The Economic Impact of Social Ties: Evidence from German Reunification[*]

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Abstract

We use the fall of the Berlin Wall in 1989 to identify a causal effect of social ties between West and East Germans on economic growth, household income, and firm investment: West German regions which (for idiosyncratic reasons) had closer social ties to East Germany prior to 1989 experienced faster growth in income per capita after reunification. A one standard deviation rise in the share of households with social ties to East Germany is associated with a 4.6% rise in income per capita over five years. Much of this effect on regional economic growth seems to be driven by a rise in entrepreneurial activity. Moreover, firms which are based in West German regions with closer social ties to the East in 1989 are more likely to operate a subsidiary in East Germany even today. At the household level, West German households with relatives in East Germany in 1989 experienced a persistent rise in their income after the fall of the Berlin Wall. We interpret our findings as evidence of a persistent effect of social ties in 1989 on regional economic development and provide evidence on possible mechanisms.

JEL Classification: O11, P16, N40.

Keywords: economic development, German reunification, networks, social ties.

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1   Introduction

There are important theoretical reasons to believe that social ties between individuals impact economic development. Social ties might facilitate communication and thereby reduce informational frictions and asymmetries (Granovetter (1973), Varian (1990), Stiglitz (1990)). Furthermore, the threat of severing social ties may serve as a form of 'social' collateral and thereby sustain a large range of credit, insurance and trade contracts that would not otherwise be feasible (Besley and Coate (1995)). Although both of these channels may fundamentally affect the ability of individuals to engage in economic transactions, there exists virtually no evidence to date on the relevance of social ties for aggregate economic outcomes, such as economic growth and the scale and success of entrepreneurial activity. In this paper we estimate the relevance of social ties between individuals for regional economic development and trace the economic impact of social ties to firm investment and household income.

The main obstacle to estimation of the causal effect of social ties on economic outcomes is that social ties are endogenous to economic activity. At the microeconomic level, individuals may form social ties in anticipation of future economic benefits, or as a result of economic interaction. At the aggregate level, the regional distribution of social ties is a result of decisions of individuals about where to live, and these decisions are endogenous to economic incentives. Identifying a causal link between social ties and economic outcomes thus requires (i) the identification of 'real friends', i.e. social ties that formed without regard to future economic benefits, and (ii) some exogenous variation in the regional distribution of these exogenously formed social ties. In this paper we use the fall of the Berlin Wall as a natural experiment, which enables us to overcome both of these difficulties by exploiting two peculiar features of Germany's post-war history. First, the partition of Germany was generally believed to be permanent, so that individuals maintaining social ties across the inner-German border must have done so for purely non-economic reasons. Second, the pattern of wartime destruction in West Germany made it temporarily much more difficult to settle in some parts of West Germany than in others, precisely during the period during which millions of refugees and expellees from the East arrived in the West.

We find that West German regions which (for exogenous reasons) received a larger inflow of expellees from East Germany before the construction of the Berlin Wall have significantly stronger social ties to East Germany in 1989 and exhibit substantially higher growth in income per capita after the fall of the Berlin Wall. This economic expansion is associated with a rise of the returns to entrepreneurial activity and with an increase in the share of the population who are entrepreneurs. Moreover, firms which are headquartered in West German regions which have stronger social ties to East Germany in 1989 are more likely to operate a subsidiary or a branch in eastern Germany today. In addition, West German households who have a relative in East Germany in 1989 experience a persistent rise in personal income after the fall of the Berlin Wall.

The household level effects explain only around one sixth of the aggregate level effects, suggesting strong spill-over effects. We interpret these findings as evidence of a causal link between social ties and regional economic development in West Germany.

The first key advantage of the natural experiment surrounding German reunification is the fact that the fall of the Berlin Wall was largely unexpected. After the physical separation of the two German states in 1961, private economic exchange between the two Germanys was impossible.[1] Social ties that West Germans maintained with East Germans during this period were then kept up for purely non-economic reasons, as individuals on both sides of the border did not expect an economic re-integration. On November 9th 1989, these social ties suddenly took on economic value: after the fall of the Berlin Wall, trade between the two Germanys became feasible, following more than three decades of isolation. The result was a boom in economic exchange between West and East.[2] In this situation, East Germans had valuable local information about demand conditions and about the quality of the assets that were offered to investors. However, they were largely unable to borrow (indeed, until the mid-1990s many did not know whether they owned their own homes) and lacked experience of the rules and norms of behavior in a capitalist economy. West Germans, on the other hand, had these capacities but lacked the requisite local knowledge. To the extent to which social ties facilitate economic exchange, social ties between East and West Germans thus suddenly took on economic value on the day of the fall of the Berlin Wall.

In our analysis we work with aggregate data on the share of individuals with social ties to East Germany.[3] This dataset shows that there was substantial variation in the share of individuals with social ties to the East across West German regions. The second key advantage of the natural experiment surrounding German reunification is that much of this variation has its roots in the idiosyncrasies of Germany's post-war history. Indeed, we show that West German regions which received a large inflow of *refugees* and *expellees* from East Germany between 1945 and 1961 tend to have significantly stronger social ties to the East in 1989.[4] However, the assignment of refugees and expellees from the East to West German regions might not be random, as individuals

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[1]In fact it had been highly restricted as far back as the late 1940s.

[2]Moreover, almost the entire East German capital stock was sold to private investors between 1990 and 1994. This boom was fueled by large transfers from West to East. These included both direct and indirect government transfers. For example, the East German Mark was converted to the Deutsche Mark at several times its market value. See (Sinn and Sinn, 1992, p. 51) and Lange and Pugh (1998), respectively.

[3]This measure of social ties thus captures bilateral ties. We are therefore not able to test network-theoretical models of social ties.

[4]'*Refugees*' are individuals who in 1939 had their primary residence in the territory that became the Soviet sector post-World War II and who then fled to West Germany between 1945 and 1961.
'*Expellees*' are individuals who in 1939 had their primary residence in areas of the German Reich which became part of Poland, Russia or another country from which ethnic Germans were expelled post-World War II. We focus on the group of expellees who held a residence in the Soviet sector after the war, but migrated to West Germany between 1945 and 1961 (as did the vast majority of expellees who were originally allocated to the Soviet sector).

may have moved to those regions in which they saw the best prospects for themselves and their families. In particular, an overwhelming concern for those arriving from the East after 1945 was the acute housing crisis in West Germany, which persisted until the early 1960s. This crisis resulted from the fact that during World War II, 32% of the West German housing stock was destroyed. The expellees and refugees arriving from the East were thus channeled predominantly into areas in which there was relatively more intact housing, i.e. to the areas that were least destroyed during the war.

Variation in wartime destruction which temporarily made it more difficult to settle in some parts of West Germany than in others thus provides the exogenous source of variation in the regional distribution of social ties which we need in order to identify a causal effect of social ties on regional economic outcomes. In particular, we use the degree of wartime destruction in 1945 as an instrument for the share of expellees settling in a given West German region. The main identifying assumption for our region-level results is thus that the degree of wartime destruction in 1945 (or any omitted factors driving it) affected growth in income per capita after 1989 only through the settlement of refugees and expellees post World War II; and that these groups indeed affect growth post-1989 exclusively due to their social ties to East Germany.

We devote a great deal of care to corroborating this identifying assumption in various ways. For example, we show that wartime destruction is uncorrelated with pre-war population growth, that it affects post-war population growth only until the 1960s, and that it has no effect on the growth of income per capita in West German regions in the years before 1989. Moreover, all of our specifications are robust to controlling for the growth in income per capita in the years prior to 1989. Finally, we show that our results are particular to expellees arriving from East Germany rather than to other expellees who arrived directly to West Germany, i.e. without settling in East Germany for some time.

Based on this identifying assumption, we show a strong causal relationship between the intensity of social ties to East Germany and post-1989 growth in income per capita among West German regions: a one standard deviation rise in the share of expellees from East Germany settling in a given West German region in 1961 is associated with a 4.6% rise in income per capita over the six years between 1989 and 1995. This is a sizable effect, amounting to around 0.7 percentage points higher growth per year.[5] While the regional growth effect diminishes after 1995, there is no evidence of a subsequent reversal, so that the pattern of social ties to the East which existed in 1989 may have permanently altered the distribution of income across West German regions.

In an effort to shed light on the mechanism linking social ties to regional economic growth

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[5]This result is robust to several different variations in the estimation strategy and cannot be explained by likely alternatives, such as migration from East to West in 1989 or by a decline in West German heavy industry in the 1990s.

we estimate separate effects for the incomes of entrepreneurs and non-entrepreneurs. While both entrepreneurs and non-entrepreneurs who live in regions with strong social ties to the East experience a significant rise in their incomes, the incomes of entrepreneurs increase at more than twice the rate of those of non-entrepreneurs. Consistent with this observation, the share of the population engaged in entrepreneurial activity rises in regions with strong social ties.

To trace this effect of social ties on entrepreneurial activity to the behavior of firms, we use data on the cross-section of West German firms in 2007. We show that West German firms which are headquartered in a region which had strong social ties to the East in 1989 are more likely to operate a subsidiary or a branch in East Germany in 2007. In particular, a one standard deviation rise in the share of expellees from East Germany settling in a region before 1961 is associated with a 3.4% increase in the likelihood that a given firm within that region operates a subsidiary or branch in East Germany in 2007. Interestingly, this effect seems to be concentrated in the services sector, which is consistent with the view that social ties are particularly important in industries which rely heavily on local information. While social ties to East Germany predict a higher probability of investing in East Germany, they do not predict a higher probability of investing anywhere else in the world, except for a small rise in the probability of investing in Poland. This latter finding is notable as many of those arriving in West Germany from East Germany before 1961 were originally expelled from present-day Poland in 1945, then lived in East Germany for up to 16 years and arrived in the West before the construction of the Berlin Wall in 1961.

We then estimate the effect of social ties at the household level. We show that West German households who report having relatives in East Germany in 1989 experience a persistent rise in their income after the fall of the Berlin Wall: the income of households with at least one relative in the East rises on average by 4.9% over the six years following the fall of the Berlin Wall. This rise in income again occurs immediately after 1989 and is robust to controlling for possible omitted variables, such as the age, level of education, or capital income of the household head. Especially households headed by individuals below the age of 40 (lowest quartile of the age distribution) and above the age of 52 (top two quartiles) seem to profit from their social ties to East Germany. We also show that households profit from their ties to East German relatives regardless of their level of capital income in 1989, which is consistent with the view that households used their ties to the East primarily as conduits for information, rather than to facilitate borrowing.

We interpret our results as evidence that social ties to East Germany indeed took on significant economic value after the fall of the Berlin Wall: West Germans who had ties to the East were better able to take advantage of the new economic opportunities in the East, possibly because they were better informed about investment opportunities than their peers. The rise in regional

income seems to be driven primarily by an increase in entrepreneurial activity and by an increase in the number of entrepreneurs. Moreover, firms which had access to a workforce with strong social ties seem to have had a comparative advantage in investing in the East. Comparing the quantitative implications of our household-level and our region-level results suggests that there were significant spill-overs, through which households living in regions with strong ties to the East experience rising incomes, even if they themselves do not have direct personal ties to the East.

While we believe that this paper convincingly demonstrates the relevance of social ties for regional economic development, there are two important caveats to the interpretation of our results. First, it is unclear how our results generalize beyond the context of a large economic transition, such as the economic re-integration of Germany. Social ties may be particularly useful in an environment in which markets are established rapidly and informational asymmetries are large. Second, we cannot be sure whether social ties led to an increase of economic activity at the country level or whether they merely resulted in a re-distribution of rents from regions with weaker social ties to regions with stronger social ties. However, the fact that we find positive spill-overs rather than crowding out at the regional level suggests that Germany as a whole was better off for its access to individuals with social ties.[6] Finally, some of the patterns that we document may be explained if there remain unobserved cultural differences in 1989 between 'native' West Germans and the population of expellees and refugees who settled in West Germany post-World War II. We do not emphasize this interpretation, as Germans of all parts were fairly homogenous before the separation, sharing a common language and culture. The integration of the new arrivals into West German society is commonly regarded as one of the preeminent achievements of post-war Germany, such that people would typically not know (or care) whether their neighbors were descendants of expellees or refugees after the war.

To our knowledge, this paper is the first to identify the effect of social ties on aggregate economic outcomes and the first to trace this effect from the households and firms to regional economic development. Our results relate to a large literature which links social networks and social ties to a broad set of microeconomic outcomes, ranging from employment (Munshi (2003), Laschever (2007), and Beaman (2008)) and informal insurance (e.g. Weerdt and Dercon (2006)) to performance in the financial industry (Cohen, Frazzini, and Malloy (2008), Hochberg, Ljungqvist, and Lu (2007), and Kuhnen (2009)) and agricultural yields (Conley and Udry (2009)). Since social ties have been documented to influence such a wide range of microeconomic outcomes, an obvious question to ask is whether they also influence aggregate economic variables. While there are number of models that predict such aggregate effects (e.g. Rauch

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[6]In the main part of the paper we only estimate the effects for West German districts - mainly due to a lack of East German data before 1989. If some of the surplus generated by social ties accrued to East Germans, our estimates likely underestimate the total growth effect of social ties.

(1996), Rauch and Casella (1998), Kranton and Minehart (2001), and Ambrus, Mobius, and Szeidl (2010)), we believe our paper to be the first to provide causally interpretable evidence on this matter.

Most closely related to our empirical work is the paper by Fuchs-Schündeln and Schündeln (2005) who use the reunification of Germany to identify the role of risk aversion in occupational choice. A number of other authors have used the partition of Germany as natural experiment. Redding and Sturm (2008) estimate the effect of market access on city growth, Alesina and Fuchs-Schündeln (2007) estimate the effect of the East German regime on voter preferences, and Bursztyn and Cantoni (2009) estimate the effect of exposure to West German media on consumer preferences.

In using the effect of wartime destruction on the settlement of expellees in West Germany, we also relate to a number of papers which quantify the effect of wartime destruction on long-run economic development. At the aggregate level, Brakman, Garretsen, and Schramm (2004) find that the pattern of wartime destruction had no long-run impact on city growth in West Germany. Davis and Weinstein (2002) and Miguel and Roland (2006) show similar results for Japan and Vietnam, respectively. At the individual level, Akbulut-Yuksel (2009) documents a detrimental effect of wartime destruction on the education and health of school-age children who grew up in the most affected areas.

The remainder of the paper is organized as follows: Section 2 reviews the historical background of wartime destruction, the partition of Germany, and the settlement of expellees and refugees in West Germany. Section 3 discusses the data and its construction. Section 4 establishes the basic relationship between wartime destruction and social ties to the East, and uses this relationship to identify a causal effect of social ties on growth in income per capita post-1989. Section 5 provides evidence which suggests that entrepreneurial income and activity being the main driver of aggregate income growth. In particular, section 5.2 documents the influence of social ties on the ownership structure of German firms today. Section 6 looks at the relationship between social ties and income growth at the household level. Section 7 discusses possible mechanisms by which social ties might affect economic activity. Section 8 discusses our results, while the appendix contains additional robustness checks and details on the construction of our dataset.

2   Historical Background

2.1   Destruction of Housing Stock during World War II

German cities and towns were heavily destroyed after World War II. This was mainly the result of Allied air raids, which began in 1940 and intensified until the final days of the war in 1945.

These left around 500,000 dead and resulted in the destruction of a third of the West German housing stock, making it the most devastating episode of air warfare in history.[7]

In the early days of the war the Royal Air Force attempted to slow down the advance of the German army into the Soviet Union by destroying transport infrastructure. This strategy was an abject failure and was quickly abandoned, as the available technology at the time did not permit targeted raids. At best, the pilots flying the nighttime raids were able to make out that they were above a city (and they were often even unsure which city lay below). This led to the adoption of the doctrines of 'moral bombing' (1941) and of 'fire and carpet bombing', which were aimed at destroying the Germans' morale and ability to resist by destroying cities and towns (Kurowski (1977)). By the end of the war, 50% of the 900,000 metric tons of bombs deployed had hit settlements, while 17% had hit industry or infrastructure.

The cities destroyed most during the early years of the war were those that were close to the British shore and easy to spot from the air, e.g. Hamburg and Cologne. After 1944, utilizing recent technological advances, the allies were able to implement fire storms, which were easiest to create in cities with highly flammable, historical centers, such as Darmstadt, Dresden, or Wuerzburg. Fire storms could typically not be implemented in cities which had already been hit by a large number of explosive bombs, as the rubble from earlier raids would have prevented the fire from spreading. This is why the cities that were attacked relatively late in the war (often strategically the least important) were among the most heavily destroyed.[8]

Appendix Figure 1 shows the varying intensity of destruction in West German regions. Note that none of our empirical results rely on this pattern being random or driven by certain factors. Instead, our identification strategy relies on the assumption that the pattern of wartime destruction or any omitted factors driving it have no direct effect on growth in West German regions 45 years later, post 1989.

2.2 The Partition and Reunification of Germany

In 1944, as World War II entered its final phase, the UK, the US and the Soviet Union agreed on a protocol for the partition of pre-war Germany: The areas to the east of the rivers Oder and Neisse were to be annexed by Poland and by the Soviet Union, and the remaining territory was to be divided into three sectors of roughly equal population. The UK would occupy the Northwest, the US the South, and the Soviet Union the East. The capital, Berlin, would be jointly occupied. At the end of the war, the three armies took control of their sectors, and the

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[7]The information presented in this section is from U.S. Govt. Print Office (1945), Kurowski (1977), and Friedrich (2002).

[8]During a fire storm, a large section of a city catches fire, creating winds of up to 75 meters per second, depriving those exposed of oxygen and often sucking them into the fire.

US and Britain carved a small French sector out of their territory.[9] In 1949, with the onset of the Cold War, the three Western sectors formed the Federal Republic of Germany (West Germany), and the Soviet sector became the German Democratic Republic (East Germany). Economic exchange between the two parts of Germany became increasingly difficult as the East German government immediately introduced central planning. Only three years later, in 1952, the border was completely sealed, cutting any remaining legal or illegal trade links between East and West.[10]

Until the construction of the Berlin Wall in August 1961 there remained the possibility of personal transit from East to West Berlin, which was the last remaining outlet for refugees fleeing from East to West Germany. After 1961, migration between East and West virtually ceased. In the following years the partition of Germany was formally recognized in various international treaties, and was, until the summer of 1989, generally believed to be permanent.[11]

In September of 1989 it became apparent that a critical mass of East Germans had become alienated from the socialist state, its declining economic performance, and the restrictions it placed on personal freedom. Increasingly large public demonstrations led to the opening of the Berlin Wall on November 9th, 1989. The first free elections in East Germany were held in March of 1990, followed by the rapid political, monetary, and economic union between East and West Germany by the end of the same year.

2.3 Refugees and Expellees in Western Germany, 1945-1961

In 1945 the Polish and Soviet authorities expelled all German nationals from the annexed territory, so that areas which used to be German before 1939 could be inhabited by Polish (and Russian) nationals after 1945. While many Germans in these regions had fled the advancing Soviet Army, those that remained were marched or transported out of the annexed territories towards the four sectors. We refer to this group of people as 'expellees'. Germans that either originally lived in or moved to the countries occupied by the German army during war were also expelled in many cases, particularly from Czechoslovakia, Hungary, Romania, and Yugoslavia. Expellees were registered and then assigned one of the four sectors in which to settle, according to quotas fixed in the Potsdam accord.[12] The authorities in turn allocated the expellees to the

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[9]This entailed a significant withdrawal of the British and US forces, who had captured much more territory than expected (Sharp (1975)).

[10]The only remaining trade between the two countries was the 'Interzonenhandel' which was arranged between the two governments. In this system the East German government would trade goods and services by the barter system. In 1960 its total volume came to the equivalent of $178 m. See Holbik and Myers (1964) for a detailed description of the Interzonenhandel.

[11]The most important of these treaties was the 'Grundlagenvertrag' of December 1972 between East and West Germany in which both countries recognized 'two German states in one German nation.' Following this treaty East and West Germany were accepted as full members of the United Nations.

[12]The official plan adopted by the allies in November 1945 was to expel 6.65 million Germans. 2.75 million, were to be allocated to the Soviet sector and 2.25 million, 1.5 million, and 0.15 million to the American, British,

(later to become federal) states within their jurisdictions and assigned them quarters wherever they could find intact housing stock.

The first wave of 5.96 million expellees arrived in the three Western sectors by 1946. We refer to this group as 'direct expellees'. As it became increasingly apparent that the division of Germany would become permanent, most of the 3.04 million that had originally been allocated to the Soviet sector left for the West. These 'expellees via the Soviet sector' are critical to our empirical analysis as they had the opportunity to form social ties to East Germans before migrating on to West Germany. By 1960, the total number of expellees in West Germany had risen to 9.697 million, of which roughly one third were expellees via the Soviet sector.[13]

In parallel, an increasing number of native residents of the Soviet sector who were dissatisfied with the political and economic prospects of the fledging East Germany fled to the West. This flow of 'refugees' peaked in the years before the construction of the Berlin Wall, with on average around 300,000 individuals illegally crossing the Border in each year between 1957 and 1961 (Hunt (2006)). By 1961 the total number of East German refugees settling in West Germany was 3.5 million.

While the authorities in the western sectors, and later the West German authorities, had an explicit policy supporting expellees, supplying them with housing and various subsidies, there was very little support for refugees. In fact, as late as 1950 the authorities actively tried to discourage refugees from entering West Germany on the grounds that they would exasperate an already catastrophic situation in the housing market and for fear of the political consequences of a de-populating East Germany. In practice, however, the authorities never attempted to deport refugees back to the East, and so refugees often made their own way in West Germany, without registering with the authorities.[14] The severe housing crises that resulted from the inflow of millions of migrants into the heavily destroyed Western sectors remained the principal determinant in the allocation of expellees and refugees to West German cities and towns until the late 1950s.[15]

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and French sectors, respectively (Bethlehem (1982), p.29).

[13]We are unable to determine exactly how many expellees remained in East Germany, as the communist government declared after 1950 that the expellees had been fully integrated into East German society and banned the concept from subsequent government statistics (Franzen (2001)).

[14]See Bethlehem (1982, chapter 3).

[15]In the early years the availability of housing was the only determinant of where the expellees were sent (Bethlehem, 1982, p. 29, pp.49). After 1949 economic considerations started playing a more important role in the allocation process and the West German government also initiated a number of programs encouraging migration to areas in which there was a relatively higher demand for labor. However, these programs remained relatively limited, with less than one in ten expellees participating in them.

3   The Data

We use data at the household, firm, district (Landkreis), and regional (Raumordnungseinheit) level. Districts are the equivalent of US counties. Regions are the union of several districts, and each district belongs to one such unit. Regions do not have a political function but exist exclusively for statistical purposes; in this sense they are analogous to metropolitan statistical areas in the US, but also encompass rural areas. All of our aggregate data is available at the district level, except for income per capita before 1995, which is available only at the regional level. Our primary units of analysis are thus the 74 West German regions. When we use aggregate controls in our firm and household level analysis we always use data at the lowest level of aggregation available.

3.1   Region Level Data

Our primary proxy of social ties to the East at the region level is the share of expellees via the Soviet sector in 1961. The 1961 census reports the number of inhabitants and the number of expellees in each West German district. The census presents the data separately for expellees who arrived directly in West Germany in or after the war and those who arrived in West Germany after having registered a residence in the Soviet sector. From this data we created the variables *Share Expellees (Direct) '61* and *Share Expellees (Sov. Sector) '61*.[16]

For our instrumental variables strategy we coded two measures of wartime destruction: the share of dwellings that were destroyed in 1946, labeled *Share Housing Destroyed '46*, and the amount of rubble in cubic meters per inhabitant, labeled *Rubble '46 (m^3 p.c.)*. Both measures are from the 1946 edition of the annual statistical publication of the German Association of Cities. This data is reported at the city level for the 199 largest West German cities and towns. We also coded the number of inhabitants of these towns in 1939 and 1946 from this volume. We aggregated the data on wartime destruction by calculating the mean destruction across cities in a district or region, weighted by the cities' population in 1939. Additional details on the data sources used are given in Appendix C.

Our data on income per capita is from the German 'Mikrozensus', an annual, obligatory random survey of one percent of the population. We aggregated the individual income data

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[16]This data was collected at the 1961 district level. Some West German district boundaries have changed between 1961 and 1989. Our analysis uses the 1989 district boundaries. To calculate the district level share of expellees on the basis of the 1989 district boundaries, we proceeded as follows: We first tracked (using ArcGIS) which share of the area of each 1961 district became part of which 1989 district. For example, we calculated that 71% of what used to be district 'Mainburg' in 1961 became part of a district called 'Kelheim' in 1989, and the remaining 29% became part of the 1989 district 'Freising'. Assuming that the expellees were distributed homogenously across space within districts in 1961, we calculate the number of expellees living in each 1989 district.

to the region level for every second year between 1985 and 2001. Income per capita at time t is labeled *Income t (p.c.)*. As the 'Mikrozensus' does not identify districts prior to 1995, an aggregation to districts was not possible. We also used the 'Mikrozensus' to construct the average income of entrepreneurs (*Income (p.c.) Entrepreneurs t*), the average income of all others (*Income (p.c.) Non-Entrepreneurs t*), as well as the share of entrepreneurs amongst the respondents (*Share Entrepreneurs t*) for each region. From the same source we obtained data on the share of the population working in the manufacturing sector in 1989 (*Share Working in Manufacturing '89*) and the share of the population that migrated to the region from the East in the years 1991, 1993 or 1995 (*Migration from East '91-'95*). As an additional control we calculated the distance of the center of each district or region to the former inner German border from GIS data (*Distance to East (100 km)*).

3.2 Firm Level Data

Our firm level data is from the 2007 edition of the ORBIS dataset. This source contains data on some 750,000 firms in West Germany and their subsidiaries and branches both in Germany and abroad, including information on the postal code of the firms' headquarters and of their associated subsidiaries and branches. We used this information to match each firm to the West German district in which its headquarters are located. We selected all firms which have at least one subsidiary or branch in a West German district other than the district of the headquarters ($N = 19,420$). As a simple measure of firms' investment activity in different parts of the world, we created a dummy variable for whether the firm has a subsidiary or branch in location x (*S. & B. in x (Dummy)*), made up of separate variables for 'East Germany', 'Poland', the 'Old EU Countries', the 'New EU Countries (excluding Poland)' and for 'Non-EU Countries' ('Old EU Countries' refers to the 14 EU member countries other than Germany prior to enlargement in 2004). For the same set of firms we computed the share of firm's subsidiaries and branches in location x as a fraction of its total number of subsidiaries and branches in location x and West Germany (*Share of Total S. & B. in x*). As proxy for the size of the firm we use the number of subsidiaries and branches it operates in West Germany (*S. & B. in West Germany*). Finally, we used the NACE code given in the ORBIS dataset to define four sectoral fixed effects (agriculture, manufacturing and construction, trade and service, and government).

3.3 Household Level Data

Our household level data is from the German Socio-Economic Panel (SOEP), which is an annual panel of German households. From the panel we selected households which participated in the 1985, 1989, and 1995 waves, and used information on household income in the years 1985-2001

(*Income (SOEP)*), the amount of capital income in 1989, and the age and years of education (including professional education) of the household head. We also created dummies for the primary occupation and gender of the household head.[17]

Importantly, the SOEP questionnaire asked in 1991 whether the respondent had any relatives in the other part of Germany. From this information we constructed our measure of social ties at the household level (*Ties to Relatives '91*), which is a dummy variable equal to 1 if at least one individual in the household had a relative in the other part of Germany. We also aggregated this variable to the region level by calculating the share of households with ties to East Germany in each West German region (*Share Ties to Relatives '91*), which we use as a secondary measure of social ties. Lastly, we created a dummy variable indicating households whose household head was an entrepreneur in 1989 (*Entrepreneur '89*).

3.4   Descriptive Statistics

Table 1 provides descriptive statistics. Panel A of Table 1 presents the data on West German regions; here, the second and third columns divide the sample into regions with a higher and lower share of housing destroyed in 1946 than the median region. The first row of column 1 gives the mean and the standard deviation of the share of expellees via the Soviet sector in 1961, while the second column gives the mean and standard deviation for regions with below median levels of wartime destruction. Expellees via the Soviet sector made up 4.8% of the 1961 population in the average region. Similarly, expellees that came directly to West Germany made up 11.9% of the average region's population in 1961 (row 2), and 22.3% of the population report having relatives in East Germany in 1991 (row 3). In all three cases, these shares are higher in regions that suffered lower levels of wartime destruction. The variation in wartime destruction is considerable, with 15.4% of housing on average destroyed in regions with low destruction and 49.3% in regions with high destruction (row 4). Moreover, regions which are closer to the inner-German border tended to be less destroyed than those that are further away (row 6). The pattern in income per capita is interesting: while regions with lower wartime destruction are slightly poorer in 1985 and 1989, they are slightly richer than the average region in 1995.

Panel B of Table 1 presents the data on West German firms in 2007, split up by regions above and below the median level of wartime destruction. On average, firms in regions with lower wartime destruction are slightly smaller as measured by the number of subsidiaries they operate in West Germany (row 1). Nevertheless they are also more likely to operate a subsidiary or branch in the East (8.3% versus 7.2%). On average, 7.7% of the firms in our sample operate a subsidiary or a branch in East Germany (row 3) and 1.8% operate in non-EU countries.

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[17]Details of how we aggregated data on individuals to the household level are given in Appendix C.

4 Social Ties and Regional Economic Growth

We first explore the effect of social ties between West and East Germans on income growth in West German regions. The structural equation of interest is

$$\log\left(\frac{y_{r,t}}{y_{r,1989}}\right) = \beta s_{r,1989} + \phi \log y_{r,1989} + Z'_r \zeta + \varepsilon_r \tag{1}$$

where $y_{r,t}$ is income per capita in region r in year t, $t \in \{1991, 1993, 1995, 1997, 1999, 2001\}$. The left hand side variable is thus the growth in income per capita between 1989 and subsequent census years. $s_{r,1989}$ denotes our measure of social ties in region r. Z_r is a vector of controls, which always contains a constant term, a complete set of federal state fixed effects, and the distance between district r and the inner-German border. The coefficient of interest is β, which measures the effect of social ties on growth in income per capita after 1989. In all specifications we control for income per capita in 1989. The coefficient ϕ thus measures the degree of mean reversion in income per capita between West German districts. In our standard specification we also control for the pre-existing growth trend by including the log of growth between 1985 and 1989, $\log\left(y_{r,1989}/y_{r,1985}\right)$. In these specifications the coefficient β thus estimates how growth in income per capita changed after 1989 for regions with different levels of intensity of social ties to the East. The assumption that the relationship between growth in income per capita and social ties is linear is made for simplicity. The error term ε_r captures all omitted influences, including any deviations from linearity. Throughout, standard errors are calculated using the Huber-White correction to ensure robustness against arbitrary heteroscedasticity.

Equation (1) will consistently estimate the parameter of interest if $Cov\left(s_{r,1989}, \varepsilon_r\right) = 0$. This covariance restriction may not, however, hold in practice, since the settlement of expellees in West Germany prior to 1961 (and thus the strength of social ties to East Germany) might have been determined persistent economic prospects. Although we show results of Ordinary Least Squares estimates of equation (1) for reference and comparison, we primarily rely on an instrumental variables strategy, which uses only the variation in $s_{r,1989}$ that is attributable to variation in wartime destruction across regions in 1946. Our first-stage specification is

$$s_{r,1989} = \gamma w_r + \phi^{fs} \log y_{r,1989} + Z'_r \zeta^{fs} + \nu_r, \tag{2}$$

where w_r is our measure of wartime destruction and (2) contains the same covariates as (1). Our key identifying assumption is that $Cov\left(w_r, \varepsilon_r\right) = 0$. This states that, conditional on the covariates we control for, (i) wartime destruction in 1946 has no effect on growth in income per capita after 1989 other than through the settlement of expellees via the Soviet sector and (ii) there is no omitted variable which drives both wartime destruction and differences in income

growth post-1989.

4.1 The First-Stage Relationship

Panel A of Table 2 shows our basic first-stage regressions, using the share of expellees via the Soviet sector in 1961 as a proxy for social ties in 1989. Column 1 is the most parsimonious specification as shown in equation (2). It regresses the share of expellees via the Soviet sector on the share of housing destroyed in 1946, while controlling for the distance to the inner-German border and for income per capita in 1989. The coefficient estimate of -0.019 (s.e.= 0.004) is statistically highly significant and suggests that a one standard deviation increase in the share of housing destroyed in 1945 (s.d.= 0.21) is associated with a 0.4 percentage point drop in the share of expellees via the Soviet sector in 1961. (This corresponds to 8% fewer expellees via the Soviet sector relative to the mean share of expellees via the Soviet sector across regions.) We do not have reliable data on the settlement patterns of refugees arriving from the Soviet sector during the same period. However, since both groups faced similar constraints regarding the shortage of housing, the settlement pattern of refugees across West German regions was likely very similar to that of expellees arriving from the Soviet sector. As both groups were roughly of the same size (around 3.5 million) we may speculate that the total effect on the settlement of individuals migrating from the Soviet sector was around twice as large as our estimates suggest.

As expected, the share of expellees in 1961 falls with the distance to the inner-German border. The coefficient on income in 1989 is positive and significant, suggesting that expellees tended to settle in districts that were richer in 1989, which is most likely attributable to permanent differences in income per capita between districts, which existed prior to 1961.[18]

The specification in column 2 is our standard specification. It adds income growth in the five years prior to 1989 as an additional control. The coefficient of interest remains virtually unchanged at -0.020 (s.e.= 0.005). The coefficient on income growth is statistically indistinguishable from zero, suggesting that the pattern of settlement of expellees via the Soviet sector in 1961 is not correlated with income growth in the years prior to the fall of the Berlin Wall.

Figure 1 plots the conditional relationship estimated in this column graphically and shows that the first-stage relationship is not driven by outliers. Columns 3-5 of Panel A of Table 2 show the first-stage regressions corresponding to robustness checks performed in the instrumental variables estimation. In column 3 we use the volume of rubble per capita in 1946 as an alternative measure of wartime destruction, which again yields a negative and significant coefficient. In columns 4 and 5 we add the share of the workforce employed in manufacturing in 1989 and the extent of

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[18]Income per capita in 1989 is included in all specifications to present the first stage corresponding to the instrumental variables results discussed below. If we drop all controls from the regression, the estimated coefficient is identical, -0.019, s.e.=0.007.

migration after reunification as additional controls. The coefficient of interest remains unchanged and statistically significant at the 1% level in each case.

Panel B of Table 2 repeats the same specifications as in Panel A, using the share of households with ties to relatives in East Germany in 1991 from our household level dataset as an alternative proxy for social ties in 1989. In the interest of preserving space we show only the coefficient of interest. All estimates are negative and all except the one in column 3 are statistically significant at the 5% level. The coefficient in column 1 is -0.099 (s.e.= 0.042). It implies that a one standard deviation rise in the share of housing destroyed in 1945 is associated with a 2.08 percentage point drop (or alternatively a 9.3% drop relative to the average) in the share of respondents that have a relative in East Germany in 1991. Similar results (not shown) hold for the share of respondents that report to be in contact with friends in East Germany. In the remainder of the paper we use the share of expellees via the Soviet sector in 1961 as our main proxy for social ties since, coming from a comprehensive survey of the population, we expect it to be measured with less error than the results from our household level dataset. Needless to say, the correlation between the two proxies is very high (64%), as shown in Figure 2.

4.2   The Reduced Form Relationship

As a prelude to our instrumental variables estimates, Panel C shows the reduced form relationship between growth in income per capita after the fall of the Berlin Wall and wartime destruction. All specifications (except the one in column 3) are again identical to the ones in Panels A and B, with the left hand side variable now $\log\left(\frac{y_{r,1995}}{y_{r,1989}}\right)$, the growth in income per capita between 1989 and 1995. The coefficient of interest is negative and statistically significant at the 5% level in all columns except in column 1, where it is significant at the 10% level. The estimate in column 2 is -0.048 (s.e.= 0.020), suggesting that regions that were least destroyed during the war experienced significantly higher differential growth in income per capita after the fall of the Berlin wall. A one standard deviation drop in the share of housing destroyed in 1946 is associated with a 1.5 percentage point higher growth in income per capita over the six years following German reunification. The size of the estimated coefficient is stable across columns 1, 2, 4, and 5, with point estimates ranging from -0.042 in column 1 to -0.048 in columns 2 and 4. Figure 3 depicts this relationship graphically in a conditional scatter plot, where the slope shown corresponds to the estimate in column 2.[19]

As a first test of the mechanism by which wartime destruction could suddenly affect economic

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[19]In the plot, Wilhelmshaven looks like a significant outlier. Dropping Wilhelmshaven from the sample reduces the coefficient estimate to -0.033 (s.e. = 0.016). As a more systematic check for the effect of outliers, we run a robust regression (according to the terminology used by STATA) in which observations with a Cook's D value of more than one are dropped and weights are iteratively calculated based on the residuals of a weighted least squares regression. The robust estimate is -0.032 (s.e. = 0.014).

growth 50 years later, the specification in column 3 includes both the share of housing destroyed in 1946 and rubble per capita in 1946. The results are encouraging for our identification strategy: while the coefficient on the share of housing destroyed remains negative and significant at -0.060 (s.e.= 0.027), the coefficient on rubble per capita is positive and insignificant. This pattern suggests that it is primarily the lack of housing in 1946 and not wartime destruction per se that affects economic growth post 1989.

4.3   Instrumental Variables Results

In our instrumental variables estimation we explicitly test the main hypothesis of this paper: that the intensity of social ties between East and West Germans in 1989 is causally related to a rise in income per capita after the fall of the Berlin Wall. In Table 3, we estimate (1) using only the variation in the social ties in 1989 that is due to variation in wartime destruction, by instrumenting for the share of expellees via the Soviet sector in 1961. In column 1 we instrument with the share of housing destroyed in 1946. The coefficient estimate for the share of expellees is 2.169 (s.e.= 0.947), suggesting that a one standard deviation increase in the share of expellees in 1961 (s.d.= 0.019) is associated with a 4.3% rise in income per capita over the six years following 1989 (or roughly a 0.7 percentage point higher rate of growth per annum).[20] The coefficient on income in the base year, 1989, is negative and significant, which suggests mean reversion in income per capita across West German districts. Somewhat surprisingly, the coefficient on the distance to the inner-German border is positive, which suggests that the districts closest to the inner-German border did not immediately profit from the opening of the border (which is in line with a similar observation in Redding and Sturm (2008), that the population of West German cities close to the inner-German border grew relatively little between 1989 and 2002).

Column 3 gives our standard specification in which we control both for the level of income in 1989 and for income growth in the five years preceding 1989. The coefficient of interest rises slightly to 2.442 (s.e.= 0.880) and is now significant at the 1% level.[21] The fact that we control for both for the pre-existing income level and for pre-1989 income growth means that this estimate is specific to the period after the fall of the Berlin wall: It can neither be explained by mean reversion in income growth nor by a pre-existing trend. After the fall of the Berlin wall, there is a sudden improvement in the growth trajectory of the districts that were least destroyed 50 years earlier, over and above any pre-existing growth trend.[22]

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[20]The F-statistic against the null that the excluded instrument is irrelevant in the first-stage regression is 22.56 (this is the squared t-statistic from Table 2).

[21]We do not cluster the standard errors at the federal state level as there are only 10 federal states. However, the results presented throughout this section are generally robust to doing so. For our standard specification the clustered standard error is 1.288, which implies that the coefficient of interest remains statistically significant at the 10% level.

[22] Since our model contains a lagged dependent variable there may be a mechanical bias in the coefficient of

The results of column 3 are almost unchanged when we simultaneously instrument the share of expellees with both the share of housing destroyed and with rubble per capita (shown in column 4). Column 2 shows the OLS estimate of our standard specification for comparison. It is only about one half of a standard error lower at 1.963 (s.e.= 0.574), suggesting that the endogenous assignment of expellees to West German districts induces only a relatively mild downward bias in the OLS estimate. A Hausman test fails to reject the null hypothesis that $Cov\left(s_{r,1989}, \varepsilon_r\right) = 0$.

4.4 Validity of the Exclusion Restriction

While the endogenous assignment of expellees to West-German districts does not seem to have a large impact on our results, our identifying assumption, that the degree of wartime destruction in 1945 affected growth in income per capita after 1989 only through its effect on the intensity of social ties in 1989, cannot be tested directly. Nevertheless, we can perform a number of falsification exercises to assess its plausibility. There are two types of potential challenges and corresponding tests.

<u>Pre-Trend Tests</u>

The 'simple' challenge to our identifying assumption is that wartime destruction (or an omitted variable driving it) may have had a lasting effect on income growth in West German regions which persisted for more than half a century (until 1995). We believe that we can convincingly discard this 'simple' challenge.

First, our standard specification controls for the growth rate of income pre-1989 and thus identifies *changes* in the region-specific growth trajectory that occur after 1989.

Second, the conventional wisdom in the literature is that wartime destruction had no lasting impact on West German growth past 1960 (Brakman, Garretsen, and Schramm (2004)). Figure 4 replicates part of this result. It shows coefficient estimates of regressions relating the population growth in West German cities to wartime destruction in 1946 for various years since 1929. Not surprisingly, wartime destruction had a strong and significant negative effect on population growth during the war (between 1939 and 1945). During the period of reconstruction between 1946 and 1960 the cities most heavily destroyed grew fastest. However, from 1960 onwards there is no statistically significant effect of wartime destruction on population growth and the coefficient estimates are virtually zero. To the extent that population growth is correlated with income growth, this result suggests that the effects of war destruction on income growth were short lasting.

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interest. In principle we can instrument for the lagged dependent variable as suggested by Anderson and Hsiao (1982). However, we do not have sufficient pre-1989 data to do this for the specification in column 3. However, we can use income in 1985 as instrument for income in 1989 in the specification of column 1. The coefficient estimate increases slightly to 2.289 (s.e.=0.984) and remains significant at the 5% level.

Third, for the short period pre-1989 for which we do have income data we can easily test for a trend in growth before 1989 that may be correlated with wartime destruction. In Table 4 we use the full panel structure of our data set by regressing log income per capita for each district and year post-1985 on the interaction of year fixed effects with the share of expellees in 1961, income per capita in the base year (1985), a full set of state-year fixed effects, and the distance to the inner-German border. The share of housing destroyed in 1946, interacted with year fixed effects, are the excluded instruments. Here we use a two-step GMM estimator which accounts for first-order autocorrelation in the error structure. As in our simpler specifications from Table 3, the coefficients on the interacted variables estimate the effect of social ties on income growth between 1985 and each of the following census years. In column 1 we see that there is a negative and insignificant effect of the share of expellees on growth between 1985 and 1987 (-0.329, s.e.= 1.023). The effect changes sign in 1989 (0.506, s.e.=1.022), grows further in 1991 (1.532, s.e.=1.022) and finally becomes statistically significant in 1993 (2.059, s.e.=1.022) and 1995 (2.813, s.e.=1.023). Columns 2 and 3 show alternative specifications which use 1987 and 1989 as base years, with very similar results. There is thus no evidence of a pre-trend in growth that would be correlated with wartime destruction, and the timing of the effect is highly supportive of the view that variation in the degree of wartime destruction only became relevant after the fall of the Berlin Wall.

Controlling for Alternative Channels

The more 'sophisticated' concern about our results is that the pattern of wartime destruction (or some omitted variable driving it) affected income growth through some other channel which only switched on post-1989.

One such possibility is that the allies may have bombed areas that were highly industrialized and the manufacturing sector may have experienced a relative decline in those areas after 1989. To address this potential concern, the specification in Table 3 column 5 controls for the share of the population that works in manufacturing in 1989. Indeed, the estimated coefficient on this variable is negative and significant, picking up a relative decline of highly industrialized districts, but the coefficient of interest is virtually unaffected by this additional covariate. The variation in income growth post-1989 due to the relative decline of manufacturing is thus unrelated to the variation in income growth post-1989 due to the settlement of expellees in West Germany. In addition, Figure 4 shows that wartime destruction was uncorrelated with pre-war population growth. To the extent that we can interpret take pre-war population growth as an indicator for economic growth more generally, this would suggest that allied bombings during World War II were not specifically targeted at destroying cities which were on a higher or lower growth trajectory.

Another potential concern is that after 1989 highly skilled workers from East Germany may

have migrated to the same districts in which their relatives settled before 1961, and that this migration may have increased the average wage paid in these districts. In column 6 we control for the flow of migration from East to West, and again there is little effect on the coefficient of interest.[23]

Placebo Test

While neither of these two likely channels seem to be driving our results, there might be other omitted variables which are correlated with the pattern of wartime destruction and post-1989 deviations from the existing growth trajectory. Furthermore, we may be misinterpreting our results in that expellees may affect income growth after 1989 through some channel other than social ties, which switches on post-1989. In particular, expellees might have been somehow different from other Germans, and these different traits (a higher propensity to become an entrepreneur, different preferences, etc.), put them in an advantageous position to earn higher incomes post 1989 for reasons unrelated to social ties to the East. We are able to provide evidence on this, and in fact the entire class of 'sophisticated' challenges, by comparing the expellees via the Soviet sector with expellees who arrived directly from the annexed parts of pre-war Germany. The direct expellees migrated from the same areas in Eastern Europe, they look very similar to expellees via the Soviet sector on observable characteristics, and their settlement pattern was affected by wartime destruction in a similar way. The only relevant difference between the two groups is that expellees who arrived directly from the annexed areas did not spend any significant time living (and forming social ties) in East Germany. If we misinterpret our results and the effects we document are driven by some omitted variable which determined both wartime destruction and post 1989 income growth, or if there was something special about expellees per se that gave them access to business opportunities post-1989, we would expect to find the same effects for both the expellees via the Soviet sector and the direct expellees.[24]

Table 5 shows summary statistics on both groups of expellees from the 1971 census, the last census in which the two groups are separately identified. The table gives the average income, the average number of years of schooling, and the occupational structure of the 'native' West German population (column 1) and of both groups of expellees (columns 2 and 3). While both groups of expellees have slightly lower income in 1971 than the native West German population, the average income of direct expellees and expellees who arrived via the Soviet sector is similar (DM 777.8 and DM 764.4 per month, respectively). Similarly, both groups of expellees have

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[23]When we use the flow of migration from East Germany as the dependent variable, the coefficient on expellees is not significant, which is comforting for our interpretation of the results. A related result in the literature is that high-skilled workers from the East were actually less likely to migrate to the West than low-skilled workers up until 1996 (Fuchs-Schündeln and Schündeln (2009)).

[24]Recall from our discussion in section 2 that expellees were allocated to the four sectors according to quotas and that, as far as we can tell from the statistics published in East Germany, the vast majority of expellees who were allocated to the Soviet sector migrated to the West before 1961.

relatively fewer entrepreneurs among them and a lower representation in agriculture than the native West German population, but the occupational structure of direct expellees and expellees via the Soviet sector is extremely similar.

To compare the effect of direct expellees and expellees via the Soviet sector we require a second instrument, which gives us differential leverage in identifying the exogenous components in the settlement patterns of both groups. In columns 1 and 2 of Table 6 we re-run our standard first-stage regression from Table 2 column 2, but include both the share of housing destroyed and the volume of rubble per capita in 1946. (We again do not report covariates in the interest of space.) Column 1 gives the results for expellees arriving via the Soviet sector and column 2 gives the results for expellees arriving directly in West Germany. In the case of the former, the share of housing destroyed is significant with a negative sign and rubble is insignificant. In the case of the latter, the size of the effect of the share of housing destroyed is roughly preserved, though it is less precisely estimated. However, importantly for us, the coefficient on the amount of rubble is negative and significant. Our two measures of wartime destruction thus give us differential leverage in identifying the exogenous components in the settlement patterns of both groups. We believe that this feature of the data is related to the timing of the arrival of the two groups of expellees. The direct expellees arrived immediately after the war and the expellees via the Soviet sector arrived between 1945 and 1961. We suspect that rubble per capita measures a dimension of wartime damage which was important in the immediate aftermath of the war but then cleared away relatively quickly (many German cities famously have 'rubble mountains' which were piled up in the first two to three years after the war), while the share of housing destroyed had a longer lasting effect on the settlement of expellees.

Using both instruments, we are thus able to separately estimate the effect of expellees who arrived via the Soviet sector and the effect of direct expellees on differential income growth after 1989. Column 3 presents the result. While the coefficient on the share of expellees who arrived via the Soviet sector is positive, similar in magnitude to the estimates obtained earlier (3.422, s.e.= 1.809), and statistically significant, the coefficient on the share of direct expellees is close to zero and statistically insignificant. Since both groups are extremely similar, except for the fact that expellees who spent a number of years in the Soviet sector had an opportunity to form social ties with East Germans, we view this result as strong support in favor of our interpretation.

4.5 Remaining Caveats

A remaining caveat to our results is that they are also consistent with two proximate interpretations which we do not emphasize due to our reading of German history. First, the results might document the value of 'local knowledge' about East Germany. In principle, the effects we document could be driven by individuals who lived in East Germany during their youth, do not

have personal contact with anyone there, but remember enough details about the local economy to earn rents after reunification. We do not emphasize this interpretation as the conventional view is that economic conditions in East Germany have changed dramatically between 1961 and 1989, so that local knowledge acquired before the division of Germany would be useless after 40 years of socialist rule. Moreover, our individual-level results show that even households headed by individuals who were too young to remember living in East Germany experience a rise in their personal income after 1989 if they have a relative in the East, providing some partial evidence against this alternative interpretation.

Second, some of the rise in household and regional income may be driven by restitutions and payments of compensation to those whose property had been expropriated in East Germany. Under the reunification treaty, former owners of firms and real estate could apply for restitution providing that they had not received compensation from the East German government and the assets they were claiming still existed at the time of filing a claim. This meant that practically all individual claims made related to buildings and land. While there were a large number of claims filed (around 2 million), we do not believe that restitution or compensation payments could be responsible for the patterns we document in the data.

The administrative backlog created by the task of tracing ownership rights over a period of 50 years was so enormous that it was not sufficiently cleared in time to confound the effects we document (in fact, the authorities and courts are still processing claims to the present day). The first compensation payments were not set to begin until 1996, whereas the effects we document begin immediately after 1989 (Southern (1993)). The only real concern is thus the existence of cases in which the filing of a claim resulted in the restitution of a property prior to 1995, and the restitution of this property resulted in a rise in income. The early restitutions were mainly of firms, as the establishment of safe property rights for productive assets was a political priority (although even these were the subject of protracted legal battles, so that in 1992, 90% of claims concerning firms were still on hold due to litigation; see Sinn and Sinn (1992)).

We address this concern by calculating an upper bound for the value of all restitutions that could possibly have been made in the period in question and comparing it to the magnitude of the effects that we attribute to social ties. According to the government agency handling restitutions, half of all approved claims had been settled by restitution, and the total sum of compensation payments made between 1990 and 2009 was EUR 1.4 bn.[25] These compensation payments were made at about 50% of market value, and so a reasonable estimate of the value of all restitutions is therefore $\frac{EUR\ 1.4bn}{0.5}$ =EUR 2.8bn. Assuming that all restitutions had been completed before 1995 (which they were not) and assuming that the new owners immediately sold

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[25]Personal correspondance with Dr. Händler, press liaison of the Bundesamt fuer zentrale Dienste und offene Vermögensfragen.

the returned assets on (which they were often legally prevented from doing), aggregate income in West Germany could thus have risen at most by EUR 2.8bn. This number is an order of magnitude smaller than the total effect implied by our regional level results (around EUR 74.0 bn in 1989 equivalents of Euros).

5   Understanding the Effect on Regional Economic Growth

5.1   Entrepreneurial Activity

In an effort to shed light on the channel linking social ties to regional economic growth, we disaggregate regional income per capita into the average income of households whose primary income derives from entrepreneurial activity (entrepreneurs) and the average income of all other individuals (non-entrepreneurs) for each year.[26] In columns 1 and 2 of Table 7 we re-run our standard specification from column 3 in Table 3 with the growth rate in the average income of each of these groups as the dependent variable. Both specifications include the same covariates as our standard specification, but add the (log of the) average income of entrepreneurs and non-entrepreneurs in 1989, respectively, as an additional control. The coefficient estimate is 4.008 (s.e.= 2.096) for entrepreneurs (column 1) and 1.755 (s.e.= 0.735) for non-entrepreneurs (column 2); suggesting that a one standard deviation rise in the share of expellees via the Soviet sector is associated with a 7.6% rise in the average income of entrepreneurs, but only a 3.3% rise in the average income of non-entrepreneurs. Entrepreneurs who lived in a region with strong social ties to the East thus experienced a much steeper rise in their average income than non-entrepreneurs living in the same region.[27]

This strong effect on the income of entrepreneurs is mirrored by an increase in the number of entrepreneurs. In column 3 we re-run our standard specification but use the share of the population that are entrepreneurs in 1995 as the dependent variable, where we again add the share of the population that are entrepreneurs in 1989 as an additional control. The coefficient of interest is 0.322 (s.e.=0.163), suggesting that a one standard-deviation rise in the share of expellees in 1961 (0.019) induces a 0.61 percentage point rise in the share of the population which are entrepreneurs. This is a sizable effect, corresponding to a 14.2% rise relative to the

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[26]In the German Mikrozensus these are households whose household heads declare that their primary occupation is 'entrepreneur' (Selbststaendiger mit oder ohne Beschaeftigte).

[27]The residuals of the specifications in column 1 and 2 of Table 7 are likely to be correlated. If we estimate the two equations as well as the first stage jointly with a 3SLS estimator, the results are considerably reinforced. In particular, the coefficient of interest in column 1 rises to 4.920 (s.e.= 1.657) and is significant at the 1% level. In column 2 the coefficient of interest is estimated to be 1.451 (s.e.= 0.665) and significant at the 5% level. In these specifications we control for the (log of the) average income of entrepreneurs and non-entrepreneurs in 1989 in both structural equations of interest and the first stage. The null of equality of these coefficients is rejected at the 5% level.

mean share of entrepreneurs in 1989 (0.043).

5.2 Firm Investment

The strong rise in entrepreneurial income in regions with strong social ties to the East suggests that firms which were based in these regions must have generated higher profits in the years following the fall of the Berlin Wall. One possible reason for such a rise in profitability is that being based in a region with strong social ties to the East may have generated a comparative advantage in investing in the East. Firms who had access to a workforce or to an owner with strong social ties to the East may have been in a better position to estimate the value of East German firms that came up for sale or may have been better able to gauge demand for Western products and services. We explore this possibility by examining the subsidiaries and branches that West German firms operated in eastern Germany in 2007, which is the earliest year for which we were able to obtain detailed data at the firm level.

From the universe of West German firms in 2007 we select the 19,402 firms whose headquarters are located in West Germany and who operate at least one subsidiary or branch in West Germany. For these firms we calculate a dummy variable which is one if the firm operates a subsidiary or branch in East Germany and zero otherwise. Since West German firms could not own assets in East Germany prior to the fall of the Berlin Wall, any subsidiaries or branches that they operate in 2007 must have been acquired after 1989. Our dummy variable is thus informative both about the investment behavior of West German firms in East Germany since 1989 and about a possible long-lasting effect of social ties in 1989 on the economic structure of West Germany.

The structural equation of interest is

$$b_{kdr,2007} = \beta^f s_{dr,1989} + \phi^f \log y_{d,1989} + Z'_{kdr} \zeta^f + \varepsilon^f_{kdr} \tag{3}$$

where $b_{kdr,2007}$ stands for the dummy indicating whether firm k in West German district d and region r operates a subsidiary or a branch in East Germany in 2007. $s_{dr,1989}$ is again our measure of social ties between the residents of district d in region r and East Germany in 1989; $y_{r,1989}$ stands for income per capita in region r in 1989; and Z_{kdr} is a vector of firm and district level controls which contains a complete set of federal state fixed effects, a fixed effect for the sector in which the firm has its primary operations, the log of the number of subsidiaries and branches that firm k operates in West Germany, and the distance between district d and the inner-German border. Note that income per capita in 1989 is available only at the regional level and not at the district level.

The coefficient of interest is β^f which measures the effect of the intensity of social ties to the East in a given West German district in 1989 on the probability that a firm headquartered

within that district operates a subsidiary or branch in East Germany in 2007. As in section 4, we account for the possibility that our measure of social ties (the settlement of expellees via the Soviet sector in West Germany) is jointly determined with income growth, and instrument for $s_{dr,1989}$ with the share of housing destroyed in 1946. The first stage of our instrumental variables strategy is thus the analog to (2). We cluster all standard errors at the district level to account for likely spatial correlation.

Panel A of Table 8 shows reduced form estimates, relating the share of housing destroyed in 1946 directly to the probability that a given firm operates a subsidiary or branch in East Germany in 2007. In column 1, we regress our dummy variable on the share of housing destroyed in the district and the log of the number of subsidiaries and branches that the firm operates in West Germany in 2007, which we use as a simple control for the size of the firm.[28] The coefficient of interest is -0.030 (s.e.=0.011) and statistically significant at the 1% level. The estimate implies that a one standard deviation rise in the extent of wartime destruction within a given West German district is associated with a 0.7% drop in the probability that a firm based in that district operates a subsidiary or branch in East Germany in 2007.[29] Unsurprisingly, larger firms are more likely to operate subsidiaries and branches in East Germany, which is reflected in a positive coefficient on our size control. Columns 3-6 add all of the now familiar district and region level covariates from section 4, and column 3 gives the analog of our standard specification. Throughout, the coefficient of interest remains in a tight range between -0.029 and -0.031 and statistically significant at 1%.

Panel B shows our instrumental variables estimates of equation (3), which use the variation in wartime destruction to quantify the causal effect of social ties in 1989 on the investment behavior of West German firms. All specifications contain the same covariates as those in Panel A. The estimates in all columns are positive and all are statistically significant at the 5% level. The estimate from our standard specification in column 3 is 1.556 (s.e.= 0.693), which implies that a one standard deviation rise in the share of expellees in a West German district is associated with a 3.4% increase in the probability that a firm based in that district will operate a subsidiary or a branch in East Germany in 2007.[30] This link between the pattern of social ties in 1989 and the investment behavior of West German firms offers a potential explanation for why residents of districts with strong social ties to the East, and entrepreneurs in particular, may have experienced a rise in their incomes. The increased firm level activity also suggests potential spill-over effects of social ties, i.e. residents of districts with strong social ties to the East might experience a rise in income even if they themselves did not have social ties to the East. We return to this issue in

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[28] The raw correlation between our dummy variable and the share of housing destroyed is -0.019 (s.e.=0.012) and statistically significant at the 10% level.

[29] The standard deviation of the share of housing destroyed at the district level is 0.24.

[30] The district level standard deviation of the share of expellees via the Soviet sector is 0.022.

the following section where we calculate the size of such potential spill-over effects.

The remaining panels of Table 8 show the results of a number of falsification exercises. These are based on the idead that if the pattern in holdings of subsidiaries and branches prevailing in 2007 is truly attributable to the intensity of social ties to East Germany in 1989, and not to some other factor, our measure of social ties to East Germany should not predict investment in other areas of the world.[31] Panels C-F repeat the same specifications as in Panel B, but with a dummy variable indicating whether a firm has subsidiaries or branches in Poland, in the 'old' EU countries (the 14 member countries other than Germany prior to the enlargement in 2004), in the 'new' EU countries (the 9 countries, other than Poland, which joined the EU in 2004), or in non-EU countries as the dependent variable. As expected, all estimated coefficients in Panels D, E and F are statistically insignificant. Firms which are based in districts with a high share of expellees are thus *not* more likely to operate subsidiaries or branches in areas other than East Germany. Interestingly, however, the only exception from this rule is that the estimates for Poland are positive and statistically significant at the 5% level in all columns. The estimated effect for Poland is about 1/5th the size of the effect estimated for East Germany. Since the largest group of expellees who settled in West Germany after 1945 actually came from areas that are today part of Poland, these results suggest a possible additional effect of social ties to Poland on the investment behavior of West German firms.[32] [33]

6   Social Ties and Household Income

Lastly, we explore how individual households may have profited from having ties to East Germany and how these ties may have affected regional economic growth. We use the German Socio-Economic Panel (SOEP) dataset and select households which were in the panel in 1985, located in West Germany in 1989 and remained in the panel at least until 1995. The 1991 wave of the panel contains several questions about contacts with friends and family in East Germany. Since the survey was conducted in the second year after the fall of the Berlin Wall and individuals had some time to renew ties with individuals in the other part of Germany, we choose not to rely on information about the intensity of contact to friends and relatives, although it is available.[34]

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[31]If firms from districts with a high fraction of expellees were merely good at capitalizing on new business opportunities, regardless of social ties, we might, for example, expect to see an effect on their holdings in other Eastern European countries following consecutive rounds of EU enlargement.

[32]However, the size of the coefficient for Poland is similar to that of some of the other, insignificant coefficients.

[33]Table A.2 in the appendix reports the outcomes of additional robustness checks, in which we repeat the same specifications as in panels A and B of Table 12, but now use the share of each firm's subsidiaries and branches operated in East Germany as the dependent variable. The results are again similar, indicating that firms which are headquartered in West German districts that have strong social ties to East Germany in 1989 also operate a larger share of their subsidiaries and branches in East Germany today.

[34]Our results are very similar if we use this information on friendships or condition on respondents indicating 'close' ties to their relatives or friends.

Instead, we base our work on the response to the simple factual question: "Do you have relatives in East Germany?", and generate a dummy variable that is one if at least one member of the household responded with 'yes' and zero otherwise. A possible source of measurement error is that some West Germans may have migrated to East Germany directly after the fall of the Berlin Wall and before the conclusion of the 1991 wave of the survey. However, our data indicate that the flow of migrants from West to East in 1990 was not large enough to plausibly induce a quantitatively large bias. It is thus safe to assume that households which were based in West Germany in 1989 and report a relative in East Germany in 1991, also had a relative in East Germany in 1989.

Table 10 gives summary statistics for the entire panel of 1911 households, and for the subsets of households which report and do not report any ties to relatives in East Germany. The households with ties to East Germany had slightly lower income in 1989 (DM 3219 versus DM 3491 per month in 1989) and the household heads of households with ties to East Germany tend to have had slightly less education (on average 12.12 years versus 12.42 years). However, the two subsets of households look very similar on other observable dimensions: they had about the same amount of capital income on average, and the proportion of households whose head was reported as entrepreneur was similar across the two subsets, as was the proportion reported as unemployed.

Our basic household level regression estimates the growth in household income that results from having social ties to East Germany in 1989:

$$\log\left(\frac{y_{i,t}}{y_{i,1989}}\right) = \beta^{hh} T_i + \phi^{hh} \log y_{i,1989} + Z_i' \zeta^{hh} + \varepsilon_i, \tag{4}$$

where $y_{i,t}$ is the income of household i in year t, T_i is a dummy variable indicating ties to East Germany and Z_i is a vector of controls which contains a full set of district fixed effects, household income growth between 1985 and 1989, and the gender, age and age squared of the household head. The coefficient of interest is β^{hh} which estimates the effect of ties to relatives in East Germany on the growth in household income after 1989.

Before estimating (4), Table 11 establishes the consistency of our household level and region level datasets. Column 1 reproduces the standard specification from Table 3 column 3, in which we related region-level income growth to the share of expellees in the district in 1961, regional average income in 1989, regional average income growth prior to 1989, and the distance of the region to the inner-German border. In column 2, we regress *household level* income growth on the same region level covariates, as well as on household level income in the base year and household level income growth between 1985 and 1989. The coefficient estimate on share expellees is insignificant, but remarkably similar to the one we obtained in the district level dataset, 2.777

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(s.e.= 3.609). The fact that the estimate is statistically insignificant is not surprising as we are now using a sample of 1911 households, rather than district averages of 1% of the population. However, it is comforting that both datasets seem to have similar quantitative implications in this regard.

In column 3 we drop the region level share of expellees variable and replace it with a household level dummy variable indicating ties to East Germany. The estimate is positive and highly statistically significant, 0.069 (s.e.= 0.025). However, our dummy variable indicating ties to East Germany is mechanically correlated with the average level of social ties in a given district. The coefficient estimate in column 3 may therefore confound the direct (household) effect of having ties to the East with possible spill-over effects from other households in the same region having social ties.

We therefore introduce a full set of region fixed effects in column 5, which absorb the region wide effect of a higher incidence of social ties. Additionally we control for gender, age and age squared of the household head (which are standard controls in the labor literature) and estimate the full model in (4). The coefficient of interest drops to 0.049 (s.e.= 0.023) and remains statistically significant at the 5% level. The point estimate indicates that households with ties to East Germany in 1989 experienced on average a 5 percentage points higher income growth in the 6 years following the fall of the Berlin Wall relative to comparable households without such ties.

For specification (4) to consistently estimate the coefficient of interest we require $cov\,(T_i, \varepsilon_i) = 0$. As social ties existing prior to 1989 must have been maintained for reasons unrelated to any expected economic benefit, this condition does not fail due to reverse causality. However, it may still fail if individuals with social ties have some omitted characteristics which affect income *differently* after 1989 as compared to before 1989 and are correlated with social ties. In particular, individuals with social ties might somehow be more entrepreneurial or better educated, and therefore better able to seize the economic opportunities that present themselves after the fall of the Berlin Wall.[35] The summary statistics in Table 10 suggest the opposite: the heads of households with social ties to the East were actually slightly less educated and were somewhat less likely to be an entrepreneur in 1989. We control for these observable characteristics in our robustness checks discussed below.

In Table 12 we add a number of additional covariates (again this table only reports the

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[35]A second reason why the estimation might be inconsistent is that we include a lagged dependent variable, which might be correlated with an auto-correlated error. We cannot perform Arellano-Bond style estimation as we do not have enough pre-1989 data. However, when running a specification in which we control for the household income in 1989, but not for the pre-existing growth trend, we can instrument for household income in 1989 with household income 1985. When running a specification equivalent to column 5 in Table 11, but without controlling for growth between 1985 and 1989, the coefficient of interest is estimated to be 0.049 (s.e.=0.023). When instrumenting for household income in 1989 with household income in 1985 the coefficient of interest is estimated to be 0.038 (s.e.=0.022) and significant at the 10% level.

coefficient of interest and the coefficients on the variables that are added relative to the standard specification). Column 1 reproduces the standard specification for comparison. Column 2 adds years of education and years of education squared of the household head in 1989, both of which remain statistically insignificant. Column 3 adds the log of capital income in 1989 as a proxy for the household's ability to finance investments. The variable is positive and significant, but induces little change in the coefficient of interest which remains at 0.047 (s.e.= 0.023). Column 4 introduces a dummy variable for whether the household head is an entrepreneur. Surprisingly, this variable remains insignificant, and again induces almost no change in the coefficient of interest. Finally, in column 5 we add a dummy for household heads who are not in employment in 1989 and column 6 adds all of these additional covariates simultaneously. Throughout, the changes in the coefficient of interest are minor and it remains statistically significant at the 10% level.

In Figure 5 we explore the timing of the effect by again using the full panel structure of the data in a specification analogous to Table 4 column 1.[36] We regress the income of each household in a given year on its income in 1985, a full set of year and district fixed effects, the interaction of year effects with the dummy variable indicating ties to East Germany in 1991, and controls from our standard specification (gender, age and age squared). The figure plots the interaction of year fixed effects with the dummy for ties to relatives in 1991, and identifies a 5% confidence interval.[37] These interactions measure the differential income growth of households with social ties to the East between 1985 and the indicated year. The pattern is striking: the estimates are statistically indistinguishable from zero until 1989, when the estimates jump up and are mostly statistically significant at the 5% level until 1995. All coefficients after 1989 are statistically significant at the 10% level until the end of the sample in 2001.

Lastly, we can check that our results are robust to potentially confounding restitutions of assets from the East. The claimants who were likely to have received their assets by 1995, the year on which we focus in our analysis, are those whose claim related to a firm. If we re-run our standard specification in Column 5 of Table 11, dropping all households that state not to own productive assets in 1989, but state to own productive assets in 1995, the coefficient drops only very slightly to 0.047 (s.e.= 0.023).[38] The household level results are thus robust to excluding the subgroup of observations that could plausibly have benefited from restitutions prior to 1995. This adds to the evidence presented in section 4.4 that restitutions are unlikely to drive our results.

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[36] Although we use a standard fixed effects estimator as all of our covariates are exogenous

[37] The sample size is decreases monotonically from 1911 in 1995 to 1419 in 2001.

[38] A total of 57 households in our sample acquired productive assets between 1989 and 1995, 17 of which had relatives in East Germany.

6.1   Cohort Heterogeneity

Our sample contains only 596 households with ties to the East. Nevertheless, we are able to give some further evidence on why the income of individual households increased after 1989. In Table 13, we estimate our standard specification, but interact the dummy for ties to East Germany with a fixed effect for the age quartile of the household head (and naturally also add fixed effects for each age quartile on the right hand side). The coefficient estimate for the youngest age quartile (those aged below 40 in 1989) is positive and significant at the 10% level, 0.092 (s.e.= 0.051). This is particularly interesting as it indicates that the effect we estimate is about knowing people and not about knowing places: the household heads in this group were younger than 11 years old at the time when the Berlin Wall was built and thus could not have had much personal experience of living in East Germany. However, they could easily have kept in contact with their relatives in East Germany.

6.2   East German Households

We have presented evidence on the returns to social ties accruing in West Germany. Naturally, we are interested in the corresponding effects in East Germany. Due to a lack of data on the settlement of expellees and on outcome variables prior to 1990, we cannot replicate our region level results for East Germany. However, we can replicate part of our standard specification in column 5 of Table 11 for households in East Germany. In particular, Table 14 shows results for a regression relating log income of East German households in the years after German reunification to a dummy variable indicating relatives in West Germany in 1991 and all household level covariates of column 5 in Table 11 other than income in 1989 and pre-1989 income growth. As we have no data on income before 1990 for East German households, this specification can only speak to differences in levels of income, rather than to differences in income growth. Nevertheless, we find that the estimate on the coefficient of interest is positive in all years between 1990 and 1995 and marginally significant in two of the six years (1992 and 1994). For example, the estimate for 1995 is 0.057 (s.e.=0.040) suggesting that East German households with ties to the West tend to have higher income than those without ties to the West.

6.3   Spill-over Effects

The household level effect we estimated in this section is economically large. However, it is not large enough to account for the size of the entire region level effect of social ties estimated in section 4. Since the district level standard deviation of the share of households with social ties to the East is 0.10 (see Table 1), a one standard deviation rise is thus associated with at most a 0.7 percentage point rise in income per capita at the region level (Table 11, column 3). To the

extent that the variation in the level of social ties in 1991 is driven by variation in the share of expellees (recall that the correlation between our two measures of social ties is very high), a one standard deviation rise in the share of households with relatives in East Germany corresponds to the same variation as a one standard deviation rise in the share of expellees in a district. However, a one standard deviation increase in the share of expellees in 1961 was associated with a 4.3 percentage point rise in district level income. The two estimates suggest a spill-over effect by which households without ties profit from living in a district with strong ties to the East.

This spill-over is consistent with the view that firms which were based in regions with strong social ties had an advantage in investing in East Germany, which resulted in increased wage levels in those West German districts. The presence of spillovers might also imply that social ties have an economic value even at the second or third degree of separation, where a household (and entrepreneurs in particular) might profit from having a social tie to another household who has a social tie to East Germany.[39]

7   Understanding the Microeconomic Effects

While we were able to provide a range of evidence suggesting that social ties facilitated regional economic growth by generating a rise in entrepreneurial activity, a deeper question is why social ties matter at the individual level. Two potential channels linking social ties to economic performance at the microeconomic level are that (i) social ties may reduce informational asymmetries (Granovetter (1973), Varian (1990), Stiglitz (1990)) and (ii) social ties may sustain a large range of credit contracts that would otherwise not be feasible (Besley and Coate (1995)). In our context, possible examples of these stories might be (i) a West German who hears from his East German cousin about the lack of second hand cars in East Germany and reacts by starting a local car dealership in the East or (ii) a wealthy West German who lends his own money or acts as a guarantor for a East German relative who otherwise would not have access to funds.

One way to gauge the relevance of the first mechanism is to test whether social ties are particularly beneficial for firms in sectors in which informational frictions are important. In Table 9 we return to the standard specification of our firm level analysis (Table 8, Panel B, column 3) and replace the share of expellees variable with its interaction with each of the four sectoral fixed effects included in the specification (instrumenting these variables with the interactions of the sectoral fixed effects and the share of housing destroyed in 1946). The estimated effects in the Primary, Government, and Manufacturing sectors are statistically insignificant, while the effect estimated for the Trade and Services sector is positive and statistically significant at the 5% level (0.962, s.e.= 0.449). We may interpret this as evidence that social ties were particularly

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[39]A novel by Schulze (2005) presents an example of such interaction at the second degree of separation.

important for firm investment in the Trade and Services sector, which is arguably the sector of the economy which is most susceptible to informational asymmetries and reliant on knowledge of local demand.[40]

We may evaluate the relevance of the second channel by testing whether the West German households who had the highest ability to fund or act as guarantors for projects in the East were also the ones to benefit most from their social ties to the East. Column 1 of Table 15 replicates the standard specification of our household level results from Table 11, column 5 (again reporting only the coefficient of interest). In columns 2-4 we add a dummy which is one if the household's capital income in 1989 is above the pth percentile (75th, 95th and 99th, respectively) as well as the interaction of this variable with our dummy for social ties. If the principal function of social ties was to enhance households' ability to enter into credit contracts we would expect the coefficient on the interaction term to be positive. In column 2 the point estimate on our social ties dummy drops marginally to 0.46 (s.e.=0.026) and remains significant at the 10% level. The dummy indicating top-quartile capital income in 1989 is estimated to have a positive, but insignificant significant effect on post reunification growth in household income (0.046, s.e.= 0.028). However, the interaction of social ties and the above-median wealth dummy is insignificant. Columns 3 and 4 show similar results, using the 95th and 99th percentile. This evidence suggests that West German households benefited from their ties to East Germans regardless of their wealth in 1989 and, consequently, that social ties may have acted mainly as conduits for information rather than a form of 'social' collateral which would serve to sustain credit contracts.

8   Discussion

In this paper we used evidence from German reunification to establish a causal link between social ties and regional economic development. West German regions which, for idiosyncratic reasons, have strong social ties to East Germany at the time of the fall of the Berlin Wall exhibit substantially higher growth in income per capita in the early 1990s. This effect on regional economic growth appears to be driven both by a rise in the profits accruing to entrepreneurs and by an increase in the share of the population engaging in entrepreneurial activity. Consistent with these findings, we show that firms headquartered in a West German district which has strong ties to East Germany in 1989 are more likely to operate a subsidiary or a branch in East Germany today, suggesting that the pattern of social ties which existed in 1989 may thus have had a lasting effect on the pattern of economic activity in West Germany. We also show that West German households who have a relative in East Germany in 1989 experience a persistent

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[40]It would be interesting to disaggregate this estimate for a finer partition of the trade and services sector. Unfortunately this is not possible with the data available.

rise in their personal income after the fall of the Berlin Wall. While this rise is economically large, it accounts for only about one sixth of the rise in income per capita at the region level, suggesting positive spill-over effects, through which households living in regions with strong ties to the East experience rising incomes even if they themselves do not have direct personal ties to the East.

Our findings appear robust to a wide range of plausible variations in the estimation strategy and placebo treatments. However, while we interpret these results as implying that social ties affect regional economic development, this interpretation is subject to two important caveats. First, we cannot rule out the possibility that social ties merely served to re-distribute rents between regions with stronger and weaker social ties to the East, rather than increasing economic output at the country level. However, since our results suggest that there were positive spill-overs from households with social ties to those households without such ties at the regional level, it is unclear why we should expect crowding out at higher levels of aggregation. Second, it is unclear how our findings generalize beyond the historical context of a large economic transition, such as the economic re-integration of Germany. While our results may be informative about the economic effects of social ties maintained by migrants and diasporas in other parts of the world, social ties might be particularly useful in an environment in which markets are established rapidly and informational asymmetries are large.

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A Tables

TABLE 1 - SUMMARY STATISTICS (REGION AND FIRM LEVEL DATA)

	(1)	(2)	(3)	(4)
Panel A: Region Level Data	*All*	*Low Destr.*	*High Destr.*	*p-Value*
Share Expellees (Soviet sector) '61	0.048	0.049	0.047	0.63
	(0.019)	(0.022)	(0.015)	
Share Expellees (Direct) '61	0.119	0.143	0.095	0.00
	(0.045)	(0.041)	(0.036)	
Share Ties to Relatives '91	0.223	0.235	0.211	0.31
	(0.100)	(0.114)	(0.085)	
Share Housing Destroyed '46	0.321	0.154	0.493	0.00
	(0.210)	(0.108)	(0.141)	
Rubble '46 (m^3 p.c.)	0.090	0.037	0.144	0.00
	(0.070)	(0.033)	(0.056)	
Distance to East (100km)	1.753	1.504	2.010	0.05
	(1.075)	(1.071)	(1.046)	
Income 1985 (p.c.)	1598	1568	1628	0.04
	(126)	(140)	(104)	
Income 1989 (p.c.)	1761	1747	1775	0.37
	(131)	(147)	(114)	
Income 1995 (p.c.)	2222	2227	2218	0.82
	(154)	(166)	(143)	
Share Working in Manufacturing '89	0.203	0.209	0.197	0.28
	(0.045)	(0.047)	(0.043)	
Migration from East '91-'95	0.005	.006	0.004	0.04
	(0.004)	(0.005)	(0.002)	
N	71	35	36	
Panel B: Firm Level Data	*All*	*Low Destr.*	*High Destr.*	*p-Value*
S. & B. in West Germany (log)	0.443	0.437	0.450	0.23
	(0.742)	(0.729)	(0.756)	
Share of Total S. & B. in East Germany	0.026	0.028	0.024	0.00
	(0.103)	(0.107)	(0.098)	
S. & B. in East Germany (Dummy)	0.077	0.083	0.072	0.00
	(0.267)	(0.275)	(0.259)	
Share of Total S. & B. in Non-EU Countries	0.006	0.006	0.006	0.69
	(0.055)	(0.055)	(0.054)	
S. & B. in Non-EU Countries (Dummy)	0.018	0.018	0.017	0.46
	(0.131)	(0.134)	(0.129)	
N	19420	9726	9694	

Notes: The table presents means (and standard deviations). Variables in Panel A refer to our sample of regions used in Tables 2, 3, 4, 6 and 7. Variables in Panel B refer to our sample of firms used in Tables 8 and 9. Column 1 shows data for all observations. In Panel A, columns 2 and 3 show data for regions in which the share of housing stock destroyed was below the median and above median, respectively. In Panel B, columns 2 and 3 present means and standard deviations for firms headquartered in regions with share of housing stock destroyed above and below the median, respectively. Column 4 shows p-values of a t-test of equality of the means in column 2 and 3. The term 'S&B' stands for subsidiaries and branches which firms headquartered in a given West German region operate in the indicated location. See data appendix for details.

TABLE 2 - FIRST STAGE

	(1)	(2)	(3)	(4)	(5)
PANEL A:	*Share Expellees (Sov. Sector) '61*				
Share Housing Destroyed '46	-0.019***	-0.020***		-0.020***	-0.020***
	(0.004)	(0.005)		(0.005)	(0.005)
Rubble '46 (m^3 p.c.)			-0.044***		
			(0.013)		
Distance to East (100km)	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Income 1989 (p.c., log)	0.042***	0.047***	0.043***	0.049***	0.047***
	(0.012)	(0.013)	(0.014)	(0.012)	(0.013)
Income '89/'85 (p.c., log)		-0.026	-0.020	-0.036	-0.026
		(0.024)	(0.024)	(0.023)	(0.024)
Share Working in Manufacturing '89				0.045*	
				(0.026)	
Migration from East '91-'95					-0.006
					(0.212)
R^2	0.918	0.920	0.905	0.925	0.920
N	71	71	71	71	71
PANEL B:	*Share Ties to Relatives '91*				
Share Housing Destroyed '46	-0.099**	-0.102**		-0.102**	-0.101**
	(0.042)	(0.043)		(0.043)	(0.047)
Rubble '46 (m^3 p.c.)			-0.161		
			(0.146)		
PANEL C:	*Income '95/'89 (p.c., log)*				
Share Housing Destroyed '46	-0.042*	-0.048**	-0.060**	-0.048**	-0.047**
	(0.021)	(0.020)	(0.027)	(0.020)	(0.020)
Rubble '46 (m^3 p.c.)			0.046		
			(0.071)		

Notes: Coefficient estimates from ordinary least squares regressions at the regional level. Standard errors are given in parentheses. The standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. The main variable of interest in all columns except column 3 is the share of the region's 1939 housing stock which was destroyed in 1946. In column 3 the main variable of interest in panel A and B is the amount of rubble per capita in the region in 1946. In column 3 of panel C both of these variables are included. The dependent variable in panel A is our main proxy for the intensity of social ties to East Germany - the share of the region's 1961 population which are expellees who had arrived from the Soviet sector. The dependent variable in panel B is our alternative measure of the intensity of social ties to the East: the share of the population which states in the 1991 SOEP survey to have relatives in East Germany. In Panel C the dependent variable is the log of the ratio of the region's mean per capita income in 1995 and 1989. All regressions include 10 federal state fixed effects. All specifications in panel B and C include the same controls as show in panel A. The coefficient estimates on these are suppressed for expositional clarity. The additional control in column 4 is the share of the population working in manufacturing in 1989. The additional control in column 5 is the number of immigrants from East Germany in the years 1991, 1993 and 1995 (we do not have data for 1992 and 1994).

Table 3 - IV Estimation

	(IV)	(OLS)	(IV)			
	(1)	(2)	(3)	(4)	(5)	(6)
	Income '95/'89 (p.c., log)					
Share Expellees (Sov. S.) '61	2.169**	1.963***	2.442***	2.453***	2.428***	2.366***
	(0.947)	(0.574)	(0.880)	(0.877)	(0.882)	(0.878)
Distance to East (100km)	0.011**	0.008**	0.011**	0.011**	0.008**	0.011**
	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
Income 1989 (p.c., log)	-0.267***	-0.189***	-0.209***	-0.209***	-0.221***	-0.206***
	(0.068)	(0.060)	(0.060)	(0.060)	(0.059)	(0.062)
Income '89/'85 (p.c., log)		-0.362***	-0.355***	-0.355***	-0.307***	-0.353***
		(0.083)	(0.086)	(0.086)	(0.080)	(0.087)
Share Working in Manufacturing '89					-0.223**	
					(0.097)	
Migration from East '91-'95						0.349
						(1.130)
R^2	0.505	0.598	0.590	0.589	0.626	0.593
N	71	71	71	71	71	71
Instruments	Housing	-	Housing	Housing & Rubble	Housing	Housing

Notes: The table reports coefficient estimates from instrumental variable regressions at the regional level in columns 1 and 3 through 6. Column 2 reports results from an ordinary least squares regression. Standard errors are given in parentheses. The standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. The dependent variable is in all regressions the log of the ratio of mean per capita income in 1995 and 1989. The main variable of interest in all columns is the share of the region's 1961 population which are expellees who had arrived from the Soviet sector. In column 1, 3, 5 and 6 we have instrumented for this with the share of the region's 1939 housing stock which was destroyed in 1946. In column 4 we use the amount of rubble per capita in 1946 as additional instrument. First stage results are shown in Table 2. All regressions control for a region's distance to the former East German border and the log of mean per capita income in 1989. All regressions include 10 federal state fixed effects. Columns 2-6 include the log of the ratio of mean per capita income in 1989 and 1985 as control. The regression shown in column 4 controls for the share working in manufacturing in 1989 and the regression shown in column 5 controls for the number of regional immigrants from East Germany in the years 1991, 1993 and 1995 (we do not have data for 1992 and 1994).

TABLE 4 - GMM USING PANEL STRUCTURE

	Income (p.c., log)		
	(1)	(2)	(3)
Share Expellees $\times$ 1995	2.813***	2.871***	2.538***
	(1.023)	(0.960)	(0.916)
Share Expellees $\times$ 1993	2.059**	2.117**	1.783*
	(1.022)	(0.959)	(0.915)
Share Expellees $\times$ 1991	1.532	1.590*	1.257
	(1.022)	(0.959)	(0.916)
Share Expellees $\times$ 1989	0.506	0.564	
	(1.022)	(0.961)	
Share Expellees $\times$ 1987	-0.329		
	(1.023)		
Income 1985 (p.c., log)	0.864***		
	(0.030)		
Income 1987 (p.c., log)		0.859***	
		(0.030)	
Income '87/'85 (p.c., log)		-0.487***	
		(0.059)	
Income 1989 (p.c., log)			0.871***
			(0.031)
Income '89/'85 (p.c., log)			-0.445***
			(0.055)
Distance to East (100km)	0.003	0.005**	0.004*
	(0.003)	(0.003)	(0.003)
N	563	492	421

Notes: The table reports coefficient estimates from an asymptotically efficient two-step GMM estimation. In the first step we applied the Bartlett kernel to estimate the covariances of the errors up to one lag. The dependent variable is in all regressions the log of mean per capita income in year t. The main variable of interest in all columns is the share of the region's 1961 population which are expellees who had arrived from the Soviet sector. We interacted this with a *full set* of possible year dummies (different across columns) and hence the main effect is not included. We instrumented for this with the interaction of the same year dummies with the share of the region's 1939 housing stock which was destroyed in 1946. All regressions control for a region's distance to the former East German border and include federal state-year fixed effects. Column 1 controls for the log of the mean per capita income in 1985, column 2 controls for the log of the mean per capita income in 1987 and column 3 controls for the log of the mean per capita income in 1989. Column 2 controls as well for log of the ratio of mean per capita income in 1987 and 1985. Column 2 controls for log of the ratio of mean per capita income in 1989 and 1985.

Table 5 - Summary Statistics (Census '71)

	(1)	(2)	(3)
	West German	*Expel. (Sov. S.)*	*Expel. (Direct)*
Income '71	809.7	777.8	764.4
	(487.8)	(460.3)	(446.0)
	[227648]	[7681]	[38253]
Years of Schooling '71	9.81	9.80	9.72
	(1.50)	(1.59)	(1.46)
	[322240]	[10120]	[49638]
Labour Force Participation '71	0.55	0.52	0.54
Entrepreneur '71	0.06	0.03	0.03
Primary Sector '71	0.12	0.04	0.05
Production and Construction '71	0.44	0.51	0.53
Services and Trade '71	0.32	0.33	0.30
Government '71	0.11	0.12	0.13

Notes: The table shows means, standard deviations in parentheses and the number of observations in square brackets. Data is from the 1971 edition of the German Census. Column 2 shows summary statistics for expellees via Soviet sector. Column 3 shows summary statistics for direct expellees. Column 1 shows data for all remaining individuals excluding refugees. Income in 1971 is given in German Marks. All other variables except years of schools are shares. The labour force participation and entrepreneurial share are given relative to the entire population. The sectorial distribution is given relative to all working individuals.

TABLE 6 - PLACEBO

	(First Stage)		(IV)
	(1)	(2)	(3)
	Expel. (Sov. S.)	*Expel. (Direct)*	*Income '95/'89 (p.c., log)*
Share Expellees (Sov. S.) '61			3.422*
			(1.809)
Share Expellees (Direct) '61			-0.350
			(0.624)
Share Housing Destroyed '46	-0.020***	-0.026	
	(0.006)	(0.018)	
Rubble '46 (m^3 p.c.)	0.002	-0.107**	
	(0.015)	(0.046)	
R^2	0.920	0.821	0.557
N	71	71	71
Instruments	-	-	Housing & Rubble

Notes: The table reports coefficient estimates from instrumental variable regressions at the regional level in columns 3. Column 1 and 2 report results from ordinary least squares regressions. Standard errors are given in parentheses. These are the first stage regressions corresponding to the instrumental variable regression in column 3. The standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. In column 3 the dependent variable is the log of the ratio of mean per capita income in 1995 and 1989. The main variables of interest are the share of the region's 1961 population which are expellees who had (i) arrived from the Soviet sector or (ii) came directly to West Germany. We instrument for these variables with the share of the region's 1939 housing stock which was destroyed in 1946 and the amount of rubble per capita across the cities of a region in 1946. All regressions control for a region's distance to the former East German border, the log of mean per capita income in 1989 and the log of the ratio of mean per capita income in 1989 and 1985. All regressions include 10 federal state fixed effects. Coefficient estimates for these controls are not shown for expositional clarity.

TABLE 7 - INCOME CHANNEL

	(1)	(2)	(3)
	Income '95/'89 (p.c., log)		*Entrepreneurs*
	Entrepreneurs	*Non-Entrepreneurs*	*Share 1995*
Share Expellees (Sov. S.) '61	4.008*	1.755**	0.322*
	(2.096)	(0.735)	(0.163)
Income Entrepreneurs '89 (p.c., log)	-0.657***		
	(0.194)		
Income Non-Entrepreneurs '89 (p.c., log)		-1.940***	
		(0.535)	
Share Entrepreneurs '89			0.496***
			(0.104)
R^2	0.578	0.662	0.794
N	71	71	71

Notes: The table reports coefficient estimates from instrumental variable regressions at the regional level. Standard errors are given in parentheses. The standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. The dependent variable in column 1 is the log of the ratio of mean per capita income of entrepreneurs in 1995 and 1989. The dependent variable in column 2 is the log of the ratio of mean per capita income of non-entrepreneurs in 1995 and 1989. The dependent variable in column 3 is the share of individuals who report in 1995 to be entrepreneur. The main variable of interest in all columns is the share of the region's 1961 population which are expellees who had arrived from the Soviet sector. We instrument for this with the share of the region's 1939 housing stock which was destroyed in 1946. First stage results are shown in Table 2. All regressions control for a region's distance to the former East German border, the log of mean per capita income in 1989 and the log of the ratio of mean per capita income in 1989 and 1985. All regressions include 10 federal state fixed effects. Coefficient estimates on these controls are not reported for expositional clarity. For details on the construction of the variables see data appendix.

TABLE 8 - FIRM LEVEL DATA (DUMMY)

	(1)	(2)	(3)	(4)	(5)
PANEL A: Reduced Form	*S. & B. in East Germany (Dummy)*				
Share Housing Destroyed '46	-0.030***	-0.029***	-0.029***	-0.028***	-0.031***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
S. & B. in West Germany (log)	0.119***	0.119***	0.119***	0.119***	0.119***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Distance to East (100km)		-0.013***	-0.013***	-0.012***	-0.014***
		(0.004)	(0.004)	(0.004)	(0.004)
Income 1989 (p.c., log)		0.001	0.004	0.017	0.001
		(0.032)	(0.033)	(0.031)	(0.032)
Income '89/'85 (p.c., log)			-0.016	-0.044	-0.008
			(0.043)	(0.048)	(0.044)
Share Working in Manufacturing '89				0.111	
				(0.084)	
Migration from East '91-'95					-1.517
					(1.125)
R^2	0.126	0.127	0.127	0.127	0.127
N	19387	19387	19387	19387	19387
PANEL B: IV					
Share Expellees (Sov. Sector) '61	1.579**	1.469**	1.556**	1.559**	1.616**
	(0.689)	(0.654)	(0.693)	(0.714)	(0.690)
PANEL C: IV	*S. & B. in Poland (Dummy)*				
Share Expellees (Sov. Sector) '61	0.281**	0.290**	0.289**	0.298**	0.293**
	(0.137)	(0.133)	(0.140)	(0.145)	(0.137)
PANEL D: IV	*S. & B. in Old EU Countries (Dummy)*				
Share Expellees (Sov. Sector) '61	0.060	0.377	0.459	0.483	0.409
	(0.580)	(0.527)	(0.540)	(0.546)	(0.534)
PANEL E: IV	*S. & B. in New EU, exc. Poland (Dummy)*				
Share Expellees (Sov. Sector) '61	0.188	0.185	0.182	0.182	0.213
	(0.206)	(0.206)	(0.218)	(0.227)	(0.213)
PANEL F: IV	*S. & B. in Non-EU Countries (Dummy)*				
Share Expellees (Sov. Sector) '61	0.034	0.139	0.115	0.104	0.114
	(0.304)	(0.276)	(0.287)	(0.292)	(0.277)

Notes: All regression report firm level regression results, using our sample of firms which are headquartered in West Germany and have at least one subsidiary or branch in West Germany. The standard errors are clustered at district level to account for likely spatial correlation. Panel A reports results from firm level ordinary least squares regressions. Panel B-F report firm level instrumental variable regression results. The main variable of interest in these is the district level share of expellees via the Soviet sector. We instrument for this with the share of the district's 1939 housing stock which was destroyed in 1946. First stage results are not reported. The dependent variable in panel A and B is a dummy indicating whether a firm has a subsidiary or branch in East Germany. The dependent variables in panels C-F indicate whether a firm has a subsidiary or branch in the specified location. All regressions include 10 federal state fixed effects and 4 sector fixed effects. We control for distance to the former East German border at the district level. Log of per capita income in 1989, log of the ratio of per capita income in 1989 and 1985, the share working in the manufacturing sector 1989 and the sum of migrants from the East in 1991, 1993 and 1995 are regional level controls. All specifications in Panels B-E include the same controls as the respective specification in panel A. We do not report the results for expositional clarity.

TABLE 9 - SECTOR SPECIFIC EFFECTS

	S. & B. in East Germany (Dummy)	N
Expellees '61 × Primary Sector	3.382	313
	(4.310)	
Expellees '61 × Trade and Services	2.142**	15521
	(0.993)	
Expellees '61 × Manufacturing and Construction	0.156	3225
	(1.784)	
Expellees '61 × Government	-2.552	361
	(2.447)	
N	19420	
Instrument	Housing×Sector	

Notes: The table reports coefficient estimates and standard errors in parentheses from a firm level instrumental variables regression, using our sample of firms which are headquartered in West Germany and have at least one subsidiary or branch in West Germany. The standard errors are clustered at district level to account for likely spatial correlation. The main variable of interest is the interaction of 4 exhaustive sectorial dummies with the district level share of expellees via the Soviet sector. (The main effect of the share expellees via the Soviet sector is hence not included.) We instrument for these with the interaction of the sectorial dummies and the share of the district's 1939 housing stock which was destroyed in 1946. First stage results are shown in Table 2. The dependent variable is a dummy indicating whether a firm has a subsidiary or branch in East Germany. The regression includes 10 federal state fixed effects and 4 sector fixed effects. It also includes the same controls as the specifications in column 3 of Table 8. We do not report these results for expositional clarity. The second column shows the number of firms in each sector.

TABLE 10 - SUMMARY STATISTICS (HOUSEHOLD LEVEL DATA)

	All (N=1911)	*Ties* (N=597)	*No Ties* (N=1314)	*p-Value*
Age '90	51.2	51.5	50.4	0.12
	(14.6)	(15.0)	(13.6)	
Gender	0.29	0.33	0.22	0.00
	(0.46)	(0.47)	(0.41)	
Years of Education '89	12.21	12.12	12.42	0.00
	(1.84)	(1.80)	(1.91)	
Income 1989 (SOEP)	3304	3219	3492	0.00
	(1856)	(1935)	(1656)	
Capital Income '89	783	799	746	0.54
	(1729)	(1867)	(1378)	
Entrepreneur '89	0.046	0.045	0.047	0.85
	(0.209)	(0.207)	(0.212)	
Not Employed '89	0.075	0.079	0.065	0.29
	(0.263)	(0.270)	(0.247)	

Notes: Columns 1-3 show means and standard deviations in parentheses for our sample of households from the SOEP panel. We selected only households which were in the panel in all of 1985, 1989 and 1995. Income in 1989 and capital income in 1989 are reported in German Marks. The variables *Entrepreneur '89* and *Not Employed '89* are dummy variables indicating whether the household head is entrepreneur and not working, respectively. Column 1 shows data for all observations in our sample. Column 2 shows data for households with ties to relatives in East Germany. Column 3 shows data for households without ties to relatives in East Germany. Column 4 shows p-values of a t-test testing the equivalence of the means shown in column 2 and 3. See data appendix for details.

TABLE 11 - HOUSEHOLD LEVEL DATA

| | Aggregate (MC) | Household (SOEP) | | | |
| Level (Source) | | | | | |
	(1)	(2)	(3)	(4)	(5)
Share Expellees (Sov. Sector) '61	2.442***	2.777			
	(0.880)	(3.609)			
Ties to Relatives '91			0.069***	0.046**	0.049**
			(0.025)	(0.023)	(0.023)
Income 1989 (p.c., log, MC)	-0.209***	0.166	0.267**	0.260*	
	(0.060)	(0.186)	(0.126)	(0.137)	
Income '89/'85 (p.c., log, MC)	-0.355***	-0.649	-0.664	-0.798*	
	(0.086)	(0.446)	(0.449)	(0.450)	
Distance to East (100km)	0.011**	0.001	-0.009	-0.008	
	(0.004)	(0.025)	(0.016)	(0.017)	
Income 1989 (log, SOEP)		-0.242***	-0.248***	-0.340***	-0.338***
		(0.024)	(0.025)	(0.028)	(0.029)
Income '89/'85 (log, SOEP)		-0.115***	-0.117***	-0.144***	-0.146***
		(0.031)	(0.031)	(0.027)	(0.029)
Gender				-0.157***	-0.162***
				(0.024)	(0.024)
Age '90				-0.017***	-0.018***
				(0.005)	(0.005)
$(\text{Age '90})^2$				0.000**	0.000**
				(0.000)	(0.000)
Fixed Effects	State	State	State	State	Region
R^2	0.590	0.137	0.143	0.249	0.288
N	71	1911	1911	1911	1911

Notes: Columns 1 shows results of a region level instrumental variable regression. Column 2-5 show results from household level regressions. In column 1 and 2 we instrument for the regional share of expellees via the Soviet sector with the share of the region's 1939 housing stock which was destroyed in 1946. First stage results are shown in Table 2. Columns 3-5 report results from ordinary least squares regressions. The dependent variable in column 1 is the log of the ratio of per capita income in 1995 and 1989 at the regional level. The dependent variable in columns 2-5 is the log of the ratio of the household's income in 1995 and 1989. Columns 1 through 4 control for the same region level variables as column 3 in Table 3. Columns 2 through 5 control at the household level for the log of the household's income in 1989 and the log of the ratio of the household's income in 1989 and 1985. Columns 4 and 5 control additionally for the gender, age and age squared of the household head. The specifications in columns 1 through 4 include 10 federal state fixed effects. The standard errors are clustered on the regional level, which for columns 1 through 4 coincides with heteroscedasticity robust standard errors. Column 5 includes 71 region fixed effects. See data appendix for details on the construction of our variables.

Table 12 - Robustness

	Income '95/'89 (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
Ties to Relatives '91	0.049**	0.044**	0.047**	0.050**	0.049**	0.042*
	(0.023)	(0.021)	(0.023)	(0.023)	(0.023)	(0.021)
Years of Education '89		0.043				0.032
		(0.061)				(0.060)
(Years of Education '89)^2		0.000				0.001
		(0.002)				(0.002)
Capital Income '89 (log)			0.018***			0.014***
			(0.005)			(0.005)
Entrepreneur '89				0.058		0.025
				(0.071)		(0.065)
Not Employed '89					-0.028	-0.016
					(0.045)	(0.043)
R^2	0.288	0.326	0.294	0.288	0.288	0.331
N	1911	1911	1911	1911	1911	1911

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. Standard errors, clustered at the region level to account for spatial correlation, are given in parentheses. The inverse of the sampling probability provided by SOEP is used as weights. Columns 1 replicates the results from the household level ordinary least squares regression in column 5 in Table 11. The dependent variable is the log of the ratio of household income in 1995 and 1989. All specifications include the same controls as the specification in column 5 in Table 11, but we do not report results for expositional clarity. See data appendix for details on the construction of our variables.

TABLE 13 - HETEROGENEOUS EFFECTS

	Income '95/'89 (log)	N [with Ties]
Ties × Age Group 1	0.092*	496
	(0.051)	[153]
Ties × Age Group 2	-0.052	494
	(0.044)	[162]
Ties × Age Group 3	0.108**	447
	(0.052)	[151]
Ties × Age Group 4	0.063*	474
	(0.037)	[131]
R^2	0.448	
N	1911	

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. Standard errors, clustered at the region level to account for spatial correlation, are given in parentheses. The inverse of the sampling probability provided by SOEP is used as weights. The dependent variable is the log of the ratio of household income in 1995 and 1989. The explanatory variables of interest are the interactions of the dummy indicating ties to relatives in the East interacted with 4 exhaustive household head cohort dummies. The age quartiles are: 'below 40', 'between 40 and 51', 'between 52 and 62' and 'above 62'. The second column shows the number of household heads in each cohort. The number of household heads with ties to relatives in East Germany is given in square brackets. The specification also includes the same controls as column 5 of Table 11, so amongst others a full set of regional control. We do not report results for expositional clarity. See data appendix for details on the construction of our variables.

TABLE 14 - EAST GERMANY

	Income (log, SOEP)					
	_1990_	_1991_	_1992_	_1993_	_1994_	_1995_
	(1)	(2)	(3)	(4)	(5)	(6)
Ties to Relatives '91	0.058	0.047	0.078*	0.046	0.068*	0.057
	(0.036)	(0.041)	(0.041)	(0.032)	(0.036)	(0.040)
Gender	-0.130***	-0.116***	-0.119***	-0.130***	-0.129***	-0.139***
	(0.024)	(0.028)	(0.025)	(0.026)	(0.028)	(0.030)
Age '90	0.067***	0.051***	0.038***	0.035***	0.026***	0.024***
	(0.005)	(0.005)	(0.007)	(0.006)	(0.004)	(0.005)
$(\text{Age '90})^2$	-0.001***	-0.001***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.399	0.283	0.255	0.260	0.221	0.228
N	1506	1492	1473	1462	1474	1506

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. It uses the sample of households located in East Germany in both 1990 and 1995. The inverse of the sampling probability provided by SOEP is used as weights. Standard errors, clustered at the region level to account for spatial correlation, are given in parentheses. The dependent variable is the log of the household income in the specified year. The explanatory variable of interest is a dummy indicating ties to relatives in West Germany. All specifications include a full set of region fixed effects. See data appendix for details on the construction of our variables.

TABLE 15 - WEALTH AND TIES

	Income '95/'89 (log)			
	(1)	(2)	(3)	(4)
Ties to Relatives '91	0.049**	0.046*	0.052**	0.050**
	(0.023)	(0.026)	(0.024)	(0.023)
Ties × Capital Income '89 (75th percentile)		0.011		
		(0.047)		
Capital Income '89 (75th percentile)		0.046		
		(0.028)		
Ties × Capital Income '89 (95th percentile)			-0.036	
			(0.112)	
Capital Income '89 (95th percentile)			0.067	
			(0.056)	
Ties × Capital Income '89 (99th percentile)				-0.022
				(0.242)
Capital Income '89 (99th percentile)				0.148
				(0.121)
R^2	0.288	0.290	0.288	0.289
N	1911	1911	1911	1911

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. Standard errors, clustered at the region level to account for spatial correlation, are given in parentheses. The inverse of the sampling probability provided by SOEP is used as weights. The dependent variable in all specifications is the log of the ratio of household income in 1995 and 1989. All specifications use ties to relatives in East Germany as explanatory variable and control for the same set of covariates as the specification in column 5 of Table 11, including a full set of region dummies. We do not report results for expositional clarity. Column 3, 4 and 5 control for a dummy indicating whether the household has capital income above the 75, 95 and 99 percentile of the capital income distribution, respectively. The explanatory variable of interest is the respective interaction of the capital income dummy and the dummy indicating ties to relatives in East Germany. See data appendix for details on the construction of our variables.
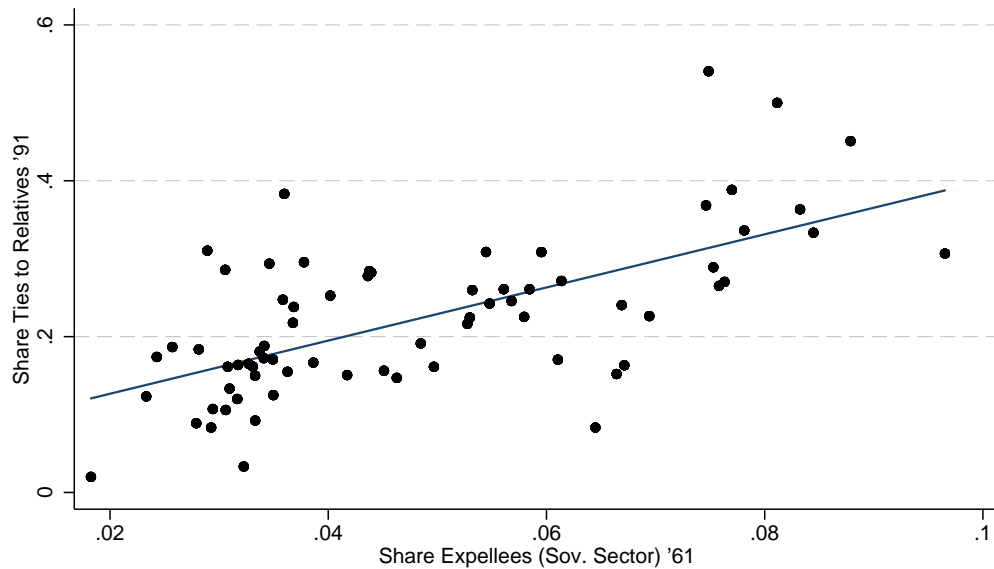
B   Figures

Figure 1: Share Expellees and Share Housing Stock Destroyed
Conditional Scatterplot
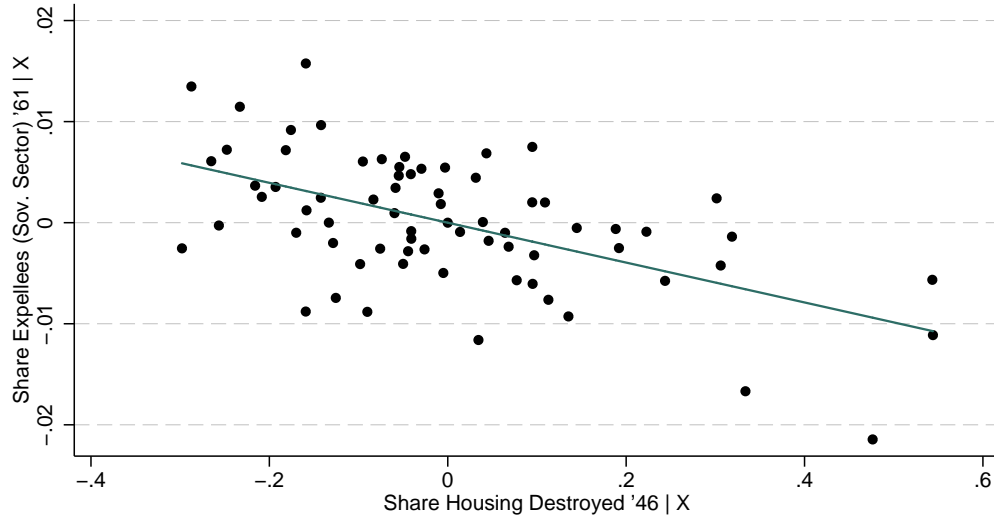
Notes: The figure is a conditional scatterplot of our measure of war destruction and the share of expellees at the regional level. In the first stage regression underlying this plot we control for distance to the former East German border, the log of per capita income in 1989, the log of the ratio of per capita income in 1989 and 1985 and a full set state fixed effects. Results from this regression are presented in column 2 of table 2. The solid line depicts the estimated linear relation between war destruction and the share of expellees.

### Figure 2: Share Ties to Relatives and Share Expelleees

Notes: The figure is a scatterplot of our two measures of social ties at the regional level: the share of expellees and the share of individuals responding to have relatives in East Germany. The solid line depicts the estimated linear relations from an ordi–nary least squares regresssion of the share of expellees via the Soviet Sector on the share of individuals with relatives in the East and a constant. The coefficient estimate is 3.41 (robust s.e.=0.54) is significant at the 1% level.

Figure 3: Income Growth and Share Housing Destroyed
### Conditional Scatterplot

Notes: The figure is a conditional scatterplot of the log of the ratio of per capita income in 1995 and 1989. The labels present names of the regions. In the reduced form regression underlying this plot we control for distance to the former East German border, the log of per capita income in 1989, the log of the ratio of per capita income in 1989 and 1985 and a full set state fixed effects. Results from this regression are presented in column 2 of panel C of table 2. The solid line depicts the estimated linear relation between the log of the ratio of per capita income in 1995 and 1989 and war destruction.

Figure 4: Effect of WWII Destruction on Population Growth
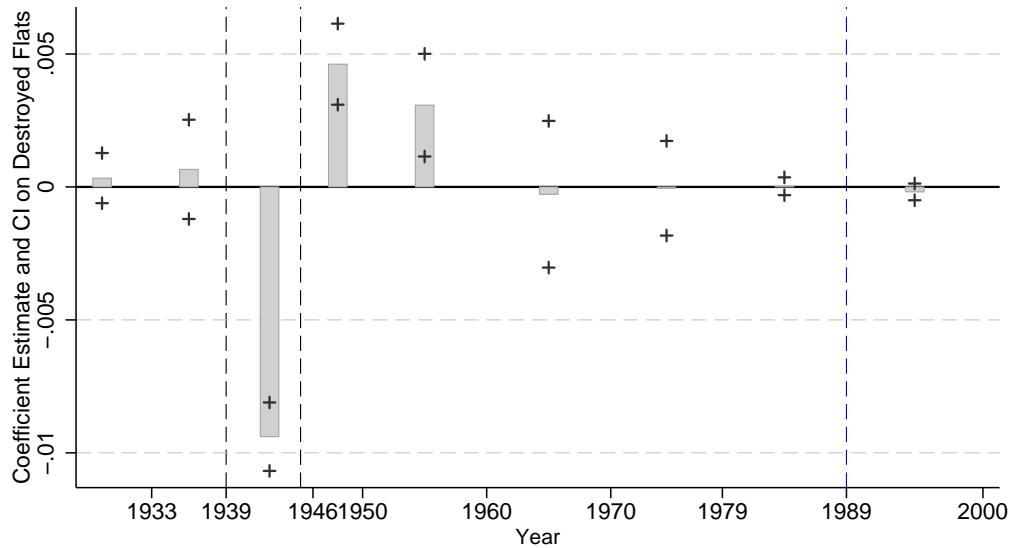
Notes: The figure depicts coefficient estimates and 10% confidence intervals for the coefficient on war destructions for 9 separate city level regressions. Each regression uses as dependent variable the population growth in between the dates specified on the horizontal axis (which are the years for which we have data) and includes as explanatory variables the share of expellees and a constant. The black dashed line indicate the period of WWII. The blue dashed line indicates the time of German reunification. The standard errors are calculated using the Huber–White correction to account for potential heteroscedasticity.

Figure 5: Individual Effects over Time
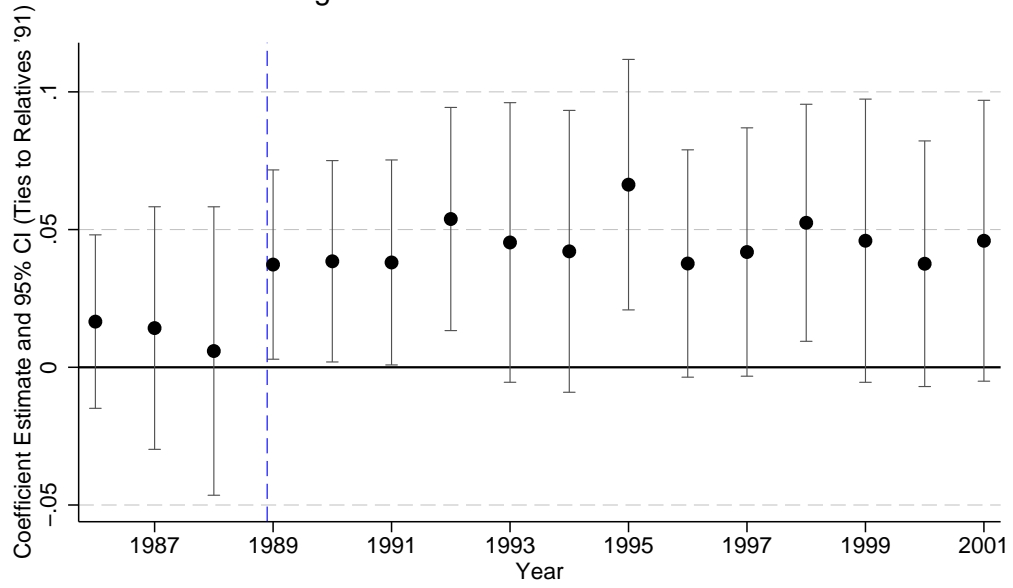
Notes: The figure depicts coefficient estimates and 95% confidence intervals from the following regression using the SOEP houehold panel: The dependent variable is the log of household income in a given year. The explanatory variables of interest – the coefficients on which are plotted in the figure – are the interactions of Ties to Relatives '91 with a full set of year dummies (hence not including the main effect). The regression controls for log of household income in 1985, gender, age and age squared. It as well includes region and year fixed effects. The standard errors are clustered at the regional level.

C Data

<div align="center">

Appendix Table 1

Data Description and Sources

</div>

Variable	Description	Source
Original variables		
Share Expellees (Sov. Sector) '61	Share of the total region/district population in 1961 that is made up by expellees from the former Eastern territories of the German Reich *who settled in the Soviet sector* before arriving in Western Germany (the Western sectors). The exact census definition of this group is given in Statistisches Bundesamt (1961), p.4.	1961 Census
Share Expellees (Direct) '61	Share of the total region/district population in 1961 that is made up by expellees from the former Eastern territories of the German Reich *who did not settle in the Soviet sector* before arriving in Western Germany (the Western sectors). The exact census definition of this group is given in Statistisches Bundesamt (1961), p.4.	1961 Census
Share Ties to Relatives '91	The respondents were ask whether they had relatives in the other part of Germany. We calculated the share of people who responded affirmatively.	SOEP (1991)
Subsidiaries and Branches in *loc*[a]	Number of subsidiaries and branches registered in *loc* belonging to the firm.	Orbis (2007)
Share of Housing Destroyed '46	Destroyed flats in 1946 as a share of the stock of flats in 1939.	German Association of Cities (1949)
Rubble '46 (m^3 p.c.)	Untreated rubble in 1946 in ccm per capita.	German Association of Cities (1949)
Income t (p.c., log, MC)	Log of a region's individuals' average income in Deutsche Mark. This information is not publicly available on levels lower than federal state level. We have hence extracted it from the German Micro-Census, a yearly survey of a random 1% sample of the population. The question used asks for the households average income per household member and respondent has to answer in which interval his household falls. We have taken the mean of the intervals as household income.	German "Mikrozensus" (1985, 1987, 1989, 1991, 1993, 1995)
Income Entrepreneurs t (p.c., log)	Log of region's individuals' average income in Deutsche Mark, for the subgroup of individuals who indicated to be 'entrepreneur' (with or without employees).	German "Mikrozensus" (1989, 1995)
		Continued on next page

Variable	Description	Source
Income Non-Entrepreneurs t (p.c., log)	Log of region's individuals' average income in Deutsche Mark, for the subgroup of individuals who indicated to have an occupation other than being 'entrepreneur' (with or without employees).	German "Mikrozensus" (1989, 1995)
Share Entrepreneur t	Regional share of individuals who indicate as occupation to be entrepreneur (with or without employees).	German "Mikrozensus" (1989)
Share Working in Manufacturing '89	Regional share of individuals who indicate to be working in manufacturing.	German "Mikrozensus" (1989)
Distance to East (100km)	Closest distance from a region's centre to the former GDR's border in 100 km.	- own calculations -
Migration from East '91-'95	Surveyed individuals who migrated to the region in the years 1991, 1993 and 1995 from East Germany as a share the total surveyed population.	German "Mikrozensus" (1991, 1993, 1995)
Region	The geocode of the 'spacial ordering unit', an agglomeration of on average 4.4 districts. This is the lowest level at which income data is made available in the German Micro Census.	
Ties to Relatives '91 (Dummy)	Dummy indicating whether household head or another person in the same household had relatives in the other part of Germany in 1991.	German SOEP (1991)
Income t (log, SOEP)	Log of income in German Mark of household head in year t.	German SOEP
Gender	Gender of highest ranked individual in the household for whom income data exists. Usually this will be the household head.	German SOEP (1990)
Age '90	Age of household head in 1990.	German SOEP (1990)
Years of Education '89	Years of education (including professional) of highest ranked individual in the household for whom income data exists. Usually this will be the household head.	German SOEP (1990)
Capital Income '89	Log of household capital income in 1989.	German SOEP (1990)
Occupation '89	We aggregated the occupations given in the German SOEP to the 8 categories 'Not Employed', 'Pensioner', 'In Education/Military Service', 'Worker', 'Farmer', 'White Collar', 'Entrepreneur' and 'Civil Servant'.	German SOEP (1990)
Generated variables		
Income t_1/t_0 (p.c., log)	Income t_1 (p.c., log) - Income t_0) (p.c., log).	
Share of Total Subsidiaries and Branches in loc^a	Number of subsidiaries and branches in loc over the sum of this and the number of subsidiaries and branches in West Germany.	
Subsidiaries and Branches in loc^a (Dummy)	Dummy variable that indicates whether the firm operates at least one subsidiary or branch in loc.	
	Continued on next page	

Variable	Description	Source
Subsidiaries and Branches in loc^a (log)	Logarithm of Subsidiaries and Branches in loc.	
Income t (p.c., log, SOEP)	Log of average income in the region, using the SOEP data.	
Income t_1/t_0 (log, SOEP)	Income t_1 (p.c., log, SOEP) - Income t_0) (p.c., log, SOEP)	

[a] Where loc stands for East Germany, West Germany, 'New' EU Countries, 'Old' EU Countries, and Non-EU Countries.

D   Further Results

APPENDIX TABLE 2 - FIRM LEVEL DATA (SHARE)

	Share of Total S. & B. in East Germany				
	(1)	(2)	(3)	(4)	(5)
PANEL A: Reduced Form					
Share Housing Destroyed '46	-0.012**	-0.011**	-0.012**	-0.011**	-0.013***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
S. & B. in West Germany (log)	0.016***	0.016***	0.016***	0.016***	0.016***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Distance to East		-0.005***	-0.005***	-0.004**	-0.005***
		(0.002)	(0.002)	(0.002)	(0.002)
Income 1989 (p.c., log)		-0.008	-0.007	-0.003	-0.009
		(0.013)	(0.013)	(0.013)	(0.012)
Income '89/'85 (p.c., log)			-0.004	-0.014	0.000
			(0.019)	(0.020)	(0.018)
Industry Share 1989				0.040	
				(0.035)	
Migration '91-'95					-0.805
					(0.492)
R^2	0.024	0.024	0.024	0.024	0.025
N	19387	19387	19387	19387	19387
PANEL B: IV					
Share Expellees (Sov. Sector) '61	0.646**	0.587**	0.619**	0.622**	0.657**
	(0.298)	(0.277)	(0.292)	(0.301)	(0.294)

Notes: All regression report firm level regression results, using our sample of firms which are headquartered in West Germany and have at least one subsidiary or branch in West Germany. The standard errors are clustered at district level to account for likely spatial correlation. Panel A reports results from firm level ordinary least squares regressions. Panel B reports firm level instrumental variable regression results. The variable of interest in these is the district level share of expellees via the Soviet sector. We instrument for this with the share of the district's 1939 housing stock which was destroyed in 1946. First stage results are not reported. The dependent variable is the share of a firm's subsidiaries and branches located in East Germany. All regressions include 10 federal state fixed effects and 4 sector fixed effects. We control for distance to the former East German border at the district level. Log of per capita income in 1989, log of the ratio of per capita income in 1989 and 1985, the share working in the manufacturing sector 1989 and the sum of migrants from the East in 1991, 1993 and 1995 are regional level controls. All specifications in Panels B include the same controls as the respective specification in panel A. We do not report the results for expositional clarity.

Appendix Figure 1: Share of Housing Destroyed
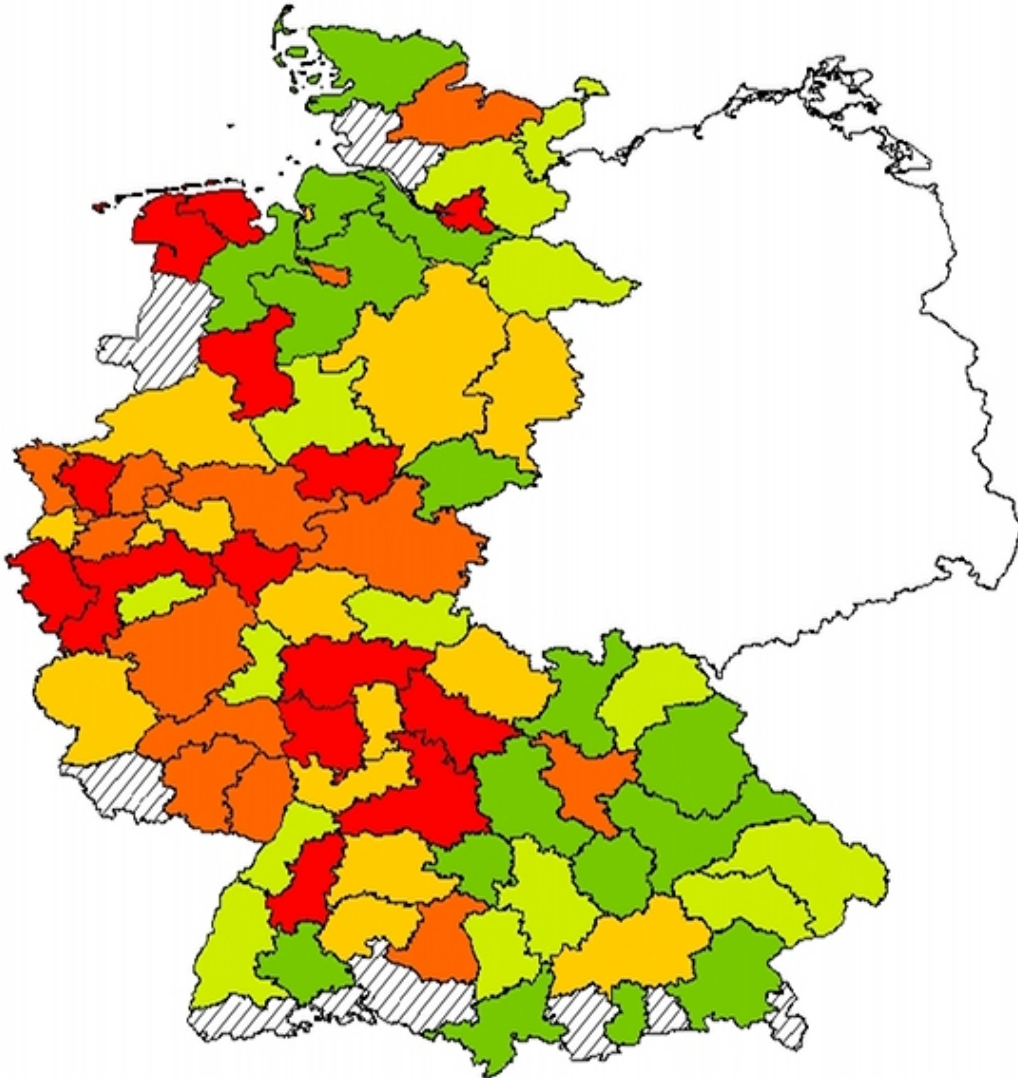
Notes: The figure presents the level of housing destroyed in 1946 in West German regions. The 5 colors refer to the 5 quintiles of war destruction, with red indicating those regions worst destroyed and green indicating the least destroyed regions. The cut-off values for the quintiles of housing destroyed are 0.093, 0.267, 0.377 and 0.526, respectively. The median level of housing destroyed in each quintile is 0.034, 0.189, 0.335, 0.406 and 0.591, respectively. Grey areas indicate regions for which we do not have data.