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ABSTRACT

We use the fall of the Berlin Wall in 1989 to identify a causal effect of social ties on regional economic growth. We show that households who have social ties to East Germany in 1989 experience a persistent rise in their personal incomes after the fall of the Berlin Wall. Moreover, the presence of these households significantly affects economic performance at the regional level: it increases the returns to entrepreneurial activity, the share of households who become entrepreneurs, and the likelihood that firms based within a given West German region invest in East Germany. As a result, West German regions which (for idiosyncratic reasons) have a high concentration of households with social ties to the East exhibit substantially higher growth in income per capita in the early 1990s. A one standard deviation rise in the share of households with social ties to East Germany in 1989 is associated with a 4.6 percentage point rise in income per capita over six years. We interpret our findings as evidence that social ties between individuals can indeed facilitate\ economic growth.

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1 Introduction

There are strong theoretical reasons to believe that social ties between individuals are important drivers of economic growth. First, social ties may facilitate communication and thereby reduce informational frictions and asymmetries (Varian (1990), Stiglitz (1990)). Second, social ties may sustain a wide range of economic transactions by enabling individuals to trust each other, as the threat of severing social ties may serve as a form of 'social' collateral (Greif (1993), Besley and Coate (1995)).[1] Social ties have therefore long been considered an important determinant of aggregate economic outcomes (e.g. Putnam (1993)). Nevertheless there exists virtually no evidence to date on the causal relationship between social ties and aggregate economic outcomes. We attempt to fill this gap by using the fall of the Berlin Wall as a natural experiment which allows us to estimate the causal effect of social ties across German regions on regional economic growth. In addition, we are able to trace this effect on regional economic growth to its microeconomic underpinnings by documenting a causal effect of social ties on entrepreneurial activity, on the investment behavior of firms, and on household income.

The main obstacle to estimating 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 of course endogenous to economic incentives. Identifying a causal link between social ties and aggregate economic outcomes thus requires (i) identifying '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 argue that the fall of the Berlin Wall provides a unique setting which enables us to overcome both of these difficulties.

The first key advantage of this setting is the fact that the partition of Germany was generally believed to be permanent. After the physical separation of the two German states in 1961, private economic exchange between the two Germanys was impossible. Individuals maintaining social ties across the inner-German border during this period did so for purely non-economic reasons. After the fall of the Berlin Wall on November 9th 1989, trade between the two Germanys suddenly became feasible, and in fact there was a boom in economic exchange between West and East.[2]

[1] These ideas go back to a large sociological literature including Granovetter (1973), Coleman (1988) and Putnam (2000).

[2] 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.

To the extent that social ties facilitate economic exchange, social ties between West and East Germans thus unexpectedly took on economic value on the day of the fall of the Berlin Wall. Indeed, we show that West Germans who report to be in contact with friends or relatives in East Germany in 1989 experience a significant increase in the growth rate of their personal income after the fall of the Berlin Wall.

The second key advantage of the natural experiment surrounding the fall of the Berlin Wall is that the idiosyncrasies of Germany's post war history resulted in substantial variation across West German regions in the fraction of households with social ties to East Germany. In 1945 all German residents were expelled from Pomerania, Silesia, and East Prussia (which all became part of Poland and Russia) and allocated to the areas which would later become West and East Germany according to quotas fixed in the Potsdam accords. Between the founding of the East German state in 1948 and the construction of the Berlin Wall in 1961, the vast majority (2.8 million) of expellees allocated to East Germany also migrated to the West (we refer to this group as *expellees via Soviet sector*). During the same period, an additional 3 million *refugees* who had lived in East Germany before World War II also fled to West Germany. We show that West German regions which received a large inflow of these two groups of migrants from East Germany (henceforth 'the East') have significantly stronger social ties to the East in 1989.

Of course, the assignment of migrants to West German regions might not be random, since individuals may have strategically settled in those regions in which they saw the best prospects for long-term economic growth. However, an overwhelming concern for those arriving from the East was an acute lack of housing. During World War II almost a third of the West German housing stock was destroyed. In some areas only 4.4% of the housing stock that existed in 1939 was habitable in 1946. Variation in wartime destruction thus made it more difficult to settle in some parts of West Germany than in others at the time when millions of migrants arrived from the East. We argue that the extent of destruction in 1946 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 post 1989.

Using the degree of wartime destruction in 1946 as an instrument, we show a strong relationship between the share of migrants from the East settling in a given West German region, the share of households reporting to have social ties to the East in 1989, and changes in the growth rate of income per capita post 1989: a one standard deviation rise in the share of migrants from the East 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.[3] While this regional growth effect dimin-

[3]This result is robust to several different variations in the estimation strategy and cannot be explained by

ishes after 1995, there is no evidence of a subsequent reversal. The pattern of social ties to the East which existed in 1989 may therefore have permanently altered the distribution of income across West German regions.

The main identifying assumption for the causal interpretation of our region-level results is that the degree of wartime destruction in 1945 (or any omitted factors driving it) affects changes in the growth rate of income per capita post 1989 only through its effect on the settlement of migrants from East Germany after World War II, and that the presence of these migrants indeed affects 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 rate of income per capita in West German regions in the years before 1989. In addition, all of our specifications are robust to controlling for growth in income per capita in the years prior to 1989. Moreover, we show that our results are particular to migrants arriving from East Germany and not to migrants arriving directly from the areas that became part of Poland and Russia: the settlement of the group of expellees who were allocated directly to West Germany in 1945, those who did not settle in East Germany before arriving in the West, has no effect on income growth post 1989.

In an effort to shed light on the mechanism linking social ties to regional economic growth, 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 three times 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 the East.

We then trace this effect on entrepreneurial activity to the investment behavior of West German firms: 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 migrants from East Germany settling in a region before 1961 is associated with a 3.4 percentage point increase in the likelihood that a given firm within that region invests in East Germany after the fall of the Berlin Wall. 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,

likely alternatives, such as migration from East to West in 1989 or by a decline in West German manufacturing in the 1990s.

except for a small rise in the probability of investing in Poland. This latter finding is notable as about half of those arriving in West Germany from East Germany before 1961 were originally expelled from present-day Poland in 1945.

Finally, we show that individual households who have social ties to East Germany in 1989 internalize part of the income growth which they generate at the regional level. The income growth of households who have ties to at least one relative in the East is on average 5 percentage points higher over the six years following the fall of the Berlin Wall than that of comparable households who have no such ties. This finding is again robust to controlling for a wide range of covariates, such as growth in household income prior to 1989, as well as the age, gender, and level of education of the household head. Moreover, the rise in income occurs immediately after 1989, and there is no evidence of a pre-existing trend. Households headed by individuals below the age of 40 (the lowest quartile of the age distribution) and above the age of 52 (the top two quartiles) seem to profit from their social ties to East Germany. We also show that households profit from their ties to relatives in East Germany regardless of their level of capital income in 1989.

We believe the most plausible interpretation of our results is that West German households which had social ties to East Germany in 1989 had a comparative advantage in seizing the new economic opportunities in the East. Having personal relationships with East Germans may have given them access to valuable information about local demand conditions or about the quality of East German assets that were offered to investors. (Almost the entire East German capital stock was sold to private investors between 1990 and 1994.) This comparative advantage resulted in a persistent rise in their household incomes but also appears to have generated growth in income per capita and increased returns to entrepreneurial activity at the regional level. Part of this effect on regional economic performance may be explained if firms owned by a household with social ties to the East (or firms with access to a local labor force with such ties) had a comparative advantage in investing in East Germany.

While we believe that this paper convincingly demonstrates the relevance of social ties for regional economic growth, there are a number of 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, most of our results are also consistent with a proximate interpretation which would posit that individuals who lived in East Germany during their youth retain knowledge about local economic conditions which enables them to earn rents after reunification even if

they do not have personal contact with East Germans. We do not emphasize this interpretation as our reading of German history suggests that economic conditions in East Germany changed dramatically between 1961 and 1989, such that 'local economic 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.[4]

A large literature shows that measures of 'trust' or 'social capital' correlate strongly with cross-country variation in macroeconomic outcomes, such as economic growth (Knack and Keefer (1997)), international trade (Rauch and Trindade (2002)), and international investment (Guiso, Sapienza, and Zingales (2009)). To the extent that social ties across regions represent economically valuable 'social capital' (Putnam (2000)) this paper provides the first causally identified evidence of such a link.[5] More generally, our findings show that social interactions can affect macroeconomic outcomes, which is a link that is implicit in a wide range of models that feature network-based economic interaction (e.g. Rauch (1999), Kranton and Minehart (2001), Calvo-Armengol and Jackson (2004), Karlan, Mobius, Rosenblat, and Szeidl (2009), and Ambrus, Mobius, and Szeidl (2010)).

By tracing the effect of social ties on economic growth to household income, entrepreneurial activity, and firm investment, our paper also provides evidence on the microeconomic channels through which social ties may affect economic growth. In this sense 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)) to performance in the financial industry (Cohen, Frazzini, and Malloy (2008), Hochberg, Ljungqvist, and Lu (2007), and Kuhnen (2009)), corporate decision making (Shue (2011)), and agricultural yields (Conley and Udry (2009)).[6]

One interesting feature of our findings is that individual households who have social ties to East Germany in 1989 appear to internalize only a small part of the income growth which they generate at the regional level. Our results are thus consistent with the presence of a 'social multiplier' (Glaeser, Sacerdote, and Scheinkman (2003)) through which residents of a region with

[4] A potential confounding factor to our econometric analysis is that West Germans whose property had been expropriated by the East German government prior to 1961 could apply for restitution of their property after reunification. While we are able to control for restitutions directly at the household level, we are unable to do so at the regional level. However, we show that the volume of restitutions received by West Germans prior to 1995 is too small to induce a relevant bias in our estimates.

[5] Note however that all of our results are about income growth at the regional level and that we are unable to make any statements about income growth at the country level.

[6] Also see Laschever (2007), Beaman (2008), Bertrand, Luttmer, and Mullainathan (2000), and Weerdt and Dercon (2006).

a high concentration of households who have social ties to the East experience a rise in their incomes even if they themselves have no such ties to the East.[7]

As the patterns of social ties which we identify in our analysis are driven by an internal migration post World War II, our paper also relates to a large literature on the economic effects of migration (e.g. Card (1990), Borjas (2003) and Friedberg (2001)). We add to this literature by providing evidence of a distinct channel through which large-scale migration may affect long-run economic growth.

In highlighting a channel through which wartime destruction suddenly affects changes in regional income growth 45 years after it was inflicted, our work also provides an interesting contrast with the long-standing result in urban economics that wartime destruction has no long-run effect on the size of cities and towns (see Brakman, Garretsen, and Schramm (2004) for an application to Germany).[8]

Other papers have used German reunification as a testing ground for economic theory. Most closely related are the papers by Fuchs-Schündeln and Schündeln (2005) who use it to identify the role of risk aversion in occupational choice and Redding and Sturm (2008) who use it to estimate the importance of market access for economic development.[9]

The remainder of the paper is organized as follows: Section 2 summarizes the relevant history of post war Germany. Section 3 discusses the data and its construction. Section 4 identifies the effect of social ties on regional economic growth. Section 5 traces this effect to the effect of social ties on entrepreneurial activity, firm investment, and household income. Section 6 concludes. The online 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.

[7] Similar spill-over effects have previously been found in experimental settings. See for example Ludwig, Duncan, and Hirschfield (2001), Duflo and Saez (2003), and Kling, Liebman, and Katz (2007).

[8] Also see, Davis and Weinstein (2002) for Japan and Miguel and Roland (2011) for Vietnam. Acemoglu, Hassan, and Robinson (2011) show a long-run effect of the Holocaust in Russia on economic and political development. Akbulut-Yuksel (2009) documents a detrimental effect of wartime destruction on long-run education and health outcomes in Germany.

[9] Also see Alesina and Fuchs-Schündeln (2007), Bursztyn and Cantoni (2009), and Ahfeldt, Redding, Sturm, and Wolf (2010).

They 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.[10]

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 failed and was quickly abandoned, as the technology available 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 aimed at destroying the German morale by destroying cities and towns (Kurowski (1977)). By the end of the war, 50% of the 900,000 metric tons of bombs had hit residential areas, while 17% had hit industry or infrastructure.

The most heavily-damaged cities 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, the Allies used recent technological advances to implement fire storms, which were easiest to create in cities with highly flammable, historical centers, such as Darmstadt, Dresden, and 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 prevent the fire from spreading. This is why the cities that were attacked late in the war (often strategically the least important) were among the most heavily destroyed.[11]

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 specific factors. Instead, our identification strategy relies on the assumption that the pattern of wartime destruction or any omitted variables driving it have no direct effect on changes in growth rates of 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 (Pomerania, Silesia, and East Prussia) 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 size. The UK would occupy the Northwest, the US the South, and the Soviet Union the East. The

[10] The information presented in this section is from Office (1945), Kurowski (1977), and Friedrich (2002).

[11] 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.

capital, Berlin, would be jointly occupied. At the end of the war, the three armies took control of their sectors, and the US and Britain carved a small French sector out of their territory. 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 rapidly introduced central planning. In 1952 the border was completely sealed, cutting any remaining legal or illegal trade links between East and West.[12]

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 East Germans to flee 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 late summer of 1989, generally believed to be permanent.[13]

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 West Germany, 1945-1961

In 1945 the Polish and Soviet authorities expelled all German nationals from annexed territory so that these areas could be inhabited by Polish (and Soviet) nationals. Those that did not leave on their own accord (many had fled the advancing Soviet army in the final months of the war) were marched or transported towards the four sectors. We refer to former residents of the annexed territory as 'expellees' (*Vertriebene*). Ethnic 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 to one of the four sectors, according to quotas fixed in the Potsdam

[12]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 with the West German government 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.

[13]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.

Agreement.[14] The authorities of the sectors in turn allocated the expellees to the 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 expellees that had originally been allocated to the Soviet sector (2.8 million) also left for the West. These 'expellees via the Soviet sector' are critical to our empirical analysis as they lived in East Germany for up to 16 years before migrating to West Germany and thus had the opportunity to form social ties to East Germans. By 1960, the total number of expellees in West Germany had risen to 9.0 million, of which roughly one third were expellees via the Soviet sector.[15]

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' (*Flüchtlinge)* 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 settled in West Germany was 3 million.

While the occupying authorities in the western sectors, and later the West German authorities, had an explicit policy of supplying expellees 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 housing situation and in fear of the political consequences of de-populating East Germany. 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 (Bethlehem (1982, chapter 3)). The severe housing crisis that resulted from the inflow of millions of migrants into the heavily destroyed Western sectors remained the principal determinant of the allocation of expellees and refugees to West German cities and towns until the late 1950s.[16]

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

[15]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)).

[16]In the early years the availability of housing was the only determinant of where the expellees were assigned quarters. 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 high demand for labor. However, these programs remained relatively limited, with less than one in ten expellees participating (Bethlehem, 1982, p. 29, pp.49).

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 they also encompass rural areas.) Most of our aggregate data is available at the district level, except for data on income per capita and employment before 1995, which is available only at the regional level. Our primary units of analysis are the 74 West German regions, of which we drop three for which we have no information on wartime destruction. 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

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 during or after the war and for expellees who arrived in West Germany after having registered a residence in the Soviet sector. From these data we created the variables *Share Expellees (Direct) '61* and *Share Expellees (Sov. Sector) '61*.[17] By contrast, we do not have reliable regional data on the settlement of refugees arriving from the Soviet sector as refugees had little incentive to reveal themselves to the authorities. However, since expellees via the Soviet sector arrived in West Germany around the same time as refugees and 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. We therefore use *Share Expellees (Sov. Sector) '61* as our primary proxy for the intensity of social ties to the East in a given West German region.

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. The data are 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

[17] These data were collected at the district level. Some West German district boundaries changed between 1961 and 1989. In those cases we used area weights calculated in ArcGIS to convert 1961 districts into their 1989 equivalents.

aggregated the data on wartime destruction by calculating the mean destruction across cities and towns in a district or region, weighted by population in 1939. (Additional details are in Appendix Table 1).

Our data on income per capita are from the German *Mikrozensus*, an annual, obligatory random survey of one percent of the population. We aggregated the individual income data 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 non-entrepreneurs (*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 different sectors s of the economy in 1989 (*Share Employed in s '89*), where s stands for agriculture, manufacturing, services, and government, respectively. We also constructed a proxy for the share of the region's population that are migrants arriving from the East in the years following fall of the Berlin Wall by summing up the share of the region's population who reported arriving from the East in the Mikrozensus years 1991, 1993 and 1995 (*Migration from East '91-'95*).[18] As an additional control we calculated the distance of the center of each district or region to the former inner-German border using 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, which is the edition that expands coverage to small and medium sized German firms. It includes information on the location of the headquarters of each West German firm and a list of its subsidiaries and branches. We use the postal code to match each firm to the district in which its headquarters is located. After dropping firms based in districts for which we lack data on wartime destruction we are left with data on 19,420 firms which have at least one subsidiary or branch in West Germany outside of the district of their headquarters. 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 a given location x (*S. & B. in x (Dummy)*). We calculated this dummy variable for 'East Germany', 'Poland', the 'Old EU Countries' (the 14 EU member countries other than

[18] We did not obtain data on the share arriving in 1990, 1992 and 1994 as the German Mikrozensus charges a flat fee for accessing the datasets of each year. However, we are confident that the shares arriving in consecutive years must be highly correlated.

Germany prior to enlargement in 2004), the 'New EU Countries (excluding Poland)' (all EU member countries that acceded in or after 2004), and for 'Non-EU Countries'. For the same set of firms we computed the share of each 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 log of 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, services, 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 all households which participated in the 1985, 1989, and 1995 waves. For each of these households we use information on household income in the years 1985-2001 (*Income (SOEP)*), on the amount of capital income in 1989, and on 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.[19]

Importantly, the 1991 wave of the panel contains several questions about contacts to friends and family in East Germany. Since the survey was conducted in the second year after the fall of the Berlin Wall and households 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.[20] 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 (*Ties to Relatives '91*). 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 the intensity of social ties at the regional level. A possible source of measurement error is that West German relatives of the survey respondents 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, the flow of migrants from West to East in 1990 was small (only around 30,000 individuals, Hunt (2006)). It is thus safe to assume that households which were based in West Germany in 1989 and report a relative in East Germany

[19] Details of how we aggregated data on individuals to the household level are given in Appendix Table 1.

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

in 1991 also had a relative in East Germany in 1989.

3.4 Descriptive Statistics

Panel A of Table 1 presents the data on West German regions; column 1 gives the data for all regions, columns 2 and 3 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. Expellees via the Soviet sector made up 4.8% of the 1961 population of 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, again split up by regions with 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.

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 state fixed effects, and the distance between region 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 regions. In our standard specification we also control for the pre existing growth trend by including the growth rate of income per capita between 1985 and 1989, $\log\left(y_{r,1989}/y_{r,1985}\right)$. In our standard specification the coefficient β thus estimates the *differential change* in the growth rate of income per capita after 1989 for regions with different intensities 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 however not hold in the data, since the settlement of migrants from the East in West Germany prior to 1961 (and thus the strength of social ties to East Germany) may be correlated with differences in growth prospects across regions. Although we show 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 $Cov\left(w_r, \varepsilon_r\right) = 0$. It states that, conditional on the covariates we control for, (i) wartime destruction in 1946 has no effect on changes in the growth rate of income per capita after 1989 other than through its effect on the settlement of migrants who have social ties to the East and (ii) there is no omitted variable which drives both wartime destruction and differential changes 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, for income per capita in 1989, and for state fixed effects. The coefficient estimate of -0.019 (s.e.= 0.004) is statistically significant at the 1% level 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.)[21]

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 regions that were richer in 1989, which is most likely attributable to persistent differences in income per capita between regions which existed prior to 1961.[22]

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.

Appendix Figure 2 plots the conditional relationship estimated in this column and shows that the first stage relationship is not driven by outliers. Columns 3-6 of Panel A of Table 2 show the first stage regressions corresponding to robustness checks which we perform 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 column 4 we replace our control for the distance to the inner-German border with a fixed effect for each distance quartile and in column 5 we add the share of the workforce employed in agriculture, manufacturing, services, and government in 1989 (we do not report the coefficients on these variables to save space). Finally, column 6 adds the extent of migration after reunification as an additional control. In each case the coefficient of interest remains virtually unchanged and statistically significant at the 1% level.

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 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

[21]The share of expellees via the Soviet sector proxies for both groups of migrants (expellees and refugees) arriving from East Germany. Since both groups were roughly of the same size we may speculate that a one standard deviation increase in wartime destruction may be associated with a drop in the total share of migrants from the East settling in a given West German region which is around twice as large.

[22]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.

negative and all except the ones in columns 3 and 4 are statistically significant at the 5% level (the latter is significant at 10%). 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 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, as it lays bare the historical source of the variation and clarifies possible alternative interpretations of our results. Since it comes from a comprehensive census, we also expect it to be measured with less error than a variable generated from a panel survey of only 1911 individuals. Needless to say, the correlation between the two proxies is very high (64%), as shown in Appendix Figure 3, and results are very similar when we use either of the two proxies.

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 being the growth in income per capita between 1989 and 1995, $\log\left(\frac{y_{r,1995}}{y_{r,1989}}\right)$. 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 (-0.048, s.e.= 0.020), suggests that regions which were least destroyed during the war experienced a significantly higher increase in the growth rate of income per capita post 1989 than regions which were most destroyed during the war. 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 and 4-6, with point estimates ranging from -0.042 in column 1 to -0.052 in column 4. Appendix Figure 4 depicts this relationship graphically in a conditional scatter plot, where the slope shown corresponds to the estimate in column 2.[23]

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

[23] 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 45 years after the fact, 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 is consistent with the view that it is primarily the lack of housing in 1946 and not wartime destruction per se that affects changes in economic growth post 1989.

4.3 Instrumental Variables Results

In our instrumental variables estimation we explicitly test the hypothesis that a concentration of households with social ties to East Germany in 1989 in a given West German region is causally related to a rise in the growth rate of income per capita after the fall of the Berlin Wall. In Table 3, we estimate (1) using only the variation in 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.[24] The coefficient estimate on 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 percentage point rise in income per capita over the six years following 1989 (or roughly a 0.7 percentage point higher growth rate per annum).[25] The coefficient on income in the base year, 1989, is negative and significant, which suggests mean reversion in income per capita across West German regions. Somewhat surprisingly, the coefficient on the distance to the inner-German border is positive, which suggests that the regions 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 four years preceding 1989. The coefficient of interest rises slightly to 2.442 (s.e.= 0.880) and is now significant at the 1% level.[26] The fact that we control for both the pre-existing income level and for pre-1989 income growth means that this estimate

[24] 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 the corresponding specification in Table 2).

[25] Since our model contains a lagged dependent variable there may be a mechanical bias in the coefficient of interest. Instrumenting the lagged dependent variable with its own lag ensures consistency (Anderson and Hsiao (1982)). If we use income in 1985 as instrument for income in 1989 the coefficient estimate increases slightly to 2.289 (s.e.=0.984) and remains significant at the 5% level.

[26] We do not cluster the standard errors at the state level as there are only 10 states (our sample excludes Berlin).

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.

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 regions 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 migrants from the East to West German regions does not seem to have a large impact on our results, our identifying assumption, that the degree of wartime destruction in 1946 affected changes in the growth rate of income per capita after 1989 only through its effect on the settlement of migrants who have social ties to the East, 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.

Simple Challenge 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 growth rate of income per capita that occur after 1989.

Second, we can show that growth in income per capita in the four years prior to 1989 is uncorrelated with wartime destruction and with the settlement of expellees. Panel B of Table 3 shows a placebo experiment in which we use income growth between 1985 and 1989 as the dependent variable rather than as a control. All specifications are parallel to those in Panel A (except that we now control for log income per capita in 1985 rather than in 1989). Throughout the panel the coefficient of interest is statistically indistinguishable from zero. Wartime destruction thus becomes relevant for economic growth only post 1989. In Appendix Table 2 we pinpoint the timing of the effect at a higher frequency by regressing log income per capita for each region and year post 1985 on the interaction of year fixed effects with the share of expellees in 1961. The table shows no effect of the settlement of expellees on income growth rates prior to 1989, a positive effect in all years post 1989 and a statistically significant effect on growth between 1989

and 1993 and later years. The timing of the effect is thus highly supportive of the view that variation in the degree of wartime destruction only became relevant after the fall of the Berlin Wall.

Third, while we have no data on regional income per capita prior to 1985, it is a well documented fact that wartime destruction had no impact on population growth in West German cities post 1960 (Brakman, Garretsen, and Schramm (2004)). In Figure 1 we replicate part of this result. The figure depicts coefficient estimates from city-level regressions of population growth in the years between 1929 and 2000 on the share of housing destroyed in 1946 and a constant. Not surprisingly, wartime destruction had a strong and significantly 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 proxies for income growth, this result suggests that the direct effects of wartime destruction on income growth were short-lasting.

Sophisticated Challenge The 'sophisticated' challenge to our identifying assumption is that the pattern of wartime destruction (or some omitted variable driving it) may have 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 6 controls for the sectoral composition of the workforce in 1989. Indeed, the estimated coefficient on the share of the workforce employed in manufacturing is negative, but it is not statistically significant and the coefficient of interest changes only marginally to 2.772 (s.e.=0.854). Any variation in income growth post 1989 due to the relative decline of manufacturing is thus unrelated to the variation in income growth due to the settlement of migrants from the East in West Germany pre 1961.[27]

Another potential concern is that after 1989 highly skilled workers from East Germany may have migrated to the same regions in which their relatives settled before 1961, and that this migration may have increased the average wage paid in these regions. In column 6 we control for the flow of migration from East to West post 1989, and again there is little effect on the

[27] In addition, Figure 1 shows that wartime destruction was uncorrelated with pre war population growth. To the extent that we can 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.

coefficient of interest.[28]

While neither of these two channels appear to be driving our results, there might be other omitted variables which may be correlated with the pattern of wartime destruction and affect changes in regional growth trajectories post 1989. Alternatively, we may be misinterpreting our results in that migrants from the East may affect changes in income growth post 1989 through some channel other than social ties. In particular, they might have been somehow different from other Germans, and these different traits may have put them in a position to earn higher incomes post 1989 for reasons unrelated to social ties to the East.[29]

We are able to provide evidence on this, and the entire class of 'sophisticated' challenges, by comparing the effects of expellees via the Soviet sector with the effects of expellees who arrived directly from the parts of pre-war Germany that were annexed by Poland and Russia. Appendix Table 3b shows that, conditional on our standard control variables, there are no systematic differences in 1989 between the regions in which the two groups settle in terms of industrial structure, average educational attainment, and share of the population engaged in entrepreneurial activity. The only exception is that regions with a larger share of direct expellees tend to have a marginally larger share of their workforce employed in the agricultural sector.[30] (We therefore control for the employment share in agriculture and the employment shares of the three other sectors in the specifications discussed below.) Conditional on this caveat, it seems that 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 changes in 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 that both groups of expellees have an identical effect on income growth post 1989.

[28] When we use the flow of migration from East Germany post 1989 as the dependent variable, the coefficient on expellees via the Soviet sector is not significant, which is comforting for the interpretation of our 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 until 1996 (Fuchs-Schündeln and Schündeln (2009)).

[29] In fact, the 1971 census, the last census in which expellees are separately identified, would suggest the opposite. It shows that both groups of expellees are slightly poorer, slightly less educated, and significantly less likely to be entrepreneurs than 'native' West Germans. See Appendix Table 3a.

[30] Appendix Table 3b reports regressions of seven region characteristics in 1989 on the share of both groups of expellees in 1961 and our standard region-level controls (distance to east, income in 1989, income growth between 1985 and 1989, and state fixed effects). Each line of the table corresponds to one regression. It reports the dependent variable, the coefficients on the two groups of expellees, as well as the p-value corresponding to the null hypothesis that the two coefficients are equal. We cannot reject this hypothesis at the 5% level in any of the seven specifications.

In Table 4 we relate growth in income per capita post 1989 simultaneously to the share of expellees via the Soviet sector and to the share of direct expellees, again conditional on our standard region-level controls (not shown). Column 1 gives the results from an OLS regression. While the coefficient on expellees via the Soviet Sector is positive, statistically significant at the 1% level, and very similar to the estimates from Table 3 (2.131, s.e.=0.706), the coefficient on the share of direct expellees is negative and statistically indistinguishable from zero. In columns 2 and 3 we add additional controls for the share of the population employed in agriculture (column 2) and for the share of the population employed in the other three sectors (column 3). Both make little difference to the results.

In columns 4-6 we repeat this exercise using our instrumental variables strategy. To compare the causal effect of direct expellees and expellees via the Soviet sector on income growth post 1989 we require two instruments which give us differential leverage in identifying the exogenous components in the settlement patterns of both groups. In Panels B and C 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.) Panel B gives the results for expellees arriving via the Soviet sector and Panel C gives the results for direct expellees. In the case of the former, the share of housing destroyed is significant with a negative sign and rubble is insignificant across all three specifications. 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. 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.[31]

Using both instruments, we are thus able to separately estimate the causal effects of expellees via the Soviet sector and of direct expellees on differential income growth after 1989. Columns 1-3 of Panel A present the results. While the coefficient on the share of expellees via the Soviet sector is again positive, similar in magnitude to the estimates obtained earlier (3.422, s.e.= 1.809 in column 1), and statistically significant at the 10% level, the coefficient on the share of direct expellees is close to zero and statistically insignificant.[32] The growth effects we document are thus particular to the group which had the opportunity to form social ties to East Germans

[31]This feature of the data may be related to the timing of the arrival of the two groups of expellees. The direct expellees arrived immediately after the war, whereas the expellees via the Soviet sector arrived between 1945 and 1961. We therefore suspect that rubble per capita measures a dimension of wartime damage which was more important in the immediate aftermath of the war but was then cleared away relatively quickly, while the destruction of the housing stock had longer-lasting effects.

[32]The two coefficients are statistically significantly different in the specification shown in column 1 (p-value: 0.008). In the instrumental variable specification of column 4 the p-value is 0.117.

before moving to the West. We view this result as strong support in favor of our interpretation.

4.5 Remaining Caveats

A final concern with the interpretation of our results is that migrants arriving from East Germany may have had an unobservable emotional affinity to the East that direct expellees did not share. Such an emotional affinity may have prompted them to accept lower expected returns when investing in the East and, by pure chance, realized returns may have been so much higher than expected that they resulted in a rise in income per capita at the regional level. Conceptually, we cannot rule out this possibility. However, the idea that realized returns of investing in the East were a large positive surprise would be grossly at odds with the dominant narrative that economic performance of the East post reunification was a significant disappointment (see for example Paque (2009)).

A final econometric concern for which we cannot control explicitly at the regional level is that expellees via the Soviet sector might be more likely than 'native' West Germans to have restitution claims to property expropriated in East Germany. Under the reunification treaty, former owners of assets located in East Germany could apply for restitution or compensation providing that they had not received compensation from the East German government and that the assets they were claiming still existed at the time of filing. This meant that practically all individual claims filed related to real estate and/or firms. While compensation payments by law did not begin until 1996 (Southern (1993)), the restitution of assets began in the early 1990s and could potentially confound our measure of income per capita. However, we can be confident that any bias they may induce in our estimates is quantitatively small.[33]

First, the Mikrozensus asks about household income in a usual month and respondents select an income bracket (with the highest category being DM 7000 in 1995), so that one-time inflows of cash have no impact on our measure of income per capita. The only potential concern for our results is therefore any flow income that may be generated by restituted assets (or by assets purchased from proceeds of sales of restituted assets).

Second, the volume of restitutions was orders of magnitude smaller than the effect on income per capita we document above. For example, the average East German rental unit generated a monthly cash flow of DM 240 in 1995.[34] If we estimate that about 300,000 apartments and houses

[33] According to the government agency handling restitutions, half of all approved claims were settled by compensation payments, and the total sum of compensation payments made between 1996 and 2009 was EUR 1.4 bn. (Personal correspondence with Dr. Händler, press liaison of the *Bundesamt fuer zentrale Dienste und offene Vermögensfragen*.)

[34] Average rent paid in East Germany per month in 1995 excluding utilities is DM 437 (DIW (1996)). According

were returned to former West German owners by 1995[35] and made the extreme assumption that all of these units went to expellees via the Soviet sector, the average expellee would experience a rise in her monthly income of DM $240\frac{300,000}{2,800,000}$ = DM 25.71. A one standard deviation increase in the share of expellees (0.019) would then be associated with a rise in income per capita at the regional level of DM 0.49 (or 0.03%). Similarly, a reasonable estimate of the total value of the 1,571 firms restituted to their former owners by 1994 is DM 9.7bn.[36] If we again made the extreme assumption that all of these firms were restituted to expellees via the Soviet sector, and that they immediately generated an annual cash flow of 10% (which they almost certainly did not as the average recipient of a firm had a contractual obligation to make investments amounting to two times the estimated firm value in the five years following privatization (Lange and Pugh, 1998, p. 73)), the average expellee would experience a rise in her monthly income of DM $\frac{9.7bn}{2,800,000}\frac{0.1}{12}$ = DM 28.87. A one standard deviation increase in the share of expellees would then be associated with a rise in income per capita of a mere 0.03%. The volume of restitutions was therefore orders of magnitude too small to induce a meaningful bias in our estimates.

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 households (non-entrepreneurs).[37] In columns 1 and 2 of Table 5 we re-run our standard specification from column 3 in Table 3 with the growth rate in the average income of entrepreneurs and non-entrepreneurs as dependent variables. 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. Since the errors in the specifications

to a survey of large operators of rental apartments and houses (GdW (1994)), maintenance and renovations accounted for 45% of rental revenues in 1993 such that we may estimate the cash flow per unit as (.55) 437 = 240.

[35] Hubert and Tomann (1993) estimate that a maximum of 1,3m apartments and houses were affected by restitution claims. Approximately 60% of all restitution claims were made by West Germans (Thimann, 1996, p. 147). By the end of 1993, 20% of rental properties which had been claimed by former owners had been restituted GdW (1994).

[36] The *Treuhandanstalt*, the government body administering the privatization of East German firms, generated a total of DM 60bn in revenues from the sale and liquidation of 10,428 firms (or DM 6.2m per firm). Assuming that the 1,571 restituted firms had the same average value and that they were returned to their former owners for free, the total value of firm restitutions amounts to DM 9.7bn (Lange and Pugh, 1998, p. 73).

[37] In the German Mikrozensus these are households whose household heads declare that their primary occupation is *Selbstständiger mit oder ohne Beschäftigte*.

in columns 1 and 2 are likely to be correlated, we estimate the two equations (as well as their first stage) jointly using the three stage least squares estimator. The coefficient estimate is 4.516 (s.e.= 1.668) for entrepreneurs (column 1) and 1.491 (s.e.= 0.676) for non-entrepreneurs (column 2), implying that a one standard deviation rise in the share of expellees via the Soviet sector is associated with a 8.6% rise in the average income of entrepreneurs, but only a 2.8% rise in the average income of non-entrepreneurs.[38] 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.

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 who are entrepreneurs in 1995 as the dependent variable, where we again add the share of the population who are entrepreneurs in 1989 as an additional control. The coefficient of interest is 0.322 (s.e.=0.163), implying that a one standard-deviation rise in the share of expellees (0.019) induces a 0.61 percentage point rise in the share of the population engaged in entrepreneurial activities. This is a sizable effect, corresponding to a 14.2% rise relative to the mean share of entrepreneurs in 1989 (0.043).

5.2 Firm Investment

The significant rise in entrepreneurial income in regions with strong social ties to the East suggests that firms which were based in these regions generated higher profits in the years following the fall of the Berlin Wall. One possible reason for such a rise in profitability is that locating 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 social ties to the East may have been in a better position to assess the value of East German firms that came up for sale or may have been better able to gage local demand for products and services. We explore this possibility by examining the holdings of subsidiaries and branches of West German firms in East Germany.

We have data on 19,402 firms whose headquarters are located 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

[38] The p-value on the null hypothesis that the two coefficients on Share Expellees (Soviet Sector) '61 are equal in columns 1 and 2 is 0.070.

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

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

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 proxy 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 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 share of expellees via the Soviet sector settling in a West German region in 1961) is jointly determined with income growth by instrumenting $s_{dr,1989}$ 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.[39]

Panel A of Table 6 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.[40] 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 share of housing destroyed (0.24) within a given West German district is associated with a 0.7 percentage point drop in the probability that a firm based

[39] We use a simple linear probability model, since this allows for a straight-forward interpretation of the coefficient.

[40] 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.

in that district operates a subsidiary or branch in East Germany in 2007. Unsurprisingly, the coefficient on our size control is positive and significant, reflecting the fact that larger firms are also more likely to operate in East Germany. Columns 2-5 add all of the now familiar district- and region-level covariates from section 4, and column 2 gives the analog of our standard specification. Throughout, the coefficient of interest remains in a tight range between -0.026 and -0.031 and is statistically significant at the 1% or 5% level.

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 statistically significant at the 5% level. The estimate from our standard specification in column 2 is 1.497 (s.e.= 0.664), which implies that a one standard deviation rise in the share of expellees via Soviet sector in a West German district (0.022) is associated with a 3.3 percentage point increase in the probability that a firm based in that district will operate a subsidiary or a branch in East Germany in 2007.

The remaining panels of Table 6 show the results of a number of falsification exercises. If the pattern in holdings of subsidiaries and branches prevailing in 2007 is truly attributable to variation in social ties to East Germany in 1989, and not to some other factor, our measure of social ties to East Germany should predict investment in East Germany but not in other areas of the world.[41] Panels C-F repeat the same specifications as in Panel B, but with a dummy variable indicating whether a firm operates 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), and in non-EU countries as the dependent variable. As expected, all estimated coefficients in Panels D, E and F are statistically indistinguishable from zero. Firms which are based in districts with a high share of expellees via the Soviet sector 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. (Although the size of

[41] 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.

the coefficient for Poland is similar to that of some of the other, insignificant coefficients.)[42]

In Appendix Table 5 we explore whether social ties may have been especially relevant in determining the investment behavior of firms in any particular sector. To this end we return to the standard specification of our firm-level analysis (Table 6, Panel B, column 2) and interact the share of expellees via the Soviet sector with each of the four sectoral fixed effects included in the specification (and instrument each interaction with the interactions of the sectoral fixed effects with the share of housing destroyed in 1946). The estimated effects in the agriculture, government, and manufacturing sectors are statistically insignificant, while the effect estimated for the services sector is positive and statistically significant at the 5% level (2.142, s.e.= 0.993). We may interpret this as evidence that social ties were particularly important for firm investment in the services sector, which is arguably the sector of the economy which is most susceptible to informational asymmetries and reliant on knowledge of local demand. However, most of the firms in our sample have their primary focus in this sector such that we interpret this result with due caution.[43]

5.3 Social Ties and Household Income

If the presence of households who have social ties to East Germany encourages local firms to invest in the East and has beneficial effects on income growth at the regional level, we would expect these households to internalize at least part of the gain which they generate at the regional level. In this section we explore how individual households may have benefited from their social ties to East Germany using data from the German Socio-Economic Panel (SOEP). From the panel we select households which were located in West Germany in 1989 and participated in the 1985 and 1995 waves of the survey.

Panel C of Table 1 gives summary statistics for the entire panel of 1911 households, and for the subsets of households which report and do not report 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) and their household heads tended to have slightly less education (on average 12.12 years versus 12.42 years). However, the two subsets of households look similar on other observable dimensions such as the amount of capital income, the share of household heads

[42] Appendix Table 4 reports the outcomes of additional robustness checks, in which we repeat the same specifications as in Panels A and B of Table 6, 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 in 2007.

[43] Unfortunately it is not possible to further disaggregate the services sector with the data available.

engaged in entrepreneurial activity, and the share unemployed.

Our basic household-level regression estimates the effect of social ties to East Germany on changes in the growth rate of household income post 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 region fixed effects, household income growth between 1985 and 1989, as well as 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 differential growth in household income after 1989.

Before estimating (4), Table 7 establishes the consistency of our household-level and region-level datasets. Column 1 reproduces the standard specification from Table 3 column 3, which relates region-level income growth to the share of expellees via the Soviet sector, 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 of expellees is insignificant, but remarkably similar to the one we obtained in the region-level dataset, 2.777 (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 region averages of 1% of the population. However, it is comforting that both datasets appear 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). In column 4 we add controls for the gender, age, and age squared of the household head (these are standard controls in the labor literature), which reduces the coefficient of interest to 0.046 (s.e.=0.023). In column 5 we add region fixed effects and estimate the full model in (4). The coefficient of interest is 0.049 (s.e.= 0.023).[44] It suggests that households with ties to East Germany in 1989 experienced on average 5 percentage points higher income growth in the 6 years following the fall of the Berlin Wall than comparable

[44]This coefficient estimate is essentially unchanged if we consider only households who have relatives in the East and report that they are in contact with these relatives or if we consider households who have friends and/or relatives in the East.

households who do not have such ties.[45]

For specification (4) to estimate the coefficient of interest consistently we require $cov\left(T_i, \varepsilon_i\right) = 0$. As ties to relatives could not have had an economic benefit prior to 1989, we believe this condition does not fail due to reverse causality. However, it may still fail if households with ties to the East are also more likely than other households to have some omitted characteristics which affect their income growth *differently* after 1989 than before 1989. For example, we may worry that individuals with social ties could 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. However, the summary statistics in Panel C of Table 1 actually suggest the opposite.

In Table 8 we add a number of additional covariates (again, this table only reports the 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 the household head's years of education and years of education squared 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 in 1989. 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 5% level (except for column 6 in which it is significant at the 10% level).

In Panel B we check the robustness of our results using a restricted sample of households which excludes all households who may potentially have received restitutions of assets from the East: It excludes all households who have rental income in 1989 or 1995 as well as all households who owned firms in 1995 but not in 1989.[46] This reduces the sample size by one fifth. In our standard specification (column 1) the coefficient of interest rises slightly to 0.055 (s.e. = 0.027) and remains statistically significant at the 5% level. Moreover, the results in the

[45] Since our model contains a lagged dependent variable there may again be a mechanical bias in the coefficient of interest. We cannot perform an Arellano-Bond style estimation as we do not have enough pre-1989 data. However, if we drop the control for the pre-existing growth trend, we can instrument for household income in 1989 with household income 1985. In this case the coefficient of interest is estimated to be 0.038 (s.e.=0.022) and significant at the 10% level.

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

remaining columns are similar to those from Panel A, albeit with slightly larger standard errors. Our household-level results are thus robust to excluding the subgroup of households that could plausibly have benefited from restitutions prior to 1995 and are consistent with the view that the effect of restitutions on income growth, particularly pre 1995, is economically small.

In Figure 2 we explore the timing of the effect by using the full panel structure of the data in a specification analogous to Appendix Table 2 column 1. We regress the income of each household in a given year on its income in 1985, a full set of year and region 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 coefficients on the interaction terms, and identifies a 95% confidence interval.[47] Each coefficient measures the differential income growth of households with social ties to the East between 1985 and the indicated year. The pattern is striking: the coefficients are statistically indistinguishable from zero until 1989, when they jump up and remain statistically significant at the 5% level in most years until 1995. All coefficients after 1989 are statistically significant at the 10% level until the end of the sample in 2001.

5.3.1 Heterogeneous Effects

As households who have ties to relatives in the East appear to profit from these ties post 1989 an obvious question is *how* they are managing to do so. One way to address this question is to examine which groups of households were more or less able to profit from their ties to the East.[48]

In column 1 of Table 9 we again depart from our standard specification in Table 7 column 5, and interact the dummy for ties to relatives with a fixed effect for the age quartile of the household head (and also add fixed effects for each age quartile on the right hand side). The pattern suggests that all age groups, except those aged 52-62, appear to profit similarly from their ties to the East. Interestingly, 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). 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 local economic knowledge about East Germany. However, they could easily have kept in contact with their relatives in East Germany. This result is thus consistent with our view that households profit from knowing people and not from knowing places.

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

[48] However, as our sample contains only 596 households with ties to the East our statistical power in identifying heterogenous effects is limited.

Anther interesting question is whether households who are wealthier were able to benefit more from their social ties to the East. In column 2 of Table 9 we again depart from our standard specification and add the interaction of the ties to relatives dummy with a dummy which is one if the household's capital income in 1989 is above the 75th percentile (we again add the main effect of this dummy on the right hand side). The estimate on the ties to relatives dummy is very similar to that in our standard specification (0.046, s.e.=0.026). However, the interacted variable remains insignificant, suggesting that West German households benefited from their ties to East Germans regardless of their wealth in 1989. Column 3 shows similar results, using the 95th percentile of household capital income.

5.3.2 A Social Multiplier

The estimates in this section clearly show that households who have social ties to the East internalize part of the income growth which they generate at the regional level. Although we should be cautious when comparing the magnitude of estimates across different datasets, it also seems clear that a 5 percentage point increase in the personal income of households who have social ties to the East could not account for the large increase in income per capita which we find at the regional level (a one standard deviation increase (0.1) in the share of households who experience a 5 percentage point rise in their income growth mechanically accounts for a rise in regional income per capita of only 0.5 percentage points).[49] The magnitudes of our estimates are thus consistent with the presence of a 'social multiplier', some mechanism by which households who do not have direct social ties to the East somehow benefit from living in the same region as many households who do.

Such a social multiplier may arise if firms based in regions with strong social ties had a comparative advantage in investing in the East and if this comparative advantage resulted in a local pecuniary externality (local factor prices may have risen). Alternatively, it might also arise from a network externality through which households might benefit from being connected to other households who have social ties to the East. The biography of an entrepreneur which inspired this paper (Schulze (2005)) presents an example of such interaction at the second degree of separation.

[49] If we re-run our standard specification of Table 3 Panel A, column 3 with *Share Ties to Relatives '91* as the intervening variable we get an estimate of 0.417 (s.e.=0.261), which suggests that a one standard deviation increase in the share of the population who have ties to relatives in the East is associated with a 4.1 percentage point higher growth rate of income per capita post 1989.

5.3.3 East German Households

Throughout the paper we have focused on the economic effects of social ties on outcomes in West Germany. An obvious question is what effects the same social ties have in East Germany. Unfortunately, we have no data on income in East Germany prior to 1990 and no information on where in East Germany migrants lived before migrating to the West. Therefore we cannot replicate our region-level results for East Germany. However, we can replicate part of our standard specification in column 5 of Table 7 for households in East Germany. In particular, Appendix Table 4 shows results of a regressions relating log income of East German households in the years after German reunification to a dummy variable indicating relatives in West Germany in 1991 as well as our standard household-level covariates. As we have no data on income before 1990, 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 may have higher incomes than those without ties to the West.

6 Conclusion

The question how social ties between individuals relate to the capacity of societies for economic growth is of great importance in economic theory. Theorists in many fields are beginning to incorporate network-based interactions into their models. Showing that the pattern of social ties between individuals impacts aggregate economic outcomes highlights the relevance of their work beyond the microeconomic context and facilitates a deeper theoretical understanding of otherwise puzzling correlations between measures of 'social capital', 'trust' and economic development.

Empirical work, however, has found it difficult to resolve a double reverse causality problem: Both the decision of individuals to form social ties and the regional distribution of individuals who make these decisions are endogenous to economic activity.

In this paper we are able to solve both layers of this reverse causality problem in the context of the natural experiment surrounding German reunification. We show that West German regions which (for idiosyncratic reasons) have a high concentration of households with social ties to the East in 1989 exhibit substantially higher growth in income per capita after the fall of the Berlin Wall. Moreover, we are able to provide evidence on the microeconomic underpinnings of the this effect. We show that households who have social ties to the East in 1989 experience a persistent

rise in their personal incomes and that their presence increases returns to entrepreneurial activity at the regional level as well as the likelihood that local firms invest in East Germany. These findings appear robust to a wide range of plausible variations in the estimation strategy and placebo treatments. They show that social ties between individuals can indeed facilitate economic growth.

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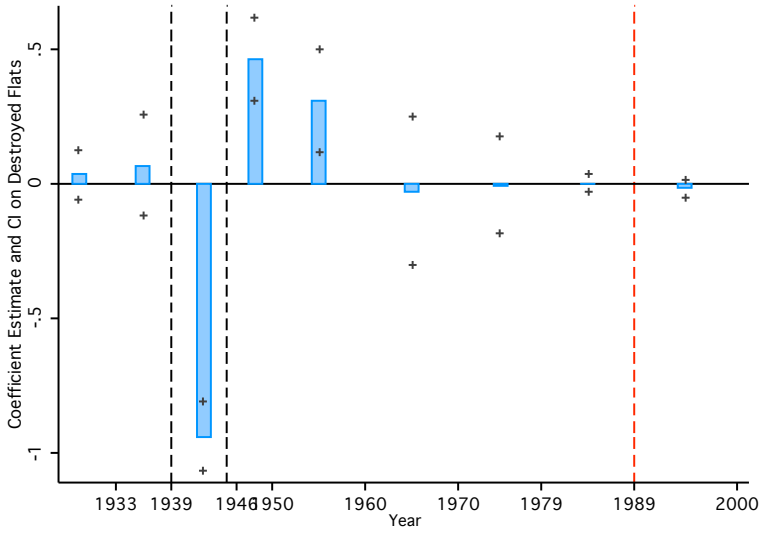
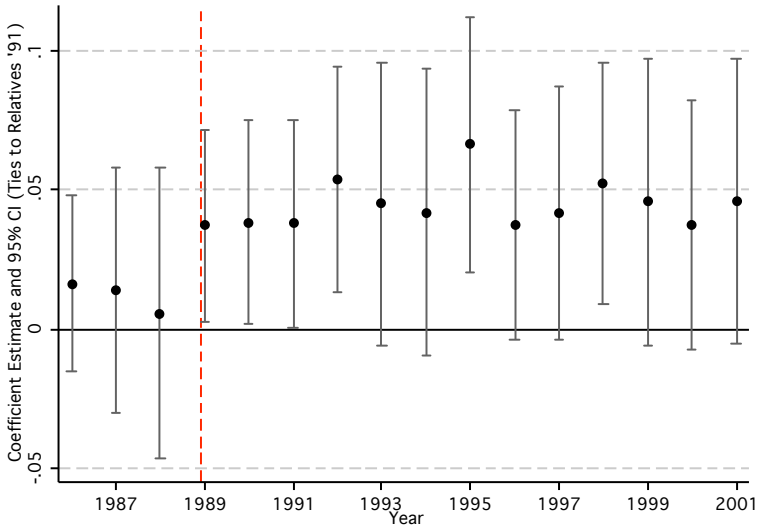
Figure 1: Effect of Wartime Destruction on Population Growth



Notes: The figure depicts coefficient estimates from city-level regressions of population growth on share housing destroyed during World War II. We ran separate regressions for each time interval shown on the horizontal axis of the figure. In each of these regressions the dependent variable is city population growth in the time interval shown. The explanatory variable is always city-level *Share Housing Destroyed '46* and a constant. The bars in the figure present the respective coefficient estimates on *Share Housing Destroyed '46*, the crosses give 90% confidence intervals. Standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. The city-level population panel is unbalanced. It contains information for between 144 and 165 cities on population growth between 1925-1933, 1933-1939, 1970-1979, 1979-1989, and 1989-2000; it contains information for 73 cities on population growth between 1939-1946, and 1946-1950; but it only contains information for 17 cities on population growth between 1950-1960, and 1960-1970. Missing data tends to be from smaller cities. The black dashed lines indicate the time of World War II, the red dashed line indicates the time of the fall of the Berlin Wall.

Figure 2: Individual Effects over Time



Notes: The figure depicts coefficient estimates and 95% confidence intervals from the following regression using the SOEP household 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 to correct for temporal correlation.

TABLE 1: SUMMARY STATISTICS

	(1)	(2)	(3)
PANEL A: Region-Level Data	*All*	*Low Destr.*	*High Destr.*
Share Expellees (Soviet Sector) '61	0.048	0.049	0.047
	(0.019)	(0.022)	(0.015)
Share Expellees (Direct) '61	0.119	0.143	0.095
	(0.045)	(0.041)	(0.036)
Share Ties to Relatives '91	0.223	0.235	0.211
	(0.100)	(0.114)	(0.085)
Share Housing Destroyed '46	0.321	0.154	0.493
	(0.210)	(0.108)	(0.141)
Rubble '46 (m^3 p.c.)	0.090	0.037	0.144
	(0.070)	(0.033)	(0.056)
Distance to East (100km)	1.753	1.504	2.010
	(1.075)	(1.071)	(1.046)
Income 1985 (DM, p.c.)	1598	1568	1628
	(126)	(140)	(104)
Income 1989 (DM, p.c.)	1761	1747	1775
	(131)	(147)	(114)
Income 1995 (DM, p.c.)	2222	2227	2218
	(154)	(166)	(143)
N	71	35	36
PANEL B: Firm-Level Data	*All*	*Low Destr.*	*High Destr.*
S. & B. in West Germany (log)	0.443	0.437	0.450
	(0.742)	(0.729)	(0.756)
S. & B. in East Germany (Dummy)	0.077	0.083	0.072
	(0.267)	(0.275)	(0.259)
S. & B. in Non-EU Countries (Dummy)	0.018	0.018	0.017
	(0.131)	(0.134)	(0.129)
N	19420	9726	9694
PANEL C: Household-Level Data	*All*	*Ties*	*No Ties*
Age '90	51.2	51.5	50.4
	(14.6)	(15.0)	(13.6)
Gender	0.29	0.33	0.22
	(0.46)	(0.47)	(0.41)
Years of Education '89	12.21	12.12	12.42
	(1.84)	(1.80)	(1.91)
Income 1989 (SOEP)	3304	3219	3492
	(1856)	(1935)	(1656)
Capital Income '89	783	799	746
	(1729)	(1867)	(1378)
Entrepreneur '89	0.046	0.045	0.047
	(0.209)	(0.207)	(0.212)
Not Employed '89	0.075	0.079	0.065
	(0.263)	(0.270)	(0.247)
N	1911	597	1314

Notes: The table presents means (and standard deviations). Variables in Panel A refer to our sample of regions used in Tables 2 through 5. Variables in Panel B refer to our sample of firms used in Tables 6 and 5. Panel C refers to our sample of households from the SOEP panel used in Tables 7 through 9. Column 1 shows data for all observations. In Panel A, columns 2 and 3 show data for regions in which *Share Housing Destroyed '46* is above and below the median, respectively. In Panel B, columns 2 and 3 present means and standard deviations for firms headquartered in regions with *Share Housing Destroyed '46* above and below the median, respectively. *S. & B.* stands for subsidiaries and branches which firms headquartered in a given West German region operate in the indicated location. In Panel C, columns 2 and 3 show data for households with ties to relatives in East Germany and without ties to relatives in East Germany, respectively. Monetary values are given in nominal Deutsche Mark. See data appendix for details.

Table 2: Wartime Destruction, Social Ties, and Income Growth

	(1)	(2)	(3)	(4)	(5)	(6)
PANEL A: First Stage	*Share Expellees (Sov. Sector) '61*					
Share Housing Destroyed '46	-0.019***	-0.020***		-0.021***	-0.021***	-0.020***
	(0.004)	(0.005)		(0.005)	(0.004)	(0.005)
Rubble '46 (m^3 p.c.)			-0.044***			
			(0.013)			
Distance to East (100km)	-0.005***	-0.005***	-0.005***		-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)
Income 1989 (p.c., log)	0.042***	0.047***	0.043***	0.046***	0.025*	0.047***
	(0.012)	(0.013)	(0.014)	(0.014)	(0.015)	(0.013)
Income '89/'85 (p.c., log)		-0.026	-0.020	-0.028	-0.029	-0.026
		(0.024)	(0.024)	(0.026)	(0.026)	(0.024)
Migration from East '91-'95						-0.006
						(0.212)
R^2	0.918	0.920	0.905	0.989	0.931	0.920
PANEL B: First Stage (alternative)	*Share Ties to Relatives '91*					
Share Housing Destroyed '46	-0.099**	-0.102**		-0.095*	-0.102**	-0.101**
	(0.042)	(0.043)		(0.050)	(0.041)	(0.047)
Rubble '46 (m^3 p.c.)			-0.161			
			(0.146)			
PANEL C: Reduced Form	*Income '95/'89 (p.c., log)*					
Share Housing Destroyed '46	-0.042*	-0.048**	-0.060**	-0.052**	-0.058***	-0.047**
	(0.021)	(0.020)	(0.027)	(0.020)	(0.020)	(0.020)
Rubble '46 (m^3 p.c.)			0.046			
			(0.071)			
N	71	71	71	71	71	71
Distance Quartile Fixed Effects	-	-	-	yes	-	-
Sector Controls	-	-	-	-	yes	-

Notes: Coefficient estimates from ordinary least squares regressions at the regional level. Standard errors are given in parentheses. 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, *Share Housing Destroyed '46*. In column 3 of Panels A and B the main variable of interest is *Rubble '46 (m^3 p.c.)*. In column 3 of Panel C both of these variables are included. The dependent variable in Panel A is our main proxy for social ties to East Germany, *Share Expellees (Sov. Sector) 61*. The dependent variable in Panel B is our alternative measure of social ties to the East: the share of the population which states in the 1991 SOEP survey to have relatives in East Germany, *Share Ties to Relatives 91*. 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 state fixed effects. All specifications in Panel B and C include the same controls as shown in Panel A. The coefficient estimates on these are not reported to save space. Column 4 controls for 4 distance dummies, corresponding to the quartiles of the distance measure. Column 5 controls for the share of the 1989 population working in agriculture, manufacturing, services and government, respectively. The specification in column 6 controls for the share of the region's population who are migrants arriving from East Germany between 1991 and 1995.

Table 3: Social Ties and Income Growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	(IV)	(OLS)	(IV)				
PANEL A: Main Results	*Income '95/'89 (p.c., log)*						
Share Expellees (Sov. S.) '61	2.169**	1.963***	2.442***	2.453***	2.526***	2.772***	2.366***
	(0.947)	(0.574)	(0.880)	(0.877)	(0.885)	(0.854)	(0.878)
Distance to East (100km)	0.011**	0.008**	0.011**	0.011**		0.012***	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***	-0.212***	-0.305***	-0.206***
	(0.068)	(0.060)	(0.060)	(0.060)	(0.063)	(0.072)	(0.062)
Income '89/'85 (p.c., log)		-0.362***	-0.355***	-0.355***	-0.379***	-0.278***	-0.353***
		(0.083)	(0.086)	(0.086)	(0.087)	(0.083)	(0.087)
Sh. Employed in Agricult. '89						-0.115	
						(0.295)	
Sh. Employed in Manufact. '89						-0.301	
						(0.283)	
Sh. Employed in Services '89						0.145	
						(0.290)	
Sh. Employed in Governm.'89						-0.522	
						(0.397)	
Migration from East '91-'95							0.349
							(1.130)
R^2	0.505	0.598	0.590	0.589	0.567	0.642	0.593
PANEL B: Placebo	*Income '89/'85 (p.c., log)*						
Share Expellees (Sov. S.) '61	-	0.656	0.560	0.557	0.672	0.443	0.790
	-	(0.602)	(1.024)	(1.029)	(0.939)	(1.100)	(1.041)
N	71	71	71	71	71	71	71
Distance Quartile Fixed Effects	-	-	-	-	yes	-	-
Instruments	Housing	-	Housing	Housing & Rubble	Housing	Housing	Housing

Notes: The table reports coefficient estimates from instrumental variable regressions at the regional level in columns 1 and 3 through 7. 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 correct for potential heteroscedasticity. In Panel A the dependent variable is the log of the ratio of mean per capita income in 1995 and 1989. In Panel B it is the log of the ratio of mean per capita income in 1989 and 1985. The main variable of interest in all columns is *Share Expellees (Soviet Sector) '61* . In columns 1, 3, 5, 6 and 7 we instrument for this variable with *Share Housing Destroyed 46*. In column 4 we use *Rubble '46 (m^3 p.c.)* as an additional instrument. First stage results are shown in Table 2. All regressions include 10 state fixed effects. In Panel A all regressions control for the log of mean per capita income in 1989 and columns 2-7 include the log of the ratio of mean per capita income in 1989 and 1985 as control. In Panel B all regressions control for the log of per capita income in 1985. All regressions except column 5 control for a region's distance to the inner-German border. The specifications shown in column 5 control for 4 distance dummies, corresponding to the quartiles of the distance measure. The regressions shown in column 6 control for the share of the 1989 population working in agriculture, manufacturing, services and government, respectively. The specifications shown in column 7 controls for the share of the region's population who are migrants arriving from East Germany between 1991 and 1995. In Panel B we do not report results for covariates to save space.

Table 4: Placebo

	(1)	(2)	(3)	(4)	(5)	(6)
PANEL A:	*Income '95/'89 (p.c., log)*					
	(OLS)			(IV)		
Share Expellees (Sov. S.) '61	2.131***	2.150***	2.039***	3.422*	3.396*	2.943*
	(0.706)	(0.727)	(0.561)	(1.809)	(1.787)	(1.738)
Share Expellees (Direct) '61	-0.092	-0.099	-0.043	-0.350	-0.371	-0.065
	(0.150)	(0.161)	(0.155)	(0.624)	(0.660)	(0.698)
Sh. Employed in Agricult. '89		0.047	-0.028		0.139	-0.114
		(0.193)	(0.304)		(0.272)	(0.297)
Sh. Employed in Manufact. '89			-0.197			-0.316
			(0.252)			(0.308)
Sh. Employed in Services '89			0.240			0.121
			(0.253)			(0.333)
Sh. Employed in Governm.'89			-0.452			-0.535
			(0.429)			(0.413)
R^2	0.600	0.600	0.664	0.557	0.561	0.640
Instruments	-	-	-	Housing & Rubble	Housing & Rubble	Housing & Rubble
PANEL B: First Stage				*Share Expellees (Sov. Sector) '61*		
Share Housing Destroyed '46				-0.020***	-0.021***	-0.020***
				(0.006)	(0.006)	(0.006)
Rubble '46 (m^3 p.c.)				0.002	0.001	-0.002
				(0.015)	(0.015)	(0.016)
PANEL C: First Stage				*Share Expellees (Direct) '61*		
Share Housing Destroyed '46				-0.026	-0.026	-0.027
				(0.018)	(0.018)	(0.020)
Rubble '46 (m^3 p.c.)				-0.107**	-0.106**	-0.104**
				(0.046)	(0.045)	(0.051)
N	71	71	71	71	71	71
Standard Region-Level Controls	yes	yes	yes	yes	yes	yes

Notes: Panel A reports coefficient estimates from ordinary least squares regressions at the regional level in columns 1 through 3. Columns 4 through 6 report results from instrumental variable regressions. Standard errors are given in parentheses. Standard errors are calculated using the Huber-White correction to account for potential heteroscedasticity. In Panel A the dependent variable is the log of the ratio of mean per capita income in 1995 and 1989. The main variables of interest are *Share Expellees (Soviet Sector) '61* and *Share Expellees (Direct) '61*. In the specifications in columns 4 through 6 of Panel A we instrument for these variables with *Share Housing Destroyed 46* and *Rubble 46 (m^3 p.c.)*. The corresponding first stage regressions are given in columns 4-6 of Panel B and C. All regressions control for a region's distance to the inner-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 state fixed effects. Coefficient estimates for these controls are not shown to save space.

Table 5: Social Ties and Entrepreneurial Activity

	(1)	(2)	(3)
	Income '95/'89 (p.c., log)		*Share*
	Entrepreneurs	*Non-Entrepreneurs*	*Entrepreneur 1995*
	(3SLS)		(IV)
Share Expellees (Sov. S.) '61	4.516***	1.491**	0.322*
	(1.668)	(0.676)	(0.163)
Income Entrepreneurs '89 (p.c., log)	-0.622***		
	(0.147)		
Income Non-Entrepreneurs '89 (p.c., log)		-2.079***	
		(0.456)	
Share Entrepreneurs '89			0.496***
			(0.104)
R^2	0.577	0.661	0.794
N	71	71	71
Standard Region-Level Controls	yes	yes	yes

Notes: The table reports coefficient estimates from regressions at the regional level. Standard errors are given in parentheses. 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. Column 1 and 2 are estimated jointly with three stage least squares, instrumenting for *Share Expellees (Soviet Sector) '61* with *Share Housing Destroyed '46*. First stage results are not reported. In column 3, which shows results from an instrumental variables regression, the dependent variable is the share of individuals who report in 1995 to be entrepreneur. Again we instrument for *Share Expellees (Soviet Sector) '61* with *Share Housing Destroyed '46*. The standard errors in column 3 are calculated using the Huber-White correction to correct for potential heteroscedasticity. First stage results are shown in Table 2. The main variable of interest in all columns is *Share Expellees (Soviet Sector) '61*. All regressions control for a region's distance to the inner-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 state fixed effects. Coefficient estimates on these controls are not reported to save space. For details on the construction of the variables see data appendix. We reject the equality of the coefficients on *Share Expellees (Soviet Sector) '61* in column 1 and 2 (p-value= 0.070).

Table 6: Social Ties and Firm Investment

	(1)	(2)	(3)	(4)	(5)
PANEL A: Reduced Form	*S. & B. in East Germany (Dummy)*				
Share Housing Destroyed '46	-0.030***	-0.029***	-0.026**	-0.028***	-0.031***
	(0.011)	(0.011)	(0.011)	(0.010)	(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)		-0.014***		-0.016***	-0.015***
		(0.004)		(0.004)	(0.004)
Income 1989 (p.c., log)		0.009	-0.026	0.051	0.006
		(0.033)	(0.041)	(0.059)	(0.032)
Income '89/'85 (p.c., log)		-0.003	-0.003	-0.019	-0.007
		(0.034)	(0.036)	(0.045)	(0.034)
Migration from East'91-'95					-1.644
					(1.198)
R^2	0.126	0.127	0.126	0.127	0.127
N	19387	19387	19387	19387	19387
PANEL B: Second Stage					
Share Expellees (Sov. Sector) '61	1.579**	1.497**	1.262**	1.412**	1.519**
	(0.689)	(0.664)	(0.581)	(0.579)	(0.643)
PANEL C: Second Stage	*S. & B. in Poland (Dummy)*				
Share Expellees (Sov. Sector) '61	0.281**	0.291**	0.308**	0.282**	0.300**
	(0.137)	(0.135)	(0.131)	(0.132)	(0.130)
PANEL D: Placebo	*S. & B. in Old EU Countries (Dummy)*				
Share Expellees (Sov. Sector) '61	0.060	0.408	0.392	0.371	0.429
	(0.580)	(0.543)	(0.521)	(0.516)	(0.522)
PANEL E: Placebo	*S. & B. in New EU, exc. Poland (Dummy)*				
Share Expellees (Sov. Sector) '61	0.188	0.180	0.160	0.174	0.208
	(0.206)	(0.209)	(0.197)	(0.210)	(0.202)
PANEL F: Placebo	*S. & B. in Non-EU Countries (Dummy)*				
Share Expellees (Sov. Sector) '61	0.034	0.137	0.122	0.144	0.158
	(0.304)	(0.290)	(0.276)	(0.286)	(0.277)
N	19387	19387	19387	19387	19387
Firm-Level Sector Fixed Effects	yes	yes	yes	yes	yes
Distance Quartile Fixed Effects	-	-	yes	-	-
Region-Level Sector Controls	-	-	-	yes	-

Notes: All Panels report firm-level regression results, using our sample of firms which are headquartered in West Germany. Standard errors are clustered at the district level to account for likely spatial correlation. Panel A reports results from firm-level ordinary least squares regressions. Panel B-F report results of firm-level instrumental variables regressions. The main variable of interest in these specifications is *Share Expellees (Soviet Sector) '61*. We instrument for this variable with *Share Housing Destroyed '46*. Corresponding first stage results at the regional level are shown in Table 2. The dependent variable in Panels 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 are dummies which indicate whether a firm has a subsidiary or branch in the specified location. All regressions include 10 state fixed effects and 4 firm-level sector fixed effects (agriculture, manufacturing, services, government). We control for distance to the inner-German border at the district level. Log of per capita income in 1989 and log of the ratio of per capita income in 1989 and 1985 are regional level controls. Column 3 controls for 4 distance dummies, corresponding to quartiles of the distance measure. Column 4 controls for the share of a region's 1989 population working in agriculture, manufacturing, services and government, respectively. The specification in column 5 controls for the share of the region's population who are migrants arriving from East Germany between 1991 and 1995. All specifications in Panels B-E include the same controls as the specification in Panel A, which we do not report to save space.

Table 7: Region- and Household-Level Income

	(1)	(2)	(3)	(4)	(5)
	Income '95/'89 (log)				
Level (Source)	*Aggregate (MZ)*	*Household (SOEP)*			
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, MZ)	-0.209***	0.166	0.267**	0.260*	
	(0.060)	(0.186)	(0.126)	(0.137)	
Income '89/'85 (p.c., log, MZ)	-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)
(Age '90)^2				0.000**	0.000**
				(0.000)	(0.000)
R^2	0.590	0.137	0.143	0.249	0.288
N	71	1911	1911	1911	1911
Fixed Effects	State	State	State	State	Region

Notes: Column 1 shows results of a region-level instrumental variables regression. Columns 2-5 show results from household-level regressions. In column 1 and 2 we instrument for the regional *Share Expellees (Soviet Sector) '61* with *Share Housing Destroyed '46*. 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 household 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 household income in 1989 and the log of the ratio of household income in 1989 and 1985. Columns 4 and 5 also control for the gender, age and age squared of the household head. The specifications in columns 1 through 4 include 10 state fixed effects. Standard errors are given in parentheses. Standard errors are clustered at 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 8: ROBUSTNESS

	(1)	(2)	(3)	(4)	(5)	(6)
PANEL A: Full Sample			*Income '95/'89 (log)*			
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
PANEL B: Restricted Sample			*Income '95/'89 (log)*			
Ties to Relatives '91	0.055**	0.048*	0.054*	0.055**	0.055**	0.047*
	(0.027)	(0.025)	(0.027)	(0.027)	(0.027)	(0.025)
R^2	0.308	0.351	0.314	0.309	0.308	0.354
N	1490	1490	1490	1490	1490	1490
Household-Level Controls	yes	yes	yes	yes	yes	yes

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. 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 in all regressions is the log of the ratio of household income in 1995 and 1989. Column 1 replicates the results from the household-level regression in column 5 of Table 7. All specifications include the same controls as the specification in column 5 in Table 7 in addition to the shown covariates. Panel A reports results using the full sample. In Panel B we replicate the regressions from Panel A using a restricted sample. In this sample we exclude households who have rental income in 1989 or 1995 as well as all households who owned firms in 1995 but not in 1989. For expositional clarity we do not report results on covariates. See data appendix for details.

Table 9: Heterogeneous Effects

	(1)	(2)	(3)
	Income '95/'89 (log)		
Ties × Age Group below 40	0.092*		
	(0.051)		
Ties × Age Group 40-51	-0.052		
	(0.044)		
Ties × Age Group 52-62	0.108**		
	(0.052)		
Ties × Age Group above 62	0.063*		
	(0.037)		
Ties to Relatives '91		0.046*	0.052**
		(0.026)	(0.024)
Ties × Capital Income '89 (75th percentile)		0.011	
		(0.047)	
Ties × Capital Income '89 (95th percentile)			-0.036
			(0.112)
R^2	0.448	0.290	0.288
N	1911	1911	1911

Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. 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 ratio of household income in 1995 and 1989. All regressions include the same controls as column 5 of Table 7 (not reported). In column 1 the variables of interest are the interactions of the dummy *Ties to Relatives '91* with 4 exhaustive cohort dummies, for the age quartile of the household head ('below 40', 'between 40 and 51', 'between 52 and 62' and 'above 62'). The specifications in columns 2 and 3 use *Ties to Relatives '91* as explanatory variable and control for a dummy indicating whether the household has capital income above the 75th or 95th percentile of the capital income distribution, respectively, as well as the interaction of the dummy and *Ties to Relatives '91*. See data appendix for details.

A Online Appendix (Not for Publication)

Appendix Table 1 - Data Description and Sources

Variable	*Description*	*Source*
PANEL A: 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 asked 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 apartments and houses in 1946 as a share of the stock of apartments and houses in 1939.	German Association of Cities (1949)
Rubble '46 (m^3 p.c.)	Untreated rubble in 1946 in cubic meters per capita.	German Association of Cities (1949)
Income t (p.c., log, MZ)	Log of average income in Deutsche Mark. This information is not publicly available at the region level. We have extracted it from the German Mikrozensus, a yearly survey of a random 1% sample of the population. The question used asks for the household's average income per household member and the respondent selects an income bracket in which his household falls. We use the mean of the bounds of the brackets to calculate the average income per household member and aggregate to the region level.	German Mikrozensus (1985, 1987, 1989, 1991, 1993, 1995)
Income Entrepreneurs t (p.c., log)	Log average income in Deutsche Mark for the subgroup of individuals who indicated to be 'entrepreneur' (with or without employees).	German Mikrozensus (1989, 1995)
Income Non-Entrepreneurs t (p.c., log)	Log average income in Deutsche Mark for the subgroup of individuals who indicated to have an occupation other than 'entrepreneur' (with or without employees).	German Mikrozensus (1989, 1995)
Share Entrepreneur t	Regional share of individuals who indicate that they are an entrepreneur (with or without employees).	German Mikrozensus (1989)
Share Working in x '89	Regional share of individuals who indicate to be working in sector x.	German Mikrozensus (1989)
Distance to East (100km)	Closest distance from a region's center to the former GDR border in 100 km.	- own calculations -

Continued on next page

Appendix Table 1 – continued from previous page

Variable	*Description*	*Source*
Migration from East '91-'95	Sum of the share of surveyed individuals who migrated to the region in the years 1991, 1993 and 1995 from East Germany.	German Mikrozensus (1991, 1993, 1995)
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 education) 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)
PANEL B: 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*.	
Subsidiaries and Branches in loc^a (log)	Logarithm of the number 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.

Appendix Table 2: GMM Using Panel Structure

	(1)	(2)	(3)
	Income (p.c., log)		
Share Expellees × 1995	2.813***	2.871***	2.538***
	(1.023)	(0.960)	(0.916)
Share Expellees × 1993	2.059**	2.117**	1.783*
	(1.022)	(0.959)	(0.915)
Share Expellees × 1991	1.532	1.590*	1.257
	(1.022)	(0.959)	(0.916)
Share Expellees × 1989	0.506	0.564	
	(1.022)	(0.961)	
Share Expellees × 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 the log of mean per capita income in year t. The main variable of interest in all columns is *Share Expellees (Soviet Sector) '61*. We interacted this with a *full set* of possible year dummies (different across columns) and hence the main effect is not included. We instrument for these interactions with the interaction of the same year dummies with *Share Housing Destroyed '46*. All regressions control for a region's distance to the inner-German border and include 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 also controls for log of the ratio of mean per capita income in 1987 and 1985. Column 3 also controls for log of the ratio of mean per capita income in 1989 and 1985.

Appendix Table 3: Direct Expellees and Expellees via Soviet Sector

(a) Summary Statistics (Expellees, Census '71)

	(1) *Ex. (Soviet Sector)*	(2) *Ex. (Direct)*	(3) *West Germans*
Years of Schooling '71	9.69	9.63	9.81
	(1.19)	(1.11)	(1.50)
Entrepreneur '71	0.03	0.03	0.06
Labor Force Participation '71	0.52	0.54	0.55
Agriculture '71	0.04	0.05	0.12
Manufacturing '71	0.51	0.53	0.44
Services '71	0.33	0.30	0.32
Government '71	0.12	0.13	0.11
N	10120	49638	322240

(b) Expellee Settlement and Regional Characteristics '89

	(1)	(2)	(3)
	Coefficient		*p-value*
Outcome Variable	*Ex. (Soviet Sector)*	*Ex. (Direct)*	*(H_0: Equality of Coeff.)*
Years of Schooling '89	-0.398	-0.538	0.956
	(2.108)	(0.678)	
Share Entrepreneur '89	0.017	0.033	0.937
	(0.161)	(0.047)	
Share Unemployed '89	-0.130	-0.036	0.509
	(0.121)	(0.031)	
Sh. Employed in Agriculture '89	-0.406*	0.151*	0.059
	(0.240)	(0.081)	
Sh. Employed in Manufacturing '89	0.877	-0.022	0.350
	(0.806)	(0.222)	
Sh. Employed in Services '89	0.447	-0.195	0.338
	(0.558)	(0.162)	
Sh. Employed in Government '89	-0.323	0.005	0.395
	(0.355)	(0.066)	

Notes: Part A of Appendix Table 3 shows means, standard deviations in parentheses. Data is from the 1971 edition of the German Census. Column 1 shows summary statistics for expellees via the Soviet sector. Column 2 shows summary statistics for direct expellees. Column 3 shows data for all remaining individuals excluding refugees. Income in 1971 is given in nominal Deutsche Mark. The labor force participation and entrepreneurial share are given relative to the entire population. The sectoral distribution is given relative to all working individuals. Part B presents results from ordinary least squares regressions of the outcome variable shown in the leftmost column on *Share Expellees (Soviet Sector)*, the *Share Expellees (Direct)* and the same controls as column 3 of Table 3. Each row represents an independent regression and we only report the coefficient estimates on the shares of the two types of expellees in column 1 and column 2. Standard errors are given in parentheses. The standard errors are calculated using the Huber-White correction to correct for potential heteroscedasticity. Column 3 gives the p-value of a t-test of the equality of the coefficients in column 1 and 2.

Appendix Table 4: Social Ties and Firm Investment (Share)

	(1)	(2)	(3)	(4)	(5)
	Share of Total S. & B. in East Germany				
PANEL A: Reduced Form					
Share Housing Destroyed '46	-0.012**	-0.012**	-0.011**	-0.012**	-0.013***
	(0.005)	(0.005)	(0.005)	(0.004)	(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)
Income 1989 (p.c., log)		-0.001	-0.017	0.017	-0.003
		(0.012)	(0.015)	(0.025)	(0.012)
Distance to East (100km)		-0.005***		-0.006***	-0.006***
		(0.002)		(0.001)	(0.002)
Income '89/'85 (p.c., log)		0.011	0.011	0.010	0.010
		(0.014)	(0.014)	(0.018)	(0.014)
Migration from East'91-'95					-0.704
					(0.517)
R^2	0.024	0.024	0.024	0.025	0.025
PANEL B: IV					
Share Expellees (Sov. Sector) '61	0.646**	0.609**	0.539**	0.586**	0.620**
	(0.298)	(0.283)	(0.258)	(0.258)	(0.275)
N	19387	19387	19387	19387	19387
Firm-Level Sector Fixed Effects	yes	yes	yes	yes	yes
Distance Quartile Fixed Effects	-	-	yes	-	-
Region-Level Sector Controls	-	-	-	yes	-

Notes: All Panels report firm-level regression results using our sample of firms which are headquartered in West Germany. Standard errors are clustered at the district level to account for likely spatial correlation. Panel A reports results from firm-level ordinary least squares regressions. Panel B reports results of firm-level instrumental variables regressions. The main variable of interest in these specifications is *Share Expellees (Soviet Sector) '61*. We instrument for this variable with *Share Housing Destroyed '46*. Corresponding first stage results at the regional level are shown in Table 2. The dependent variable in both panels is the number of a firm's subsidiaries and branches located in East Germany relative to the number of its subsidiaries and branches in all of Germany. All regressions include 10 state fixed effects and 4 firm-level sector fixed effects (agriculture, manufacturing, services, government). We control for distance to the inner-German border at the district level. Log of per capita income in 1989 and log of the ratio of per capita income in 1989 and 1985 are regional level controls. Column 3 controls for 4 distance dummies, corresponding to quartiles of the distance measure. Column 4 controls for the share of a region's 1989 population working in agriculture, manufacturing, services and government, respectively. The specification in column 5 controls for the share of the region's population who are migrants arriving from East Germany between 1991 and 1995. All specifications in Panels B-E include the same controls as the specification in Panel A, which we do not report to save space.

Appendix Table 5: Sector Specific Effects

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

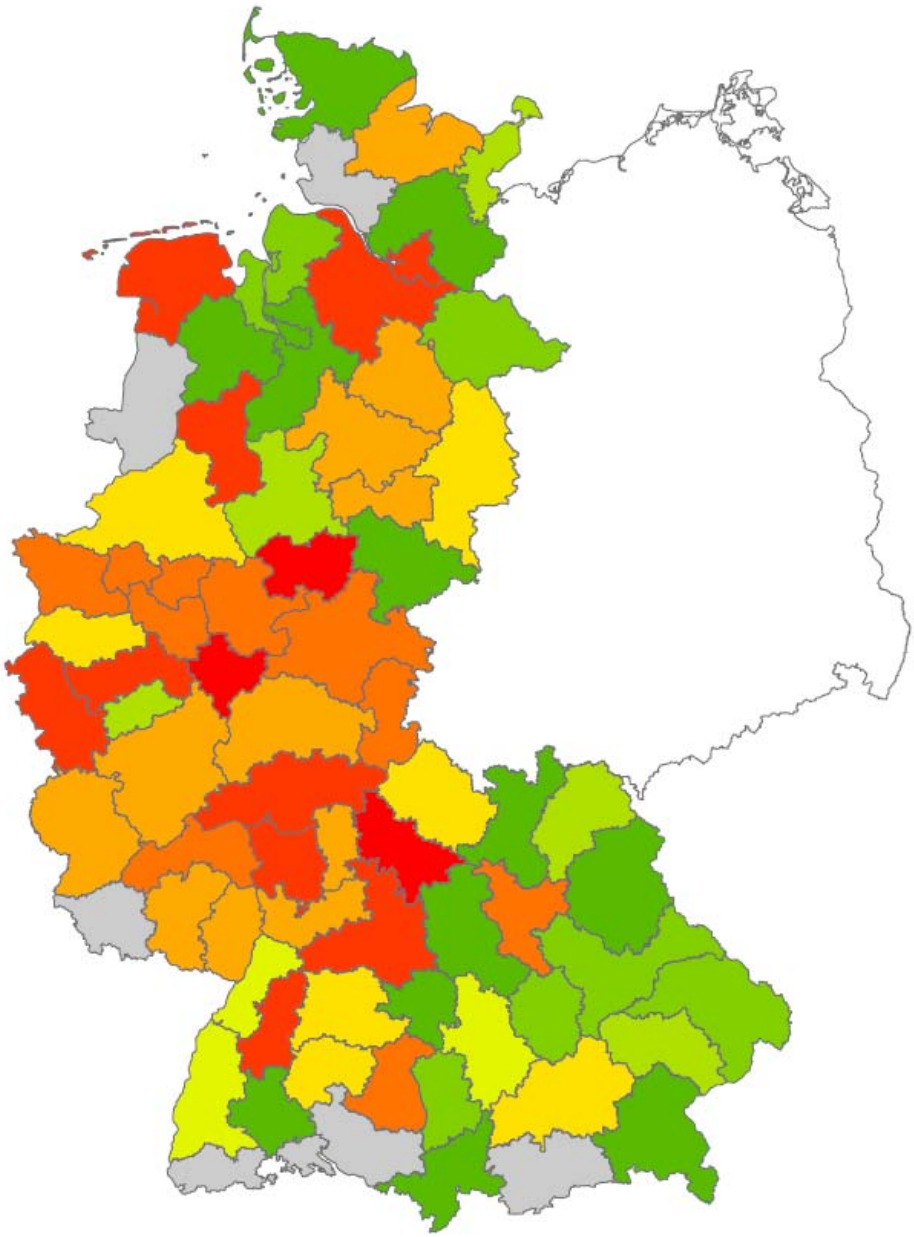
Notes: The table reports coefficient estimates from a firm-level instrumental variables regression using our sample of firms which are headquartered in West Germany. Standard errors are given in parentheses. Standard errors are clustered at the district level to account for likely spatial correlation. The main variable of interest is the interaction of 4 exhaustive sectoral fixed effects (agriculture, manufacturing, services and government) with *Share Expellees (Soviet Sector) '61*. (The main effect of *Share Expellees (Soviet Sector) '61* is hence not included.) We instrument with the interaction of the sectoral fixed effects and *Share Housing Destroyed 46*. The dependent variable is a dummy indicating whether a firm has a subsidiary or branch in East Germany. The regression includes 10 state fixed effects and the 4 firm-level sector fixed effects (agriculture, manufacturing, services, government). It also includes the same controls as the specifications in column 2 of Table 6. We do not report these coefficients on these controls to save space. The second column shows the number of firms in each sector.

Appendix Table 6: East Germany

	(1)	(2)	(3)	(4)	(5)	(6)
	Income (log, SOEP)					
	1990	*1991*	*1992*	*1993*	*1994*	*1995*
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)
(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

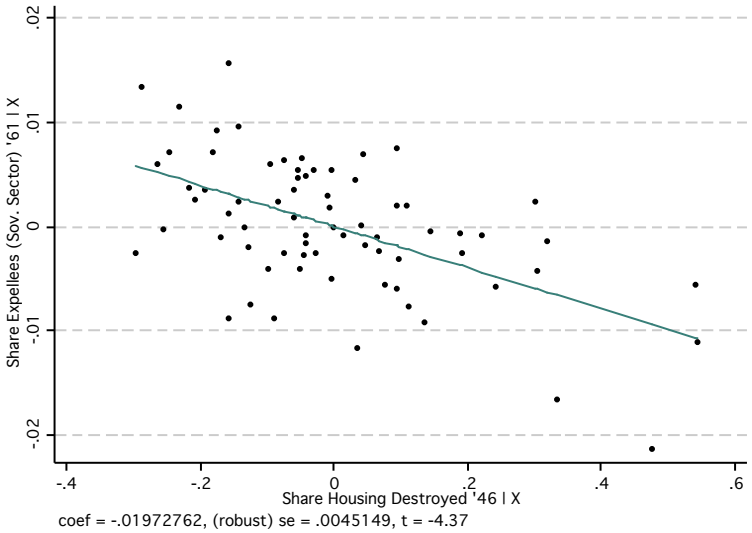
Notes: The table reports coefficient estimates from weighted least squares regressions at the household level. It uses the sample of households located in East Germany in both 1990 and 1995. The inverse of the sampling probability provided by SOEP is used as weights. Standard errors, clustered at the regional level to correct for spatial correlation, are given in parentheses. The dependent variable is the log of 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.

Appendix Figure 1: Share of Housing Destroyed



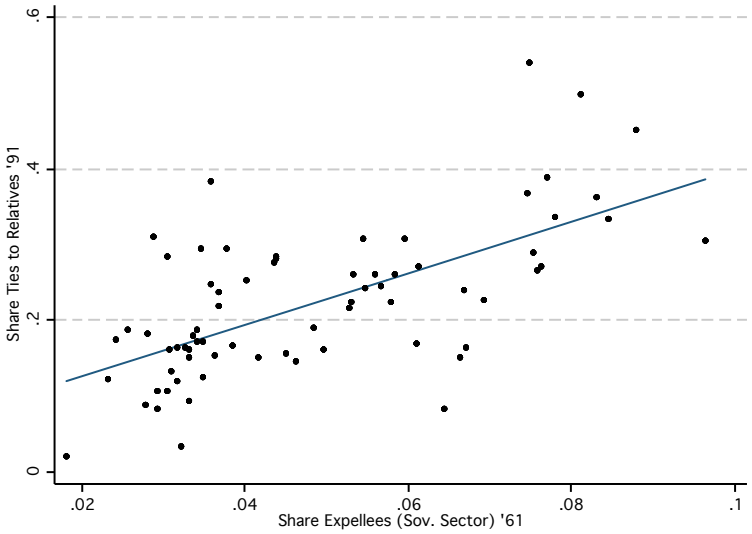
Notes: The figure presents the level of *Share Housing Destroyed '46* in West German regions. The 5 colors refer to the 5 quintiles of war destruction, with red indicating those regions worst destroyed and green indicating the least destroyed regions. The cut-off values for the quintiles of share housing 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.

Appendix Figure 2: Share Expellees and Share Housing Destroyed (Conditional Scatterplot)



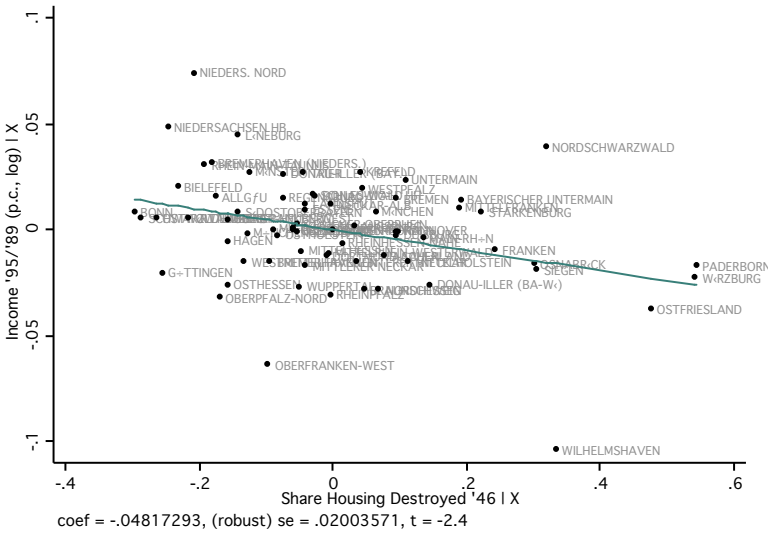
Notes: The figure is a conditional scatterplot of *Share Housing Destroyed '46* and *Share Expellees (Soviet Sector) '61* at the regional level. The corresponding first stage regression (shown in column 2 of Panel A of Table 2) controls for distance to the inner-German border, the log of per capita income in 1989, the log of the ratio of per capita income in 1989 and 1985 and a full set of state fixed effects. The solid line depicts the fitted regression line. The coefficient estimate is -0.020 (s.e.=0.005) and significant at the 1% level.

Appendix Figure 3: Share Ties to Relatives and Share Expellees



Notes: The figure is a scatterplot of our two measures of social ties, *Share Expellees (Soviet Sector) '61* and *Share Ties to Relatives '91*. The solid line depicts the fitted regression line from an ordinary least squares regression of *Share Ties to Relatives '91* on *Share Expellees (Soviet Sector) '61* and a constant. The coefficient estimate on *Share Expellees (Soviet Sector) '61* is 3.41 (s.e.=0.54) and significant at the 1% level. (Standard errors calculated using the Huber-White correction to account for potential heteroscedasticity.)

Appendix Figure 4: 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 and *Share Housing Destroyed '46*. The reduced form regression corresponding to this plot, presented in column 2 of Panel C of Table 2, controls for distance to the inner-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 of state fixed effects. The solid line depicts the estimated linear relation between the log of the ratio of per capita income in 1995 and 1989 and share housing destroyed. The coefficient estimate is -0.048 (s.e.=0.020) and significant at the 5% level. (Standard errors calculated using the Huber-White correction to account for potential heteroscedasticity.)