cities might have experienced a greater decrease in their male population; thus the probability of marriage might have been lower in these cities after WWII regardless of the amount of wartime destruction experienced in the city. We address this potential concern by including the interaction of the city-level female/male ratio in 1946 and an indicator for being in the affected group in our analysis.

The second source for the population change might be internal and international migration. Internal migration within Germany is unlikely to be a concern for our analysis; hence it is extensively documented that Germany has historically low levels of geographic mobility relative to the U.S. and U.K. (Rainer and Siedler 2005; Hochstadt 1999). The annual migration rate between states was around 0.02 among native Germans in former West Germany during the period of 1950 to 1970 (Hochstadt 1999). Moreover, historical accounts report that wartime displacement was temporary, where the urban population returned to its prewar levels by 1948 (Hochstadt 1999). Nevertheless, as robustness check, we estimate whether the rubble women's migration decision was affected by the wartime destruction using the German Socio-Economic Panel (GSOEP), which allows us to determine whether internal migration occurred. Women are coded

as movers if they report that they no longer reside in their childhood city or area in 1985.<sup>10</sup> Results are summarized in the first two columns of Appendix Table 1. The difference-in-difference estimates for probability of moving are close to zero and statistically insignificant in every specification. This suggests that the rubble women did not choose their final destination according to the relative destruction in the cities, which lends credence to the estimation results presented in Table 3.

On the other hand, Germany experienced an influx of German refugees from the former parts of Germany and Soviet Zone/GDR after WWII and the arrival of 3 million guest workers from developed and developing countries in 1970s. These German refugees and international migrants might have settled in less destroyed cities due to the availability of housing and job opportunities. Alternatively, highly destroyed cities might have attracted a large number of postwar economic migrants seeking to take part in reconstruction efforts and work in the newly-established factories, especially guest workers in 1970s. Therefore, it is not as clear how the presence of German refugees and international migrants in the city would affect the rubble women's marriage outcomes. Hence, their presence likely reduces the demand for female labor in a given city, while increasing the availability of potential spouses for the rubble women. To account for this potential concern arising from international migration, we use information on individual's refugee and migration statuses reported in the German Microcensus and calculate the average share of refugees and international migrants in each city in 1978.<sup>11</sup> We interact these city-level measures of the population change with being in the affected cohort

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<sup>10</sup>The GSOEP provides information on the respondent's RORs starting from 1985; therefore we use the 1985 wave for the internal migration analysis.

<sup>11</sup>Luettinger (1986, p.21-22) suggests that in the German displaced persons law passed in 1953, refugees are defined as the individuals who migrated from the Soviet Zone/GDR (Fluechtlingsausweis C, refugee card C). On the other hand, according to the same law, displaced people are subdivided into two groups as follows: (a) displaced individuals who lived in the Eastern regions on 1.1.1937 (Vertriebenenausweis A, displaced person card A) (b) displaced individuals who lived in the German Eastern regions on 1.1.1939 (Vertriebenenausweis B, displaced person card B). Moreover, the German displaced persons law applies not only to the original refugees and displaced people but also to the individuals who were born in the refugee and displaced households after the displacement. The status therefore is transferred over generations through birth.



and add them as controls in Column (4).

Another related concern underlying the estimated effects may be the differential postwar demand for female labor which is another important determinant for marriage decision in each city. That is, some cities might have invested in more female-dominated sectors such as service and public sectors; thereby permanently increasing the demand for female labor in these cities after the reconstruction period was over. To capture the postwar demand for female labor in each city, we collected city-level data on the share of female workers in the total work force in 1949 and include the interaction of this variable with being rubble women.

Other confounding factor would be the change in the household wealth during and after WWII. Historical accounts document that German households lost 80% of their savings during WWII (German Municipality Statistical Yearbooks). Moreover, AAF area bombings destroyed more than 40 percent of the houses nationwide, which left people homeless or in partially destroyed homes. This decrease in savings and wealth would have induced a higher number of women to seek employment to support their families as a main breadwinner and as an added worker even after the postwar mandatory employment was over. Along the same lines, more generous war relief payments from the government would provide a safety net for the rubble women and help them to support themselves and thereby stay single or get divorced. To account for the changes in household wealth, we assembled city-level data on the average per capita war relief payments distributed by the federal government after WWII. Using this information, we control for the interaction between war relief payments and being in the affected cohort in column (4).

Finally, the postwar state-specific policies might differentially affect the postwar cohorts in cities with higher wartime destruction. The extent of such potential bias is largely mitigated by the fact that we use a lower level of geographical aggregation than the state in estimating the long-term effects of working in postwar reconstruction on family formation which allows us to explore within state variation. Nonetheless, as ro-

bustness, in column (4), we control for the interaction of state dummies with year of birth dummies in addition to postwar city-level characteristics.

Column (4) shows that rubble women were less likely to be married at the time of the survey if they reside in a city with more generous war relief payments, while we find that female/male ratio, migrant and refugee ratios and female employment share have no differential effects on the probability of being currently married in 1978. Essential to our analysis, the difference-in-difference estimate for wartime destruction in column (4) is quantitatively and statistically similar to the baseline specification which suggests that our results are robust to inclusion of state-specific cohort trends and potential confounding factors.

Results presented in Table 3 would also be confounded by the probability of the differential mortality across German cities. Columns (3) and (4) of Appendix Table 1 presents the mortality results for the rubble women. For the mortality analysis, we use the German Socioeconomic Panel (GSOEP) as the Microcensus only provides cross-sectional information and we cannot follow individuals over time to understand whether selective mortality occurred over time. The panel structure of GSOEP allows an analysis of the mortality of the respondents between 1985 and 2011. The mortality variable refers to a dummy variable that takes a value of 1 if an individual has a recorded death year sometime between 1985 (the beginning of our sample) and 2011, and zero otherwise.<sup>12</sup> All the difference-in-difference coefficients in columns (3) and (4) are statistically insignificant and close to zero; therefore it is unlikely that the results presented in Table 3 are confounded by the differential mortality rates across cities.

Having shown that postwar mandatory employment increased the propensity of currently being married among the rubble women, in Table 4, we now estimate how working in the postwar reconstruction affected these women's probability of ever getting married. Women are coded as being ever married if they report that they are currently married, divorced or widows at the time of the survey. Our preferred specification pre-

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<sup>12</sup>Information on an individual's death year in GSOEP comes from official vitality records.

sented in Column (4) shows that the rubble women in Cologne are 3 percentage points more likely to be ever married relative to the rubble women in Munich after controlling for potential state-specific postwar policies and the change in the composition of population, the demand for female labor and household income. We also find in column (4) that in cities with higher percentage of male population and international migrants who were predominantly male, the rubble women have a higher propensity to be ever married. Similarly, column (4) indicates that the rubble women residing in cities with higher female employment share in 1949 are more likely to report being ever married at the time of the survey. Hence Table 3 documents no such positive female employment effect for being currently married, findings in column (4) likely stem from the rubble women who were divorcees or widows in 1978. This suggests that higher demand for female labor in their city enabled these women to postpone or relinquish remarriage.

Table 5 presents the results for the divorce rates of rubble women using a linear probability model. None of the difference-in-difference estimates for postwar reconstruction are statistically significant in Table 5, which suggests that the postwar mandatory employment had no differential effect on the rubble women's probability of getting divorced in the future. The results summarized in Tables (3)-(5) therefore point out that mandatory employment led the rubble women to enter into marriage, stay married and likely raise their kids at home after the postwar mandatory employment.

Finally, we estimate the effects of postwar mandatory employment on the rubble women's age at first marriage in Table 6. The difference-in-difference estimates in Table 6 suggest that the participation in the postwar reconstruction efforts reduced the age at first marriage for the rubble women by almost half a year if they were in highly destroyed city. The German women who were affected by the postwar mandatory employment law therefore had a limited time to gain experience in the labor market and establish themselves in their professions before they were married and had children. As a consequence, they had a weaker labor market attachment and a lower probability of going back to work after child bearing years, which is indeed what Akbulut-Yuksel,

Khamis and Yuksel (2011) show.<sup>13</sup>

## 6 Discussion and Conclusion

This paper provides the first causal evidence on the consequences of postwar mandatory employment on German women's long-term family formation outcomes. We exploit the plausibly exogenous city-by-cohort variation in the postwar mobilization of German women which was determined by wartime destruction experienced in each German city during WWII. We combine a unique city-level data on the physical destruction experienced in German cities with the 1978 German Microcensus. Our results show that the rubble women were more likely to be currently and ever married at the time of the survey and marry at younger ages, whereas we find no differential effect of postwar mandatory employment on these women's divorce rates. Our results therefore indicate that many of rubble women went back to work at home and marry, similar to the experience of the "Rosie the Riveter" in the U.S. This can be explained by the large double-burden that this cohort of women was exposed to during the postwar reconstruction period: physical strenuous work and also additional work at home to gather the bare necessities for survival, which led to over 16 hour work days on average (Kuhn 1984). Taken together, these findings suggest that the positive effects of the mandatory employment on the emancipation of German women were brief, thereby underlining the importance of persistent economic policies to attain permanent and long-lasting gains on the emancipation and standing of women in the society.

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<sup>13</sup>Moreover, we estimate the effects of the mandatory employment law on rubble women's fertility. However, these analyses warrant caution since the Microcensus only provides information on the number of children still residing within the same household as their mothers. Hence, children of the rubble women may have already moved out as the rubble women were married earlier and probably had children at younger ages; it is likely that we focus on a selective group in our fertility analysis, which renders statistical inference difficult.

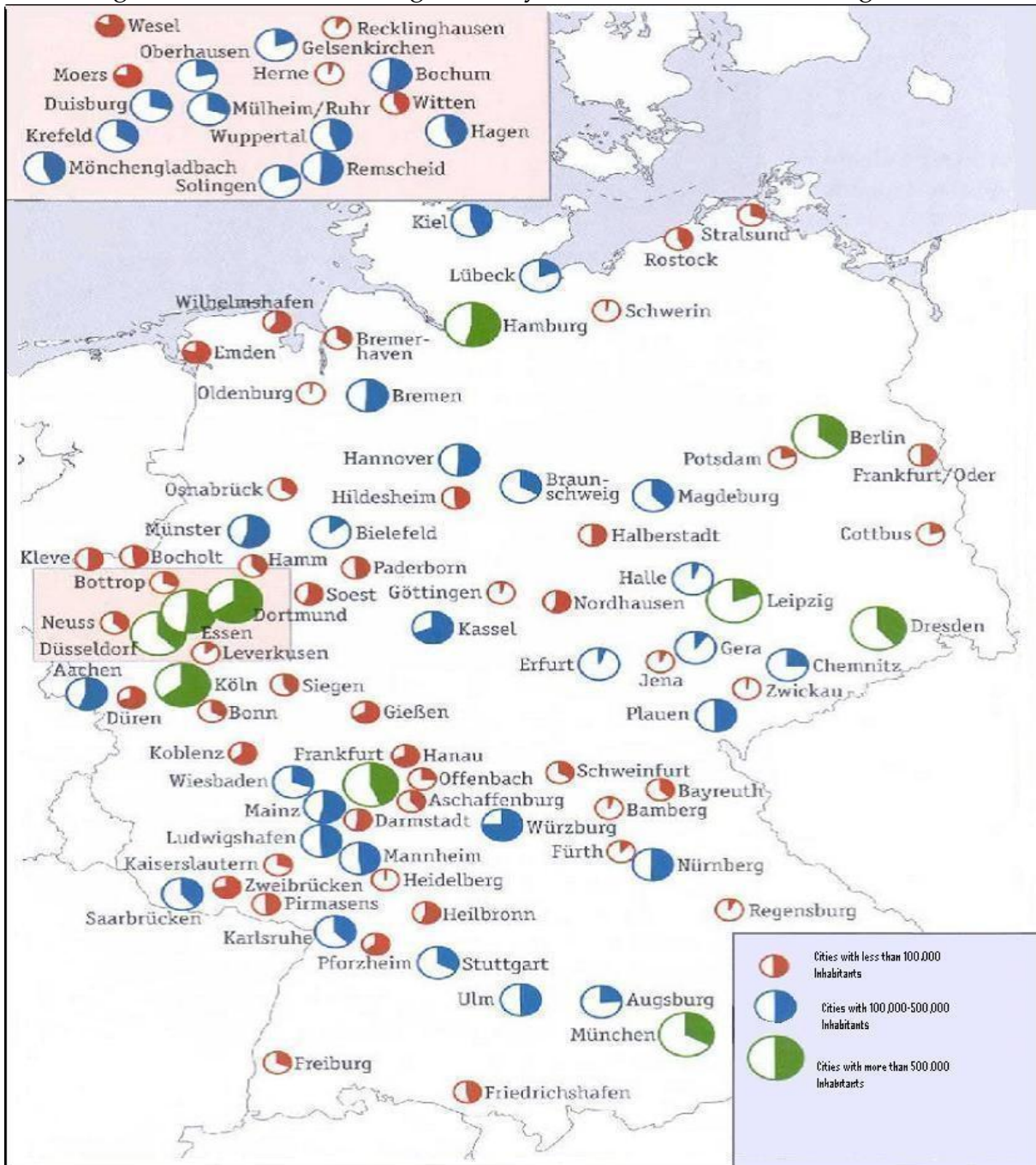
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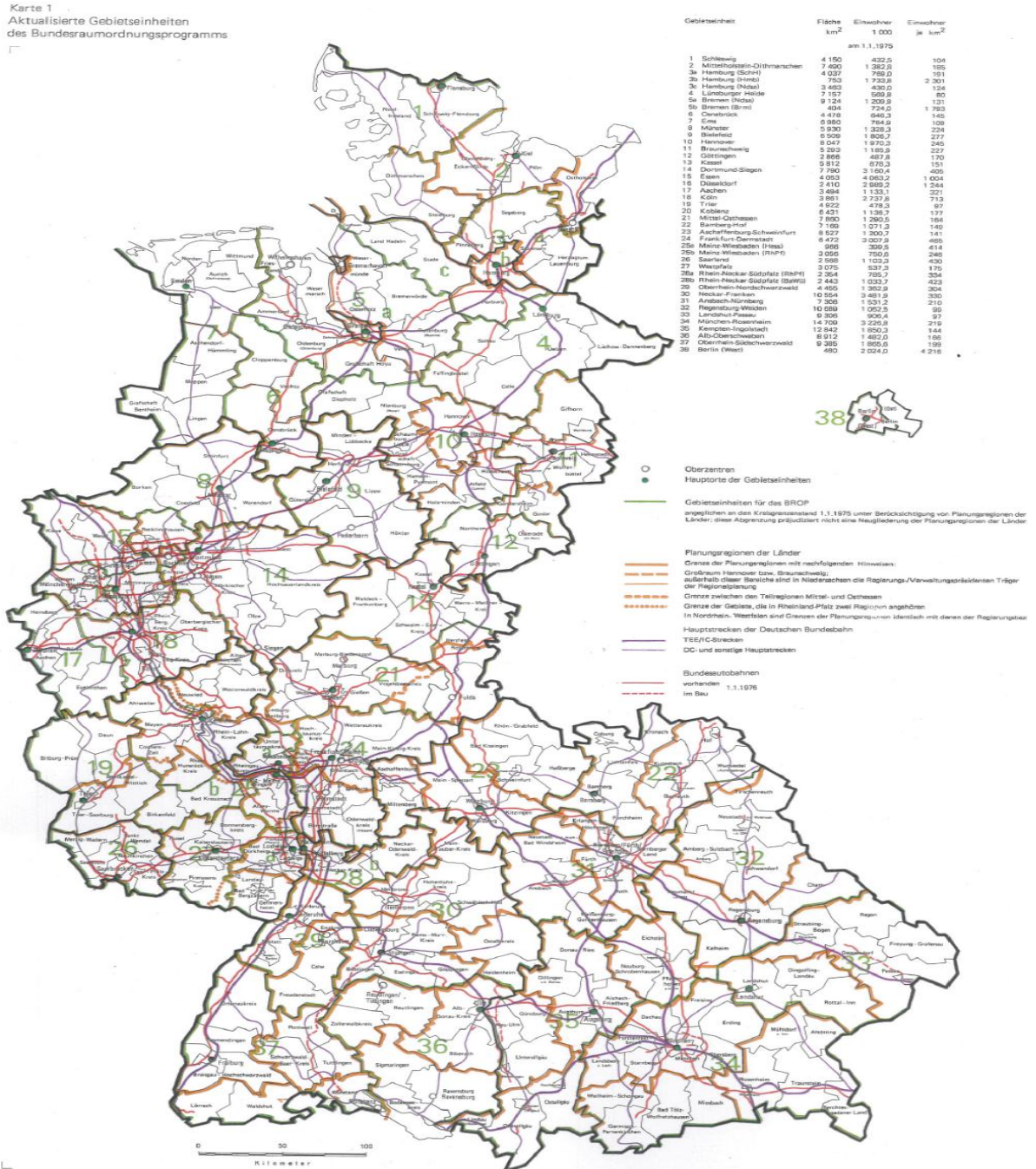
Figure 1: Share of Dwellings Destroyed in German Cities during WWII



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 Raumordnungsregionen (RORs or Cities) in Former West Germany



Source: Federal Office for Building and Regional Planning (Bundesamt fuer Bauwesen und Raumordnung, BBR). There are 38 regional policy regions (RORs) in former West Germany in 1978.

Table 1: Descriptive Statistics for WWII Destruction

	All	Cities with Above avg. Destruction	Cities with Below avg. Destruction	Difference s.e (Difference)
	(1)	(2)	(3)	(4)
Rubble in $m^3$ per Capita	12.910 (7.201)	18.487 (4.446)	6.425 (3.419)	12.062*** (0.133)
Housing Units Destroyed (%)	37.224 (18.557)	49.706 (12.143)	25.823 (15.874)	23.882*** (0.479)
Total bombs dropped in tons	25,036 (22,507.6)	36,333 (25,566.1)	14,717 (12,223.1)	21,616*** (664.975)
Area in $km^2$ in 1938	253.296 (238.281)	359.747 (292.370)	156.060 (103.811)	203.687*** (7.255)
Population Density in 1939	2,011 (909.237)	2,218 (946.585)	1,821 (829.899)	397*** (29.881)
Income per Capita in RM in 1938	467.317 (106.305)	501.933 (68.110)	432.556 (124.841)	69.377*** (3.760)
N	93,403	48,748	44,655	93,403

Notes: Data are from several years of the German Municipalities Statistical Yearbook and the 1978 German Microcensus. The sample consists of Raumordnungsregionen ("RORs" or "cities") in the former territory of West Germany. 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 wartime destruction.

Table 2: Descriptive Statistics, Microcensus Data

	All (1)	Women born btw. 1920–1934 (2)	Women born btw. 1920–1934 (3)
Currently Married	0.806 (0.395)	0.793 (0.405)	0.820 (0.384)
Ever Married	0.883 (0.321)	0.905 (0.293)	0.861 (0.346)
Divorced	0.043 (0.204)	0.040 (0.196)	0.046 (0.210)
Age at Marriage	23.352 (5.199)	25.165 (5.994)	21.448 (3.258)
Years of Schooling	10.410 (1.860)	9.995 (1.566)	10.820 (2.029)
Employment	0.499 (0.500)	0.446 (0.497)	0.551 (0.497)
Has Gymnasium Diploma or More	0.050 (0.218)	0.035 (0.185)	0.064 (0.245)
Technical High School Diploma	0.179 (0.383)	0.125 (0.331)	0.232 (0.422)
Basic High School Diploma	0.762 (0.426)	0.832 (0.373)	0.692 (0.462)
Years of Schooling of Household Head	11.040 (2.141)	10.719 (1.935)	11.360 (2.284)
Rural	0.565 (0.496)	0.563 (0.496)	0.566 (0.496)
N	93,403	46,673	46,730

Notes: Data are from the 1978 German Microcensus. The sample consists of individuals born between 1920 and 1954. Individuals born between 1935 and 1939 are dropped from the analysis since they were partially exposed to the postwar reconstruction. Standard deviations are presented in parentheses.

Table 3: Effect of Postwar Mobilization on Being Currently Married

	(1)	(2)	(3)	(4)
Rubble per Capita x Born btw. 1920-1934	0.0011** (0.0005)	0.0012** (0.0005)	0.0013*** (0.0005)	0.0012** (0.0006)
Years of Schooling		-0.0199*** (0.0010)	-0.0552*** (0.0013)	-0.0551*** (0.0013)
Years of Schooling of Household Head			0.0477*** (0.0010)	0.0477*** (0.0010)
Female/Male Ratio x Born btw. 1920-1934				-0.0010 (0.0008)
Female Employment Share x Born btw. 1920-1934				0.0018 (0.0012)
Per Capita War Relief Payments x Born btw. 1920-1934				-0.0022** (0.0009)
Migrant Share x Born btw. 1920-1934				0.0001 (0.0010)
Refugee Share x Born btw. 1920-1934				-0.0006 (0.0009)
$R^2$	0.0486	0.0568	0.0951	0.0965
N	90,806	87,180	86,103	86,103
State-Cohort Trends				Yes

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (\*=.10, \*\*=.05, \*\*\*=.01). The control group is individuals born between 1940 and 1954. Each column is from a separate regression which controls for city and birth year fixed effects and a rural dummy. Data are from the 1978 German Microcensus.

Table 4: Effect of Postwar Mobilization on Being Ever Married

	(1)	(2)	(3)	(4)
Rubble per Capita x Born btw. 1920-1934	0.0006** (0.0003)	0.0007** (0.0004)	0.0009** (0.0004)	0.0016*** (0.0005)
Years of Schooling		-0.0227*** (0.0010)	-0.0405*** (0.0011)	-0.0404*** (0.0011)
Years of Schooling of Household Head			0.0241*** (0.0007)	0.0241*** (0.0007)
Female/Male Ratio x Born btw. 1920-1934				-0.0016** (0.0006)
Female Employment Share x Born btw. 1920-1934				0.0019** (0.0010)
Per Capita War Relief Payments x Born btw. 1920-1934				0.0004 (0.0008)
Migrant Share x Born btw. 1920-1934				0.0023*** (0.0008)
Refugee Share x Born btw. 1920-1934				-0.0002 (0.0007)
$R^2$	0.0517	0.0691	0.0848	0.0866
N	90,806	87,180	86,103	86,103
State-Cohort Trends				Yes

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (\*=.10, \*\*=.05, \*\*\*=.01). The control group is individuals born between 1940 and 1954. Each column is from a separate regression which controls for city and birth year fixed effects and a rural dummy. Data are from the 1978 German Microcensus.

Table 5: Effect of Postwar Mobilization on Divorce

	(1)	(2)	(3)	(4)
Rubble per Capita x Born btw. 1920-1934	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0002 (0.0002)	0.0002 (0.0003)
Years of Schooling		-0.0009** (0.0005)	0.0073*** (0.0005)	0.0073*** (0.0005)
Years of Schooling of Household Head			-0.0111*** (0.0003)	-0.0111*** (0.0003)
Female/Male Ratio x Born btw. 1920-1934				0.0003 (0.0004)
Female Employment Share x Born btw. 1920-1934				0.0004 (0.0006)
Per Capita War Relief Payments x Born btw. 1920-1934				0.0009* (0.0005)
Migrant Share x Born btw. 1920-1934				-0.0007 (0.0006)
Refugee Share x Born btw. 1920-1934				0.0009* (0.0005)
$R^2$	0.0141	0.0142	0.0221	0.0227
N	90,806	87,180	86,103	86,103
State-Cohort Trends				Yes

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (\*=.10, \*\*=.05, \*\*\*=.01). The control group is individuals born between 1940 and 1954. Each column is from a separate regression which controls for city and birth year fixed effects and a rural dummy. Data are from the 1978 German Microcensus.

Table 6: Effect of Postwar Mobilization on Age at First Marriage

	(1)	(2)	(3)	(4)
Rubble per Capita x Born btw. 1920-1934	-0.0140** (0.0060)	-0.0141** (0.0060)	-0.0130** (0.0059)	-0.0160** (0.0074)
Years of Schooling		0.3836*** (0.0104)	0.1238*** (0.0120)	0.288*** (0.0128)
Years of Schooling of Household Head			0.2888*** (0.0127)	0.1250*** (0.0120)
Female/Male Ratio x Born btw. 1920-1934				-0.0008 (0.0109)
Female Employment Share x Born btw. 1920-1934				0.0219 (0.0155)
Per Capita War Relief Payments x Born btw. 1920-1934				-0.0194 (0.0132)
Migrant Share x Born btw. 1920-1934				0.0794*** (0.0130)
Refugee Share x Born btw. 1920-1934				-0.0349*** (0.0128)
$R^2$	0.1727	0.1888	0.19	0.1909
N	80,134	76,913	75,939	75,939
State-Cohort Trends				Yes

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (\*=.10, \*\*=.05, \*\*\*=.01). The control group is individuals born between 1940 and 1954. Each column is from a separate regression which controls for city and birth year fixed effects and a rural dummy. Data are from the 1978 German Microcensus.

Table A-1: Robustness Checks

	Internal Migration		Mortality	
	(1)	(2)	(3)	(4)
Rubble per Capita x Born btw. 1920-1934	-0.0027 (0.0035)	-0.0026 (0.0035)	-0.0014 (0.0028)	-0.0015 (0.0028)
Years of Schooling		0.0382*** (0.0063)		-0.0038 (0.0047)
$R^2$	0.113	0.134	0.271	0.271
N	1,975	1,966	1,983	1,974

Notes: Standard errors clustered by cities are shown in parentheses. Asterisks denote significance levels (\*=.10, \*\*=.05, \*\*\*=.01). The control group is individuals born between 1940 and 1954. Each column is from a separate regression which controls for city and birth year fixed effects and a rural dummy. Data are from the 1985 GSOEP.