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ABSTRACT

On the Origin and Composition of the German East-West Population Gap*

The East-West gap in the German population is believed to originate from migrants escaping the socialist regime in the German Democratic Republic (GDR). We use newly collected regional data and the combination of a regression discontinuity design in space with a difference-in-differences approach to document that the largest part of this gap is due to a massive internal migration wave 3 years prior to the establishment of the GDR. The timing and spatial pattern of this migration movement suggest that the dominant motive was escaping physical assault by the Soviet army and not avoiding the socialist regime. The skill composition of these migrants shows a strong positive selection. The gap in population has remained remarkably sharp in space and is growing.

JEL Classification: N44, N94, R23, R11, R12, J61

Keywords: institutions, wartime violence against civilians, selective migration, regional migration, World War II, Germany, spatial distribution, regional economic activity

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1 Introduction

At the end of WW2 Germany was divided. The separation of this single nation proceeded in two steps. First, in 1945, Germany was divided by the victorious Allies into four occupation zones (see left map in Figure 1). Second, in 1949, it was divided in two countries. These two distinct political entities undertook the process of reconstruction, each guided by its own set of ideological principles (Witte and Wagner, 1995). Citizens in the 'East' were exposed to a centrally planned and largely state-owned economy. Citizens in the 'West' experienced the famous *Wirtschaftswunder* with economic aid provided by the US and the Marshall Plan in a free market economy. In 1990, the division of Germany came to an end.

This unique policy episode has attracted the attention of scholar across social sciences. A large number of studies in economics exploit it as a natural experiment to study the effect of institutions in post-reunification data. This approach rests on the assumption that the division of Germany was uncorrelated with confounding factors. Studies in contemporary German history, however, point to East-West migration in the aftermath of WW2 (see, e. g., Fassmann and Münz, 1994; Grundmann, 1998). These studies use aggregate statistics (similar to the upper Panel in of Figure 2)[1] and refer to changes in population over longer periods of time (such as 1945 to 1990). Thus, the exact timing and the spatial pattern of this migration wave is not documented. Nevertheless, this literature postulates that the origin of this migration movement is the emerging socialist regime in the East.

We provide evidence that the East-West gap in population originates from an internal migration wave of positively selected individuals that pre-dates the institutional shock. The bulk of the East-West migration took place during the period of the *Allied-occupied Germany*. Only a small fraction of the East-West migration in the aftermath of WW2 can be attributed to refugee flows after the establishment of the *German Democratic Republic* (GDR). The specific timing and spatial pattern of the initial migration wave suggest that the dominant motive of migrants was escaping physical assault by the Soviet army and not the emerging socialist regime. This finding is not only interesting from a cliometric perspective, but has also ramifications for the economic literature exploiting the division and reunification of Germany as a natural experiment to identify the impact of institutions. Our findings on the timing and composition of the East-West migration renders the interpretation of these studies to be difficult.

[1] Figure 2 shows, relative to the year 1939, a diverging trend in the population levels in the East versus the West. In the East, the total population (see upper panel), the urban population (see middle panel), and population in counties along the border (see lower panel) has decreased. The increase in the total German population between 1939 and 1946 is driven by the immigration of ethnic Germans from Eastern Europe, which overcompensate population losses due to WW2.

We further highlight that the East-West population gap has remained remarkably sharp in space at the former demarcation line until today and is still growing. This result speaks to the debate on the existence of multiple equilibria in economic geography and suggests the presence of large agglomeration economies.

Our empirical analysis is based on newly compiled regional data from population censuses spanning the period before, during and after WW2. We compare population levels between counties bordering the former demarcation line, established on 1 July 1945 as the boundary between the Western and Soviet occupation zones of former Nazi Germany. This line became the so-called *inner German border* in 1949 dividing East and West Germany until 1990. Our long series, dating back to 1900, allows us to demonstrate that the regions east and west to this border were following parallel trends in population development prior to WW2. This suggests that the exact position of the demarcation line was exogenous. We combine ideas from a *Difference-in-Differences* (DiD) approach with those from a *Regression Discontinuity Design* (RDD) to show that the divergence in population levels between the East and the West can be traced back to the period between January 1945 and October 1946. In this short period of time, the population level in the East had dropped by almost 20 percent.[2] The population leaving the East was positively selected in terms of occupation as compared to the stayers. Over the subsequent 15 years, when escaping the East was still relatively easy, the population gap had only increased by another 5.1 percentage points. Thus, the largest part of the East-West migration was completed 3 years prior to the establishment of the GDR (in 1949), and 16 years before the construction of the Berlin Wall (in 1961).

We consider two competing explanations for the massive migration wave. First, migrants may have reacted to an *expected* institutional shock (and not as widely believed to an actual change in institutions). This explanation presumes that the vast majority of the German population had correct believes about the political future of the East already in the year 1945/46. The second explanation is that migrants reacted to the immediate threat of physical and sexual violence by the Soviet army, which successfully entered Germany in January 1945 on the Eastern Front. The specific timing of the migration wave and the second discontinuity in population density it created at the Line of Contact within the East, suggest that escaping the Soviet army (and not the socialist regime) was the main motive to migrate. More importantly, we find that migrants to the West were positively selected by their skills. Workers with a background in agriculture were about 30 percent more likely to stay in the East, whereas workers in manufacturing had a higher likelihood to migrate to the West.

[2]Eder and Halla (2016) document a comparable migration response from the Soviet to the non-Soviet zone in the case of the Allied Occupation of Austria. Using a comparable method, they find a reduction in the population in the Soviet zone of 11 percent between 1939 and October 1946. They do not provide any evidence on the migrants motive.

Studies exploiting the division and reunification of Germany as a natural experiment aim to quantify the impact of the exposure to a socialist regime as compared to a democratic regime.[3] These studies provide overwhelming evidence for a significant East-West gradient and attribute this difference exclusively to institutional differences. The vast majority of these studies share three methodological features: First, they exclusively analyze post-reunification data. This can be explained by the lack of historical data of the outcomes under consideration. Second, they follow a reduced-form approach. They do not aim to identify a specific causal channel, but quantify an East-West gap at a certain point in time after reunification. Third, they do not exploit the *local* randomness (in space) generated by discontinuous border between East and West Germany.[4]

Our finding adds to this literature by providing new evidence on the causal driver of the onset of the East-West population gap and the positive selection of migrants.[5] Our result complicates the interpretation of these studies. Differences in post-reunification outcomes have two potential sources. They could either result from the exposure to the socialist regime and/or originate from the pre-existence of differences between stayers and movers and their offspring. While a detrimental causal effect of the exposure to the socialist regime is plausible, our evidence for the positive selection of East-West migrants in 1945/46 is also in line with worse post-reunification outcomes in the East.

In a second step, we use our research design to analyze the persistence of the East-West population gap in the post-reunification period. We find that the inner German border (i.e., the former demarcation line) left a remarkably sharp discontinuity in space with respect to population density. The East-West population gap is still increasing at this location.

[3]Most papers studying micro-level outcomes focus on human capital and social behavior. The human capital outcomes studied are labor productivity (Fuchs-Schündeln and Izem, 2012) and educational attainment (Fuchs-Schündeln and Masella, 2016). The list of social behavior and attitudes comprises political preferences (Alesina and Fuchs-Schündeln, 2007), trust (Rainer and Siedler, 2009), solidarity (Brosig-Koch *et al.*, 2011), gender attitudes (Bauernschuster and Rainer, 2012), self-reliance and entrepreneurship (Bauernschuster *et al.*, 2012), honesty (Ariely *et al.*, 2014), conspicuous consumption (Friehe and Mechtel, 2014), and tax morale (Möhlmann, 2014). Papers using more aggregated data study the effect on regional economic performance (Abadie *et al.*, 2015; Boltho *et al.*, 2018), and migration (see footnote 5).

[4]There are three notable exceptions. First, Redding and Sturm (2008a) analyze the effect of market access on the development of cities in West Germany using data covering the period from 1919 to 2002. Second, Ahlfeldt *et al.* (2015) develop a quantitative model of internal city structure and provide structural estimates of agglomeration and dispersion forces using block-level data from Berlin for the years 1936, 1986, and 2006. Third, Lichter *et al.* (2015) studies the effects of government surveillance in the GDR on social capital and economic performance after reunification.

[5]A number of quantitative papers study the East-West migration in the post-reunification period (Uhlig, 2008), when large parts of the German population moved from East to West leading to a widening in the population gap (see Figure 2). This literature analyzes the pattern and the composition of migration (Burda, 1993; Burda *et al.*, 1998; Hunt, 2006; Fuchs-Schündeln and Schündeln, 2009) and point to selective migration. Migrants to the West are comparably young, have above average education, and come from regions with low regional income. Workers recently laid-off have also a higher propensity to migrate.

While we cannot disentangle to which degree this persistence is caused by the migration wave in 1945/46 and how important the past institutional differences are, this result speaks to the literature in economic geography, which tries to explain the (uneven) distribution of population across space. In models featuring locational fundamentals, high population density is the consequence of inherent productivity advantages of a specific location (such as topographical and climatic characteristics) that cannot be influenced by migration or an institutional shock. In contrast, scale economy models stress the importance of local interaction of economic agents, in which higher population density endogenously leads to higher productivity in a location (Henderson, 1974; Krugman, 1991). Scale economy models generally allow for multiple equilibria. A sufficiently large population shock — such as East-West migration — might shift the local economy to another spatial equilibrium, if the shock sets free agglomeration forces that outweigh dispersion forces. In this way a temporary shock can affect long-run outcomes. In contrast, models stressing locational fundamentals predict a convergence back to the initial spatial equilibrium after a temporary shock.[6] Our finding clearly corroborates scale economy models.

2 Research Design

Our research design is based on the idea that the onset of the East-West population gap can be identified by focusing on migration movements around the East-West border. This border was established in 1945 within the *Allied-occupied Germany* as a demarcation line. In 1949, it became the inner German border dividing the GDR in the East and the *Federal Republic of Germany* (FDR) in the West. We have to overcome two challenges to identify the onset of the East-West gap in population at this discontinuity in space. First, we should allow for the possibility of unobserved differences between areas in the two occupation zones that were already in place before the demarcation line was decided. To do so, we have collected a long data series starting in the year 1900. These data allow us to compare population levels and trends across regions in a period before separation. It turns out that the regions east and west to the demarcation line had been following parallel trends in population development prior to WW2. This suggests that the exact position of the demarcation line was exogenous. Motivated by these parallel trends in the pre-occupation period, we assume in our analysis that the population trends would have been parallel in the absence of the

[6] Existing empirical papers testing these two theories (i. e., exploiting exogenous variations in scale, while holding locational fundamentals constant) find mixed evidence. While the findings in Davis and Weinstein (2002, 2008), Brakman *et al.* (2004), and Miguel and Roland (2011) support models of locational fundamentals, the evidence shown in Bosker *et al.* (2007) and Schumann (2014) favor scale economy models. Braun, Kramer and Kvasnicka (2017) aim to reconcile these findings with certain commuting streams.

separation later on.[7] Second, we have to be careful to rule out other time-varying confounding factors, such as differences in the proximity to Western markets in the post-WW2 period. To address this, we exploit the demarcation line as a discontinuity in space. Small geographic units bordering the demarcation line have the same geographic features and equal access to markets. More generally speaking, we assume that there are no confounding factors, which change discontinuously at the demarcation line.

2.1 Data

The history of the German nation over the last 100 years caused multiple shifts of borders at all administrative levels. The resulting lack of traceable administrative units makes it hard to connect data from population censuses over time. So far, economic scholars interested in longer series of German data have focused on larger cities (Brakman *et al.*, 2004; Bosker *et al.*, 2007; Redding and Sturm, 2008a), which are relatively easy to organize in a longitudinal data set. Since we are particularly interested in the development of population levels in a smaller geographic area around the former inner German border, a focus on cities is not conducive. Fortunately, we were successful in reconstructing a panel dataset at the county (*Kreis*) level.

The construction of our data set comprises three main steps. First, we collect data from historic population censuses covering the time period between 1900 and 2009 and calculate the population density of each historic county. For the years during WW2 we use data on the number of issued food stamps to approximate population. Second, we connect these historic county data with GIS-shapefiles of the respective historic county borders. Third, we superimpose the GIS-shapefile of the current county borders on historic population densities and calculate the average historic population density of each current county. This procedure provides us with an approximation of the true historic population levels in every current county.

We can assess the quality of our approximation by using special data from the state of Bavaria. Bavaria is the only region, which has official statistics on the historic population based on current county borders. This allows us to compare our approximation with exact data. It turns out that our approach works exceptionally well. We obtain a correlation coefficient between the log population variables in cross-sections of these two data sets covering the whole of Bavaria between 0.94 and 0.99.[8]

[7] We refrain from referring to our estimation procedure as a DiD approach, since a standard DiD approach assumes that only one group was affected by the treatment. We recognize that both the East and West have been affected by the events after WW2 and we aim to estimate the relative difference in population.

[8] Another way to assess the quality of our approximation is to plot the series for each county and to check for sudden jumps or drops. The vast majority of our series are very smooth. Appendix Table A.1 provides descriptive statistics for different sample definitions. Detailed data sources are listed in Appendix Table A.2.

2.2 Estimation Strategy

The core idea of our estimation strategy is to exploit the demarcation line (i. e., the latter inner German border) as a discontinuity in space. This lends itself to a conventional RD approach, where the distance to the demarcation line serves as the running variable. A drawback of this approach is the mismatch between a one-dimensional running variable in a two-dimensional plane. Our preferred approach accounts for the two-dimensionality of space in a simple but effective way. We focus on the sample of counties that border the demarcation line highlighted in the right map of Figure 1. Among these, we form pairs of areas that share a common border (which is the demarcation line). For each of these pairs we calculate the difference in the population level for each year and compare the mean of the differences over time. This approach translates into the following estimation model:

$$P_{i,j,t} = \alpha + \beta_t \cdot East_{i,j} + \phi_{j,t} \cdot Area\text{-}Pair_j + \varepsilon_{i,j,t}, \quad (1)$$

where $P_{i,j,t}$ is the log population in county i, belonging to pair j, measured in year t. The binary variable $East_{i,j}$ is equal to one if the county is in the East, and zero otherwise. The estimate of $\phi_{j,t}$ denotes a time-varying fixed-effect for county-pair j in year t. These are quite powerful controls, since they account for all time-varying factors that affect the population levels of bordering counties on both sides of the former demarcation line.

The parameters of primary interest are the β_t.[9] These parameters provide the average difference between the population of a county in the West to one in the East in a given year t relative to the baseline year of 1939. Estimates of β_t for years before WW2 test for differential pre-occupation trends and provide suggestive evidence for the parallel-trend assumption. Estimates of β_t post WW2 show at what point in time the East-West population gap arises and how it has developed over time. The estimate β_{1939} is the average difference in the outcome variable between counties in the East and the West in 1939.

By construction, many counties along the demarcation line appear in several area-pairs. Therefore, we cluster standard errors by area within a pair. In Section 3.4, we will demonstrate the robustness of our estimation results with respect to estimation method and sample choose. We will also discuss alternative approaches to calculate standard errors.

[9] We have six data points before WW2 (1900, 1910, 1919, 1925, 1933, 1939), three during WW2 (1943, 1944, 1945), one during the occupation period (1946), six during the division of Germany (1950, 1961, 1964, 1971, 1981, 1987), and three after reunification (1991, 2001, 2009). The year 1939 serves as the base year in all our estimations.

3 Estimation Results

Figure 3 depicts our estimation results of equation (1). More detailed estimation output is available in Column (I) of Table 1. The first important result is that all six estimates in the period before WW2 are statistically and economically insignificant. Thus, the population levels developed in the period from 1900 to 1939 almost identically on both sides of the demarcation line. During WW2 the relative distribution of the population between East and West had also remained constant. We do not find any statistically significant differences for the years 1943 to 1945 as compared to 1939. This supports the assumption that the *exact* position of demarcation line was exogenous.

The estimates for later years, will inform us about the onset of the East-West population gap and its later development. Below, we first discuss in Section 3.1 the onset, which can be located during the short period of the Allied-occupied Germany lasting from the end of WW2 until the division of Germany in 1949. We then describe the development of the gap from 1949 until the construction of the Berlin Wall in 1961. This period can be characterized by a very modest increase in the gap despite relatively open borders. In Section 3.2, we briefly comment on the development after the construction of the Berlin Wall until 1991. During this period East-West migration was strictly monitored and regulated. In Section 3.3, we discuss the development of the gap in the post-reunification period. Finally, in Section 3.4 we demonstrate the robustness of our findings with respect the specific sample and estimation method used.

3.1 The Origin of the East-West Population Gap

The most remarkable feature of Figure 3 is the sudden drop in population between January 1945 and October 1946. In this short period of time, the population level had dropped in the East by 18.4 percent. The most plausible explanation for this drastic change is a large migration wave from East towards West between January 1945 and October 1946. We see two potential causes for this migration movement.

First, the German population wanted to avoid an encounter with the Soviet army, which successfully entered Germany in January 1945 during the *Vistula-Oder-Offensive* on the Eastern Front, and escaped westbound. Due to Nazi propaganda demonizing communists, as well as factual reports on misconduct of the Soviet Army in Hungary, the German population was terrified by the Soviet Army. Sadly, the seeking of revenge and craving for booty indeed led to assaults on the local population. In particular, there is evidence for mass rapes taking place in connection with combat operations, but also during the subsequent occupation

(Dack, 2008).[10] By contrast, the reputation of the troops of the Western Allies, who entered the German border in the West about one month later, was much better. While there are also documented cases of rape, the incidence seems much lower.

Second, the German population may have had already formed correct expectation about the political future of the different occupation zones and their primary motivation for migration was to avoid living in a (Soviet led) communist country. Already starting with the *Tehran Conference* in 1943 the Allies started discussing a post-war division of Germany. However, only at the *Yalta Conference* in February 1945, the major Allies agreed on the boundaries of post-war occupation zones for Germany. The international press discussed, shortly before and after the *Tehran Conference*, the division Germany and even included some maps. However, these maps provided only a vague idea of the different zones. It is hard to reconstruct whether the German population, which had very limited access to international media, was aware of these plans.[11]

While the onset of East-West population gap can clearly be traced back to the period between January 1945 and October 1946, it is impossible to unambiguously uncover migrants' motivation. Below, we provide two findings, that provide at least suggestive evidence.

3.1.1 Timing of the Migration Wave

Between 1946 and our next data point in the year 1950, the East-West population gap increased only by about 3 percentage points. Until 1961, the gap increased further; but only modestly by another 1.9 percentage points. Thus, the bulk of the East-West migration was completed 3 years prior to the establishment of the GDR (in 1949), and 16 years before the construction of the Berlin Wall (in 1961). That means that about 80 percent of the migrants, leaving the East between 1945 and 1961, were actually not exposed to the socialist regime.

This specific timing of the East-West migration is more in line with the first motive (escaping the Soviet army) and less consistent with the second motive (escaping the socialist regime). After the establishment of the GDR there was no remaining uncertainty about the political future of the East. However, it was still possible to slip from East to West. Between 1950 and 1952, it was relatively easy to cross the inner German border at any location.[12]

[10] The best available evidence is for Berlin. Using information from hospital records, Johr (1992) estimates that in the period between April 1945 and September 1945 about 7 percent of all women of childbearing age were raped at least once by members of the Soviet army.

[11] A complementary cause could be forced migration. There are some reports that Soviet officials ordered people to move to the US zone in order to avoid caring for them. However, this phenomenon was quantitatively less relevant.

[12] Two months after Germany's unconditional surrender in May 1945, the *Allied Control Council* (ACC) was founded. This military occupation governing body of the Allied Occupation Zones was initially in charge of all border control operating procedures. The ACC officially closed all zonal borders per 30 June 1946.

In 1952, the GDR erected barbed-wire fence along the whole inner German border. Between 1952 and 1961, it was still possible to escape to the West through Berlin, which had a loose borders between its Western and Eastern sectors. This last loophole was finally closed in 1961, when the construction of the Berlin wall started. It seems implausible that such a large number of people migrated because of an *expected* institutional shock, while only a small number react to the *actual* exposure to the less favorable political regime.

3.1.2 Spatial Pattern of the Migration Wave

To provide further evidence that the progress of the Soviet army into German territory and the ongoing (sexual) assault on civilian population was the dominant migration motive, we examine the spatial pattern of the migration wave in more detail. We exploit that the farthest advance of Soviet Armies into German controlled territory (also known as the *Line of Contact*) is located east to the demarcation line. Thus, there is a region, which was conquered by Western Allies, but became part of the Soviet occupation zone later (see Figure 4). The British and US troops withdrew from there in July 1945 and passed the territory on to the Soviets.

Given that the majority of assaults took place in connection with combat, this area should have witnessed a lower number of (sexual) assaults as compared to the rest of the East. On the other hand, the areas on both sides of the Line of Contact were within the predetermined Soviet occupation zone and faced the same expectations about a future socialist regime. If migrants were escaping the socialist regime, they should have proceeded past the demarcation line. In contrast, if migrants were escaping the Soviet army, it would have been sufficient to cross the Line of Contact. If the latter is true, we should find a discontinuity in population density at the Line of Contact.

To test this hypothesis, we estimate the effect of the Soviet forces within county pairs along the Line of Contact. Column (I) of Table 2 summarizes estimation results based on the estimation model from equation (1). As in the case of the demarcation line, we do not find any significant difference in population levels at the Line of Contact before and during WW2. However, there is a significant drop in population levels by almost 13 percent in 1946. This population gap vanishes gradually over time. By 1971, the population gap is gone. This suggests that the significant force of the East-West migration wave in 1945/46 was escaping the physical assault by the Soviet army and not the expectation about differences in the

Thereafter, all persons had to obtain an interzonal pass to visit another zone. It is however documented that regulations and border control elements were circumvented regularly. While the Soviets began to apply strict border control procedures in September 1947, with an increased number of border guards and help from the newly established *East German Volkspolizei*, it was still fairly easy to cross the border (Stacy, 1984). The situation continued even after the declaration of the GDR in October 1949 until 1952.

future institutional framework.

The assignment of todays counties to the East or West side of the Line of Contact is in some instances ambiguous. We perform a sensitivity check for these cases in the remaining columns of Table 2. In column (II), we drop all pairs including the city of Dessau-Roßlau of which at least a small part was captured by US forces. The same is true for the city of Magdeburg, which we drop in column (III). In column (IV), we drop the pairs including the county of Nordsachsen, where the US forces pushed forward to first meet Soviet forces on German ground. Reassuringly, the results are not sensitive to these sample modifications, even when we drop all of these pairs in column (V).

We consider the timing of the East-West migration wave and the second discontinuity in space at the Line of Contact as suggestive evidence for the supposition that the migrants predominantly escaped from the Soviet Army fearing assaults. Clearly, the emerging socialist regime – which lead to subsequent East-West migration, however, at a much lower scale – might have been a factor for migrants of the first wave to stay in the West.

3.1.3 Composition of the Migration Wave

In our analysis above, we were only concerned with the size of migration flows, and ignored the characteristics of migrants. We now provide evidence on the composition of the East-West migration wave in 1945/46. In particular, we are interested in the distribution of sex, skills and regions of origin.

Sex and skill distribution An important aspect of migration movements is the selection of immigrants with respect to their skills (Borjas, 1999). The theoretical literature, mostly building upon the Roy model, highlights the relative earnings potential of low versus high skilled workers in the sending and receiving region as the main determinant of selection (Chiswick, 1978; Borjas, 1987). Empirically, one can examine the observable characteristics of stayers and movers to provide evidence on the type of selection into migration. We observe population by sex and occupation between 1939 and 1961 in county-level data. We use these data to estimate a model equivalent to eq. (1), where the dependent variable is equal to the share of population of a certain sex or occupation. Our estimation results are summarized in Table 3. While we find no evidence of selection into immigration by sex, there is evidence for selection by occupation. We find that the share of workers in agriculture has increased in the East by almost 9 percentage points between 1939 and 1950. This effect is (relative to share of workers in agriculture in the East in 1939) equivalent to an increase by more than 29 percent. Inversely, the share of workers in manufacturing has decreased by 5 and 10 percentage points in 1950 and 1961, respectively. This means that individuals with an

occupational background in manufacturing was substantially more likely to migrate to the West. This pattern is in line with higher migration cost for farmers, who could not transfer their landholdings. Under the assumption that the skills of workers in manufacturing and services were (compared to those in agriculture) more productive in the post WW2 economy, we interpret this as a positive selection into migration to the West.

Region of origin After WW2 there were several significant movements into and out of Germany. Therefore, it is useful to distinguish between three population groups, depending on their place of residence prior to WW2. First, there are German citizens residing on today's German territory (henceforth natives). Second, there are German citizens and ethnic Germans residing in prewar German territory east of the Oder and Neisse Rivers (henceforth expellees). These areas belong, according todays borders, to several Eastern and Central European countries (such as Czech Republic, Poland, Slovakia, and Romania). Third, there are non-Germans residing outside Germany (henceforth foreigners). The latter group comprises prisoners of war, and other displaced persons. While the suggested explanations (or motives) apply to all three groups, it is still instructive to explore the composition of the migrants.

The group of expellees is quantitatively very important.[13] In 1946 (our first post-WW2 data point), 9.7 million expellees lived in Allied-occupied Germany, a number that grew to 11.3 million by 1950. Thus, the first group could have contributed to the onset of the East-West population gap (i. e., the spike in Figure 3), if they have predominantly moved to the Western zone as compared to the Soviet zone.

We have access to state-level population data for the years 1946 and 1950 by location of residence in 1939. We distinguish the three groups defined above and a residual group with unknown origin. We use these data to estimate a model equivalent to eq. (1), where the dependent variable is equal to the ratio of population group g in year t to the total population in 1939. Columns (I) to (III) of Table 4 summarize the estimation results. We see that the East-West population gap is driven by natives. For this group, we observe an economically and statistically significant drop. The estimated effects for expellees and foreigners are much smaller and statistically not significant. The residual group exhibits a

[13]Their migration movement occurred in three overlapping phases. First, from mid-1944 to early 1945 there were some organized evacuations by the Nazi government in the face of the advancing Soviet Army. Second, following the Wehrmacht's defeat in January 1945, many ethnic Germans (not covered by previous organized evacuation) escaped on their own initiative and spontaneously. These formed kilometers-long refugee treks pushing their carts through snow trying to stay ahead of the advancing Soviet Army, with many of them eventually targeted by low-flying aircraft and some crushed by tanks. The third phase was a more organized expulsion following the Potsdam Conference later that year. In the period between mid 1945 and 1950 all remaining ethnic Germans in prewar German territory east of the Oder-Neisse line were transferred to Germany.

larger presence in the East in the year 1950, but the effect is quantitatively negligible.[14] We conclude that East-West migration wave in 1945/46, and the resulting onset of the East-West population gap, was driven by the group of natives. Thus, the event can be described as an internal migration phenomenon.

3.2 Period of the Berlin Wall

Between 1961 and 1989, essentially no migration between East and West Germany took place.[15] During this period the population gap increased in our sample from minus 23.5 to minus 28.4 (see column I of Table 4). This development can be attributed to differences in the 'normal' demographic processes of birth, death and external migration. The East had, probably due to a set of pronatalist policies, higher fertility as compared to the West (Büttner and Lutz, 1990). Mortality was also comparably higher in the East, since the West experienced higher gains in life expectancy during this period (Heilig *et al.*, 1990). Finally, the West attracted much higher number of external immigrants. Most importantly, the strong economy in the West attracted large numbers of guestworkers from Southern Europe and Turkey. The East experienced a much smaller influx of workers from socialist nations (such as Vietnam or Mozambique).

3.3 The East-West Population Gap after Reunification

After the fall of the iron curtain and the reunification, inner German mobility was restored immediately. Figure 3 shows that this led to further East-West migration. Over the entire post-reunification period the East-West population gap has grown. Column (I) of Table 1 shows that the gap has increased from 28.4 percent in 1987, to 37.3 percent in 1991, and to 51 percent in 2009. While this general pattern is well-known in aggregate numbers, our results reveal, based on disaggregated units, how large and sharp the difference in population has remained at the former demarcation line. Clearly, our estimated effects have to be interpreted as reduced form estimates. They capture the sum of all differential treatments the East has experienced (as compared to the West) since the end of WW2. Nevertheless, our estimations results are informative to discriminate among the two leading explanations for the (uneven) distribution of population and economic activity in space.

[14] Column (IV) of Table 4 lists results for the total population (i.e., sum of all groups). This estimation provide the same qualitative result as the specification in Column (I) of Table 1. However, the estimated effect size differs. This difference can be explained by the differential geographical coverage (bordering states vs. bordering counties) and the differential unit of observations (states vs. county).

[15] During the summer of 1989 Hungary reduced its border patrol to Austria. A large number of East German citizens exploited this situation and traveled to Hungary as a tourist to enter West Germany via Austria (Heiland, 2004).

The literature in economic geography discusses locational fundamentals vs. economies of scale as the determinants of the spatial distribution of economic activity. Given the increasing difference in the East-West population difference after reunification, we can unambiguously reject that locational fundamentals produce this pattern. After the removal of migration restrictions, locational fundamentals theory would predict a reversal to the population difference towards its pre-WW2 level. Our findings show no evidence that this has happened in the almost 20 years after reunification. Scale economy models, on the other hand, suggest that the population shock increases productivity or consumption amenities in the West and hence attracts additional workers/households from the East after reunification. Our findings are perfectly consistent with this prediction. It is surprising, however, that the population difference between counties along the former demarcation line remains so distinctively sharp over time. Firms and households in the West would face lower land prices and lower wages by relocating just across the former demarcation line. The sharp discontinuity suggests that productivity and amenity spillovers originating from the higher population density in the West decline relatively fast in space.[16]

Other factors that could affect the population distribution in space include differences in labor market regulations after reunification and public infrastructure investment in the East. While labor market regulations favored the West with, for instance, higher collective bargaining wages, the massive investment in infrastructure would have increased the population in the East.

3.4 Sensitivity Analysis

In this section, we present results based on alternative estimation samples and estimation strategies. First, we use samples of counties located further away of the demarcation line. Second, we use a city-level panel data set. Both sensitivity checks explore the generalizability of our findings. Third, we used different approaches for inference. Fourth, we have also calculated a conventional one-dimensional RDD.

3.4.1 Non-bordering Counties

The focus on the area along the demarcation line (or the Line of Contact) bears the risk of missing the larger picture. Our estimated effect may be only a local phenomenon that is specific to the counties along these lines. First, with respect to the origin of the population

[16] One form of productivity increases in the West could have been a direct result of the reunification as well. A complementarity between high-skilled West-German and low-skilled East-German workers would lead to an increase in productivity if these two groups come together in a single labor market. Higher bargaining power of western high-skilled workers would let East-Germans move to the West.

gap, we have to consider that migration cost vary across different points of departure (and destinations). This variation may generate discontinuous migration patterns. For instance, migrants may have predominantly settled in areas of West Germany, which are close to the demarcation line. Or, population from the far East may have migrated with a lower probability. Second, with respect to the development of the population gap, we have to consider regional planning policies. West Germany promoted settlements along the demarcation line with reduced taxes and investment subsidies in special economic zones (*Zonenrandgebiet*). East Germany, in contrast, prevented settlements close to the demarcation line. There was no trespassing within 5 kilometers of the demarcation line and forced relocation of the population to impede escape towards the West. Given these specific factors in a narrow corridor around the demarcation line, we examine the generalizability of our results by using different estimation samples.

The general finding is that the estimated pattern of the East-West population gap in counties further away from the demarcation line is very similar to the counties bordering the demarcation line (see columns II–V in Table 1). For the four different distance groups (25–50, 50–75, 75–100, and 100–125 kilometers) we considered, we fail to find significant differences between East and West in pre-WW2 trends and during WW2. There is a marked drop in population levels after WW2; although the estimate for 1946 is not significant in all distance groups. And, the population gap increases across all groups after reunification. This suggest that our baseline estimates of county pairs along the demarcation line do not just capture a local phenomenon.

3.4.2 Urban Sample

Both, the demarcation line and the Line of Contact run through mainly rural areas. We now check, whether the origin and development of the population gap is comparable in urban areas, where economic activity is most concentrated. For this analysis, we rely on the sample of cities from Redding and Sturm (2008a).[17] The middle panel of Figure 2 provides descriptive evidence. It plots the population development of cities in the East and West relative to the year 1939. Interestingly, with find again very comparable trends across the two groups for the period before and during WW2, and diverging trends thereafter.

Clearly, an important limitation of this sample definition is, that other factors, like market access and geographic factors, might affect cities in the West differently than in the East. To mitigate these concerns, we estimate in different models with varying bandwidths and covariates. While the quantitative results vary across models, all specifications confirm the

[17]Redding and Sturm (2008a) collected data for West- and East-German cities, but did not test differences between population development between the two parts.

general pattern found in our sample of counties along the demarcation line also for the urban sample (see Table 5).

3.4.3 Calculation of Standard Errors

In our estimation strategy, we form pairs of bordering counties along the demarcation line. By construction, many counties appear in several of these county-pairs. This feature of the estimation strategy increases our sample size and gives rise to several different ways to cluster standard errors. In our baseline specification in column (I) of Table 1, we cluster standard errors at the county level within a pair.

We now investigate other options of clustering and calculating standard errors. Column (I) of Table 6 repeats our baseline estimates for reference. In columns (II)-(V) we cluster standard errors at the county level, at the pair level, at an East-German county level including all bordering West-German counties, and at the West-German county level including all bordering East-German countries, respectively. In each case, we obtain statistically significant effects. In the next two columns, we address that some counties enter several pairs. In column (VI), we transform the dataset such that for each East-German county, there is only one synthetic control county. That synthetic control country consists of the average of all bordering West-German counties. Column (VII) performs the same exercise for each West-German county. Reassuringly, the point estimates and standard errors are very similar to our baseline estimates.

3.4.4 Conventional Regression Discontinuity Design

We also perform a one-dimensional RDD. Therefore, we restrict the sample to counties with a distance of at most 40 kilometers to the demarcation line and use this distance as the running variable. We calculate the distance as the minimum distance of the centroid of a county to the centroid of a county on the other side of the demarcation line and subtract the lowest distance of a county within each zone. Figure 5 summarizes estimates based on different functional form assumption for zone-specific distance functions. Across specifications, we observe the same qualitative (and very comparable quantitative) results for the origin and development of the East-West population gap.

4 Conclusions

We study the development of population levels East and West of the inner German border between 1900 and 2009. We show that the origin of the German East-West population

difference was the advancing Soviet army and not, as generally believed, the socialist regime in the former GDR. In fact, population differences along the inner German border remained relatively stable during the GDR period compared to the period of the Soviet occupation and the period after reunification. In addition, we find evidence for strong positive selection in skills of these early East-West migrants. These findings put the German division as a valid natural experiment for institutional differences into question.

Our second finding is the surprisingly sharp and increasing discontinuity of population levels along the former inner German border after reunification. We suggest persistent local productivity differences between West and East-Germany, possibly generated by agglomeration economies, as the reason for this pattern. This finding speaks to the policy debate on market integration through economic and political cooperation. Large productivity differences between integrating countries could lead to a large out-migration of workers instead of an alignment of productivity levels even in geographically close regions.

An obvious limitation of our work is the focus on population levels as compared to more welfare-related measures like income or consumption. Population levels is one of only few comparable measures between the statistical agencies of West and East Germany. Future work could inquire our explanation of the continuously sharp discontinuity of population levels at the inner German border after reunification. We speculate that local productivity differences are at work, but fall short of showing direct evidence. This could be investigated with detailed firm or labor market data of the post-reunification period.

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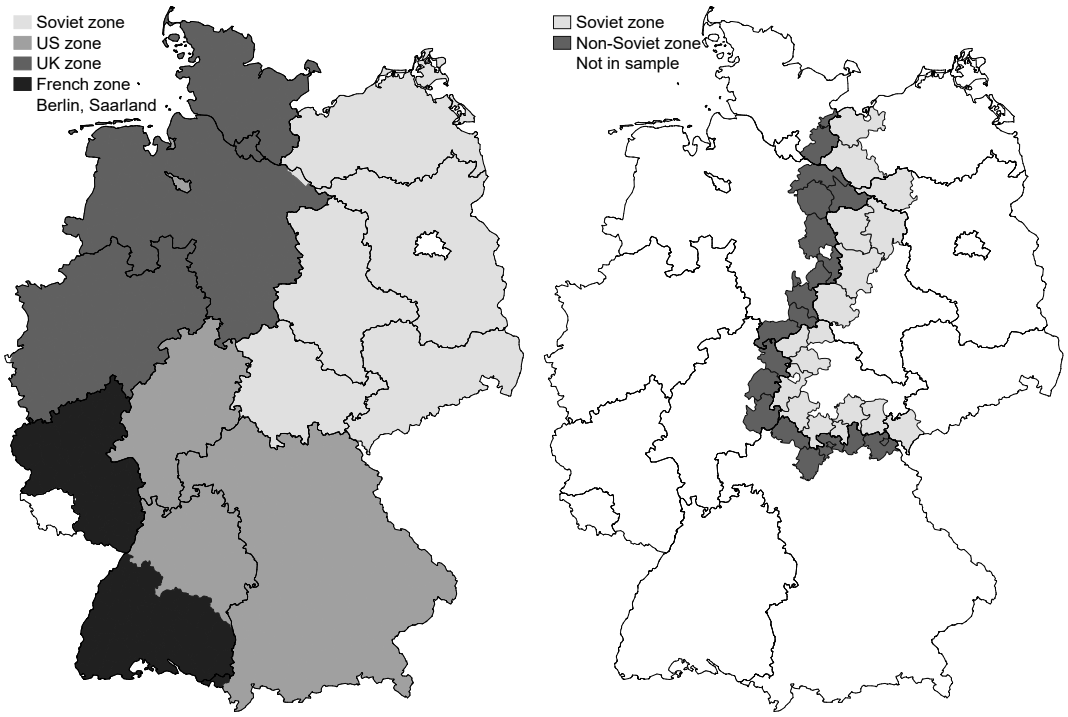
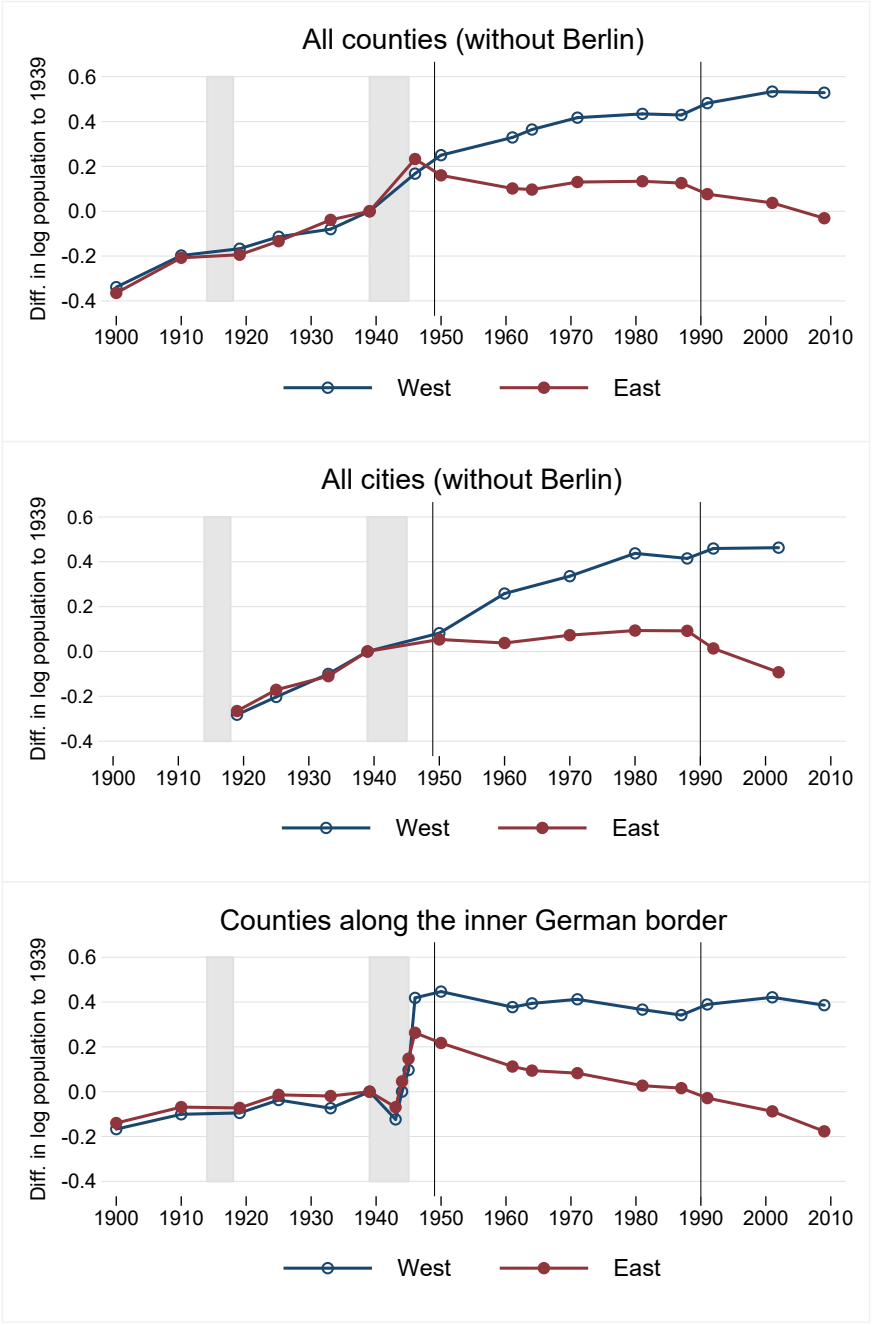
5 Figures (to be placed in article)

Figure 1: Zones of Allied-occupied Germany and Bordering Counties



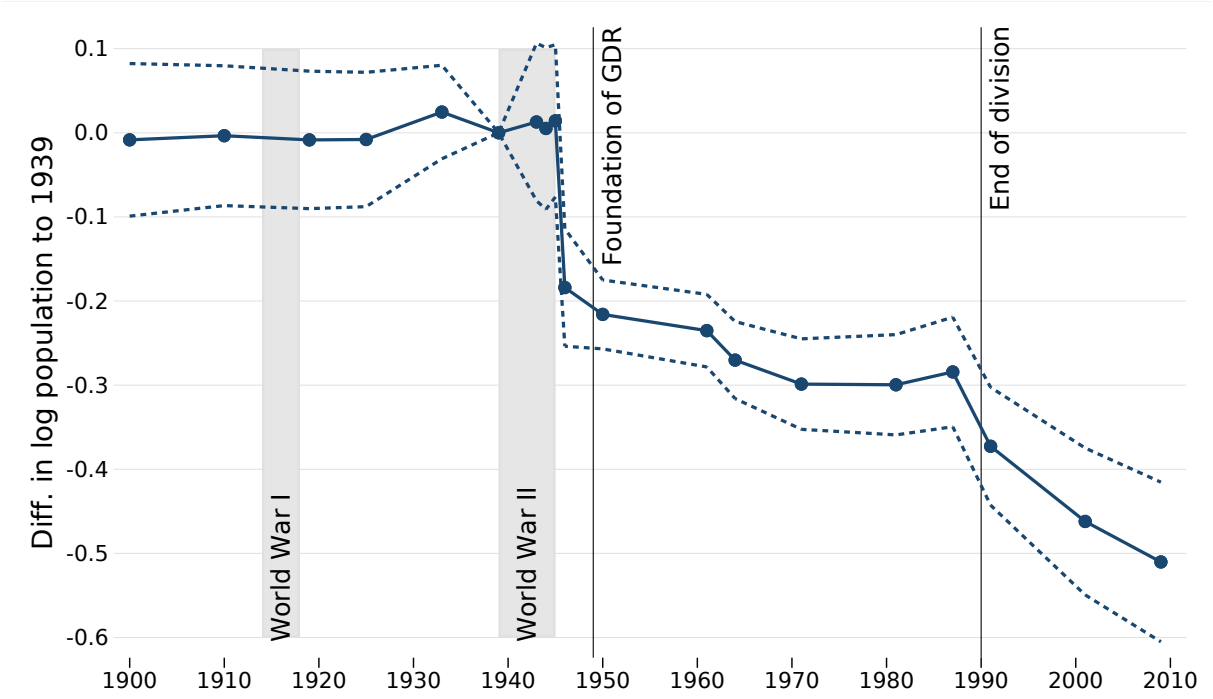
Notes: The left map shows the different zones of the *Allied-occupied Germany*, which existed between 1945 and 1949. The figure on the right shows the bordering counties (*Kreise*) along the demarcation line dividing the American/British zones and the Soviet zone. The demarcation line became the inner German border in 1949 dividing the newly established *German Democratic Republic* (GDR) in the East and the *Federal Republic of Germany* (FDR) in the West. After the reunification of Germany in 1990, this border became obsolete.

Figure 2: Population Development in East and West Germany



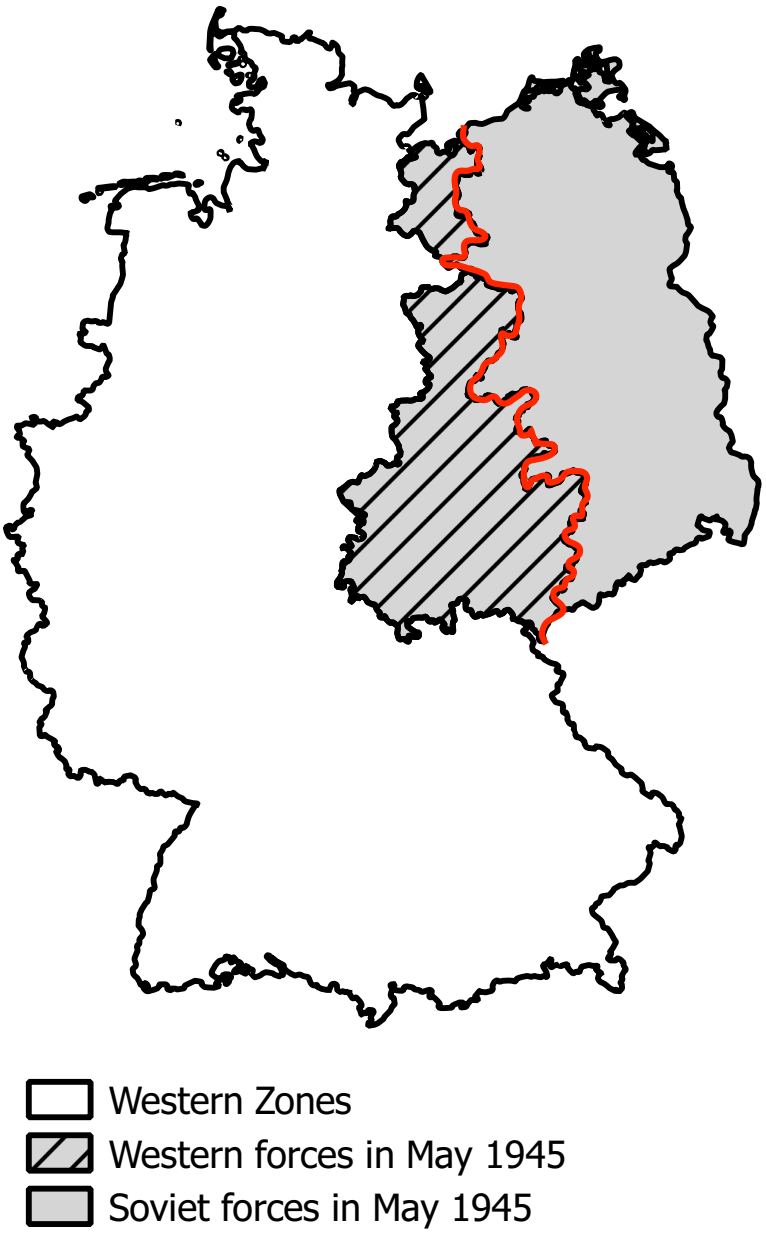
Notes: These figures show the development of population levels in the 'East' and 'West' for different sample definitions. In the period from 1945 to 1949, 'East' refers to the Soviet zone of occupation, and 'West' to the territory of the American, British and French zones of occupation. In 1949, the *German Democratic Republic* was established in the Soviet zone, while the *Federal Republic of Germany* was established in the three western zones. Grey bars mark World War I and II. The first vertical line indicates the foundation of the GDR, while the second vertical line indicates the reunification of Germany. The upper panel shows the population levels in all counties (except Berlin). The middle panel shows population levels of all German cities (except Berlin). The lower panel refers to counties located at the border (i. e., along the demarcation line or the inner German border.)

Figure 3: The Origin and Evolution of the East-West Population Gap along the Demarcation Line



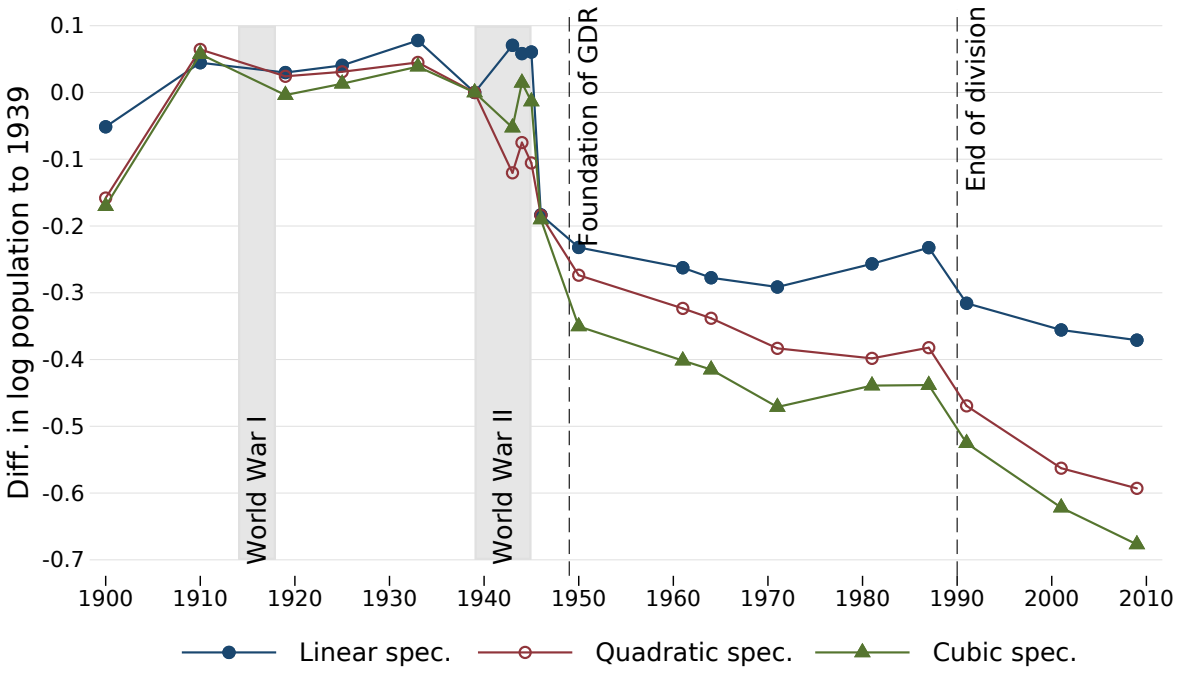
Notes: This figure shows the estimated East-West population gap in bordering counties along the demarcation line. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Dashed lines show 95% confidence intervals. Column (I) of Table 1 provides detailed estimation output.

Figure 4: The Line of Contact within Germany



Notes: The so-called *Line of Contact* (printed in red) marks the farthest advance of Canadian, American, British and Soviet Armies into German controlled territory at the end of WW2. Notably, the Line of Contact is located East to the demarcation line (printed in black) within the later Soviet zone. The gray area shows the Soviet occupation zone after July 1945. The territory marked by the diagonally shaded area was conquered by Western Allies, but became part of the Soviet occupation zone 2 months later. The British and US troops withdrew from this territory in July 1945 and passed it on to the Soviets.

Figure 5: The Origin and Evolution of the East-West Population Gap along the Demarcation Line – One-dimensional RDD Estimates



Notes: The figure show the estimated East-West population gap using a one-dimensional RDD with a 40 KM band around the demarcation line for different points in time. Dots indicate point estimates of specifications with a linear, quadratic, and cubic zone-specific distance functions around the demarcation line. None of the estimates of 1945 or before are statistically significantly different from zero and all of the post-WW2 are statistically significant different from zero at the 1% level (except the point estimates for 1946 in the linear and quadratic specifications, which are statistically significant at the 5% level).

6 Tables (to be placed in article)

Table 1: The Origin and Evolution of the East-West Population Gap along the Demarcation Line

	Log population				
	Bordering	County pairs with distance to the demarcation line of			
	counties	25–50km	50–75km	75–100km	100–125km
	(I)	(II)	(III)	(IV)	(V)
Pre-WWII differences					
1900 × East	−0.008	−0.522	−0.288	−0.092	−0.040
	(0.045)	(0.337)	(0.326)	(0.137)	(0.038)
1910 × East	−0.003	−0.301	−0.276	0.059	−0.054*
	(0.042)	(0.361)	(0.224)	(0.125)	(0.025)
1919 × East	−0.008	−0.298	−0.280	0.022	−0.038
	(0.041)	(0.363)	(0.221)	(0.126)	(0.038)
1925 × East	−0.008	−0.294	−0.251	0.036	−0.013
	(0.040)	(0.370)	(0.222)	(0.125)	(0.034)
1933 × East	0.025	0.100	0.009	0.105	−0.070
	(0.028)	(0.081)	(0.067)	(0.070)	(0.070)
Base-year (1939) differences					
East	0.592***	0.357	0.750***	0.030	0.582**
	(0.087)	(0.219)	(0.239)	(0.428)	(0.203)
Differences during WWII					
1943 × East	0.013	−0.094	−0.037	−0.049	0.031
	(0.047)	(0.083)	(0.052)	(0.037)	(0.037)
1944 × East	0.005	−0.109	−0.010	0.027	0.023
	(0.048)	(0.098)	(0.061)	(0.062)	(0.020)
1945 × East	0.014	−0.088	−0.029	0.018	0.039
	(0.045)	(0.128)	(0.100)	(0.078)	(0.042)
Differences during division					
1946 × East	−0.184***	−0.086	−0.213**	−0.014	−0.192*
	(0.035)	(0.062)	(0.079)	(0.095)	(0.092)
1950 × East	−0.216***	−0.198***	−0.244***	−0.236***	−0.266**
	(0.021)	(0.047)	(0.048)	(0.059)	(0.084)
1961 × East	−0.235***	−0.208***	−0.275***	−0.373***	−0.235***
	(0.022)	(0.034)	(0.035)	(0.044)	(0.062)
1964 × East	−0.270***	−0.222***	−0.305***	−0.423***	−0.281***
	(0.023)	(0.032)	(0.036)	(0.042)	(0.066)
1971 × East	−0.299***	−0.217***	−0.364***	−0.524***	−0.094
	(0.027)	(0.031)	(0.051)	(0.068)	(0.229)
1981 × East	−0.300***	−0.235***	−0.374***	−0.517***	−0.422***
	(0.030)	(0.051)	(0.076)	(0.044)	(0.073)
1987 × East	−0.284***	−0.221***	−0.392***	−0.515***	−0.418***
	(0.033)	(0.057)	(0.080)	(0.044)	(0.073)
Differences after reunification					
1991 × East	−0.373***	−0.319***	−0.495***	−0.629***	−0.504***
	(0.035)	(0.059)	(0.080)	(0.043)	(0.072)
2001 × East	−0.462***	−0.425***	−0.593***	−0.767***	−0.532***
	(0.044)	(0.052)	(0.077)	(0.053)	(0.072)
2009 × East	−0.510***	−0.469***	−0.646***	−0.833***	−0.571***
	(0.048)	(0.054)	(0.090)	(0.057)	(0.078)
Pair-Year FE	Yes	Yes	Yes	Yes	Yes
Number of observations	1,292	456	494	456	190
Number of pairs	34	12	13	12	5
Number of unique counties	36	19	21	16	9
Number of periods	19	19	19	19	19
R-squared	0.73	0.57	0.49	0.43	0.74
Mean of dep. var.	11.61	11.60	11.62	12.21	11.87

Notes: This table summarizes estimation results based on German county-level data. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Clustered standard errors (at the county level within a pair) are in parentheses below. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 2: The Origin and Evolution of the East-West Population Gap along the Line of Contact

	Log population				
	All counties along Line of Contact	Dessau-Roßlau dropped	Magdeburg dropped	Nordsachsen dropped	All three dropped
	(I)	(II)	(III)	(IV)	(V)
Pre-WWII differences					
1900 × East of Line of Contact	−0.042	0.003	−0.029	−0.057	0.016
	(0.102)	(0.095)	(0.110)	(0.119)	(0.120)
1910 × East of Line of Contact	−0.052	−0.008	−0.023	−0.080	0.008
	(0.106)	(0.100)	(0.112)	(0.121)	(0.122)
1919 × East of Line of Contact	−0.044	0.001	−0.018	−0.069	0.017
	(0.106)	(0.099)	(0.112)	(0.120)	(0.120)
1925 × East of Line of Contact	−0.042	0.003	−0.013	−0.064	0.025
	(0.106)	(0.099)	(0.111)	(0.120)	(0.120)
1933 × East of Line of Contact	−0.043	−0.030	−0.019	−0.066	−0.021
	(0.040)	(0.039)	(0.039)	(0.043)	(0.040)
Base-year (1939) differences					
East of Line of Contact	−0.045	−0.037	−0.081	0.012	−0.015
	(0.093)	(0.096)	(0.096)	(0.093)	(0.101)
Differences during WWII					
1943 × East of Line of Contact	−0.028	−0.022	−0.013	−0.035	−0.010
	(0.024)	(0.024)	(0.023)	(0.026)	(0.025)
1944 × East of Line of Contact	−0.032	−0.023	−0.003	−0.047	−0.002
	(0.033)	(0.032)	(0.027)	(0.034)	(0.025)
1945 × East of Line of Contact	−0.066	−0.051	−0.013	−0.097*	−0.018
	(0.050)	(0.049)	(0.036)	(0.051)	(0.027)
Differences during division					
1946 × East of Line of Contact	−0.128***	−0.128***	−0.099**	−0.161***	−0.129***
	(0.043)	(0.045)	(0.041)	(0.045)	(0.044)
1950 × East of Line of Contact	−0.090**	−0.073*	−0.055	−0.113**	−0.050
	(0.041)	(0.038)	(0.035)	(0.045)	(0.031)
1961 × East of Line of Contact	−0.075**	−0.061**	−0.050*	−0.092***	−0.044**
	(0.031)	(0.028)	(0.027)	(0.033)	(0.022)
1964 × East of Line of Contact	−0.058**	−0.044*	−0.036	−0.072**	−0.028
	(0.029)	(0.026)	(0.026)	(0.031)	(0.020)
1971 × East of Line of Contact	−0.015	−0.001	0.007	−0.026	0.019
	(0.049)	(0.049)	(0.050)	(0.056)	(0.057)
1981 × East of Line of Contact	−0.043	−0.033	−0.030	−0.063**	−0.038
	(0.029)	(0.028)	(0.029)	(0.029)	(0.029)
1987 × East of Line of Contact	−0.035	−0.026	−0.024	−0.059*	−0.038
	(0.030)	(0.030)	(0.031)	(0.030)	(0.032)
Differences after reunification					
1991 × East of Line of Contact	−0.041	−0.032	−0.031	−0.070**	−0.050
	(0.032)	(0.032)	(0.034)	(0.032)	(0.034)
2001 × East of Line of Contact	−0.051	−0.038	−0.027	−0.089*	−0.048
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
2009 × East of Line of Contact	−0.060	−0.046	−0.043	−0.095*	−0.061
	(0.048)	(0.047)	(0.050)	(0.051)	(0.054)
Pair-Year FE	Yes	Yes	Yes	Yes	Yes
Number of observations	1,102	1,064	1,026	950	836
Number of pairs	29	28	27	25	22
Number of unique counties	29	28	28	26	24
Number of periods	19	19	19	19	19
R-squared	0.80	0.82	0.80	0.81	0.82
Mean of dep. var.	12.16	12.17	12.14	12.11	12.08

Notes: This table summarizes estimation results based on German county-level data. In columns (II)-(V), all pairs with the mentioned counties were dropped. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Clustered standard errors (at the county level within a pair) are in parentheses below. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 3: The Composition of the East-West Migration Wave in 1945/46: Sex and Skill Distribution

	Share of		
	male population	workers in agriculture	workers in manufacturing
	(I)	(II)	(III)
Base-year (1939) differences			
East	−0.028**	−0.055**	0.037**
	(0.014)	(0.025)	(0.018)
Differences during division			
1946 × East	0.012		
	(0.014)		
1950 × East	−0.018	0.085***	−0.048***
	(0.016)	(0.013)	(0.011)
1961 × East	0.015	0.082***	−0.104***
	(0.014)	(0.023)	(0.019)
Pair-Year FE	Yes	Yes	Yes
Number of observations	272	194	194
Number of pairs	34	34	34
Number of unique counties	36	36	36
Number of periods	4	3	3
R-squared	0.68	0.70	0.81
Mean of dep. var.	0.47	0.32	0.37

Notes: This table summarizes estimation results based on German county-level data. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Clustered standard errors (at the county level within a pair) are in parentheses below. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 4: The Composition of the East-West Migration Wave in 1945/46: Region of Origin

	Ratio of population of group g in t to total population in 1939				
Group:	Natives	Expellees	Foreigners	Unknown	All
	(I)	(II)	(III)	(IV)	(V)
Differences during division					
1946 × Soviet zone	−0.127***	−0.006	0.037	0.001	−0.095
	(0.034)	(0.046)	(0.028)	(0.001)	(0.062)
1950 × Soviet zone	−0.327***	−0.069	−0.026	0.002**	−0.422***
	(0.024)	(0.043)	(0.021)	(0.001)	(0.049)
Pair-Year FE	Yes	Yes	Yes	Yes	Yes
Number of observations	42	42	42	42	42
Number of pairs	7	7	7	7	7
Number of unique counties	8	8	8	8	8
Number of periods	3	3	3	3	3
R-squared	0.94	0.91	0.86	0.79	0.94
Mean of dep. var.	0.96	0.15	0.07	0.00	1.19

Notes: This table summarizes estimation results based on German state-level data, split by region of residence in 1939 of the population. The dependent variable is equal to the ratio of population group g in year t to the total population in 1939. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Clustered standard errors (at the state level within a pair) are in parentheses below. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 5: The Origin and Evolution of the East-West Population Gap in an Urban Sample

	Log population				
	(I)	(II)	(III)	(IV)	(V)
Pre-WWII differences					
1919 × East	0.017	0.017	0.003	0.117*	−0.056
	(0.026)	(0.048)	(0.033)	(0.068)	(0.098)
1925 × East	0.032	0.067*	0.043	0.157***	−0.004
	(0.022)	(0.033)	(0.027)	(0.053)	(0.081)
1933 × East	−0.010	0.048	0.034	0.111**	−0.016
	(0.019)	(0.030)	(0.025)	(0.047)	(0.070)
Differences during division					
1950 × East	−0.028	−0.172*	−0.068	−0.284***	−0.550***
	(0.031)	(0.086)	(0.054)	(0.102)	(0.137)
1960 × East	−0.221***	−0.257***	−0.211***	−0.320***	−0.506***
	(0.029)	(0.075)	(0.043)	(0.094)	(0.142)
1970 × East	−0.263***	−0.249***	−0.226***	−0.317***	−0.470***
	(0.034)	(0.085)	(0.051)	(0.111)	(0.171)
1980 × East	−0.344***	−0.290**	−0.319***	−0.332**	−0.595***
	(0.045)	(0.112)	(0.071)	(0.145)	(0.216)
1988 × East	−0.323***	−0.246**	−0.294***	−0.265*	−0.544**
	(0.050)	(0.112)	(0.073)	(0.145)	(0.213)
Differences after reunification					
1992 × East	−0.446***	−0.362***	−0.416***	−0.380**	−0.677***
	(0.051)	(0.116)	(0.075)	(0.150)	(0.221)
2002 × East	−0.556***	−0.466***	−0.528***	−0.436***	−0.783***
	(0.050)	(0.115)	(0.076)	(0.150)	(0.222)
City FE	Yes	Yes	Yes	Yes	Yes
Distance cutoff in KM		50	100	100	100
Linear year-spec. distance				Yes	Yes
Quadratic year-spec. distance					Yes
Number of observations	1,936	308	759	759	759
Number of unique cities	176	28	69	69	69
Number of periods	11	11	11	11	11
R-squared	0.97	0.97	0.97	0.97	0.97
Mean of dep. var.	11.27	11.12	11.08	11.08	11.08

Notes: This table summarizes estimation results based on German city data from Redding and Sturm (2008b). The city of Berlin is excluded, since the demarcation disunited the city. The dependent variable is equal to the log of population. Method of estimation is a one-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. Clustered standard errors (at the city level) are in parentheses below. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively.

Table 6: The Origin and Evolution of the East-West Population Gap – Different Standard Errors

	Log population						
	Base	Different standard error clustering				Synthetic control	
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)
Pre-WWII differences							
1900 × East	−0.008	−0.008	−0.008	−0.008	−0.008	0.044	−0.023
	(0.045)	(0.047)	(0.065)	(0.075)	(0.060)	(0.072)	(0.042)
1910 × East	−0.003	−0.003	−0.003	−0.003	−0.003	0.034	−0.003
	(0.042)	(0.043)	(0.059)	(0.061)	(0.061)	(0.066)	(0.037)
1919 × East	−0.008	−0.008	−0.008	−0.008	−0.008	0.027	−0.008
	(0.041)	(0.042)	(0.058)	(0.060)	(0.060)	(0.065)	(0.035)
1925 × East	−0.008	−0.008	−0.008	−0.008	−0.008	0.027	−0.007
	(0.040)	(0.040)	(0.057)	(0.059)	(0.056)	(0.064)	(0.034)
1933 × East	0.025	0.025	0.025	0.025	0.025	0.048	0.025
	(0.028)	(0.034)	(0.040)	(0.036)	(0.059)	(0.038)	(0.036)
Base-year (1939) differences							
East	0.592***	0.592***	0.592***	0.592***	0.592***	0.533***	0.650***
	(0.087)	(0.109)	(0.123)	(0.150)	(0.162)	(0.118)	(0.118)
Differences during WWII							
1944 × East	0.005	0.005	0.005	0.005	0.005	0.038	0.008
	(0.048)	(0.058)	(0.069)	(0.070)	(0.094)	(0.074)	(0.048)
Differences during division							
1946 × East	−0.184***	−0.184***	−0.184***	−0.184**	−0.184***	−0.145***	−0.201***
	(0.035)	(0.045)	(0.050)	(0.072)	(0.056)	(0.045)	(0.048)
1950 × East	−0.216***	−0.216***	−0.216***	−0.216***	−0.216***	−0.210***	−0.220***
	(0.021)	(0.024)	(0.029)	(0.032)	(0.036)	(0.029)	(0.028)
1961 × East	−0.235***	−0.235***	−0.235***	−0.235***	−0.235***	−0.243***	−0.230***
	(0.022)	(0.026)	(0.031)	(0.040)	(0.034)	(0.027)	(0.027)
1964 × East	−0.270***	−0.270***	−0.270***	−0.270***	−0.270***	−0.281***	−0.260***
	(0.023)	(0.028)	(0.033)	(0.045)	(0.035)	(0.028)	(0.028)
1971 × East	−0.299***	−0.299***	−0.299***	−0.299***	−0.299***	−0.313***	−0.282***
	(0.027)	(0.033)	(0.038)	(0.056)	(0.038)	(0.032)	(0.031)
1981 × East	−0.300***	−0.300***	−0.300***	−0.300***	−0.300***	−0.319***	−0.283***
	(0.030)	(0.035)	(0.043)	(0.060)	(0.039)	(0.037)	(0.032)
1987 × East	−0.284***	−0.284***	−0.284***	−0.284***	−0.284***	−0.303***	−0.268***
	(0.033)	(0.040)	(0.047)	(0.066)	(0.047)	(0.039)	(0.036)
Differences after reunification							
1991 × East	−0.373***	−0.373***	−0.373***	−0.373***	−0.373***	−0.390***	−0.358***
	(0.035)	(0.043)	(0.050)	(0.071)	(0.051)	(0.042)	(0.038)
2001 × East	−0.462***	−0.462***	−0.462***	−0.462***	−0.462***	−0.478***	−0.441***
	(0.044)	(0.053)	(0.062)	(0.082)	(0.068)	(0.054)	(0.045)
2009 × East	−0.510***	−0.510***	−0.510***	−0.510***	−0.510***	−0.530***	−0.486***
	(0.048)	(0.057)	(0.068)	(0.090)	(0.073)	(0.059)	(0.048)
Pair-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,292	1,292	1,292	1,292	1,292	722	646
Number of pairs	34	34	34	34	34	19	17
Number of unique counties	36	36	36	36	36	38	34
Number of periods	19	19	19	19	19	19	19
R-squared	0.73	0.73	0.73	0.73	0.73	0.72	0.77
Mean of dep. var.	11.61	11.61	11.61	11.61	11.61	11.67	11.60

Notes: This table summarizes estimation results based on German county-level data. Method of estimation is a two-dimensional regression discontinuity design (RDD) in space combined with a difference-in-differences (DiD) approach. *, ** and *** indicate statistical significance at the 10% level, 5% level, and 1% level, respectively. Clustered standard errors (different levels) are in parentheses below: (I) baseline approach (see column (I) in Table1), (II) clustered within each county, irrespective of the pair of the county, (III) clustered within each pair, (IV) clustered within each county in the East plus all bordering counties in the West, (V) clustered within each county in the West plus all bordering counties in the East, (VI) dataset is transformed so that for each county in the East, there is a synthetic control county in the West. The synthetic control county is the mean of all bordering counties in the West, (VII) dataset is transformed so that for each county in the West, there is a synthetic control county in the East. The synthetic control county is the mean of all bordering counties in the East.

Appendix A: Additional Tables

Table A.1: Descriptive Statistics

	Both zones		West	East
	Mean	Std. dev.	Mean	Mean
All counties (without Berlin) (N=411)				
Population				
in 1900	100,135	102,306	89,913	138,767
in 1939	135,095	143,951	123,987	177,071
in 1950	160,474	138,789	149,834	200,682
in 2009	190,656	164,356	201,298	150,437
Neighboring counties (N=36)				
Population				
in 1900	99,828	60,613	70,490	132,617
in 1939	117,415	71,795	85,542	153,037
in 1950	158,522	75,316	133,400	186,599
in 2009	126,936	54,756	129,730	123,814
Cities (N=176)				
Population				
in 1919	94,386	149,854	104,781	70,902
in 1939	123,384	193,736	138,606	88,995
in 1950	122,810	178,234	138,741	86,819
in 2002	151,093	205,428	183,016	78,972
Counties within 40KM of demarcation line (N=58)				
Population				
in 1900	87,939	66,478	67,119	117,434
in 1939	107,532	77,007	85,419	138,858
in 1950	140,733	76,515	125,698	162,033
in 2009	121,269	60,046	126,343	114,082

Notes: German city data comes from Redding and Sturm (2008b). All other data are from collections and calculations of the authors as described in Section 2.1.

Table A.2: Population Data at the County Level in Germany

Variable	Year	Entity	Source
Variable	Year	Entity	Source
Population	1900	German Empire	"Volkszählung 1900 1. Dezember 1900 im Deutschen Reich." Statistisches Reichsamt.
Population	1910	German Empire	"Vorläufige Ergebnisse der Volkszählung im Deutschen Reich vom 16. Juni 1925." Statistisches Reichsamt.
Population	1919	German Empire	"Vorläufige Ergebnisse der Volkszählung im Deutschen Reich vom 16. Juni 1925." Statistisches Reichsamt.
Population	1925	German Empire	"Vorläufige Ergebnisse der Volkszählung im Deutschen Reich vom 16. Juni 1925." Statistisches Reichsamt.
Population	1933	German Empire	"Ergebnisse der Volks-, Berufsund landwirtschaftlichen Betriebszählung 1939." Statistik des Deutschen Reichs.
Male population; employment: total, agriculture, manufacturing	1939	German Empire	"Ergebnisse der Volks-, Berufsund landwirtschaftlichen Betriebszählung 1939." Statistik des Deutschen Reichs.
Population	1939	FDR	"Statistisches Jahrbuch für die Bundesrepublik Deutschland 1962." Statistisches Bundesamt. Wiesbaden.
Population	1939	GDR	"Statistisches Jahrbuch der Deutschen Demokratischen Republik 1965." 10. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Population	1943–45	German Empire	"Statistische Berichte." Arb.-Nr. VIII/19/1. Statistisches Bundesamt. Wiesbaden. (based on food stamps for the periods 8.2.-7.3.1943, 1.2.-5.3.1944, and 11.12.1944-7.1.1945)
Population: total, male	1946	Allied-occupied Germany	"Volks- und Berufszählung vom 29. Oktober 1946 in den vier Besatzungszonen und Groß-Berlin." Ausschuß der Deutschen Statistiker für die Volks- und Berufszählung 1946.
Population: total, male	1950	FDR	"Statistisches Jahrbuch für die Bundesrepublik Deutschland 1962." Statistisches Bundesamt. Wiesbaden.
Employment: total, agriculture, manufacturing	1950	FDR	"Kreisdaten (Volkszählungen 1950-1987). GESIS Datenarchiv, Köln.
Population: total, male	1950	GDR	"Statistisches Jahrbuch der Deutschen Demokratischen Republik 1965." 10. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Employment: total, agriculture, manufacturing	1950	GDR	"Sonderreihe mit Beiträgen für das Gebiet der ehemaligen DDR." 1994. Heft 15. Statistisches Bundesamt. Wiesbaden.
Population: total, male	1961	FDR	"Statistisches Jahrbuch für die Bundesrepublik Deutschland 1962." Statistisches Bundesamt. Wiesbaden.
Employment: total, agriculture, manufacturing	1961	FDR	"Regionaldaten VZ 1961 (Kreise)." GESIS Datenarchiv, Köln.
Population: total, male	1961	GDR	"Statistisches Jahrbuch der Deutschen Demokratischen Republik 1963." 8. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Population	1964	FDR	"Kreisbericht 1964." Statistisches Bundesamt. Wiesbaden.
Population	1964	GDR	"Statistisches Jahrbuch der Deutschen Demokratischen Republik 1965." 10. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Employment: total, agriculture, manufacturing	1964	GDR	"Sonderreihe mit Beiträgen für das Gebiet der ehemaligen DDR." 1994. Heft 15. Statistisches Bundesamt. Wiesbaden.
Population	1971	FDR	"Statistisches Jahrbuch für die Bundesrepublik Deutschland 1972." Statistisches Bundesamt. Wiesbaden.
Population	1971	GDR	"Statistisches Jahrbuch der Deutschen Demokratischen Republik 1974." 19. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Population	1981	FDR	"Statistisches Jahrbuch für die Bundesrepublik Deutschland 1982." Statistisches Bundesamt. Wiesbaden.
Population	1981	GDR	"Statistisches Jahrbuch 1985 der Deutschen Demokratischen Republik." 30. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Population	1987	FDR	"Kreisbericht 1987." Received from the Statistisches Bundesamt
Population	1987	GDR	"Statistisches Jahrbuch 1988 der Deutschen Demokratischen Republik." 33. Jahrgang. Staatliche Zentralverwaltung für Statistik.
Population	1991	Germany	"Kreisbericht 1991." Received from the Statistisches Bundesamt. Wiesbaden.
Population	2001	Germany	"Kreisbericht 2001." Received from the Statistisches Bundesamt. Wiesbaden.
Population	2009	Germany	"Kreisbericht 2009." Received from the Statistisches Bundesamt. Wiesbaden.
Historic GIS-shapefiles			`http://www.censusmosaic.org`