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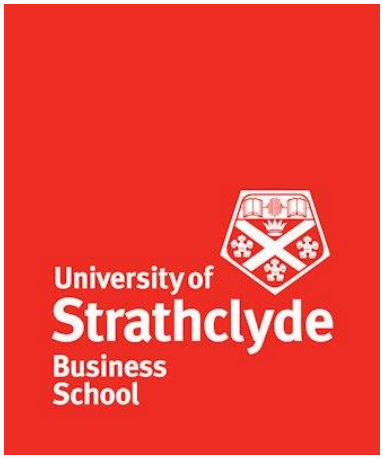

Forced Migration and Local Economic Development: Evidence from Postwar Hungary

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Abstract

We investigate the persistent effects of forced migration on sending economies using the post-WW2 expulsion of German minorities from Hungary as a natural experiment. We combine historical and contemporary data sources to show that, while towns heavily affected by the expulsions were quite similar to other areas in terms of economic activity and labour market composition before the war, the forced migrations led to lasting reductions in economic activity, and an increasing reliance on agricultural labour. We further show long-term negative correlations between forced migration and local trust levels, suggesting that the expulsion of Germans also affected the local social fabric. Our analysis reveals that forced migration can cause lasting regional inequalities in sending economies.

JEL classification numbers: N34, N94, R11, O12, O15
Keywords: forced migration, economic development, minorities, trust, persistence, regional inequality

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1 Introduction

Forced migrations commonly target ethnic or religious minorities, whose replacement by other populations is often justified through political and economic motives. Recent examples include episodes of forced migration in countries such as Myanmar or Syria[1], while throughout history millions of people were uprooted as a consequence of ethnic cleansing, nation-building, and the partitioning of countries. A large literature looks at the economic consequences of forced migrations on receiving populations and the forced migrants themselves (see Becker and Ferrara, 2019). Nonetheless, another interesting question, and one that is analysed less frequently, is how forced migrations influence economic and social changes in the areas minority populations were expelled from. In this paper, we examine these effects using a historical natural experiment: the expulsion of hundreds of thousands of ethnic Germans from Hungary after the Second World War.

The German minority population in Hungary (also referred to as the 'Swabians') have been present in the country for centuries, and have developed their own distinct social, cultural, and economic structures in the localities they resided in, whilst being largely assimilated into Hungarian society (Spira, 1985; Toth, 1993; Fischer, 1992; Prauser and Rees, 2004; Marchut, 2014). The postwar government justified their expulsion by political and economic motives (Toth, 1993; Prauser and Rees, 2004). First, the expulsions were propagated as a way to hold German minorities responsible for Hungary's wartime alliance with Nazi Germany. Second, due to a large number of Hungarian refugees in surrounding countries, population exchanges were encouraged by Allied governments. Finally, within Hungary, the communist postwar government saw the opportunity to reward their supporter base with the land and property confiscated

[1]Recent studies examining the economic effects of these events include Tumen (2016), Gehrsitz and Ungerer (2017), Balkan and Tumen (2016), Ceritoglu et al. (2017), Altındağ et al. (2020), and Segnana et al. (2020).

from German minority households, and thus raise the economic and social status of specific 'native' groups. Effectively, this resulted in the German populations, traditionally skilled in the agricultural and manufacturing activities required to cater to small local economies, being replaced by lower skilled workers who were not well-suited to local labour markets (Toth, 1993; Marchut, 2014).

To analyse the short and long-term effects of the forced migration of ethnic Germans from Hungary, we make use of both historical and contemporary data on roughly 2,000 Hungarian townships.[2] To assess the extent to which each township was affected by the forced migrations, we utilise Census data from before and after the war, along with administrative data on the number of Germans deported from each township. Our analysis shows that township-level variation in the 'effectiveness' of forced migrations is mostly explained by the prewar shares of German minorities in each town – the deportations were based on prewar Census information on people's ancestry – and is unrelated to other factors that could induce selection bias in our analysis (distance from borders or local economic factors, for example). We then examine the effects of forced migration intensity on township-level aggregate economic outcomes, both short and long-term, through a continuous difference-in-differences framework (Card, 1992; Callaway et al., 2021), where the main explanatory variable is the forced migration intensity measure interacted with a post-migration indicator. To examine how the expulsions affected the local social fabric, we also examine the effects of forced migration on present-day trust levels. In most specifications, our empirical strategy controls for past (pre-migration) levels of outcomes and covariates in each township to ensure that results are not driven by the long-run spatial auto-correlation of economic variables (see Voth, 2021).

We present three main findings. First, the forced migrations can be associated with lower levels of economic activity (measured through population and labour force den-

[2]The sample of townships we have data on for our analysis fluctuates to some extent throughout the paper due to the fact that not all outcome data are available for all townships.

sity) in heavily affected townships when compared to less affected ones. While these effects do diminish over time, they are still large and significant several decades after the expulsion of German residents. Second, we show evidence that the forced migrations can be associated with lower levels of trust in one's neighbours (measured in the present day) for individuals residing in affected townships, suggesting lasting changes in the local social fabric. Finally, forced migrations led to permanent changes in local labour market composition: while the country's economy moved towards increasing the labour share of manufacturing workers, high forced migration townships increased their agricultural share, and this change persists into the current century. We also provide some evidence, which, while only suggestive, indicates that this shift towards agricultural production cannot be associated with comparatively higher levels of agricultural productivity. Our paper also examines a number of other potential mechanisms driving long-term economic effects in addition to changes in the local labour force shares, such as changes in human capital at the local level, or changes in religious composition, but finds no evidence of lasting changes in these outcomes in response to the forced migrations. Our results, taken together with the evidence from anecdotal and historical sources, strongly suggest that changes in the composition of the local workforce is a likely factor behind the negative economic impacts of forced migrations on origin economies. Overall, our findings show that forced migration can lead to lasting regional inequalities in sending economies.

Our findings contribute to the small literature examining the effects of forced migration on sending (origin) economies. For example, Acemoglu et al. (2011) show that the expulsion of Jews from the Soviet Union led to smaller populations and lower wages in affected areas, while Arbatli and Gokmen (2018) show that historical Greek and Armenian minority presence in Turkey is positively associated with population density and human capital accumulation in the areas these minorities were expelled from. Other studies look at the effects of forced migrations on a diverse range of historical and con-

temporary outcomes, such as entrepreneurship (Grosfeld et al., 2013), banking (Pascali, 2016), literacy (Bharadwaj et al., 2015), and education (Akbulut-Yuksel and Yuksel, 2015). Our findings contribute to this literature by providing strong evidence that forced migrations have lasting negative impacts on origin economies, and identify changes in local labour force composition as a potential driver of these impacts. These findings are most similar to those in Chaney and Hornbeck (2016), who find that Spanish districts affected by Morisco expulsions failed to converge to other districts for nearly two centuries, and those in Testa (2021), who exploits spatial discontinuities in exposure to the expulsions of Germans from the Czech border areas to find that forced migrations led to reduced population density, higher unemployment, lower educational attainment, and smaller skills-intensive sectors. Our analysis yields similar results, but is unique in the literature in that it uses administrative data from deportation registries to measure the intensity of forced migrations at a highly granular regional (township) level. Using these data, in combination with other historical data sources, allows us to get more precise estimates of the extent to which each township was affected by the expulsion of its German residents. We also contribute to the literature on the lasting effects of historical events on trust (Nunn and Wantchekon, 2011; Grosjean, 2011; Becker et al., 2016), by providing evidence of long-term negative associations between forced migration and local trust levels. Finally, our paper contributes to the literature examining the effects of postwar German expulsions more specifically (Schumann, 2014; Braun and Kvasnicka, 2014; Semrad, 2015; Becker et al., 2020) by being the first study (to our knowledge) that looks at the effects of these expulsions in the context of Hungary.

The rest of this paper is organised as follows. Section 2 summarises the relevant historical background. Section 3 describes our data. Section 4 outlines our empirical strategy and summarises our main results. Section 5 examines some likely mechanisms behind our main findings. Section 6 concludes.

2 Historical Background

2.1 German Minorities in Hungary

Germans have been present in the territories of historical Hungary for millennia. Their numbers vastly increased after the end of the Ottoman occupation of the Kingdom of Hungary near the end of the 17th century. Ottoman occupation and the wars to reclaim Christian territories left the country sparsely populated and with its labour force depleted. Organised immigration to replenish the labour force started in the 1710s and was subsequently promoted by three Habsburg emperors (Charles VI, Maria Theresia and Joseph II).[3] Migrant inflows were meant to increase the population of previously Ottoman controlled regions in Buda, Southwest Hungary, the Banat, and Szatmar county in Eastern Hungary (Prauser and Rees, 2004). Most of the migrants were from the surrounding Habsburg and German territories, increasing the share of ethnic Germans within the Hungarian population. These German communities, later collectively referred to as Danube Swabians (Donau Schwaben[4]), maintained their cultural traditions and kept using their language for the subsequent centuries (Toth, 1993; Prauser and Rees, 2004).

According to historical sources, prior to the expulsions in 1946-47, the German minorities in Hungary were very similar in occupational, political, and religious preferences to the 'Magyar' majority (Spira, 1985; Fischer, 1992; Marchut, 2014).[5] Younger members of German communities, who were enrolled in the Hungarian education system, were

[3] After the end of Ottoman occupation, Hungary fell under Habsburg rule. An account of this period is provided in Evans (2006).

[4] This term can be misleading given that a large number of German migrants came from territories other than Schwaben (Swabia, in present day Bavaria), see Prauser and Rees (2004).

[5] Although Germans were somewhat more likely to be employed in certain types of agricultural and manufacturing jobs, and were less likely to be employed in intellectual positions, most of these differences are due to the mostly rural locations of German majority townships (see Marchut, 2014), and are unlikely to lead to differences in the rural sample we investigate later on in this paper.

especially likely to have been assimilated (Marchut, 2014). Our own analysis presented in Figure 1 largely confirms the assimilation of Germans to the majority population, at least as far as economic structures are concerned. Here, we regress the share of Germans in each Hungarian township area in 1941 on the local shares of different occupations. The figure shows that the share of Germans in townships was positively correlated with a higher share of helpers (domestic workers), and a lower share of physical workers, but there is no evidence of a correlation with occupational shares in key sectors.[6]

Figure 1. Population Shares in Different Occupation Types and the Share of Germans in 1941

Notes: The point estimates are obtained from regressing the share of Germans in 1940 on the population shares of different occupations. The data on the right hand side variables is from the 1940 Census. Horizontal bars not spanning zero indicate significance at the 10% level.

[6]We combined the services, trade, and transport sectors into a single measure due to very small numbers of people employed in each of these sectors in most townships. For example, transport workers have a mean share of 0.0058 (0.58%) and a standard deviation of 0.011. Including these variables separately does not change our conclusions but inflates the estimates and their standard errors.

2.2 Population Transfers After World War II

By the end of WW2, there were almost exactly 500,000 people – roughly 5.6% of the country's population – of a 'German vernacular' living in Hungary, with 303,000 citizens claiming to be of German 'nationality' in the previous (1941) Census (Prauser and Rees, 2004; Toth, 2018). In 1945, the country has emerged from the war on the losing side and conceded the territories gained in 1941.[7] These territorial changes, along with the multi-ethnic composition of the country's population have created multiple issues pertaining to minority and ethnic rights. On one hand, ethnic Hungarians now formed minority populations in the surrounding Slavic countries. On the other, both international and domestic political forces put pressure on Soviet-occupied Hungary to consider its treatment of its German minority population, mostly formed of families that have been residing in Hungary for generations.

As the Red Army was advancing through Hungary during 1944, the country's German minority was starting to be deported to Soviet labour camps.[8] On December 22, 1944, the Red Army leadership ordered the 'full mobilisation' of German Hungarians to perform forced labour. The implementation of this order fell upon Hungarian local authorities. These actions were justified by the 'collective responsibility' of German minorities – most Germans living in Hungary were conscripted into the German army – for the German war effort and the associated war crimes committed by the Nazi regime.[9] The initial deportations were disorganised and poorly administered, inflicting serious damage on both German and Hungarian communities. In January 1945, Hungary signed an armistice with the Soviet Union that included a promise to hold war criminals to

[7] Hungary lost nearly two-thirds of its former territories after WW1. Some of these territories, including the southern parts of Czechoslovakia and Northern Transylvania, were reassigned to the country in 1938-39, as part of the first and second Vienna Awards. An account of this period is provided in Cornelius (2011).

[8] An account of this period is provided (in Hungarian) by Toth (1993). An English language summary can be found in Prauser and Rees (2004).

[9] Hungary was allied with Germany for most of the war and was occupied by the Nazi regime in 1944 after the Hungarian Government sought to negotiate a separate peace with allied powers.

account along with the internment of all German nationals.[10]

Over the coming months, most of the Hungarian political elite embraced the position that a large-scale deportation of German minorities was needed. The official justification of this position usually revolved around the 'collective punishment' of Germans of all origins. Another objective of Hungarian policy makers was to free up land to repatriate Hungarian refugees from the surrounding countries. Freeing up land was also necessitated by the Land Reforms (*'foldreform'*) of 1945, whereby land was reallocated to the Hungarian 'proletariat'. In practice, this meant that many belonging to the German minority were dispossessed of their land and properties, which were then redistributed to Hungarian settler populations. By the end of 1945, the Hungarian Parliament has created and accepted the legislation required for the deportation of almost half a million German minority citizens.[11] Citizens were deported if:

- They claimed to belong to the German minority; or claimed that German was their native language in the 1941 Census;
- They changed their name to a German surname during the war years;
- They were a member of the Volksbund or a German military group[12]

Some individuals, usually due to being married to 'native' Hungarians, were able to avoid deportations, however the maximum permissible proportion of these cases were capped at 10% of all deportation cases in each local authority.[13]

It is possible that there was some heterogeneity across Hungarian counties in terms of how 'effective' deportations were.[14] Deportations were said to be particularly intense in

[10]The armistice granted sovereignty to the nation of Hungary, although in practice this was limited to a large extent by the presence and authority of the Allied Commission.
[11]Executive order 12 330/1945. ME.
[12]The Volksbund was a pro-Nazi organisation of some of the German speaking minority in Hungary.
[13]Meaning at least 90% of the local German minority population had to be deported.
[14]We find no evidence of heterogeneity in deportation 'effectiveness' at the township-level in our empirical analysis below (see Section 4).

the Western border counties of Hungary (Gyor-Moson, Sopron, and Vas) to prevent territorial requests from neighbouring Austria, and were carried out more quickly in towns compared to urban areas (Prauser and Rees, 2004). Beginning in 1947, pressure from Western countries and the US military prevented (and eventually halted) the deportations of the German minority. Overall, according to historical sources, roughly 230,000 (46% of the pre-deportation population claiming German nationality or ancestry) people of German ancestry remained in the country, although the majority of these people have had most of their land and possessions taken away from them by the Hungarian authorities (Toth, 2016).

While the deportations were partly to 'make space' for the refugee populations returning to the country after WW2, political and economic considerations also played a significant role. Powerful factions in the Hungarian parliament of the time, such as the National Peasant Party ('Nemzeti Parasztpart', or NPP) or the Independent Smallholders Party ('Fuggetlen Kisgazdapart', or FKGP) also saw an opportunity to reallocate land from German peasants to their 'native' supporter base. The NPP party leader, Imre Kovacs, put it thusly in a 1945 speech:

> We will deport the Swabians. It is not possible to have our best lands occupied by the Volksbund members, and for them to sprawl in their five-bedroom homes. There will be demand for these lands. The landless cottars of the Tiszantul[15], or the luckless Csangos who were kicked out overnight[16], should take the Swabian lands.[17]

With the deportations already mostly concluded, the social democratic wing ('Magyarorszagi Szocialdemokrata Part', or SZDP) in the parliament raised concerns about various atrocities committed during the population transfers, which seemed to be mostly focused on the complete material dispossession of the German minorities. Additionally,

[15]The Transtisza region of Hungary.
[16]The Csangos are a Hungarian ethnographic group currently living in Romania.
[17]The speech was translated from the original Hungarian by the authors. Source: Web link.

there were concerns that the settler populations meant to replace the local Germans in their work activities were not able to do so whilst maintaining productivity (Toth, 1993; Marchut, 2014). For example, anecdotal evidence presented in the Hungarian parliament suggested that often times the settlers who replaced German households were only interested in selling (formerly) German property and possessions, and were often unskilled and tended to avoid work. According to Toth (1993), settler populations had trouble integrating into township communities in many cases, and were untrained in the agricultural and manufacturing activities required to cater to local economies, hampering productivity. Upon observing the way in which the deportations were conducted, the evangelical bishop Lajos Ordass summarised these issues thusly:

> We cannot just replace a group of people, who, through centuries built their own culture, religious life, and economic structures, and became deeply rooted in this land, without financial and moral consequences for the peoples afflicted. The same way as the century-old tree cannot be replanted without us causing its destruction. Our German families were prominent in agriculture, livestock breeding, craft manufacturing, and in general, in all economic activities. We cannot offset the losses incurred from expelling them through the resettlement process, which seems to be a troubling phenomenon to begin with. Miners and factory workers will not be able to replace those who conduct their trade properly.[18]

3 Data

For our analysis of the socioeconomic effects of forced migrations on sending economies, we collect economic and demographic data on a large sample of Hungarian townships. This requires matching township (or local area) level information across historical Census records and deportation registries (see below), resulting in a largely rural sample of

[18]The quote was translated from the original Hungarian by the authors. Source: National Evangelical Archives (Evangelikus Orszagos Leveltar), Church Records (317/1946), available at: Web Link

townships for which the data are continuously available.[19] Below we detail our various data sources.

Data on forced migration intensity. Information on the number of Germans in each township before the forced migrations is available through the 1941 Census. We consider the number in each township who claimed that their mother tongue was German.[20] We use this designation because this was the criteria – having German nationality or German as a native language – used to identify the Germans to be deported by Hungarian authorities during the expulsions. Our final sample of townships has in total 221,186 German inhabitants according to the 1941 Census, meaning that our sample contains roughly half of the country's estimated German minority population at the time.[21] To determine the number of Germans in each township after the deportations we rely on two main data sources. First, we use data on the number of Germans in each township from the 1949 Census. These data are however likely to underestimate the true number of Germans, who had a strong incentive to deny German nationality (or ancestry) in the postwar Census after witnessing the deportations a few years prior. To overcome this issue, we also use Registry data on the deportations compiled by Hungarian authorities.[22] These data indicate the number of Germans (tracked using the 1941 Census records) in each township who were deported, killed in the war, or were captured and ended up in POW camps. By subtracting these numbers from the 1941 Census data we can get a more realistic estimate of the number of Germans in each township after the deportations.[23] Overall, in our sample of townships, the Census data suggests that roughly

[19] Data on large urban areas were not reported consistently throughout various censuses due to changes in city and administrative boundaries. For example, the territory of Budapest now includes a number of townships and small cities that used to be separate administrative entities in prewar censuses, and is usually disaggregated into smaller districts whose boundaries also changed during our sample period.

[20] During the 1941 Census, there was an incentive to report German ancestry as Hungary was allied with Germany in the war.

[21] This number is estimated based on historical sources, see Prauser and Rees, 2004.

[22] The registry data are available here: Web Link.

[23] According to Marchut (2014), the Registry data does likely contain some errors, but is still mostly reliable and constitutes the best source of information on the numbers deported from each township.

80% of the pre-war German population was no longer present after the deportations, while the Registry data shows that this share is around 58%, the latter number likely being a more accurate estimate of the true share of those no longer residing in Hungarian townships.

Data on economic outcomes. We use a number of different data sources, both historical and contemporary, to measure the effects of the forced migrations on various economic outcomes. First, we use the 1949 Census to collect township-level data on employment rates and the shares of local residents employed in different sectors.[24] To examine present-day outcomes, we collect the same data using the most recent Census, conducted in 2011. Second, we use township-level Census data on population density from 1941 to 1990, collated in (roughly) ten-year intervals that correspond to each Census wave. These longitudinal data were published through the 1990 Census, and are therefore available for a larger sample of townships when compared to outcomes where we relied on matching townships from parsed historical Census documents. Following several studies in historical economics (Davis and Weinstein, 2002; Bleakley and Lin, 2012; Alsan, 2015), we use population density as a proxy for local levels of economic development. As an additional outcome measure, we also use the local employment rate (from both 1949 and 2011) to examine changes in economic activity levels. Moreover, we complement our analysis with a number of additional data sources on potential outcome variables. We collect township-level Census data on educational outcomes and religious shares from 1941 and 2011, along with data on agricultural outcomes from the Hungarian Central Statistical Office (KSH) from 2007. Finally, we collate agricultural productivity data for different crops from the FAO GAEZ database for Hungarian district areas ('jaras') for the year 2010.[25]

[24]Note, that the 1941 and 1949 Census data are only available in PDF formats, which we parsed and exported into MS Excel using parsing algorithms. This process and missing data in the 1949 Census leads to a reduced sample size of townships for which we have data available from both Census years.

[25]The FAO GAEZ database is available online through the FAO website (Web Link).

Data on trust. We make use of the Life in Transition Survey (LiTS) conducted by the European Bank for Reconstruction and Development (EBRD) to measure various forms of trust for residents of Hungarian townships.[26] We use the third and latest round of the LiTS survey, which was conducted in 2016. The LiTS contains rich information on socio-demographic measures along with various measures of trust in public services for a representative sample of 1,500 Hungarian households, located in 62 township areas.[27] Respondents indicate the level of trust (on a scale of 1 to 5) they have in various entities, including the national government, courts, neighbours, and people in general. We use this information to create dummy variables corresponding to each of these categories, where a value of one indicates at least some level of trust. We match the individual-level trust data to our forced migration intensity data using information on the township of residence for each individual in the LiTS survey.[28]

Data on covariates. We also collate data on a number of key demographic variables and township-level aggregates which we use as controls in our regression models. We use the 1941 Census to collect data on the demographic (age, gender, education, etc.) composition of each township, along with local labour market characteristics (shares of different occupations, share of workers employed, and so on). We collect the same demographic data using the 1949 and 2011 Census records. We also collect county-level information on various local characteristics, such as religious composition, infrastructure (road and rail networks), and geographic variables. Some of these measures are time-invariant and therefore constant across sample years. Summary statistics for our 1949 and 2011 Census samples are shown in the Appendix, Table A.1 and Table A.2.

[26] Previous studies that used these data to measure trust in an economic context include Grosjean (2011) and Becker et al. (2016). The survey can be accessed through the EBRD website (Web Link).

[27] The survey is collected in 29 countries, but naturally we only use the Hungarian sub-sample for our analysis.

[28] Note, that this includes a smaller (but representative) sample of townships when compared to our main analytical sample.

4 Empirical Evidence

In this section, we assess the effects of the postwar forced migration of German minorities on past and current economic and social outcomes. As our main explanatory variable, we make use of three different measures of forced migration intensity in each Hungarian township. First, we use the pre-migration share of Germans in Hungarian townships, measured in 1941, as a proxy for township-level exposure to the expulsions. Our use of this measure follows similar studies such as Acemoglu et al. (2011), Arbatli and Gokmen (2018), Clemens et al. (2018), and its advantage is that *ex ante* information on the shares of Germans is plausibly exogenous in the sense that it is unaffected by potential responses to the expulsions. Our second measure considers forced migration intensity more directly (see Lee et al., 2017). This measure is based on Census data, and is the population adjusted difference between the pre and postwar number of Germans in each township, constructed as:

$$FM_i = -\frac{(Germans_{1949} - Germans_{1941})}{Germans_{1941}} x \frac{Germans_{1941}}{Population_{1941}}$$

where FM_i is the cross-sectional forced migration intensity for each township 'i'. The minus term at the beginning of the formula is included so that larger positive numbers indicate higher levels of forced migration intensity. Finally, our third measure is constructed using the same formula, but this time using the estimated number of Germans in 1949 from the deportation Registry data (see Section 3).

The key issue when it comes to identifying the socioeconomic effects of the expulsions pertains to whether forced migration intensity was exogenously determined or whether it was determined by local factors. If certain economic or geographic factors influenced the effectiveness of deportations as well as our outcomes, then our estimates would

likely be biased. Indeed, as mentioned in Section 2, some historical sources suggest that forced migration intensity was higher in some areas, for example, near the Austrian border, or in smaller townships. It is also possible that, due to the effort to replace the expelled German households with refugees and politically loyal natives, towns that were more 'attractive' to settler populations may have experienced a more efficient deportation process.

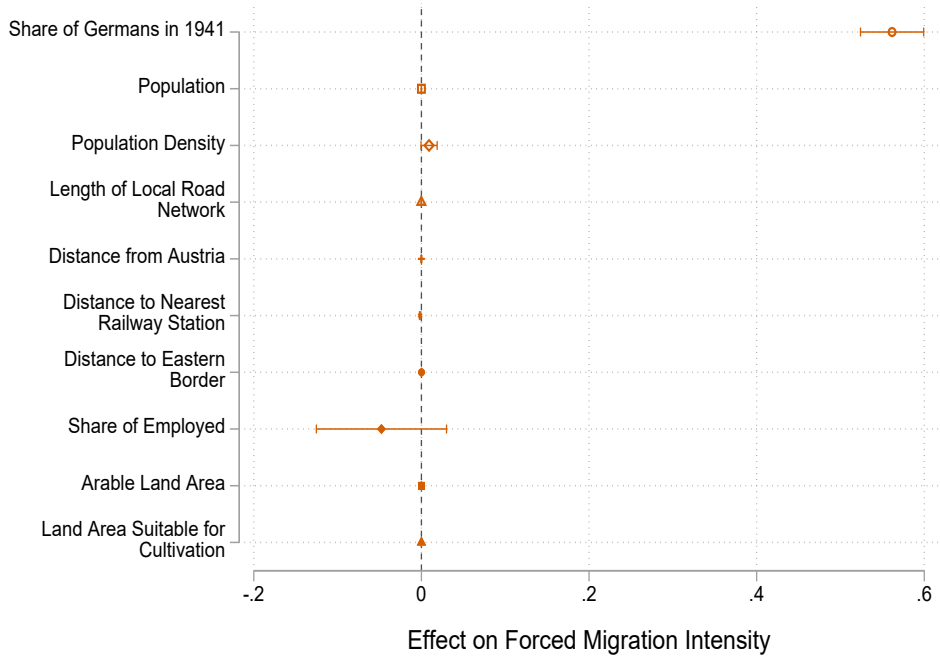
To test for the presence of factors correlated with forced migration intensity, we regress the intensity measure (based on the Registry data) on a number of key variables that could have influenced the efficacy of the deportation process. First, to check whether deportations were more effective in larger towns or more densely populated areas we include prewar township population and population density. Second, to assess whether the local rail or road infrastructure made deportations easier, we include the length of the local road network along with each township's distance to the nearest railway station. Third, to examine regional patterns in forced migration intensity, we include the distance from the Austrian border, to check if deportations were indeed more efficient in areas closer to this border (see Section 2); and the distance from the Eastern borders, to see if deportations were more (or less) effective in territories that the Red Army initially occupied. Fourth, we include the prewar share of employed residents in each township to check if deportations were more effective in towns with a more attractive labour market. We also include the size of the local arable land area and the size of the local land area suitable for agricultural cultivation, to check whether the potential for agricultural productivity in the local area influenced forced migration intensity. Finally, we include the share of Germans in 1941 as the most likely factor influencing the extent to which each township was affected by the forced migrations. The point estimates corresponding to each of these variables are plotted in Figure 2. For most of these variables, with the exception of the pre-migration share of Germans, we find precisely estimated null effects on forced migration intensity, suggesting that the majority of the factors listed

did not influence the effectiveness or intensity of the expulsions to any extent. In Figure 3 we also plot the residuals from regressing forced migration intensity on the share of Germans in 1941. The residual plots show that there is little variation left in the forced migration variable on top of what the initial share of Germans already captures, and this is even the case for townships that had a non-zero initial share of Germans (Panel B).[29] These figures tell a clear story: the main (and only) factor significantly correlated with forced migration intensity is the initial share of Germans in each township, and there is limited variation in the extent to which towns with German residents prior to WW2 were affected. We show visual evidence of this correlation as well in the Appendix, in Figure A.2.

The findings presented in Figure 3 also suggest that high and low forced migration townships are very similar in terms of observable geographical and population characteristics. Since we can assume the initial share of Germans to be exogenous - the German minorities did not sort into these townships, their families having settled centuries ago - we can consider this measure to be appropriate to assess the causal effects of the expulsions. Recall from Figure 1, that the economic and labour market structures of 'German' towns were largely similar to other townships, and our sample of townships is balanced in terms of observable (pre-migration) economic characteristics. We therefore attribute any post-migration divergence in outcomes across townships differently affected by forced migration to the expulsion of German minorities and their replacement with settler populations.

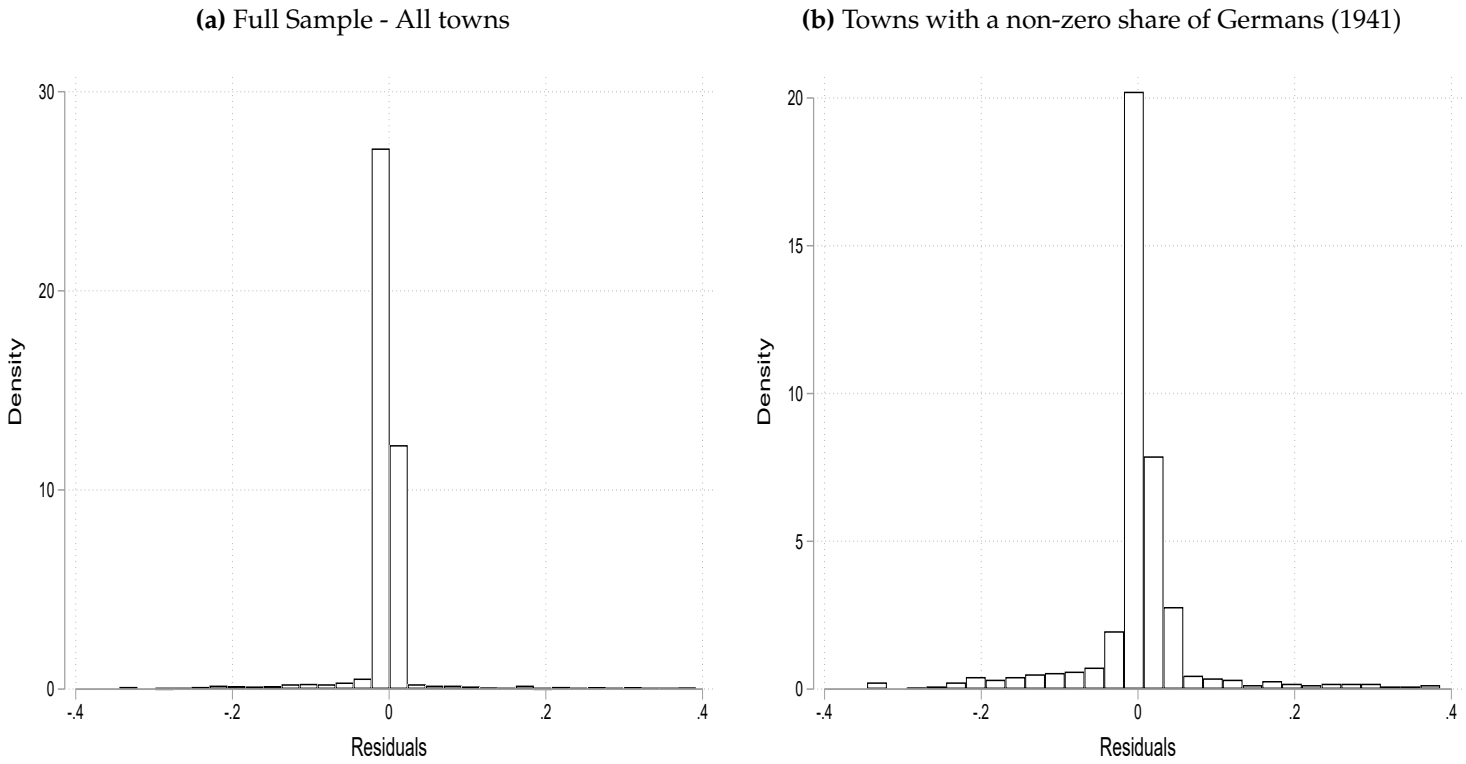
[29] Naturally, our measures of forced migration intensity are all to some extent dependent on the prewar shares of Germans in each township. Nonetheless, if, for example, several townships with high prewar shares of Germans would have experienced little (or no) forced migration, this would still lead to variation in forced migration intensity that is unrelated to the initial share of Germans. The fact that we do not observe such variation in the residuals suggests that no other factors likely influenced the effectiveness of forced migrations at the township-level.

Figure 2. Predictors of Forced Migration Intensity



Notes: The point estimates are obtained from regressing the share of Germans in 1941 on the variables on the left hand side of the figure. Data on geographical distances are from GIS shape files. Data on arable land area and land area suitable for cultivation are from the FAO GAEZ database.

Figure 3. Residuals from Regressing Forced Migration Intensity on the Share of Germans in 1941



Notes: The measure of forced migration intensity here is based on the deportations registry data compiled by Hungarian authorities in 1946-1947. Residuals are obtained from regressing forced migration intensity on the share of Germans in 1941. Panel (a) shows the residuals for the full sample of townships. Panel (b) shows the residuals for a sample of townships where at least some level of forced migration took place.

To assess the effects of forced migration intensity on township-level economic outcomes, we estimate the following two-way fixed effects (TWFE) regression model:

$$y_{it} = \alpha + \gamma \; x \; FM_i \; x \; Post_t + \beta^{'} X_{i,1940} + \delta^{'} X_{it} + \theta_c + \epsilon_{it} \; (1)$$

where our main coefficient of interest is γ, which measures the effect of forced migration intensity on our outcomes of interest (y_{it}). Our estimation follows a continuous difference-in-differences approach, where outcomes are compared across low and high treatment intensity townships, 'i', over time, 't' (see Card, 1992).[30] In specifications that rely on panel data, the term $Post_t$ indicates the year(s) after the deportations, taking a value of one in or after 1949. The terms $X_{i,1940}$ and X_{it} are collections of pre-migration and time-variant demographic and economic controls measured at the township ('i') level, respectively, while θ_c is a county fixed effect. Including θ_c in the model means that our estimations rely entirely on within-county variation in forced migration intensity. Standard errors are clustered at the township-level in all subsequent specifications. The following sections summarise our results for various outcomes of interest.

[30] We summarise the limitations of this approach in Section 4.3 below.

4.1 Effects on Population Density and Employment Rates

We begin by looking at the effects of the forced migration of German minorities on the population density of affected townships. For this outcome, we use a panel of the full sample of townships, measured at approximate ten-year intervals between 1920 and 1990.[31] Population density is measured by dividing a township's population by its total area (measured in square kilometres). Table 1 reports the results from an OLS regression using Equation (1), where the outcome is township-level (log) population density at the end of each ten-year interval from 1950 to 1990. We control for lagged values of the outcome variable in all specifications to make sure results for each year are not predicated on pre-existing differences in township-level population density. Our results indicate that forced migration had a persistent negative effect on population density in origin townships. This effect is consistent across different measures of forced migration intensity, but fades over time. For example, for our registry-based forced migration measure (Panel C), the largest effect is observed in 1960, a 10.9% (0.21 SD) reduction in population density associated with a unit increase in township-level forced migration intensity. This effect reduces to a 7.3% (0.12 SD) reduction by 1990.

Having a longer time-series from 1920 to 1990 also allows us to check for the existence of pre-trends in population density across high and low forced migration intensity townships. Panel a) of Figure 4 shows time trends in (log) population density for the top tenth percentile of townships in terms of forced migration intensity against towns with no forced migration (the median level of forced migration in our sample of townships is zero). It is evident from Figure 4 that the two groups of townships followed largely parallel trends in forced (log) population density up until the deportations, diverged during the two decades afterwards, and ended up on a negative trajectory after the 1960s. This overall downward trend in later decades is most likely due to increased urban migration

[31] To be precise, the '1940' data is from the 1941 Census while the '1950' data are from the 1949 Census.

within Hungary (Brown and Schafft, 2002).[32]

We also assess the longer-term effects of forced migration on population density, along with the existence of pre-trends, through event-study specifications in panels b) to d) of Figure 4. In this specification, we interact each of our forced migration intensity measures with year fixed effects. Point estimates correspond to differences in log population density between high and low forced migration intensity towns, relative to the same differences in a reference year (1940), for each year of the sample. The results in Figure 4 confirm the strong negative effect on population density in the first two decades after the deportations, but suggest slightly less persistent long-term effects compared to our baseline specification. Point estimates after 1960 tend to be closer to zero, although are still significant and negative in most specifications, indicating a roughly 4% reduction in population density for the last two decades of the sample. Overall, the results in this section provide strong evidence that the forced migrations led to lasting regional differences in population density, though our event-study estimates suggest that these differences did diminish over time. A possible explanation for the convergence we see starting around the 1970s is that the introduction of Hungary's New Economic Mechanism – a set of market-oriented economic policies that limited the role of central planning to some extent (see Balassa, 1983) – eliminated some of the regional inequalities by increasing the efficiency of labour markets. Another possibility is that the increasingly urban concentration of the Hungarian economy (Brown and Schafft, 2002) eventually led to a decrease in population for all rural township areas.

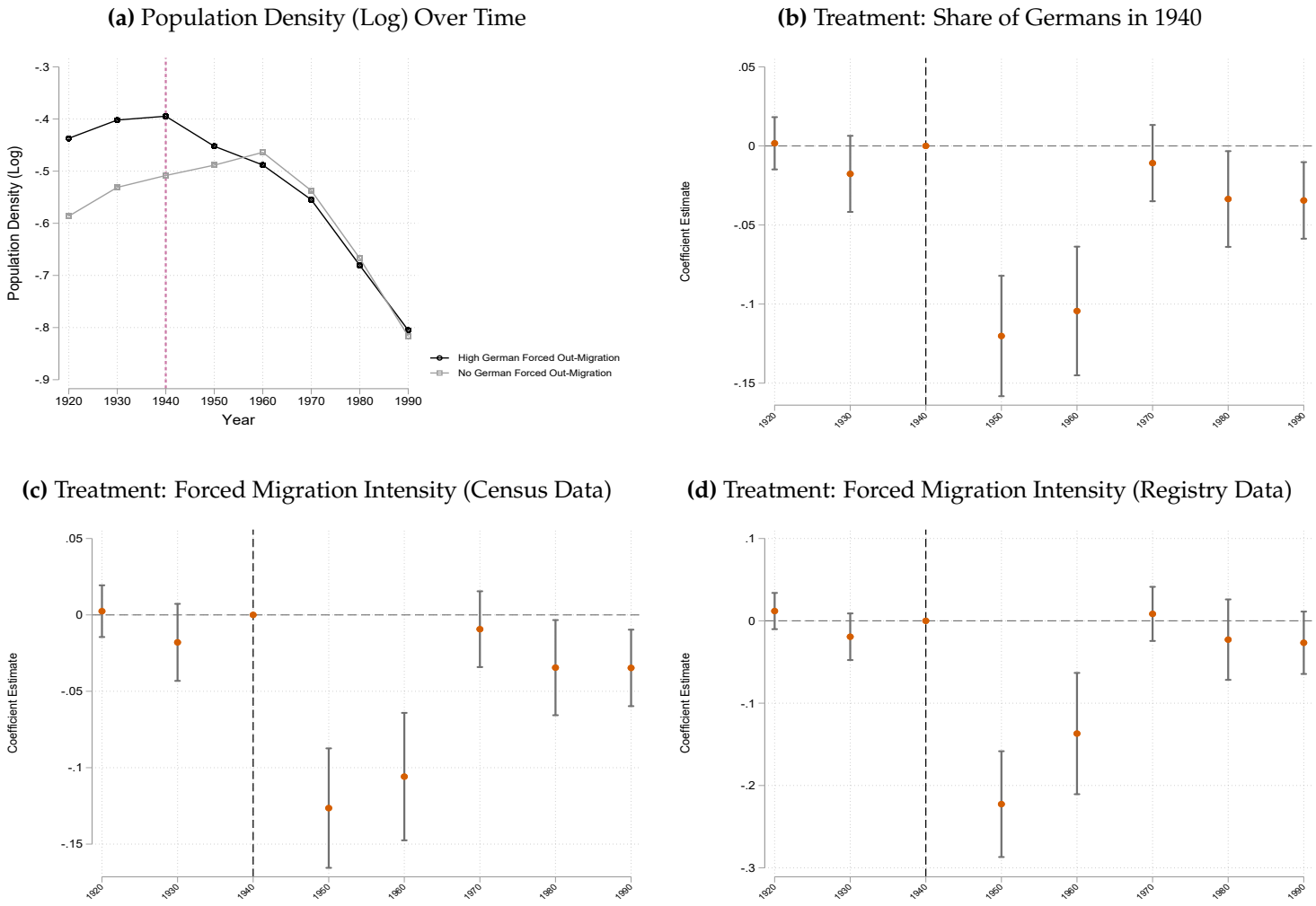
[32] As outlined in Section 3, our sample mostly consists of rural townships.

Table 1. OLS Results - Population Density Over Time

Panel A:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Share of Germans in 1941	-0.051***	-0.069***	-0.057***	-0.057***	-0.056***
	(0.010)	(0.011)	(0.010)	(0.009)	(0.009)
Observations	8317	11006	13740	16460	19161
R^2	0.923	0.905	0.897	0.906	0.920
Mean DV	-0.48	-0.47	-0.47	-0.49	-0.52
SD DV	0.51	0.52	0.54	0.57	0.60
Panel B:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Forced Migration Intensity (Census Data)	-0.053***	-0.071***	-0.058***	-0.057***	-0.056***
	(0.010)	(0.011)	(0.010)	(0.010)	(0.009)
Observations	8317	11006	13740	16460	19161
R^2	0.923	0.905	0.897	0.906	0.920
Mean DV	-0.48	-0.47	-0.47	-0.49	-0.52
SD DV	0.51	0.52	0.54	0.57	0.60
Panel C:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Forced Migration Intensity (Registry Data)	-0.095***	-0.109***	-0.086***	-0.078***	-0.073***
	(0.015)	(0.018)	(0.015)	(0.015)	(0.015)
Observations	8317	11006	13740	16460	19161
R^2	0.924	0.905	0.897	0.906	0.920
Mean DV	-0.48	-0.47	-0.47	-0.49	-0.52
SD DV	0.51	0.52	0.54	0.57	0.60
County FE	Yes	Yes	Yes	Yes	Yes
County x Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: The point estimates are obtained from regressing the log of population density on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. Each column shows the effect of the forced migrations in a different sample year. In each column specification, all preceding years are included in the sample, while all subsequent years are excluded. All specifications include county fixed effects, county times year fixed effects, and all our covariates. We control for 1941 population density in all specifications. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Figure 4. Event Studies - Population Density Over Time



Notes: In panel a), the measure of forced migration intensity is based on the deportations registry data compiled by Hungarian authorities in 1946-1947. The black connected line with the circles plots (log) population density over time for high (top 10th percentile) forced migration townships. The grey connected line with the squares shows the same outcome for townships where no forced migration had taken place. For panels b) to d), the point estimates plotted are from a version of our baseline regression where year fixed effects are interacted with the forced migration intensity variable. The baseline year is 1940. Confidence intervals (vertical bars) not spanning zero indicate significance at the 5% level.

While our results in this section suggest a clear negative effect on population density, we cannot be certain that these effects are due to changes in economic activity (for which population density is a proxy), and not due to changes in migratory and resettlement patterns. For example, it is possible that settlers did not replace Germans in the same numbers, or that they left their new residence soon after the expulsions, leading to lasting changes in population density as affected townships were never repopulated (Toth, 1993; Marchut, 2014). Naturally, these lasting negative effects on township populations would likely have a detrimental effect on local markets as well. Nonetheless, forced migration can affect local economies more directly by changing the composition of the local labour force and changing the availability of workers and skills at the township level. To assess economic effects further, we estimate two-period versions of our baseline model using the township-level employment rate as the outcome variable. In all two-period specifications, our main explanatory variable (forced migration intensity) is cross-sectional, we therefore collapse our data into a cross-section of townships with outcomes measured in the post-migration period and covariates (including past levels of outcomes) measured in both pre and post-migration periods. We conduct this exercise using both the employment rate in the short-run (in 1949), and on the long-run (2011), as outcomes. The results are summarised in Table 2 and Table 3. The results presented in these tables provide evidence of a clear negative short-run effect on local employment rates, this effect however does disappear by 2011, and how long the initial effect persisted remains unclear.[33] Note, that estimating the same two-period specification on the same sample of townships, but using (the log of) population density in 2011 as the outcome confirms the lasting negative effects of forced migrations on population density (see Appendix Table A.3). A possible explanation for the divergence in lasting effects on population density compared to the employment rate is that while the local population, and possibly the labour force (see below), shrunk due to the expulsions, the rate of em-

[33]Unfortunately, we do not have the same panel data available for employment rates as we do for population density.

ployment eventually returned to a steady-state as local labour markets adjusted to the influx of the new labour force. We detail such changes in the composition of the labour force as a potential channel for long-term economic changes in Section 5.

Table 2. OLS Results - Employment Rate in 1949

Panel A:	Employment Rate		
	(1)	(2)	(3)
Share of Germans in 1941	-0.059**	-0.077**	-0.047
	(0.029)	(0.030)	(0.037)
Observations	799	664	664
R^2	0.006	0.096	0.130
Panel B:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Census Data)	-0.062**	-0.082***	-0.053
	(0.029)	(0.031)	(0.038)
Observations	799	664	664
R^2	0.006	0.096	0.130
Panel C:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Registry Data)	-0.089	-0.154***	-0.111*
	(0.055)	(0.053)	(0.067)
Observations	799	664	664
R^2	0.005	0.100	0.132
Mean DV	0.45	0.44	0.44
SD DV	0.16	0.16	0.16
Covariates	No	Yes	Yes
County FE	No	No	Yes

Notes: The point estimates are obtained from regressing the employment rate in 1949 on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects and all our covariates. Covariates include the 1941 labour market shares of different sectors and pre-migration employment rates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Table 3. OLS Results - Employment Rate in 2011

Panel A:	Employment Rate		
	(1)	(2)	(3)
Share of Germans in 1941	0.005	0.005	0.006
	(0.008)	(0.011)	(0.012)
Observations	1971	1270	1255
R^2	0.519	0.633	0.707
Panel B:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Census Data)	0.005	0.005	0.006
	(0.009)	(0.011)	(0.012)
Observations	1971	1270	1255
R^2	0.519	0.633	0.707
Panel C:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Registry Data)	0.005	0.007	0.013
	(0.015)	(0.023)	(0.022)
Observations	1971	1270	1255
R^2	0.519	0.633	0.707
Covariates	Yes	Yes	Yes
County FE	No	Yes	Yes
Covariates (1941)	No	Yes	Yes
Additional Controls	No	No	Yes
Area FE	No	No	Yes

Notes: The point estimates are obtained from regressing the employment rate in 2011 on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates from both 1941 and 2011. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

4.2 Long-Term Effects on Trust

Here, we examine whether the forced migrations are associated with lasting differences in local trust levels. There is strong evidence in the economics literature that historical events can have permanent effects on the trust levels of different communities (see Nunn and Wantchekon, 2011; Becker et al., 2016). In the Hungarian context, historical and anecdotal evidence strongly suggests that the expulsion of Germans had a negative influence on the social fabric of affected townships: in the decades after the expulsions, conflicts between long-time residents and settlers were common over issues such as land allocation, the perceived work effort of settlers, and political differences (Toth, 1993; Marchut, 2014). To examine whether forced migration intensity is associated with present-day levels of trust for residents of Hungarian townships, we use data from the LiTS survey to measure various forms of trust in 2016 (see Section 3). The results for our baseline (two-period) regression specification are summarised in Table 4. Unlike in the previous specifications, these regressions estimate the effects of (township-level) forced migration intensity on individual-level outcomes. We control for various observable individual (age, gender, education, religion, etc.) and family (parents' education, region of birth, etc.) characteristics that could influence trust levels by making use of the rich socio-demographic information available in the LiTS data. We also control for township-level information on economic outcomes from 1941.[34]

The results summarised in Table 4 indicate large (and robust) negative associations between forced migration intensity and the extent to which residents trust their neighbours. Point estimates suggest that a unit increase in forced migration intensity can be associated with a 14.5 to 18.2 percentage point reduction in the likelihood of trusting one's neighbours. Coefficient estimates for trust in courts, and trust in people in general

[34]Note, that county fixed effects are not included in our main specification as the LiTS data only provides information on between 1-3 townships per county, leading to very small clusters of observations. Our coefficient estimates do not change their sign when these fixed effects are included, the estimates however become less precise due to inflated standard errors.

are also negative but (mostly) not significant, while point estimates for the trust in government variable tend to be small, positive, and not significant. These findings suggest that lower trust in neighbours, and to some extent in courts, are correlated with a higher township-level exposure to the expulsion of German households. Note, that since we cannot control for the pre-migration levels of trust, these results should be interpreted as historical correlations. Whether the forced migrations, or pre-existing differences in trust levels across German and non-German townships, are at the root of these correlations, is unclear. Nonetheless, the idea that the forced migrations are behind these effects is strongly supported by historical evidence, which explicitly refers to increased social conflict at the local level after the expulsions (Marchut, 2014).

Table 4. OLS Results - Trust in the Present Day

Panel A:	Trust in People		Trust in Government		Trust in Courts		Trust in Neighbours	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Germans in 1941	-0.030	-0.043	0.049	0.009	-0.104	-0.159	-0.145***	-0.152**
	(0.070)	(0.082)	(0.070)	(0.085)	(0.083)	(0.103)	(0.044)	(0.057)
Observations	922	878	922	878	922	878	922	878
R^2	0.011	0.011	0.012	0.021	0.018	0.034	0.035	0.036
Panel B:	Trust in People		Trust in Government		Trust in Courts		Trust in Neighbours	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forced Migration Intensity (Census Data)	-0.028	-0.041	0.048	0.007	-0.107	-0.163	-0.148***	-0.157***
	(0.070)	(0.083)	(0.070)	(0.086)	(0.083)	(0.103)	(0.043)	(0.056)
Observations	922	878	922	878	922	878	922	878
R^2	0.011	0.011	0.012	0.021	0.018	0.035	0.036	0.036
Panel C:	Trust in People		Trust in Government		Trust in Courts		Trust in Neighbours	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Forced Migration Intensity (Registry Data)	-0.004	-0.015	0.034	-0.020	-0.137*	-0.217**	-0.166***	-0.182***
	(0.065)	(0.085)	(0.071)	(0.090)	(0.078)	(0.097)	(0.040)	(0.057)
Observations	922	878	922	878	922	878	922	878
R^2	0.011	0.010	0.011	0.021	0.020	0.040	0.037	0.038
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Town-level Covariates (1941)	No	Yes	No	Yes	No	Yes	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 2016) on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. All trust measures are dummy variables where a value of one indicates some level of trust in the specific entity. All specifications include control variables for individual and family characteristics, along with 1941 levels of town-level covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

4.3 Threats to Identification

Matching specification. In our baseline specification in Section 4, we control for a wide range of geographic and demographic factors that could drive changes in township-level economic development. We also control for the pre-migration levels of economic outcome variables, along with county fixed effects, meaning that most of the effects we identified in the previous sections controlled for pre-existing differences in outcomes between high and low forced migration townships, and were based on within-county variation where we can expect relatively low variance of key geographical factors. Nonetheless, it is still possible that some unobservable factor has influenced the initial share of Germans in different townships within each county – leading to higher forced migration intensity for these localities – while at the same time having a persistent influence on economic development. For example, the initial German settlements were likely in areas ravaged by Ottoman occupation in the centuries prior (see Section 2), which were possibly less developed than other parts of the country. It is not implausible that local geographic factors could have simultaneously influenced Ottoman presence, wartime losses in terms of population, and long-term economic outcomes. To check the sensitivity of our findings to this possibility, we employ a propensity score matching (PSM) approach to create matched pairs of townships with high and low forced migration intensity that are similar in exogenous geographic characteristics and also in endogenous factors that could drive German minority presence.[35] High and low forced migration intensity towns are matched based on their pre-migration economic and demographic characteristics (local labour market and demographic composition) as well as geographic variables (arable and non-arable land area, area of land suitable for cultiva-

[35]Since our specification where trust levels are the outcome rely on individual survey data matched with township level forced migration data, we cannot employ this approach to the specification summarised in Table 4.

tion, etc.).[36] Note, that while creating matched pairs this way arguably leads to a comparison of towns more similar in their observable characteristics, it also leads to reduced statistical power through a smaller sample size.[37] We re-estimate the specifications from Section 4.1 using the samples of matched pairs we created. The results are summarised in the Appendix, Table B.1 to Table B.3. Our main findings from the last two sections are all robust to using the matched sample specifications.

Treatment effect heterogeneity. Our main specifications follow a multiple time period (when population density is the outcome) or two-period (for other outcomes) continuous treatment difference-in-differences approach. This approach was initially outlined in Card (1992), and relies on the fact that treated units (townships) are each affected with a different dose 'd' of the treatment (forced migration). As recently outlined in Callaway et al. (2021), researchers using continuous difference-in-differences can estimate a range of causal parameters. First, we can identify the average level effect (ATT) for any non-zero level of forced migration intensity – for any treatment dose 'd' – as the effect for the group that received dose 'd' when compared to all other groups that received some other (or no) dose. Our estimation of treatment parameters can therefore rely on multiple different counterfactual scenarios. For example, we could ask what the level effect of forced migration was for townships that experienced forced migration intensity equal to 0.1 compared to those that experienced no forced migration. We could also ask what the same effect is when comparing townships with a forced migration 'dose' of 0.1 to townships with a dose of 0.05 – in this case, the lower intensity units become the counterfactual for the higher intensity ones. Moreover, as we attempt in this paper, we can identify the average slope effect (ACR, or average causal response), which is the causal effect of moving from dose d to some other dose $d^{'}$ – this entails identifying the average

[36] For our analysis of the effect on population density, where we have longitudinal panel data available for the period 1920 to 1990, we match based on time-variant township characteristics.

[37] When matching towns, we impose a caliper of 0.01 so that we only keep 'good' matches based on observable baseline characteristics.

difference between potential outcomes under some level of forced migration intensity (dose 'd') compared to potential outcomes under an incremental (marginal) change in forced migration intensity for the townships who experience dose 'd'.

The key insight from Callaway et al. (2021) for our application is that when using the two-way fixed effects (TWFE) regression specification outlined in Section 4, the standard difference-in-differences assumption of parallel trends is not sufficient to allow for a causal interpretation of estimated coefficients. This is because the TWFE regression weights together outcome changes that are compared across incrementally different treatment doses. Even when parallel trends hold, this can introduce selection bias in the estimates if the average level effect (ATT) is different across different treatment doses. On the other hand, TWFE estimates can still be interpreted as the ACR across all doses if the 'strong' parallel assumption holds – in our case, this assumption requires that for all 'doses' of forced migration intensity, the average change in outcomes over time across all townships with that amount of dose is the same as the average change in outcome for all townships that experienced that dose of forced migration intensity. In other words, on average across all doses, there should not be selection into a particular dose, or into a particular level of forced migration intensity. How likely is this assumption going to hold in our case?[38] In Section 4, we show strong evidence that most variation (see Figure 2 and Figure 3) in our treatment measures are explained by the, arguably exogenous, pre-migration presence of German minorities in Hungarian townships, and this is even true when only comparing townships with non-zero levels of forced migration. This suggests that there are unlikely to be fundamental differences between townships with different doses, and selection bias in dose levels is unlikely to be an issue given that no observable factor (other than the pre-treatment share of Germans) has been found to explain forced migration intensity. Nonetheless, a limitation of our approach is that we

[38]The latest version of the Callaway et al. (2021) study does not yet provide formal ways to validate the stronger parallel trends assumption.

cannot formally establish the validity of the strong parallel trends assumption in the context of this study.

5 Mechanisms

Our results provide convincing evidence that the postwar deportations of German minorities had a lasting impact on local economic and social development. In the following section, we attempt to explore plausible mechanisms through which these changes materialised.

5.1 Changes in the Composition of the Local Labour Force

Historical sources suggest that differences in skills between German and settler populations led to fundamental changes in the composition of the local labour force after the expulsions of Germans in certain townships (Toth, 1993). In this section, we test this empirically by examining whether the forced migrations lead to short and long-term changes in local labour market composition. We focus on the shares of local workers employed in different sectors (agriculture, manufacturing, and trade) along with the share of workers per township area (labour force density).[39] To analyse short-term effects, we make use of Census data from 1941 and 1949, and estimate a two-period version of our baseline model in Equation 1.[40] We mainly exploit cross-sectional differences in forced migration intensity across townships, and therefore a risk is that most of the effects we

[39]The 1941 and 1949 Censuses provide information on different categories of labour shares, but data on agriculture, manufacturing, and trade shares are provided consistently in both Censuses. Nonetheless, these categories do not cover the entire labour share for each township, as a large share of workers belong to other categories (transport, construction, or 'other sectors') that are not reported consistently.

[40]The Census data was parsed from scanned PDF documents that are available online through the Hungarian Cultural Heritage Portal (https://hungaricana.hu/en/.). Matching township names across the two Census data sets leads to a smaller sample size of towns due to certain towns not being included in the 1949 Census and changes in township names.

unveil are due to economic geography, whereby stable patterns in certain regions are correlated with (or causing) long-term outcomes whilst also being correlated with the explanatory variable itself.[41] To prevent spatial auto-correlation of outcomes from driving our results, we control for the pre-migration (1941) levels of all outcome variables in most specifications. We also control for changes in township-level population over time, and include county fixed effects in our most demanding specification. The results are summarised in Table 5.

Our findings in Table 5 clearly indicate that the forced migration had a large (and robust) positive effect on the share of agricultural workers in the local labour force. This effect ranges between a 10.1 to 18.6 percentage point increase in the local share of agricultural workers corresponding to a unit increase in forced migration intensity. The effects on labour shares in other sectors (manufacturing and trade) are mostly close to zero, while local labour force density is affected negatively, although the point estimates are not significant in the specifications that include county fixed effects. The null effects on manufacturing and trade, taken together with the positive effect on agricultural shares, imply that labour shares may have declined in other sectors, such as construction or transport, that we do not have consistent data on. It is also possible that small (and statistically insignificant) declines in the labour shares of all other sectors contributed to the increase in agricultural shares.

[41] For an overview of this issue in the literature on the persistent effects of historical events, see Voth (2021).

Table 5. OLS Results - Labour Shares in 1949

Panel A:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Share of Germans in 1941	0.006	0.034	-0.006	0.131***	0.106***	0.103**	-0.005	0.001	-0.008	-0.101	-0.036	-0.003
	(0.047)	(0.037)	(0.053)	(0.038)	(0.039)	(0.046)	(0.006)	(0.005)	(0.006)	(0.065)	(0.024)	(0.030)
Observations	833	664	664	833	664	664	833	664	664	833	664	664
R^2	0.000	0.245	0.304	0.020	0.122	0.187	0.000	0.167	0.213	0.000	0.474	0.500
Panel B:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forced Migration Intensity (Census Data)	0.008	0.037	-0.003	0.128***	0.105***	0.101**	-0.005	0.001	-0.008	-0.106	-0.038	-0.005
	(0.049)	(0.039)	(0.055)	(0.038)	(0.038)	(0.045)	(0.006)	(0.006)	(0.006)	(0.067)	(0.024)	(0.030)
Observations	833	664	664	833	664	664	833	664	664	833	664	664
R^2	0.000	0.245	0.304	0.018	0.120	0.186	0.000	0.167	0.212	0.000	0.474	0.500
Panel C:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forced Migration Intensity (Registry Data)	0.001	0.052	0.013	0.186***	0.166**	0.167*	-0.001	0.010	-0.002	-0.157*	-0.077**	-0.035
	(0.074)	(0.065)	(0.084)	(0.070)	(0.076)	(0.093)	(0.011)	(0.011)	(0.011)	(0.092)	(0.038)	(0.047)
Observations	833	664	664	833	664	664	833	664	664	833	664	664
R^2	0.000	0.245	0.304	0.016	0.120	0.186	0.000	0.169	0.210	0.000	0.475	0.501
Mean DV	0.18	0.18	0.18	0.11	0.11	0.11	0.02	0.02	0.02	0.37	0.38	0.38
SD DV	0.62	0.64	0.64	0.19	0.19	0.19	0.07	0.07	0.07	1.19	1.26	1.26
Covariates	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
County FE	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 1949) on our three forced migration intensity measures. The outcomes are the manufacturing share of labour, the agriculture share of labour, the trade share of labour, and labour force density in each township. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects and all our covariates. Covariates include the 1941 labour market shares of different sectors. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

We can also assess the long-term effects of the forced migrations on local labour shares. The most recent data on labour shares and labour force density is from the 2011 Census. We run the two-period specification from Section 5.1 using data on outcomes and covariates from 1941 and 2011. We also add additional control variables from the 2011 Census, and now control for the share of different ethnic groups in each township, the share of different religions, the share of locals with high school and university degrees, along with possible local predictors of economic activity, such as the length of the local road network or the distance from the nearest railway station. Similarly to our estimations of short-term effects, we once again control for pre-migration levels of outcome variables, local population changes over time, and also include county fixed effects in most specifications.[42] Additionally, in the most demanding specification, we include local district area (*'jaras'*) fixed effects, which allow us to control for local determinants of labour shares at a highly granular regional level.[43] Our results are summarised in Table 6.

It is evident from Table 6 that the forced migrations can be associated with a persistent long-term effect on agricultural labour shares in each township. These effects are smaller than the short-term effects observed prior, and range between a 1.9 to 6.5 percentage point increase in response to a unit increase in forced migration intensity. The size of these effects suggests that while the initial effects on agricultural shares persisted to the present, they did get smaller over time. Our results also indicate small positive and small negative effects for manufacturing and trade, respectively, but these are only significant in some specifications. Nonetheless, the positive effect on manufacturing is robust across the specifications that include area fixed effects. A possible explanation for this is that while townships affected by forced migration moved towards agriculture initially, investments in local manufacturing activities were scaled up in the last few

[42] Note, that adding covariates measured in 1941 reduces our sample size somewhat due to missing data in these Census records for some townships.

[43] We have information on the current (2011) local district area designations for each town in our sample.

decades to provide a boost to local economic activity, which was still lagging behind other parts of the country during 1980s and 90s (see Table 1). Finally, the effect on labour force density continues to be negative, but is not significant in these specifications.

Our findings provide clear evidence of lasting changes in local labour market composition in response to the forced migrations. These changes may have influenced divergence in economic activity across townships. A plausible story to explain this – one that is partly based on historical and anecdotal evidence (see Section 2) – could be summarised the following way. The displacement of the German minority population, along with the efforts to reallocate formerly German-owned land to 'native' settlers, led to significant skills mismatches in local labour markets, and a subsequent increase in activities (mostly agricultural) that the new, relatively unskilled, labour force could partake in. This mismatch forced affected townships – which were similar to other townships in their share of agricultural labour prior to the expulsions (see Figure 1) – to employ a higher share of their workforce in agricultural activities, while the rest of the economy increasingly shifted towards other, more productive, sectors.[44]

[44]The post-migration period in our sample corresponds to a period of Communist rule and strong central planning policies in Hungary. At the township-level, cooperatives ('termeloszovetkezet') became the primary unit of economic activity. Cooperatives required members (joining cooperatives was state-mandated) to share all production inputs and outputs, all forming the property of the collectivist state. Under this system, it is unclear how much discretion township areas had over economic decisions that affected their workforce, although it is likely that local changes in skills composition would have influenced centrally planned policies as well. After 1968, there was a shift towards more market-oriented economic policies introduced through the New Economic Mechanism (see Balassa, 1983).

Table 6. OLS Results - Labour Share in 2011

Panel A:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Share of Germans in 1941	0.012*	0.016*	0.030**	0.035***	0.044***	0.021*	-0.010**	-0.011**	-0.005	-0.002	-0.023	0.000
	(0.007)	(0.009)	(0.012)	(0.010)	(0.011)	(0.012)	(0.005)	(0.005)	(0.006)	(0.039)	(0.029)	(0.032)
Observations	1761	1144	1128	1928	1247	1232	1854	1194	1179	1971	1270	1255
R^2	0.235	0.288	0.408	0.321	0.397	0.552	0.120	0.198	0.374	0.513	0.771	0.827
Panel B:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forced Migration Intensity (Census Data)	0.013*	0.017*	0.032**	0.034***	0.043***	0.019	-0.010**	-0.011*	-0.005	-0.005	-0.026	-0.004
	(0.008)	(0.010)	(0.013)	(0.010)	(0.012)	(0.012)	(0.005)	(0.006)	(0.007)	(0.039)	(0.029)	(0.031)
Observations	1761	1144	1128	1928	1247	1232	1854	1194	1179	1971	1270	1255
R^2	0.236	0.289	0.408	0.320	0.396	0.552	0.120	0.198	0.374	0.513	0.771	0.827
Panel C:	Manufacturing Share of Labour			Agriculture Share of Labour			Trade Share of Labour			Labour Force Density		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Forced Migration Intensity (Registry Data)	0.011	0.019	0.035*	0.047***	0.065***	0.038**	-0.011	-0.016*	-0.012	0.003	-0.058	-0.022
	(0.011)	(0.014)	(0.018)	(0.015)	(0.020)	(0.018)	(0.007)	(0.009)	(0.010)	(0.046)	(0.040)	(0.036)
Observations	1761	1144	1128	1928	1247	1232	1854	1194	1179	1971	1270	1255
R^2	0.234	0.287	0.404	0.319	0.395	0.553	0.119	0.198	0.374	0.513	0.771	0.827
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Labour Shares in 1941	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Area FE	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 2011) on our three forced migration intensity measures. The outcomes are the manufacturing share of labour, the agriculture share of labour, the trade share of labour, and labour force density in each township. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates. Covariates include 1941 labour market shares of different sectors. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

5.2 Persistent Effects on the Agriculture Sector in Local Labour Markets

Simply put, our results from the previous section indicate that the share of agricultural labour increased, over time, in high forced migration towns relative to low (or no) forced migration towns. We can clearly observe this effect when looking at the two-period means of agricultural shares in Figure 5. High forced migration townships started at a lower agricultural labour share in 1941, when compared to unaffected townships, and ended up on a higher one by 2011, while the overall (country-wide) trend in these shares is a downward one.

Here, we examine whether forced migrations affected the local composition of the agricultural sector. We collect data from the 2007 Hungarian Agrarian Census on three outcomes: 1) the share of land used from total agricultural land available 2) the number of agricultural producers per total agricultural area available and 3) the share of agricultural firms per township population. We look at these outcomes to assess the extent to which local agricultural supply and productivity is in line with the higher relative share of agricultural workers in high forced migration townships. We estimate the same set of specifications as in Section 5.1. The results are summarised in Table 7.

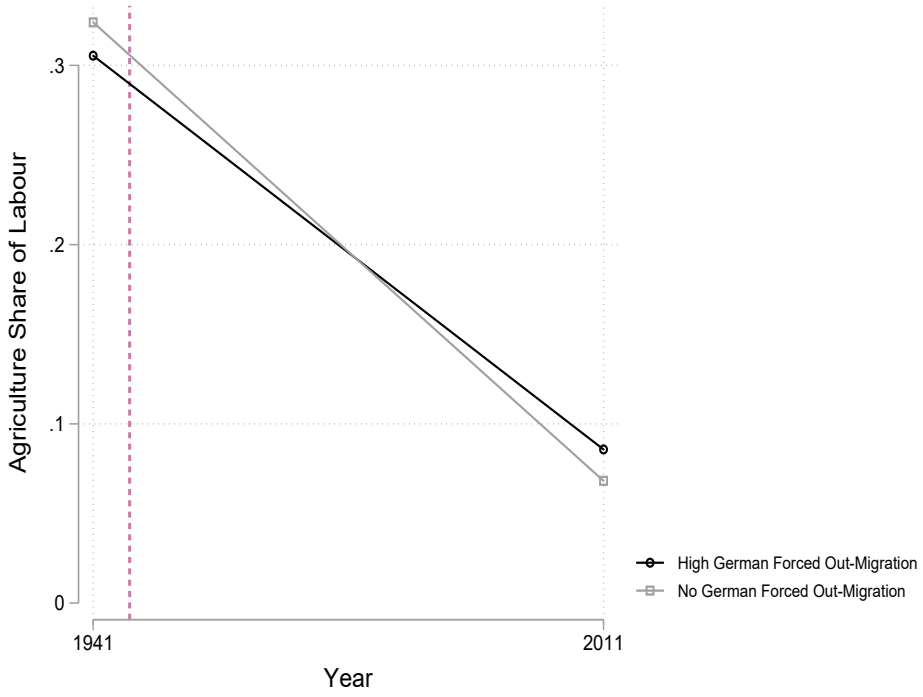
The positive effect observed on the share of agricultural land used in Table 7 confirms that high forced migration intensity is correlated with increased agricultural activity in affected townships on the long run. Nonetheless, the results for the share of agricultural producers and firms – which are negative and mostly insignificant for the earlier, and positive, but very close to zero for the latter – suggest that this does not materialise in a persistent long-term influence on the presence of agricultural producers. It is possible that this is because agricultural production in these towns is characterised by large firms with substantial market power, or alternatively, it simply implies low productivity in

these areas for agricultural activities.

We also provide suggestive evidence on agricultural productivity in townships affected by forced migration, by assessing the historical correlation between forced migration intensity and current crop yields. To do this, we estimate our two-period baseline model using crop yield data (from 2010) on 387 Hungarian agricultural areas from the FAO GAEZ database. We match each agricultural area to the nearest township to obtain values for the explanatory variable (forced migration intensity). Note, that we have no information on pre-migration crop yields, and therefore our estimates are likely only able to uncover historical correlations. Nonetheless, we include county and district area fixed effects to keep spatial determinants of crop yield relatively similar across the townships that we compare. The results are summarised in Table 8. We distinguish between capital and labour-intensive crop types to see if the forced migrations, and subsequent changes in local labour market composition, are associated with a specialisation in different types of crops. Our results indicate a negative association for almost all types of crops (along with total crop yield), suggesting that agricultural productivity is currently lower in high forced migration townships, although these estimates are imprecise and not significant at any reasonable level.

While the evidence presented in this section is only suggestive, it seems likely that despite the fact that the forced migrations had a long-term positive effect on agricultural labour shares in affected townships, this did not go hand in hand with increased agricultural productivity. Nonetheless, whether this is due to the forced migrations setting affected townships on inefficient economic trajectories or some other, unexplained, factor affecting long-term development, is unclear.

Figure 5. Share of Agricultural Labour Over Time - High vs No Forced Migration Towns



Notes: The measure of forced migration intensity here is based on the deportations registry data compiled by Hungarian authorities in 1946-1947. The black connected line with the circles plots the change in share of agricultural labour from 1941 to 2011 for high (top 10th percentile) forced migration townships. The grey connected line with the squares shows the same outcome for townships where no forced migration had taken place.

Table 7. OLS Results - Agriculture Outcomes in 2007

Panel A:	Share of Agricultural Land Used			Agricultural Producers per Area			Agricultural Firm Share		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of Germans in 1941	0.004	0.015***	0.015**	-0.155	-0.119*	-0.184*	0.001	0.002*	0.003**
	(0.007)	(0.005)	(0.007)	(0.100)	(0.063)	(0.099)	(0.001)	(0.001)	(0.001)
Observations	1956	1260	1245	1956	1260	1245	1971	1270	1255
R^2	0.074	0.126	0.212	0.040	0.116	0.199	0.032	0.086	0.198
Panel B:	Share of Agricultural Land Used			Agricultural Producers per Area			Agricultural Firm Share		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Census Data)	0.004	0.015***	0.015**	-0.158	-0.126*	-0.189*	0.001	0.002*	0.003**
	(0.008)	(0.005)	(0.007)	(0.102)	(0.066)	(0.102)	(0.001)	(0.001)	(0.001)
Observations	1956	1260	1245	1956	1260	1245	1971	1270	1255
R^2	0.074	0.126	0.212	0.040	0.116	0.199	0.032	0.085	0.197
Panel C:	Share of Agricultural Land Used			Agricultural Producers per Area			Agricultural Firm Share		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Registry Data)	0.006	0.020**	0.022**	-0.189	-0.153	-0.240	0.001	0.004	0.004*
	(0.010)	(0.008)	(0.010)	(0.164)	(0.119)	(0.178)	(0.002)	(0.002)	(0.002)
Observations	1956	1260	1245	1956	1260	1245	1971	1270	1255
R^2	0.074	0.125	0.212	0.040	0.116	0.198	0.032	0.087	0.198
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Covariates (1941)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Additional Controls	No	No	Yes	No	No	Yes	No	No	Yes
Area FE	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 2007) on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Table 8. OLS Results - Crop Yield in 2010

	Crop Yield (mtu/h) - Total	Crop Yield (mtu/h) - Capital Intensive Crops				
	(1) All Crops	(2) Wheat	(3) Maize	(4) Barley	(5) Simolina	(6) Other Cereals
Forced Migration Intensity (Registry Data)	-6.267	-0.218	-0.658	-0.249	0.278	-0.115
	(12.529)	(0.402)	(0.559)	(0.328)	(0.228)	(0.442)
Observations	387	387	387	387	387	387
R^2	0.585	0.657	0.678	0.654	0.541	0.760
	Crop Yield (mtu/h) - Top Crops	Crop Yield (mtu/h) - Labour Intensive Crops				
	(1) Top 5 Crops	(2) Potatoes	(3) Beans	(4) Sugarbeets	(5) Fruits	(6) Vegetables
Forced Migration Intensity (Registry Data)	-6.779	-0.849	-0.042	-4.021	-0.184	-1.136
	(9.765)	(2.383)	(0.127)	(5.798)	(0.752)	(2.417)
Observations	387	387	387	387	387	387
R^2	0.606	0.719	0.578	0.540	0.615	0.711
Covariates (2011)	Yes	Yes	Yes	Yes	Yes	Yes
Covariates (1941)	Yes	Yes	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Area FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The point estimates are obtained from regressing yield data on various crops (measured in 2010) on our Registry based forced migration intensity measures. Crop yields are measured in metric ton units per hectare. Crop yield data was accessed using the FAO GAEZ database. All specifications include county fixed effects, area ('jaras') fixed effects, and a full set of township level covariates from both 1941 and 2011. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

5.3 Human Capital Accumulation

In this section, we examine whether the forced migrations had a lasting impact on human capital accumulation at the township level. If the settler populations were on average less skilled or educated compared to the German population they replaced (Marchut, 2014), this could have had a permanent effect on the composition of human capital and educational preferences in affected townships, which could then become important factors in their long-term economic development. To test this, we estimate our baseline two-period specification using educational measures – the share of residents with no schooling, the share with a high school degree, and the share with a higher degree – from the 2011 Census as our outcomes of interest. Our results are summarised in Table 9. The point estimates presented in Table 9 indicate that forced migrations had no (long-term) effect on the share of residents with share of residents with a higher (university or vocational college) degree.[45] On the other hand, we do observe a negative effect for the share of locals with no schooling and the share with a high school degree, although estimates are not significant in most specifications. Overall, our results do not suggest that changes in human capital accumulation are behind the persistent effects we observe, although we cannot rule out that such effects were present in the short and medium-run after the expulsions.

[45]Note, that schooling in Hungary is compulsory until age 16.

Table 9. OLS Results - Human Capital in 2011

Panel A:	Share with No Schooling			Share with High School Degree			Share with Higher Degree		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of Germans in 1941	0.002	-0.004**	-0.002	-0.026**	-0.013	-0.006	0.001	-0.001	0.004
	(0.003)	(0.002)	(0.002)	(0.010)	(0.012)	(0.013)	(0.007)	(0.006)	(0.005)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.112	0.121	0.228	0.589	0.643	0.726	0.446	0.506	0.654
Panel B:	Share with No Schooling			Share with High School Degree			Share with Higher Degree		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Census Data)	0.002	-0.004**	-0.002	-0.027**	-0.013	-0.006	0.002	-0.000	0.004
	(0.003)	(0.002)	(0.002)	(0.011)	(0.013)	(0.013)	(0.007)	(0.007)	(0.005)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.112	0.121	0.228	0.589	0.643	0.726	0.446	0.506	0.654
Panel C:	Share with No Schooling			Share with High School Degree			Share with Higher Degree		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Registry Data)	0.003	-0.006**	-0.001	-0.027	-0.016	-0.012	0.009	0.002	0.005
	(0.005)	(0.003)	(0.003)	(0.017)	(0.022)	(0.021)	(0.012)	(0.011)	(0.008)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.112	0.120	0.228	0.588	0.642	0.726	0.447	0.506	0.654
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Covariates (1941)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Area FE	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 2011) on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates, along with the shares of people in occupations in 1941. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

5.4 Changes in Religious Composition

Finally, we test whether the forced migrations had a persistent impact on the religious composition of the population at the township level. Religious composition can play an important role in influencing historical economic development at the regional level (see Becker et al., 2021). The Hungarian German minorities were overwhelmingly affiliated with the Roman Catholic Church (Marchut, 2014; Grosz, 2020), albeit in this respect they were not different from the rest of the country, where Roman Catholicism was the majority religion in most counties before WW2 (see Figure A.3). According to Marchut (2014), there were very few Protestant German communities, and the share of Protestants among the German minorities were lower than the national share. Moreover, it is unclear what the religious affiliations of the settlers were in each township, although we can make generalisations based on certain sub-populations. For example, historical sources reveal that some of the settler populations, such as the Szekelys of Bukovina or the Csango's, were also predominantly Catholic (Gatti, 2019). Based on the information available, it is therefore unclear whether the population changes led to changes in religious composition.

We test whether the forced migrations are associated with persistent changes in township-level religious composition by estimating a version of our baseline two-period empirical specification using 2011 Census data on the share of Catholics, Protestants, and non-religious residents in each township. We use county-level religious shares from 1941 in some specifications, and county and area fixed effects in others to control for the possibility that our inference is biased by the presence of spatial autocorrelation of religious composition. The results are presented in Table 10. Our results suggest a small, non-robust negative association with Protestant shares, which is no longer significant in the specifications that use Registry data to measure forced migration intensity. The effect on Catholic and non-religious shares is close to zero and not significant, and overall there

is little evidence that the expulsion of the German minority population had a lasting impact on the religious composition of affected townships. Based on these findings, and based on the fact that on average, most settler sub-populations (for whom we have this information) were likely to share the same religion with the Germans they replaced, we conjecture that it is unlikely that changes in religious composition are behind the baseline results we observe.

Table 10. OLS Results - Religious Composition in 2011

Panel A:	Share of Catholics			Share of Protestants			Share of Non-Religious		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of Germans in 1941	-0.015	0.002	-0.001	-0.017*	-0.023*	-0.020*	-0.004	-0.006	0.001
	(0.018)	(0.021)	(0.024)	(0.009)	(0.013)	(0.012)	(0.009)	(0.011)	(0.013)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.321	0.348	0.534	0.342	0.390	0.580	0.378	0.460	0.617
Panel B:	Share of Catholics			Share of Protestants			Share of Non-Religious		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Census Data)	-0.017	0.000	0.001	-0.017*	-0.023*	-0.021*	-0.003	-0.006	-0.000
	(0.018)	(0.022)	(0.024)	(0.010)	(0.013)	(0.012)	(0.009)	(0.012)	(0.014)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.321	0.348	0.534	0.342	0.390	0.580	0.378	0.460	0.617
Panel C:	Share of Catholics			Share of Protestants			Share of Non-Religious		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Forced Migration Intensity (Registry Data)	-0.023	0.003	-0.009	-0.009	-0.019	-0.025	0.004	0.002	0.016
	(0.027)	(0.032)	(0.031)	(0.015)	(0.021)	(0.017)	(0.013)	(0.018)	(0.019)
Observations	1973	1270	1255	1973	1270	1255	1973	1270	1255
R^2	0.321	0.348	0.534	0.341	0.390	0.580	0.378	0.459	0.617
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Covariates (1941)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Area FE	No	No	Yes	No	No	Yes	No	No	Yes

Notes: The point estimates are obtained from regressing our outcomes (measured in 2011) on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

6 Conclusions

Forced migrations can not only affect receiving populations and alter the life experiences of the migrants themselves, but can also lead to permanent changes in sending economies. In this paper, we used historical and contemporary data to examine the economic and social effects of the postwar expulsions of German minorities on Hungarian townships. We found that forced migrations had a lasting negative impact on local economic development and trust levels in affected townships, and led to fundamental changes in the skills composition and industry specialisation of local economies. More specifically, our results indicated that townships affected by forced migrations increasingly specialised in agricultural activities in subsequent decades, and yet we could not find evidence that this has led to improved agricultural productivity in these areas.

While we consider a number of possible mechanisms and explanations for the empirical patterns uncovered in our analysis, a few questions remain. First, the lack of high-quality data on economic activity and productivity at the township level makes it difficult for us to distinguish between population changes and changes in local labour markets as potential drivers of long-term regional divergence in economic development. As we rely on measures such as population and labour force density to assess changes in economic activity over time, it is unclear whether these changes are a result of a failure to replace the German populations and labour force, or are due to structural differences between German and settler populations. Second, in this study we were unable to examine other potential factors behind persistent changes in local economic development that may have been induced by the forced migrations. For instance, it is still unclear how the effects of forced migrations differ across areas with different settler populations, and more granular data would be needed to assess the precise effect of the expulsions on the skills composition of the local labour force. Moreover, the period we are studying in this paper is partially overlapping with the period of strong Communist central planning

policies in Hungary, and how these policies affected the townships that were exposed to the forced migrations is as of yet poorly understood. Future studies should investigate these questions in more detail.

Nonetheless, our study offers important lessons on the issue of forced migration, which continues to affect millions of displaced individuals worldwide. The key takeaway is that forced migration can have negative effects on origin economies, even (or especially) in cases where it is motivated by redistributive objectives. In other words, even those areas that are specifically meant to benefit from forced migration may end up worse off in terms their economic development and social fabric. Considering the traumatic and life-altering experiences of those forcibly removed from their homes, this insight suggests that forced migration is not only ethically and morally reprehensible, but is also not a sensible policy from an economic and social perspective.

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Appendix – For Online Publication

A Additional Tables and Figures

Table A.1. Summary Statistics - 1949 Census Sample

	Mean	SD	Count
Treatment			
Share of Germans in 1941	0.06	0.20	833
Forced Migration Intensity (Census Data)	0.06	0.20	833
Forced Migration Intensity (Registry Data)	0.03	0.13	833
1941 Census			
Population (1941)	1921.38	4313.40	833
Population Density (1941)	0.73	0.52	833
Share of Agricultural Workers (1941)	0.33	0.15	819
Share of Trade Workers (1941)	0.01	0.01	730
Share of Transport Workers (1941)	0.01	0.01	766
Share of Manufacturing Workers (1941)	0.03	0.03	812
Share Employed (1941)	0.45	0.08	830
1949 Census			
Population (1949)	1788.38	2824.81	799
Population Density (1949)	0.72	0.40	799
Share of Agricultural Workers (1949)	0.11	0.19	833
Share of Trade Workers (1949)	0.02	0.07	833
Share of Manufacturing Workers (1949)	0.18	0.62	833
Labour Force Density (1949)	0.37	1.19	833
Share Employed (1949)	0.45	0.16	799

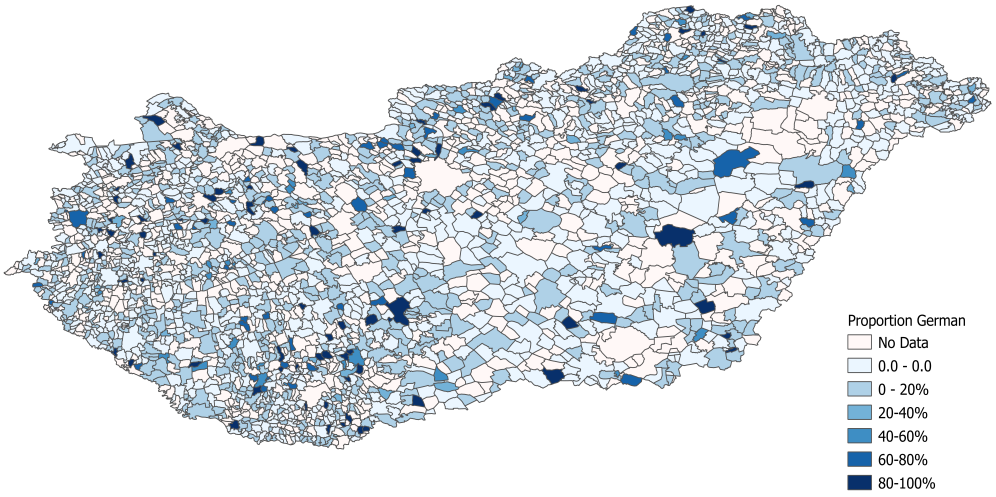
Notes: These summary statistics are based on the sample of townships where we could merge Census data from 1941 with the same data in 1949. This is the sample used for our baseline analysis of short-term effects.

Table A.2. Summary Statistics - 2011 Census Sample

	Mean	SD	Count
Treatment			
Share of Germans in 1941	0.07	0.21	1973
Forced Migration Intensity (Census Data)	0.07	0.21	1973
Forced Migration Intensity (Registry Data)	0.04	0.13	1973
Covariates (2011)			
Share of Catholics	0.54	0.20	1973
Share of Eastern Orthodox	0.00	0.01	1973
Share of Protestant	0.11	0.14	1973
Share of Evangelicals	0.03	0.08	1973
Share of Jewish	0.00	0.00	1973
Share of Atheists	0.00	0.01	1973
Share of Non-Religious	0.10	0.09	1973
Share with No Schooling	0.01	0.02	1973
Share Finished School After 10th Grade	0.22	0.05	1973
Share Graduated from High School	0.25	0.10	1973
Share Graduated University	0.07	0.04	1973
Share with German Ancestry	0.03	0.07	1973
Share of Hungarians	0.89	0.07	1973
Share with Foreign Ancestry (Non German)	0.08	0.13	1973
Population	2258.02	6783.15	1973
Covariates (1941)			
Share Employed (1941)	0.43	0.10	1549
Population (1941)	2783.72	7180.57	1973
Share of Physical Workers (1941)	0.14	0.08	1524
Share of Helpers (1941)	0.12	0.06	1537
Share of Services Workers (1941)	0.01	0.01	1401
Share of Trade Workers (1941)	0.01	0.01	1361
Share of Transport Workers (1941)	0.01	0.01	1429
Share of Agricultural Workers (1941)	0.32	0.15	1530
Share of Manufacturing Workers (1941)	0.02	0.03	1520
Share of Intellectuals (1941)	0.02	0.06	1521
Outcomes			
Agriculture Share of Labour	0.07	0.06	1762
Manufacturing Share of Labour	0.36	0.10	1929
Trade Share of Labour	0.15	0.04	1856
Labour Force Density	0.24	0.45	1973
Share Employed	0.35	0.08	1973

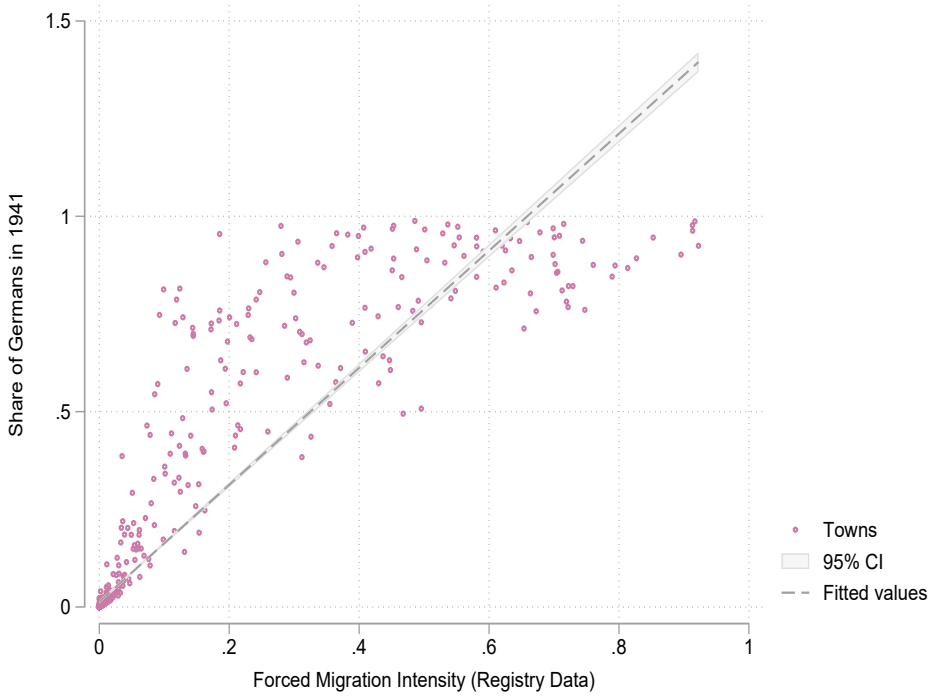
Notes: These summary statistics are based on the sample of townships where we could merge Census data from 1941 with the same data in 2011. This is the sample used for our baseline analysis of persistent (contemporary) effects.

Figure A.1. Share of Germans in Hungarian Townships in 1941 (Current Boundaries)



Notes: The map shows Hungarian township areas based on their current boundaries. Townships are matched to 1941 data on the share of Germans based on their names.

Figure A.2. The Share of Germans in 1941 and Forced Migration Intensity



Notes: The measure of forced migration intensity used for this figure is based on the deportations registry data compiled by Hungarian authorities in 1946-1947. The dashed line represents fitted values from an OLS regression of the share of Germans in 1941 on forced migration intensity.

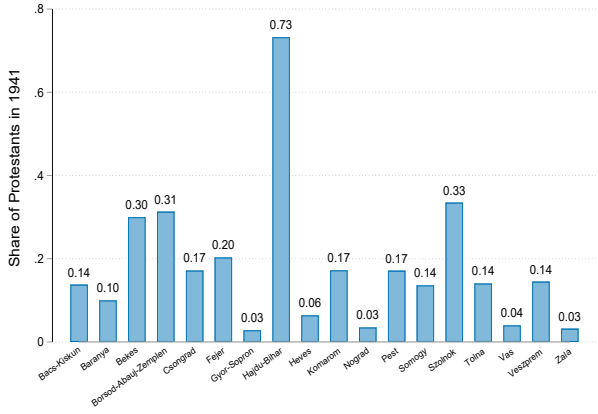
Table A.3. OLS Results - Population Density in 2011

Panel A:	Population Density (Log)		
	(1)	(2)	(3)
Share of Germans in 1941	-0.081	-0.197***	-0.312***
	(0.078)	(0.076)	(0.085)
Observations	1971	1270	1255
R^2	0.451	0.640	0.731
Panel B:	Population Density (Log)		
	(1)	(2)	(3)
Forced Migration Intensity (Census Data)	-0.089	-0.211***	-0.324***
	(0.080)	(0.077)	(0.086)
Observations	1971	1270	1255
R^2	0.451	0.640	0.731
Panel C:	Population Density (Log)		
	(1)	(2)	(3)
Forced Migration Intensity (Registry Data)	0.023	-0.262**	-0.440***
	(0.120)	(0.131)	(0.139)
Observations	1971	1270	1255
R^2	0.451	0.639	0.730
Covariates	Yes	Yes	Yes
County FE	No	Yes	Yes
Covariates (1941)	No	Yes	Yes
Additional Controls	No	No	Yes
Area FE	No	No	Yes

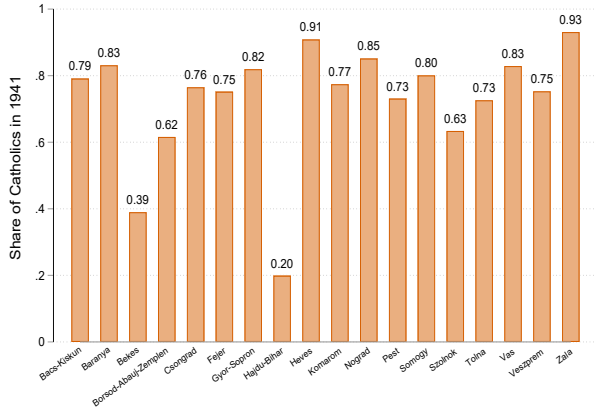
Notes: The point estimates are obtained from regressing the (log) population density in 2011 on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates from both 1941 and 2011. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Figure A.3. Religious Composition of Hungarian Counties - 1940

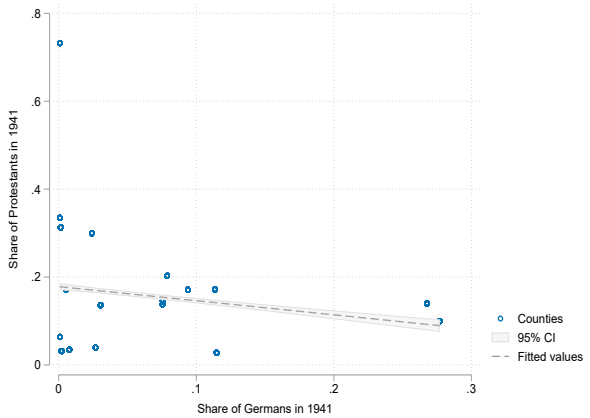
(a) Share of Protestants in 1941



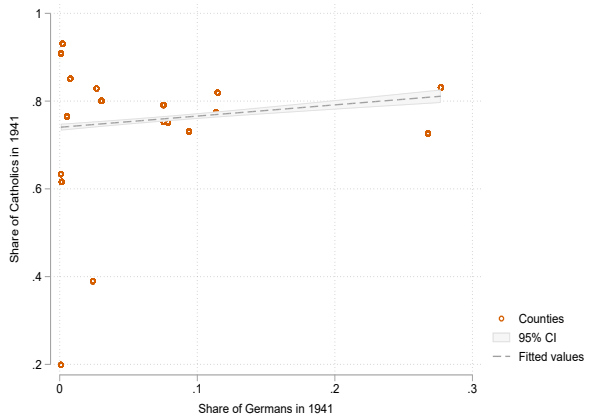
(b) Share of Catholics in 1941



(c) Share of Protestants and Share of Germans in 1941



(d) Share of Catholics and Share of Germans in 1941



Notes: Data for this figure is obtained from the 1941 Census.

B Tables and Figures for Robustness Checks

Table B.1. OLS Results - Population Density - Matched Sample

Panel A:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Share of Germans in 1941	-0.057***	-0.080***	-0.066***	-0.069***	-0.072***
	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)
Observations	2970	3934	4914	5888	6855
R^2	0.943	0.938	0.926	0.921	0.936
Mean DV	-0.37	-0.36	-0.37	-0.39	-0.42
SD DV	0.51	0.53	0.56	0.60	0.63
Panel B:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Forced Migration Intensity (Census Data)	-0.060***	-0.082***	-0.067***	-0.070***	-0.072***
	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)
Observations	2970	3934	4914	5888	6855
R^2	0.943	0.938	0.926	0.921	0.936
Mean DV	-0.37	-0.36	-0.37	-0.39	-0.42
SD DV	0.51	0.53	0.56	0.60	0.64
Panel C:	Population Density (Log)				
	(1) 1950	(2) 1960	(3) 1970	(4) 1980	(5) 1990
Forced Migration Intensity (Registry Data)	-0.098***	-0.115***	-0.090***	-0.085***	-0.082***
	(0.015)	(0.018)	(0.015)	(0.017)	(0.016)
Observations	2970	3934	4914	5888	6855
R^2	0.943	0.938	0.926	0.921	0.936
Mean DV	-0.37	-0.36	-0.37	-0.39	-0.42
SD DV	0.51	0.53	0.56	0.60	0.64
County FE	Yes	Yes	Yes	Yes	Yes
County x Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: This specification uses a sample of townships that was matched on observable characteristics through a propensity score matching (PSM) method. The point estimates are obtained from regressing the log of population density on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. Each column shows the effect of the forced migrations in a different sample year. In each column specification, all preceding years are included in the sample, while all subsequent years are excluded. All specifications include county fixed effects, county times year fixed effects, and all our covariates. We control for 1941 population density in all specifications. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Table B.2. OLS Results - Employment Rate in 1949 - Matched Sample

Panel A:	Employment Rate		
	(1)	(2)	(3)
Share of Germans in 1941	-0.068**	-0.069**	-0.062
	(0.033)	(0.034)	(0.041)
Observations	218	218	218
R^2	0.018	0.096	0.179
Panel B:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Census Data)	-0.072**	-0.073**	-0.067
	(0.033)	(0.035)	(0.042)
Observations	218	218	218
R^2	0.018	0.096	0.180
Panel C:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Registry Data)	-0.121**	-0.128**	-0.112
	(0.055)	(0.059)	(0.073)
Observations	218	218	218
R^2	0.021	0.100	0.180
Mean DV	0.42	0.42	0.42
SD DV	0.16	0.16	0.16
Covariates	No	Yes	Yes
County FE	No	No	Yes

Notes: This specification uses a sample of townships that was matched on observable characteristics through a propensity score matching (PSM) method. The point estimates are obtained from regressing the employment rate in 1949 on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates from both 1941 and 2011. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.

Table B.3. OLS Results - Employment Rate in 2011 - Matched Sample

Panel A:	Employment Rate		
	(1)	(2)	(3)
Share of Germans in 1941	0.005	0.001	0.002
	(0.012)	(0.012)	(0.013)
Observations	445	445	445
R^2	0.527	0.594	0.594
Panel B:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Census Data)	0.005	0.001	0.002
	(0.012)	(0.012)	(0.013)
Observations	445	445	445
R^2	0.527	0.594	0.594
Panel C:	Employment Rate		
	(1)	(2)	(3)
Forced Migration Intensity (Registry Data)	0.004	0.003	0.005
	(0.025)	(0.024)	(0.026)
Observations	445	445	445
R^2	0.527	0.594	0.594
Covariates	Yes	Yes	Yes
County FE	No	Yes	Yes
Additional Controls	No	No	Yes
Area FE	No	No	Yes

Notes: This specification uses a sample of townships that was matched on observable characteristics through a propensity score matching (PSM) method. The point estimates are obtained from regressing the employment rate in 2011 on our three forced migration intensity measures. Panel A shows the results from the estimations using the share of Germans in 1941 as our measure of forced migration intensity, Panel B uses our population adjusted measure based on Census data, and Panel C uses the population adjusted measure relying on Registry data. The most demanding specification in Column 3 includes county fixed effects, additional controls for geographic variables, area ('jaras') fixed effects, and all our township level covariates from both 1941 and 2011. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at the township level.