SCARED STRAIGHT? THREAT AND ASSIMILATION OF REFUGEES IN GERMANY

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ABSTRACT

This paper studies the effects of threat on convergence to local culture and economic assimilation of refugees, exploiting plausibly exogenous variation in their allocation across German regions between 2013 and 2016. We combine novel survey data on cultural preferences and economic outcomes of refugees with corresponding information on locals, and construct a threat index that integrates contemporaneous and historical variables. On average, refugees assimilate both culturally and economically. However, while refugees assigned to more hostile regions converge to local culture more quickly, they do not exhibit faster economic assimilation. Our evidence suggests that refugees exert more assimilation effort in response to local threat, but do not integrate faster because of higher discrimination in more hostile regions.

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1   Introduction

The increase in international migration flows has put the issue of immigrant assimilation at the forefront of the political debate. Adding to the movement of hundreds of millions of economic migrants, there has been an unprecedented rise in the number of refugees. The recent Russian invasion of Ukraine has forced more than 6 million individuals to leave the country since February 24, 2022 (UNHCR, 2022). Moreover, it is estimated that as many as 1 billion individuals may be forced to relocate because of climate change by 2050 (United Nations, 2020). Concerns about refugees' ability or willingness to assimilate in host societies are recurring themes within the debate over what is often referred to as the refugee crisis.

In recent years, several European countries have introduced integration policies, such as restrictions on dressing habits of Muslim women – a move that is supported by a substantial proportion of citizens.[1] In 2016, Germany passed the *Integration Act*, which prohibited the free movement of refugees for fear of "refugee ghettos". These and similar policies are often motivated by the idea that top-down pressure promotes refugees' assimilation. While the effects of government interventions have been extensively evaluated in the literature (Abdelgadir & Fouka, 2020; Bandiera et al., 2019; Fouka, 2020; Lleras-Muney & Shertzer, 2015), less is known about the impact of locals' attitudes and behavior on the integration of refugees. Yet, assimilation pressure exerted, directly or indirectly, from the bottom-up by citizens at the local level may be at least as important as formal, top-down policies.

In this paper, we study the effects of local threat and hostility on refugees' convergence to local culture and on their economic assimilation. The relationship between threat and assimilation is *ex-ante* ambiguous. On the one hand, a more friendly environment might make it easier for refugees to integrate by facilitating inter-group interactions. Similarly, lack of openness and forced assimilation may trigger backlash among immigrants, who try to preserve their own cultural norms. On the other hand, natives' hostility may heighten refugees' incentives to signal allegiance to the nation and its values – a process we label "threat hypothesis". However, faster cultural convergence triggered by threat may not coincide with successful economic and social integration. For one, out-group members may use cultural convergence as a signaling device, changing only more superficial (and observable) social norms. Moreover, in areas with higher

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[1]For instance, a majority of European voters are in favor of introducing bans on Islamic veils. See: https://www.pewresearch.org/global/2010/07/08/widespread-support-for-banning-full-islamic-veil-in-western-europe/.

threat, the majority group may discriminate more against minorities for any level of effort exerted by the latter to assimilate.

We take these ideas to the data in the context of Germany, which received more than 1.6 million refugees between 2013 and 2018. To measure regional cultural convergence, we construct an index of cultural similarity between refugees and locals combining two datasets. First, we use the novel IAB-BAMF-SOEP Survey of Refugees – a longitudinal and nationally representative survey that collects information on socio-demographic characteristics as well as values, habits, and preferences of around 8,000 refugees. Second, we take preferences and values of more than 30,000 locals from the German Socio-Economic Panel (SOEP).

We define cultural similarity in stated preferences at the individual (refugee) level as follows. We select the eight questions that capture cultural preferences and are available in both surveys (risk attitudes, type and frequency of leisure activities, positive and negative reciprocity, interest in politics, trust, locus of control, and views over fairness in the society).[2] All these cultural traits are strongly associated with political orientation, ideology, and social attitudes of SOEP respondents in our sample. They have also been shown to correlate with individual behavior and preferences, such as tax evasion, propensity to participate in protests, preferences for redistribution, and moral values (Bergolo et al., 2020; Cantoni et al., 2022; Enke, 2020), and to vary substantially across countries (Falk et al., 2018).

For each trait, we compute the distance between the answer provided by a refugee and that given by all locals living in the region at baseline. We then aggregate the question-specific difference using an index of Euclidean distance, which captures the shortest, unweighted distance between two points in the cultural space (Cha, 2007). From the same survey datasets, we also obtain self-reported measures of labor force participation and wages of both refugees and locals, which we use to analyze the economic convergence of refugees, relative to baseline economic outcomes of locals. We validate self-reported measures of economic assimilation using administrative data, linking survey respondents to administrative records that contain daily information on refugees' employment and wages.

Our empirical strategy exploits the quasi-random allocation of refugees that arrived at different points in time between 2013 and 2016 across German NUTS-2 regions. To address the concern that refugees may selectively relocate to regions whose cultural preferences are more similar to theirs, we rely on an Intention to Treat (ITT) approach that

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[2]Results are not sensitive to the exact set of questions included.

measures both refugees' outcomes and the local environment in the region of assignment, rather than that of residence. In our preferred specification, we control for individual characteristics, district fixed effects, and interactions between year dummies and baseline district characteristics.[3] We find strong evidence of both cultural and economic convergence.

Then, we turn to the role of local hostility, which we measure using different proxies for anti-minority sentiments – from historical pogroms to the vote share of modern far-right, anti-immigrant parties to ethno-centrism of locals. Since local threat may be endogenous to refugees' inflows, all variables are measured before the outcomes of individuals in our sample are recorded. To express these different components in a single variable, we combine them into a principal components index, which we validate using refugees' self-reported fears about xenophobia and feelings of being welcome in Germany.

Consistent with refugees responding to local pressure, cultural convergence is faster in regions with higher threat. Comparing a refugee allocated to a region at the 75th percentile of the distribution of the threat index to one allocated to a region at the 25th percentile, the former is 70% closer to local culture than the latter, after one year. Also in line with threat-induced assimilation, refugees who experience more anti-immigrant demonstrations in the region of assignment during the first six months since their arrival exhibit higher cultural similarity to locals in subsequent years. Yet, despite the faster cultural convergence, refugees assigned to areas with a higher threat index do not display more rapid economic assimilation. This holds both when measuring refugees' economic outcomes relative to those of locals in the region and when considering them in absolute value.

We go beyond the eight traits included in our cultural similarity index, and consider a set of "core" values, such as attitudes towards women's rights, support for democracy, and religiosity. Since we are unable to measure the corresponding preferences for locals, we consider absolute (rather than relative) cultural change. We find that refugees assigned to more threatening areas are more supportive of democracy and decrease attendance of religious events over time. At the same time, threat does not influence gender norms and the importance of religion among refugees.

We provide evidence that our results are not driven either by *ex-ante selection* on the side of authorities or by *ex-post sorting* on the side of refugees. In particular, we show that our findings are unlikely to be influenced by: *i*) changes in the composition

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[3]In Germany, there are more than 400 districts (which correspond to NUTS-3 regions), or *Kreisfreie Städte*, with an average number of 180,000 inhabitants. Germany has 38 NUTS-2 regions and 16 NUTS-1 regions (Federal States).

of refugees – e.g., with individuals who are more likely to converge towards local culture or economically integrate to move to Germany over time; ii) changes in assignment policies over time – e.g., refugees being assigned to places with different cultural and economic characteristics and threat levels; and, iii) selective internal migration – e.g., with refugees relocating to areas that are a better cultural or economic match for them or differential out-migration from threat regions.

We also verify that results are: not driven by selective survey attrition; robust to alternative definitions of cultural similarity and threat (including cultural similarity and threat index measured at endline, rather than at baseline); and, not driven by selective out-migration of locals or changes in their cultural preferences over time. Results are also robust to dropping potential outliers, conducting the analysis at different geographical levels, accounting for spatial correlation in the error term, excluding individuals interviewed multiple times (to address concerns of bias in difference-in-differences designs with heterogeneous treatment effects, De Chaisemartin & d'Haultfoeuille, 2020; Goodman-Bacon, 2021), and estimating 2SLS regressions instrumenting threat in the region of residence with that in the region of assignment. Finally, we run a horse-race between threat and other local variables, such as the size of ethnic enclaves, different proxies for local economic structure, and measures of cultural distinctiveness, which may be correlated with local hostility and simultaneously influence refugees' assimilation.

As anticipated above, one interpretation for our results is that threat induces refugees to exert more effort to learn and adopt local culture; yet, locals living in areas characterized by higher threat may discriminate more against minorities, hindering the successful (social and economic) assimilation of the latter. This is consistent with assimilation being a two-sided process (Fouka et al., 2022). Out-group members can choose if and how much effort to exert in order to learn local norms and culture. Such effort does not lead to successful assimilation, unless locals (i.e., in-group members) accept refugees into their group. Interpreting self-reported cultural preferences as a measure of assimilation effort, our findings suggest that threat-induced pressure leads out-group members to exert more effort. Yet, the same level of effort is less likely to translate into successful assimilation (proxied for by economic outcomes) in more hostile environments. Despite higher effort, refugees are not more likely to be employed or to have higher wages in areas where the threat environment is stronger. In the second part of the paper, we provide different pieces of evidence consistent with our preferred interpretation.

First, we find that threat increases refugees' assimilation only along margins where cooperation with locals is not needed (e.g., attendance of voluntary integration courses).

Relatedly, refugees assigned to areas with higher threat are less likely to have interactions with locals, either as co-workers or as customers. Second, we document that threat-induced convergence is stronger among more vulnerable refugees, such as women, less educated individuals, and families with children. Third, we show that the effects of threat are stronger in places where one's ethnic enclave is smaller, and refugees may thus feel less protected from natives' hostility. Fourth, our analysis reveals that refugees in high threat regions converge faster to the preferences of locals who are employed. This is consistent with threat leading refugees to conform to the norms set by the individuals that are perceived as "resource-holding" within the majority group.

Finally, we provide suggestive evidence on the behavior and attitudes of locals by estimating panel regressions that control for district and survey year fixed effects, and interact the (regional) threat index with the refugee share of the district population. Locals living in areas with a higher threat index are more likely to express xenophobic views against refugees, as the size of the latter increases. This holds even though refugees assigned to more threatening areas converge faster to local culture. These patterns are mirrored by locals' behavior: refugee inflows lead to more frequent endogamous mating among locals living in areas with a higher threat index.[4]

Taken together, our results indicate that, even though hostility may increase the extent to which minorities adopt local culture in the short-run, this does not translate into faster or more successful assimilation. Furthermore, it is unclear whether threat-induced faster cultural convergence is long-lasting. In fact, threat may eventually discourage minorities from exerting effort to assimilate, leading to lower, rather than higher, assimilation in the medium to long-run. Also, and importantly, our analysis does not consider the mental, physical, and social costs suffered by individuals facing hostility (Benner et al., 2018; Graeber & Schikora, 2021; Schilling & Stillman, 2021; Walther et al., 2020).

Our paper is related to different strands of the literature. First, we contribute to the literature on assimilation and cultural transmission. Several papers have studied the effects of government policies and local pressure on the assimilation of minorities. While some works find that forced assimilation backfires, due to backlash among minorities (Abdelgadir & Fouka, 2020; Fouka, 2020; Dahl et al., 2021; Glover, 2019), others document that government and social pressure may foster assimilation (Bisin & Tura, 2019; Fouka, 2019; Saavedra, 2021). We complement these works by focusing on refugees in the German context, and by measuring both threat and assimilation at the local –

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[4]Using data from Twitter and from the presence of local (pro-refugees) NGOs, we do not find evidence that faster cultural assimilation in high-threat regions stems from integration activities organized by locals (or, non-profit organizations).

rather than national – level. Moreover, relying on rich survey data allows us to directly measure stated preferences of both minorities and majority group members.

In the context of migration, economists have analyzed immigration-induced changes in preferences of natives (see Alesina & Tabellini, 2022, for a recent review), the influence of emigrants on the cultural dynamics of the origin community (Barsbai et al., 2017; Rapoport et al., 2021), and changes in or the persistence of immigrants' preferences (Abramitzky et al., 2020a; Fernández & Fogli, 2009).[5]

Our paper is also related to the vast and growing literature on the economic integration of refugees in high-income countries (see Becker & Ferrara, 2019, and Brell et al., 2020, for recent reviews). Closest to our paper, Aksoy et al. (2021) use data from the Survey of Refugees to show that more favorable labor market conditions and more open attitudes among locals promote the economic and cultural integration of refugees. We complement their findings in at least three ways. First, we construct a measure of convergence to local – as opposed to national – culture. Second, we develop a comprehensive measure capturing immediate threat, rather than attitudinal openness, faced by refugees. Third, our empirical strategy relies on weaker identifying assumptions and allows us to study the speed, rather than the level, of assimilation. These differences may explain why our findings on cultural assimilation diverge from those in Aksoy et al. (2021).[6]

Finally, our work speaks to the literature that leverages the quasi-exogenous allocation of refugees within Germany to assess the effect of local characteristics on a wide range of economic outcomes (Bahar et al., 2022; Battisti et al., 2021). More broadly, we complement the growing literature on the causes and consequences of the post-2015 refugee inflow to Germany and Europe (Battisti et al., 2019; Busch et al., 2020; Deole & Huang, 2020; Gehrsitz & Ungerer, 2022; Giavazzi et al., 2020; Hangartner et al., 2019; Hilbig & Riaz, 2022; Martén et al., 2019).

The remainder of the paper is structured as follows. Section 2 describes the institutional background. Section 3 presents the data. Section 4 lays out the empirical strategy. Section 5 presents the main results, and Section 6 examines the mechanisms. Section 7 concludes.

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[5]Our work is also related to Boelmann et al. (2021), who study how German reunification, and the ensuing regional migration, changed the working behavior of female migrants who moved between the East and the West of Germany.

[6]As explained in Section 4, we rely on the consistent allocation of refugees across districts over time, while most existing papers, including Aksoy et al. (2021), exploit the (quasi-random) allocation of refugees across districts conditional on controls at a given point in time.

2 Background: Refugee Migration to Germany

Germany has been one of the main destinations for refugees in Europe. Between 2015 and 2018 alone, a total of 1.6 million asylum applications were filed in Germany, amounting to over 40% of all applications in the European Union during this time (Eurostat, 2021). The surge in asylum applications followed the eruption of the civil war in Syria and the growing threat of the so-called Islamic State in Iraq. Starting in 2011, an increasing number of refugees fled to neighboring countries, moving westward to seek protection in Europe. The movement of hundreds of thousands of refugees from Syria and Iraq through Turkey and the *Balkan Route*, crossing Greece, Serbia, Croatia, or alternatively Hungary, rippled into an even larger and more diverse movement of people, including asylum seekers from Albania and Kosovo.

The number of asylum applications in Germany peaked in late 2015, following Angela Merkel's highly contested decision to admit refugees that were stranded in Hungary (Figure 1). This decision was a deviation from the Dublin Regulation, which assigns the responsibility of administering an asylum request to the country of first-entry. However, the regulation was effectively (though not officially) abandoned before September 2015, as registration and administrative capacities in Italy and Greece ached under the immigration pressure, and most refugees desired to move to Northern Europe. In order to curb the number of refugees, in March 2016, the European Union established a treaty with Turkey that encouraged stricter controls by Turkish authorities at its Western shores. Turkey agreed to take back refugees from Greece, and resettle local refugees in the European Union. The treaty, in combination with the closing of the Southern Hungarian border, led to a steep decline in asylum applications in Germany, which have remained relatively low (at pre-2014 levels) since then.[7]

Despite early warning signs, such as increasing numbers of refugees in Iraq and Syria's neighboring countries and growing refugee inflows across Europe, German authorities remained ill-prepared for the upcoming influx. The accommodation of hundreds of thousands of refugees within a few months proved to be a major challenge for Germany. The main tool for the distribution of refugees across States (*Bundesländer*) was the so-called *Königsteiner Schlüssel*, which allocated refugees according to a State's economic capacity (tax revenues) and population. States themselves could then distribute refugees within their districts, following independent but similar criteria. Focusing on 2016, Figure A.1 shows that the local presence of refugees is consistent with the distribution

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[7]Yet, Germany has received more than 900,000 Ukrainian refugees since February 2022 (UNHCR, 2022).

that would have arisen under the the assignment through the *Königsteiner Schlüssel*.

The German government sought to allocate refugees depending on the availability of housing at the local level, taking into account their demographic characteristics (such as age, gender, family status, and country of origin). However, for the most part, the pace of refugee arrivals left no room either for one-on-one conversations with assignment officers or for in-depth analyses of refugees' profiles. Within a short period of time, the available accommodations were filled up and local authorities had to rely on alternative solutions, such as vacant houses, empty hotels, old military barracks, schools, and improvised container colonies and tents (Baier & Siegert, 2018).

Beyond the initial assignment to accommodations within states, refugees had the ability to self-relocate under certain circumstances. Those who were still in the asylum application process or who had already been rejected were not allowed to move within the first three months of stay in Germany. Many of the rejected asylum applicants receive a special status, by which they are not officially refugees but whose stay in the country is tolerated (*Duldung*). Until August 2016, accepted applicants as well as persons with *Duldung* and pending applications that passed the three month mark were allowed to move freely across Germany.

Economic pull factors and large secondary migration fueled the fear of parallel societies if refugees were to choose their place of residence freely. Consequently, lawmakers passed the *Integration Act* in the summer of 2016, restricting the free movement across states even for asylum seekers with approved status for the first three years. Six out of sixteen states (mainly the wealthiest and most densely populated states, such as Bavaria, Baden-Württemberg, and North Rhine-Westphalia) tightened the law further, prohibiting refugees to move out of the districts they were initially assigned to, unless they could earn their own living.

In general, asylum seekers whose application has not yet been processed have access to the labor market after a waiting period of three months, except if they come from a so-called safe country of origin. The same period applies to persons with tolerated status, i.e., individuals whose asylum application has been rejected but for whom it is currently not possible to leave the country. The work permit is issued only for a specific job after review by the authorities. Instead, persons with approved asylum status can enter the labor market without any restriction.

3 Data and Measures of Threat and Assimilation

3.1 Data Sources

The German Socio-Economic Panel. The German Socio-Economic Panel (SOEP) is a large, nationally representative longitudinal study that surveys around 15,000 households and about 30,000 individuals every year since 1984, mostly in face to face interviews. The SOEP includes rich information on demographics, socio-economic status, and migration background of respondents. It also reports the state, the region, and the district of residence of respondents.[8] This allows us to construct a measure of local culture that we can match to the answer given by refugees at the same level of aggregation (district, region, and state). In our baseline analysis, we consider all local residents (other than refugees, i.e., respondents of SOEP-Core) between 18 and 66, regardless of their nativity.[9]

The refugee survey. We complement the SOEP with waves 1 to 3 (survey years 2016-2018) of the IAB-BAMF-SOEP Survey of Refugees to measure refugees' preferences over time. This is a longitudinal, representative survey of refugees, asylum seekers, and their family members in Germany (Brücker et al., 2016). The survey is conducted jointly by the Institute for Employment Research (IAB), the Research Center of the Federal Office of Migrants and Refugees (BAMF FZ), and the SOEP at the German Institute for Economic Research (DIW Berlin). The sampling frame of the survey is the Central Register of Foreigners in Germany, where each foreign citizen is registered by her or his legal status. The target population is composed of individuals arrived as asylum seekers in Germany between January 1, 2013, and December 31, 2016, irrespective of their current legal status. The total sample includes about 8,000 adult respondents (18 years and older), who were surveyed up to three times between 2016 and 2018.[10] As for locals, we restrict attention to individuals between 18 and 66, in order to focus on working-age population. Additionally, we exclude from the sample refugees that have been in the country for more than 6 years (less than 1% of the sample) as of the latest survey year in 2018. We impose this restriction because these individuals arrived well before the 2015 refugee crisis, and are thus not comparable to the population of refugees considered in our paper.

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[8] We use data version 36, including years 1984-2019 (SOEP, 2020). For more details on sampling, fieldwork, data structure, and content of the SOEP, we refer to Goebel et al. (2019).

[9] The age restriction is imposed to focus on working age population. Results are robust to omitting this restriction. Results are also unchanged when restricting attention to German-born locals to define economic and cultural variables.

[10] See Kühne et al. (2019) for more details.

The main questionnaire includes more than 400 questions regarding migration, employment and education history, socioeconomic and demographic characteristics, health status, measures of social and political integration, as well as values and attitudes. This data is complemented with a questionnaire conducted at the household level that asks questions about housing, living conditions, and welfare benefits. Crucially for our purposes, the refugee survey is designed to closely match the questions in the SOEP, and both sample and the interview process are similar between the two surveys. This feature ensures the comparability of the two surveys – a key condition to study differences in values and attitudes between refugees and locals.

Administrative data on refugees' labor market outcomes. We exploit a novel feature of the refugee survey that allows us to link individual respondents to administrative data on daily employment and wages (Keita & Trübswetter, 2020). We use this data, whose details are presented in Appendix C.1, to calculate alternative measures of economic assimilation for the record linkage sample. The administrative data reduces concerns about misreporting of employment or wages in the survey sample. We also retrieve the share of foreigners (non-German citizens) working in the company where refugees are employed on June 30th of the year of the survey.

Additional datasets. We complement the datasets described above with additional data sources. First, we obtain total population and the number of refugees at the district level at baseline (December 2012) from the German Federal Statistical Office (Destatis, 2021). Second, we retrieve data on regional unemployment rates across districts and the employment rates and median wages of immigrants at baseline (NUTS-2 and region-of-origin-specific) from the statistics department of the Federal Employment Agency (Bundesagentur für Arbeit, 2020). Third, as additional proxies for locals' attitudes, we collect: i) Twitter posts in German from 2013 to 2018 that contain the hashtag #refugeeswelcome; and, ii) the number of NGOs in a NUTS-2 region that were active as of 2017. Both datasets are described in detail in Appendix C. Finally, we collect data to construct the local threat index from multiple sources, which we describe when introducing the index in the next section.

3.2 Measurement

Threat environment. We define local threat by focusing on NUTS-2 regions, and considering different variables. First, we collect historical data on pogroms and violence against Jews from Voigtländer & Voth (2012), and the 1933 vote share of the Nazi-

party from Falter & Hänisch (1990). Second, we obtain data on political attitudes in more recent times: the 2013 vote share of the far-right, anti-immigrant National Democratic Party (NPD) from the Federal Elections Office (Bundeswahlleiter, 2020), and the frequency of marches organized by the far-right political groups between 2005 and 2012 from Kanol & Knoesel (2021). Third, we use attacks against mosques between 2001 and 2011 from Colussi et al. (2021). Finally, we measure ethno-centrism of locals by combining anti-immigrant and anti-diversity attitudes from ALLBUS (2021) (pooling the survey years 2008, 2010, and 2012),[11] and an inverse measure for "openness" – a sub-dimension of the Big-5 personality traits associated with ethnocentrism from the SOEP.[12] We describe all the components of the index and their sources in Table A.1.

In order to measure threat in a single index, we calculate the first principal component of each measure just described. We plot the threat index across NUTS-2 regions in Figure 2, both unconditional (left panel) and conditional on state fixed effects (right panel). Table A.2 reports the correlation between the various components of the index. Both the index and its components display significant regional variation, and the individual dimensions seem to be geographically correlated with each other. Overall, threat levels are most pronounced in Eastern Germany – a pattern especially apparent for the right-wing vote. This is in line with the literature connecting a history of socialism with right-wing attitudes (Acemoglu et al., 2022; Lange, 2021).

We validate our measure of threat in Figure A.2. In the left panel, we report the residual bin-scatterplot for the relationship between a self-reported measure of fears about xenophobia that ranges from 1 to 3, with higher values reflecting more concerns, expressed by refugees (y-axis) and the threat index (x-axis). The corresponding regression partials out survey year fixed effects, months since arrival, and individual characteristics.[13] There is a positive and statistically significant relationship between the two variables, indicating that refugees assigned to regions with a higher threat index are more likely to report concerns about xenophobia. The right panel confirms these patterns using refugees' answer to the question of whether they feel welcome in Germany (on a 1 to 5 scale, with higher numbers referring to more inclusive feelings). Figure A.3 shows that such relationship holds for both women (Panel A) and men (Panel B), even though the patterns are stronger for the former than for the latter, suggesting that

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[11]ALLBUS (The German General Social Survey) is a survey conducted every two years since 1980, which elicits attitudes and behavior of residents. A representative part of the survey population participates also in face-to-face interviews.

[12]Research in social psychology found a consistent association between openness to experience and ethnocentrism. See, for instance, McCrae (1996), Butler (2000), and Jost (2006).

[13]Individual controls are: gender, age, age squared, kids born before arrival in Germany, country of origin, marital status and location of partner as well as work experience and education upon arrival.

women may be responding more than men to threat. We return to this idea in our analysis, below.

All components of the threat index described above are measured before the inflow of refugees in our sample to reduce concerns of endogeneity (as natives' hostility may change with the arrival of refugees). In Appendix B.6, we replicate results using a contemporaneous measure of threat, whose components are described in Appendix C.3.

Cultural traits. To measure convergence to local culture, we build on the existing literature (Alesina et al., 2017; Bertrand & Kamenica, 2018; Desmet et al., 2017; Desmet & Wacziarg, 2021; Rapoport et al., 2021), and exploit high frequency attitudinal data from the refugee survey. We construct an Euclidean measure of cultural proximity between each refugee and all locals living in the NUTS-2 region of assignment, rather than at the national level. This measure allows us to examine whether, over time, refugees' preferences become closer to those reported by locals at baseline. We describe the construction of this index in more detail below.

When defining the local context, we face a trade-off between granularity and representativeness. Although we can observe respondents' location at the district level, some districts host fewer than 20 non-refugee respondents. For this reason, we prefer to use a higher aggregation level: the NUTS-2 region.[14] The cultural dimensions used in our analysis arise from the overlapping questions in the refugee survey and in the SOEP. We consider the 8 questions that are systematically available for both locals and refugees and that, in our view, are best positioned to capture cultural preferences and social norms. These are: risk attitudes, negative and positive reciprocity, frequency of different types of leisure and cultural activities (sports, movies, restaurants, opera, etc.), interest in politics, locus of control, generalized trust, and views over fairness in society. Table A.3 reports all questions, together with the exact wording and the range of possible answers.[15]

In Table A.5, we present the correlation between each of the traits considered in our analysis and several proxies for political orientation, cultural and social attitudes, and preferences for redistribution and altruism of SOEP (local, i.e., non-refugee) respondents.[16] Panel A documents that, in most cases, there is a strong correlation between the cultural traits included in our analysis and political preferences of individuals in-

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[14]Germany has 38 NUTS-2 regions, which gives us a sufficient number of observations per region to reduce measurement error, while also capturing the relevance of local culture.

[15]In Appendix B, we verify that results are robust to including additional survey questions (reported in Table A.4).

[16]See Table A.6 for the exact wording of each variable. In Table A.5, we adjust standard errors to account for multiple hypotheses testing using the procedure in Clarke et al. (2020), Romano & Wolf (2016), and Romano & Wolf (2005a,b).

terviewed in the SOEP, and that the patterns are consistent with the literature (Block & Block, 2006; Carney et al., 2008; Littvay et al., 2011).[17] A similar picture emerges from Panels B and C, which consider cultural preferences (e.g., support for same-sex marriages, views towards gender roles, and religiosity) and altruism and preferences for redistribution, respectively. These results are again consistent with the literature (Falk et al., 2018).

Overall, Table A.5 suggests that the traits we focus on encompass and are correlated with key political, cultural, and social preferences. This should not be surprising, since they have also been shown to predict political and economic behavior in a variety of settings. For instance, Cantoni et al. (2022) document that risk preferences and positive reciprocity are determinants of protest participation. Bergolo et al. (2020) show that lower locus of control and higher altruism are positively correlated with tax evasion. Littvay et al. (2011) and Kam (2012) find that political participation is increasing in self-efficacy and risk tolerance, respectively.[18]

Returning to our context, there is substantial variation in local preferences across regions. Figure A.4 illustrates this point by plotting the distribution of positive and negative reciprocity among locals across NUTS-2 regions in 2010. Similar patterns hold for the other cultural dimensions. While cultural preferences display substantial geographic heterogeneity, they tend to be highly persistent over time. In Figure A.5, we plot the average and standard deviation of locals' preferences over time, for each of the components of the index. Despite the wide time frames (between 10 and 15 years) and the potential changes in the demographic composition of the population, local preferences remain remarkably stable. This suggests that the traits included in the cultural similarity index are geographically anchored and hardly malleable on the local side.

Defining cultural similarity. Different statistical measures can be used to capture distance, entropy, or divergence (Cha, 2007). Most of these are derivatives of the Minkowski norm, which is defined as $D_{mink}(X, Y) = \sqrt[p]{\sum_{i=1}^{n} |x_i - y_i|^p}$, where X and Y are two independent probability density functions. The most frequently used measure of cultural distance, at least within economics, is the Euclidean distance, which belongs

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[17]For instance, higher levels of positive reciprocity and trust are associated with higher satisfaction in German democracy and with stronger concerns about climate change. Individuals who report higher negative reciprocity are more likely to have right-leaning political preferences and to be worried about immigration. As expected, respondents that are more interested in politics are more likely to have participated in recent elections. They are also less worried about immigration, more concerned about climate change, and more likely to hold a left-leaning political ideology.

[18]Interestingly, in our sample there is a negative, albeit only marginally significant, relationship between risk tolerance and the probability of having voted in parliamentary elections.

to the group of geometric distances (Alesina et al., 2017; Bertrand & Kamenica, 2018; Rapoport et al., 2021). Intuitively, it captures the shortest, unweighted distance between two points in the cultural space.[19]

Following the literature, we use the Euclidean distance to capture the cultural proximity between a refugee and a local (non-refugee) resident in the same NUTS-2 region (where the refugee was assigned). For each of the questions in Table A.3, we first calculate the pairwise differences between the refugee and all locals, $x_i - y_i$. Then, we square those differences and take the mean. Finally, we calculate the square root of this term so as to obtain the Euclidean pairwise distance between the individual refugee and all individuals living in the same NUTS-2 region for a specific question $D_{Eucl}(X,Y) = \sqrt[2]{\sum_{i=1}^{8}(x_i - y_i)^2}$. We then take the mean Euclidean distance over all refugee-local pairs and all questions, and invert this term to get a cultural similarity measure.

To isolate refugees' convergence to local culture, we fix responses of local residents at baseline. While locals' preferences may change in response to refugee inflows, making our baseline measure less accurate, we want to prevent our proxy for cultural convergence from being influenced by locals moving closer to refugees. Therefore, we take locals' responses to a specific question in the year before the large influx of refugees starting in 2014. When a question was not asked in 2013, we use the closest observation year possible.[20] This guarantees that the index of cultural proximity is constructed using pre-determined preferences of locals. Appendix B verifies that there is no correlation between any of the dimensions we include in the index (for locals) and the inflow of refugees over time, regardless of the level of threat prevailing in the region. It also documents that results are unchanged when measuring locals' preferences at endline.

We illustrate the average cultural similarity between refugees and locals across regions in Figure A.6.

Additional cultural values. The cultural similarity index allows us to measure refugees' convergence towards the values of locals living in the same region along several key traits. We complement this relative measure with a set of questions that were only asked in the survey of refugees but are not available for locals. Specifically, in Section 5.2.3, we examine the evolution of refugees' views towards gender equality, support for democracy, and religiosity in absolute terms. Appendix C.2 provides a detailed description of each variable.

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[19]Specifically, the Euclidean Distance is part of the Minkowski family with $p = 2$.

[20]All questions were asked before 2014 (in 2013, 2012, or 2010).

Economic assimilation. We measure economic assimilation using a strategy similar to that described above for cultural convergence. Specifically, we take the self-reported employment status (either zero or one) of each refugee, and subtract from it the baseline average employment rate of locals in the same NUTS-2 region (taken from administrative data sources of Bundesagentur für Arbeit, 2020). For the sub-sample of individuals who are employed, we replicate this procedure for earnings, taking the absolute value of the difference between the wage earned by the refugee and the median wage of locals in the same NUTS-2 region.[21] For the sub-sample of employed refugees, we can link survey information to administrative employment data, addressing potential biases stemming from misreporting of employment status by refugees. We therefore also construct the very same measures of economic assimilation using these data.

3.3 Descriptive Statistics

Table 1 reports the summary statistics for the main variables and the characteristics of refugees (Panel A) and locals (Panel B), for the full sample and separately for regions above and below the median value of threat (-.63). On average, the cultural distance between refugees and locals is -1.91, with very similar values and distributions in high and low threat regions. The average refugee in our sample has been in Germany for 29 months; again, this number is similar in high and low threat regions. On average, the employment gap between locals and refugees is 50%, and, among those employed, refugees earn 840 Euros less than locals.

Table 1 also presents summary statistics for additional variables considered in our analysis, such as attending integration and language courses, and time spent with Germans. Along all dimensions, refugees assigned to low-threat regions tend to report slightly lower values. Consistent with the more formal evidence documented below, refugees seem to integrate in the host region quickly: more than 50% of the individuals in our sample are or have been attending integration courses, and 14% of those who are in a relationship have a partner who was born in Germany at the time of interview. Moreover, according to the assessment of the interviewer, refugees' proficiency in German tends to be intermediate-level.

More than three in four refugees in our sample come from Syria, Afghanistan, or Iraq; Africa and the West Balkans account for another 10% of respondents (not shown). Refugees are more likely to be male and younger than locals, and only about a third of

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[21]Since, in general, refugees' employment and wages significantly lag those of locals (Brell et al., 2020), results are very similar when focusing on absolute, rather than relative, convergence.

them arrive with a secondary school leaving certificate (as compared to 85% of locals). About 17% of locals have a migration background, with the largest group coming from Poland.[22]

Panel C reports district-level controls used in the main analysis as well as the (regional) threat index. High threat regions are characterized by higher unemployment, lower population density, and a lower share of refugees. Mechanically, the threat index is higher in regions above the median. However, as shown in Table A.7, its components display substantial variation. Somewhat surprisingly, historical variables (1920s pogroms and 1933 NSDAP vote share) are not higher in regions where the index is higher. In fact, pogroms are lower in those regions where the overall threat index is above the median. A similar pattern emerges for 2001-2011 attacks against mosques, implying that the variation behind the threat index does not load onto either historical anti-Semitic attitudes or recent attacks against mosques. This is consistent with the decomposition of results presented below, where we show that neither historical threat variables nor attacks against mosques have an effect on cultural convergence. Instead, natives' attitudes towards refugees from ALLBUS (2021), the 2013 NPD vote share, and participation in far-right marches are all higher in regions with the threat index above the median.

Table A.8 presents summary statistics for additional variables, including each cultural dimension separately for refugees and locals. Risk aversion is higher among the former, consistent with the literature on risk-taking adjustment after traumatic events (Ceriani & Verme, 2018; Bialy et al., 2017). Refugees also report lower values of negative reciprocity, but higher values of positive reciprocity, relative to locals. Both groups report intermediate values for locus of control and for views over fairness of society. Refugees are instead less interested in politics, less likely to consume leisure time, and report slightly lower generalized trust than locals. Notably, preferences of refugees and locals are very similar in regions above and below the median of the threat index.

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[22]Given the high share of non-native local residents, Appendix B replicates the analysis defining the cultural similarity index by restricting attention to locals born in Germany.

4 Empirical Strategy

4.1 Estimating Equation

To study how local threat influences refugees' cultural and economic assimilation with each additional month spent in Germany, we estimate:

$$Y_{idrt} = \gamma_d + \gamma_t + \beta_1 MSA_{it} + \beta_2 MSA_{it} \times Threat_r + X'_{it} + Z'_{dt} + Q_{it} + \epsilon_{idrt} \qquad (1)$$

where Y is either cultural or economic assimilation (relative to the local population in the same NUTS-2 region r) of refugee i in district d and survey year t; MSA refers to months since arrival of the refugee; and, $Threat$ is the threat index for region r described in Section 3.2. The key regressor of interest is the interaction term between MSA and threat. The coefficient β_2 captures the differential effect that each additional month has on the assimilation of a refugee when spent in a region with a different level of threat. Positive values of β_2 would indicate that refugees converge faster (economically or culturally) in areas with higher threat.

In our preferred specification, we control for: i) district fixed effects, γ_d, which absorb any district-specific, time invariant characteristic, including the threat index (defined at the NUTS-2 region); ii) baseline district level variables (unemployment rate, population density, and share of asylum seekers) interacted with year dummies, Z'_{dt}; iii) individual characteristics (gender, age, age squared, country of origin, and marital status, dummy for children living in the household born before arrival, work experience, and education upon arrival), X'_{it}; and, iv) refugee specific time-varying dummy variables, Q_{it}, to account for compositional changes in the questionnaire and refugees' responses (or missing values). The latter control guarantees that we compare refugees that answered the same set of attitudinal questions over time.

We use the region of assignment – rather than the region of residence – as the location of treatment, thereby implementing an intention to treat (ITT) approach.[23] Standard errors are clustered at the person-level to account for the fact that some refugees are surveyed repeatedly, following the sampling-based clustering approach proposed by Abadie et al. (2017).[24]

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[23]In Appendix B, we show that results are similar when estimating 2SLS regressions, using threat in the region of assignment as instrument for threat in the region of residence.

[24]Results are robust to clustering standard errors at the district level, and to using Conley (1999) adjusted standard errors to account for potential spatial correlation in the error term (Appendix B).

4.2 Threats to Identification

The key identifying assumption behind our empirical strategy is that the allocation of refugees across German regions did not change over time in a way that was correlated with refugees' prospects of assimilation or with the underlying hostility prevailing in the region of assignment. This would be violated if the "cultural match" between refugees and locals or the economic opportunities available to refugees were to change over time between regions with different levels of threat. For example, officials may have become better able to match refugees to regions on the basis of their cultural similarity in a way that was correlated with the level of threat prevailing in a region. Alternatively, it is possible that, due to the rising number of asylum seekers, refugees arriving later were assigned to areas with more sluggish labor markets, with worse cultural affinity, and with higher levels of hostility. In any of these scenarios, our estimates would be biased due to *ex-ante* sorting of refugees across regions.

A second threat to the empirical strategy is the possible *ex-post* sorting of either locals or refugees. Using an ITT approach addresses the potential relocation decision of refugees (e.g., away from more threatening regions and into more welcoming ones). However, it does not deal with the fact that locals with varying degrees of openness may selectively move away from regions that were assigned a higher number of refugees, and that also varied in their level of threat. Even if cultural similarity between refugees and locals is defined using the culture prevailing in the region at baseline, locals' migration patterns may nonetheless change both incentives for refugees to exert effort and their eventual assimilation.

In Appendix B, we describe in detail the exercises performed to corroborate the validity of our empirical strategy, but we preview the most important ones here. First, we address concerns about *ex-ante* selection of refugees across regions with different characteristics and with different levels of threat. We document that the pre-entry characteristics of refugees, including baseline cultural similarity, assigned to different regions did not change over time. This holds both when considering the full sample and when focusing separately on regions above and below the median of the threat index (Tables B.1 and B.2).

Second, we deal with potential *ex-post* sorting in different ways. Even though the ITT design already deals with this concern for refugees, we directly examine the possibility that the latter selectively moved across regions during our sample period. Reassuringly, there is no evidence of either economic or cultural selection on the side of refugees (Fig-

ure B.1). Exploiting the residency obligation requirement introduced in the summer of 2016, which restricted a subset of refugees to move freely across Germany, we also verify that our estimates are very similar for movers and stayers (Table B.3). In addition, we check that refugees assigned to regions with higher levels of threat are not more likely to out-migrate (Table B.4, Panel A), that refugee inflows are not associated with differential migration of locals (Table B.4, Panel B), and that there is no selective attrition among refugees (Table B.5).[25]

We summarize additional robustness checks after presenting our main results, in Section 5.3 below.

5   Results

5.1   Cultural and Economic Assimilation of Refugees

Figure 3 plots the relationship between months since arrival and both cultural similarity (blue, solid line) and economic assimilation (green, dashed line) in the raw data, without any control. The two lines suggest that the cultural and the economic distance between locals and refugees shrinks over time. We turn to the formal regression analysis in Table 2, presenting results for cultural convergence and for economic assimilation in Panels A and B respectively.[26]

Cultural assimilation.   In column 1 of Panel A, we regress the cultural similarity index (CSI) against months since arrival (MSA), after partialling out survey-question composition fixed effects and individual controls. The coefficient on MSA is positive and statistically significant, confirming the pattern displayed in Figure 3. In columns 2 to 5, we gradually introduce a more stringent set of controls. In column 2, we interact survey year fixed effects with baseline district controls (unemployment rate, population density, and the refugee share of the population). Columns 3 and 4 further include state and NUTS-2 region fixed effects. Finally, column 5 controls for district fixed effects, thereby comparing local convergence between refugees assigned to the same district in different months. The controls and fixed effects of column 5 are those included in our preferred specification, and used in the remainder of the paper.

In all cases, the coefficient on MSA is positive and statistically significant, indicating that refugees converge to local culture as they spend more time in a region. Moreover,

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[25]Refugee out-migration is not sensitive to threat since - even before the residency obligation - logistic and financial restrictions made it hard for refugees to move out of their location of assignment.

[26]Coefficients and standard errors are multiplied by 100 for readability.

the point estimate remains virtually unchanged when including additional controls, suggesting that the allocation process is unlikely to be influenced by factors that may vary over time and correlate with the assimilation trajectories of refugees.[27] To interpret the magnitudes of our estimates, we ask when the average cultural similarity between a refugee and a local would equal that between two locals living in the same region. To do so, we calculate the CSI between all locals in the same region using the pairwise difference between locals. This is, on average, -1.38: as expected, lower (in absolute value) than the distance between refugees and locals (-1.91). According to our preferred specification, refugees close 3% of this gap in one year. Assuming a linear relationship, refugees would halve their cultural distance from locals in about 18 years.

In Table A.11, we present results separately for the various items included in the CSI, adjusting confidence intervals for multiple hypothesis testing (Clarke et al., 2020; Romano & Wolf, 2016, 2005a,b).[28] Refugees converge towards locals' averages for positive reciprocity (column 3), interest in politics (column 7), and leisure activities (column 8), albeit coefficients are statistically significant only for the latter two. Since Table A.11 considers convergence relative to locals, it remains silent about the direction in which refugees' preferences change over time.

In Figure A.7, we plot the change in refugees' preferences by arrival cohort, after partialling out individual controls, interactions between district characteristics and year dummies, and district fixed effects. Over time, refugees consume more leisure and become more interested in politics. These trends are consistent with the convergence results reported in Table A.11, since refugees are, on average, less likely to spend time on leisure and to be interested in politics, relative to locals (Table A.8). Along other dimensions, refugees' preferences seem to change little, except for reciprocity. In the latter case, refugees display a somewhat higher (resp. lower) positive (resp. negative) reciprocity. However, these patterns are noisy, and are not evident among more recent cohorts.

Economic assimilation. In Panel B of Table 2, we turn to economic assimilation, focusing on the most stringent specification (column 5) for brevity.[29] The dependent variable is the difference between an indicator for the employment status reported by a refugee and the average employment rate among locals at baseline. Mirroring results

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[27]Table A.9 adds controls more gradually, verifying that also in this case the coefficient on MSA remains stable. Table A.10 reports the coefficients on individual and district level controls.

[28]The number of observations varies by question, since not all items were asked in all years.

[29]Table A.9 (Panel B) introduces controls more gradually, while Table A.12 reports coefficients on individual and district level controls.

in Panel A, refugees converge to the average employment rate of locals in the region of assignment with each additional month in Germany. According to our estimates, one extra year in the region of assignment reduces the employment gap by 9 percentage points (or, almost 20% relative to the mean). Restricting attention to refugees who are employed, Table A.13 documents that similar patterns hold for wages.

One may be worried that results were influenced by desirability bias or by mis-reporting among refugees. If this were correlated with time spent in Germany, our estimates would be biased. To address this issue, we exploit the fact that the refugee survey can be linked to administrative data (Record-Linkage), which records both employment and wages except for the civil servants, self-employed, family workers, soldiers, and people in military or alternative service (see Appendix C.1). Table A.14 verifies that results are unchanged when using SOEP-Record-Linkage data. While we cannot repeat this exercise for cultural convergence, these patterns suggest that our estimates are unlikely to suffer from social desirability or other sources of reporting bias.

Overall, findings in Table 2 indicate that refugees converge to local culture and integrate economically as they spend more time in a German region. While cultural convergence may be responsible for the increase in employment and wages of refugees, the opposite relationship might hold, with economic assimilation fostering convergence to local culture. Our goal here is not to identify which force (if any) moves first, possibly triggering the other. Rather, we are interested in separately estimating the reduced form relationship between months spent in the region of assignment on the one hand and cultural similarity and economic integration on the other.

5.2 Threat and Assimilation

5.2.1 Main Findings

In this section, we examine how threat influences cultural and economic convergence of refugees at the regional level. *Ex-ante*, the effects of threat on cultural and economic assimilation are ambiguous. On the one hand, a more open environment might make it easier for refugees to integrate, by facilitating social and economic interactions. More-over, lack of openness by the host community may inhibit assimilation or even cause backlash, with refugees being more likely to preserve their own cultural norms in the presence of hostile attitudes of locals (Abdelgadir & Fouka, 2020; Fouka, 2020).

On the other hand, local hostility may increase incentives to assimilate among mi-norities. Refugees assigned to regions with higher threat may feel stronger psychological

pressure and might be more worried about their safety or that of their relatives, because of their distance from locals. As a result, they may exert more effort to learn about and adopt social norms, abandoning their own culture more quickly (Fouka, 2019; Saavedra, 2021). However, assimilation is not a deterministic process, and locals living in more hostile regions may be more likely to discriminate against out-group members, even when the latter exert higher levels of effort. Hence, a higher desire to assimilate might not translate into successful (economic and social) integration.

We test these ambiguous predictions in column 6 of Table 2, where we replicate column 5 by interacting MSA with the threat index described in Section 3.2.[30] Focusing on cultural similarity (Panel A), the coefficient on MSA is barely affected, while that on the interaction term between threat and MSA is positive and statistically significant. That is, refugees assigned to more hostile regions converge faster to local culture as they spend more time in Germany.[31] The effects are quantitatively large. When comparing a refugee assigned to a region at the 75th percentile of the threat index with one assigned to a region at the 25th percentile, the CSI of the former would be 70% higher than that of the latter after one year.[32]

Turning to economic assimilation (Panel B), the coefficient on MSA remains, again, positive and statistically significant. However, and contrary to the patterns observed in Panel A, the point estimate on the interaction term is close to zero and not statistically significant. Table A.13 presents similar results focusing on (relative) wages, and Table A.14 verifies that our findings are unchanged when using administrative data.

5.2.2 Additional Results

Heterogeneity by months since arrival. In Figure 4, we examine the trends of cultural and economic convergence by arrival cohorts. We replicate the preferred specification for both cultural (left panel) and economic (right panel) convergence, replacing the continuous measure of MSA with 12-month interval dummies, using the 0-12 months group as omitted category. To ease the visualization of results, rather than interacting MSA dummies with the threat index, we split the sample between refugees assigned to regions above (green squares) and below (blue dots) the median.

For refugees assigned to regions with threat above the median, the increase in cultural similarity is evident already after the first year. Since then, cultural convergence

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[30]The main coefficient on threat, which is defined at the regional level, is absorbed by the district fixed effects.

[31]Table A.15 presents results for the specification reported in column 6 of Table 2 adding controls one at the time.

[32]This number is obtained by multiplying the coefficient on the interaction in column 6 (.075) by the inter-quartile range of the threat index (1.15), and then scaling this by the coefficient on MSA (.125).

progresses, though slowly, reaching a plateau after 48 months. However, standard errors are large, and the CSI of refugees who spent two years or more in Germany is not statistically different from that of refugees that spent between one and two years in the country. A very different picture emerges when focusing on refugees assigned to regions with threat below the median. For this group, cultural convergence does not take place until the fourth year since arrival: only individuals that spent 48 months or more in Germany are somewhat more similar to locals, relative to refugees that spent less than 12 months in the country, although the point estimate is not statistically different from zero. These patterns suggest that our results are driven by refugees assigned to regions with higher threat, who, possibly because of fear, converge quickly to local culture.

Turning to economic assimilation, instead, we note that refugees assimilate at a very similar pace across regions, suggesting that (as already documented in Table 2, column 6) faster cultural convergence does not coincide with more successful economic integration. Moreover, differently from cultural convergence, economic assimilation does not slow down after the first two years. Rather, refugees (in both types of regions) make steady progress over time.[33]

Exposure to far-right demonstrations. In Appendix D.1, we test the possibility that refugees' cultural convergence might be influenced by episodes of hostility occurring in the first months since their arrival, when they might be more susceptible and feel more vulnerable to natives' harassment. We compute the number of far-right demonstrations that occurred in the region of assignment in the first months since a refugee's arrival. To reduce endogeneity concerns, we focus on events happening within a short period of time since the arrival of individual respondents.[34] We focus on "early" episodes also because refugees' perceptions of local hostility are likely to be shaped by what they experience early on.[35]

Table D.1 shows that, holding constant the number of months spent in the country, refugees exposed to far-right marches early on are significantly closer to local culture. This effect is driven by individuals assigned to high-threat regions, where the number of demonstrations is larger than in low-threat regions. Results are similar when considering demonstrations occurring within the first 1, 3, 6, and 9 months since a refugee's arrival.

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[33]The absence of discrete jumps across arrival cohorts weighs against the possibility that institutional factors (such as labor market access after a given number of months) mechanically influence refugees' economic assimilation.

[34]Specifically, one may be concerned that the number of demonstrations are be endogenous to refugees' inflows, which might also have an independent impact on a respondent's assimilation trajectories.

[35]This would be consistent with the psychological literature on "synaptic tagging and capture" (Frey & Morris, 1997; Richter-Levin & Akirav, 2003; Talarico et al., 2004), and with the idea that demonstrations happening early on might act as "belief twisting events" (Cogley & Sargent, 2008; Friedman & Schwartz, 2008).

Yet, consistent with earlier demonstrations having a more profound impact on refugees' perceptions, the coefficient falls as the number of months considered increases.

Threat dimensions. In Table A.16, we analyze how the different components of the threat index influence the trajectories of refugees' cultural and economic assimilation. Based on principal-component-analyses (Table A.18), we divide the 11 components of the index in three categories with eigenvalue greater than one: a first one loading heavily on contemporary anti-immigrant sentiments; a second one reflecting historical hostility against minorities; and, a third one proxying for contemporaneous openness among locals.

As documented in Panel A, contemporaneous anti-immigrant sentiments (column 1) and the lack of openness among locals in recent surveys (column 3) are both strongly associated with higher cultural convergence. Instead, the coefficient on the interaction between MSA and historical proxies for anti-minority attitudes (column 2) is not statistically significant at conventional levels, even though it is positive. This holds also when including all three sub-components simultaneously (column 4).[36] One explanation for these patterns, also consistent with the evidence discussed in the previous paragraph, is that, especially upon arrival, refugees' perceptions and actions may be more strongly influenced by recent attitudes among locals (such as anti-immigrant feelings or the degree of openness) than by historical events. Even though support for the NSDAP and historical pogroms have persistent effects on local culture (Voigtländer & Voth, 2012), when compared to more recent measures of anti-immigrant sentiments, the former may be less noticeable in the eyes of refugees. Another possibility, not in contrast with the previous one, is that refugees do not perceive anti-Semitism as a direct threat, since more than 85% of them come from majority-Muslim countries (see also Table 1).

Panel B of Table A.16 shows that none of the individual threat categories, when interacted with MSA, has a statistically significant effect on economic assimilation. Moreover, in all cases, the point estimate is quantitatively small.

Other mediating factors. Thus far, we have focused on one specific factor that influences refugees' cultural and economic assimilation: local threat. We now explore the potential influence of other social and economic forces on refugees' cultural and economic assimilation. We describe the analysis in more detail in Appendix D.2, but we

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[36]In Table A.17, we explore the impact of each threat component at the time. Consistent with Table A.16, natives' attitudes seem to be driving the threat-induced cultural convergence of refugees. Moreover, in line with the evidence presented in Appendix D.1, far-right marches increase the pace of refugees' cultural convergence.

summarize the main results, reported in Table D.2, here.[37] First, we find that neither the size nor the opportunities available to the ethnic enclave (proxied for by the average employment rate in the enclave) have a systematic effect on cultural convergence. On the other hand, economic assimilation is slower when the share of individuals born in the same country of origin is higher. But, higher employment rates among co-ethnics make economic assimilation faster. Second, we document that task diversity among employees in the region does not influence the speed of either cultural or economic convergence, while skill complexity increases refugees' assimilation along both margins.[38] Third, in line with ambiguous theoretical predictions, refugees' cultural and economic assimilation do not vary with either the distinctiveness (relative to national culture) or the degree of heterogeneity of local culture.

Finally, we conduct a horse-race, which simultaneously includes interactions between MSA and threat as well as that between MSA and each of the forces discussed above. Crucially, the coefficient on the interaction between MSA and threat remains in line with that from our preferred specification (Table 2, column 6).[39] This reduces concerns that our findings may be driven by the spurious correlation between the level of hostility prevailing in the region and other forces, although we cannot rule out the possibility that factors other than those considered here may be driving our results.

5.2.3 Local Threat and "Core" Values

The CSI allows us to measure local convergence by combining several important cultural traits. Yet, it does not include a set of "core" values, such as gender norms, support for democracy, and religiosity, since these are not asked to locals. *Ex-ante*, it is unclear whether local threat leads to faster assimilation also along these core beliefs, as abandoning such deep-rooted preferences might be too costly for refugees. In this section, we take advantage of the fact that the refugee survey elicits preferences over these three sets of issues. Hence, although we cannot measure relative convergence, we analyze how threat influences refugees' cultural change in gender norms, views towards democracy, and religious habits and beliefs.

In Appendix C.2, we construct different index that proxy for refugees' attitudes towards women's rights, the importance of democracy, and religiosity. Then, in Table 3,

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[37]In column 1, we report the interaction between MSA and the threat index. Throughout the table, we standardize all variables to ease comparisons across mediators.

[38]We consider the impact of task diversity and skill complexity (as well as the robustness of our results to these controls), since they might influence refugees' assimilation (Peri & Sparber, 2009).

[39]As discussed in Appendix D.2, the effect of threat on cultural convergence is sizeable and close to that of the size of ethnic enclaves or the employment rate of their members.

we replicate our preferred specification (Table 2, column 6) for each of these variables. In column 1, we consider gender norms. The positive coefficient on MSA indicates that, with each additional month spent in Germany, refugees are more likely to agree to gender egalitarian statements.[40] Yet, even though the coefficient on the interaction between MSA and threat is positive, it is not statistically significant at conventional levels. That is, there is no evidence that the change in refugees' cultural preferences occurs faster in regions with higher levels of threat.[41]

A somewhat different pattern emerges in column 2, where the coefficient on MSA is positive but not statistically significant, while that on the interaction term is positive and precisely estimated.[42] One possible explanation for the different effects of threat on changes in gender norms and support for democracy is that the latter may be less sticky, and thus easier to adapt, than the former. Moreover, gender norms are more likely to belong to the "private sphere", compared to the more abstract notion of institutional preferences.

In column 3, we turn to the importance of religion. Neither the coefficient on MSA nor that on the interaction between MSA and threat is statistically significant. These results are consistent with religious preferences being substantially stickier than other cultural traits (Giavazzi et al., 2019), so that refugees might deem it too costly to abandon their religious faith.[43] Finally, in column 4, we find that, although refugees increase the frequency of attendance of religious events as they spend more time in Germany, this effect is reversed for individuals assigned to more threatening regions.[44]

The seemingly contrasting results obtained in columns 3 and 4 may be due to the fact that fewer places of worship for Muslims become available over time in more hostile regions. Another possibility, consistent with the "threat hypothesis", is that visiting places of worship is more easily observable than private beliefs about the importance of religiosity. Hence, refugees may keep their (private) religious orientation, while adjusting their (publicly observable) behavior by reducing the frequency with which they attend religious events, in order to signal cultural assimilation in response to threat.

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[40]Results are unchanged when interacting year dummies with baseline female labor force participation in the district to account for the possibility that differential trends for attitudes towards women (among locals) may be driving our results.

[41]Results for each individual component of the women's right index are reported in Table A.19, using the original (resp., dichotomized) scale in odd (resp., even) columns. See also Appendix C.2 for more details.

[42]Table A.20 replicates the analysis separately for each component of the index. Results are very similar when interacting year dummies with a measure of locals' satisfaction with democracy (in 2010), to allow districts to be on differential trends with respect to support for democracy among natives.

[43]In fact, religion might help refugees endure the struggles caused by forced displacement (McMichael, 2002).

[44]In unreported regressions, we verified that our estimates are robust to interacting year dummies with the baseline share of Muslim individuals in the district. Table A.20 replicates results separately for the dummy and the non-dummy version of religiosity outcomes.

5.3 Summary of Robustness Checks

In addition to checks on *ex-ante* selection and *ex-post* sorting of refugees and locals (summarized above and presented in Tables B.1 to B.4), we perform a variety of analyses to probe the robustness of our results. These are described in detail in Appendix B.

First, we show that changes in the sample composition – due to either attrition or changes in the sampling framework – do not drive our results (Table B.5). Specifically, we verify that the likelihood of appearing in the subsequent survey wave does not depend on either the threat index or the level of cultural similarity in the previous wave. We also do not find that refugees with a lower CSI are more likely to drop out of the survey in higher threat regions. Second, we repeat the analysis using the Canberra and Herfindahl index, which are different statistical measures of cultural assimilation (Table B.6). Results remain positive but smaller in size for the Canberra index, while they become statistically insignificant for the Herfindahl index. This is to be expected, since the Herfindahl measure captures exact cultural matches, and is thus a very restrictive measure of cultural similarity. Third, we replicate our results by constructing the CSI including additional questions, restricting attention to native-born locals, dropping individual components, and measuring cultural preferences of locals in the latest survey wave (Tables B.7, B.8, and B.9). We also verify that locals' individual sub-components of the CSI do not change differentially in high-threat regions following refugee inflows (Table B.10). Fourth, we drop individual components of the threat index to assuage concerns that our results may be driven by specific types of threat (Table B.11), and replicate the analysis defining threat at endline (Table B.12). Fifth, we vary the size and the composition of the geographic units used to measure cultural and economic convergence (Table B.13). Finally, we show that results are robust to: *i*) clustering standard errors at the district level and accounting for potential spatial correlation (Conley, 1999); *ii*) interacting year dummies with a dummy for Eastern Germany and with dummies for a refugee's country of origin; *iii*) controlling for refugee arrival year fixed effects; *iv*) excluding individuals surveyed more than once to address concerns of bias in difference-in-differences designs with heterogeneous treatment effects (De Chaisemartin & d'Haultfoeuille, 2020; Goodman-Bacon, 2021); *v*) dropping potential outliers; and, *vi*) instrumenting threat in the region of residence using that in the region of assignment (Tables B.14 and B.15).

6 Mechanisms

Results in Section 5 are consistent with a framework where refugees exert more effort to adopt local culture in more hostile regions, possibly because of fear. Yet, precisely in these regions, locals might require higher levels of effort for minorities to be accepted in the in-group. Thus, despite the higher assimilation effort (proxied for by cultural convergence), refugees may not be more likely to experience assimilation success (measured with economic convergence) in regions characterized by higher levels of hostility. In this section, we provide different pieces of evidence consistent with this interpretation.

6.1 Assimilation Effort vs Success

One-sided vs cooperative assimilation outcomes. Table 4 provides evidence consistent with the hypothesis that in regions with higher threat refugees exert more effort to get acquainted with local culture, but that such effort does not translate into higher social assimilation. We begin from a specific question in the refugee survey, which asks individuals whether they attend or have attended integration or language courses. According to the Residence Act, immigrants with a residence permit are obliged to visit an integration course of the Federal Office for Migrants and Refugees (BAMF) if they cannot communicate at least in a simple way in German. Persons whose asylum application has not yet been decided and who come from a country with good prospects of staying or who have a tolerated status can apply for participation. Refugees also have the option of attending additional courses, offered by local agencies or non-profit organizations. We create two separate dummies equal to one if a refugee is attending (or has attended) a mandatory and a voluntary course, respectively.

If refugees were to exert stronger effort to integrate in more threatening areas, we would expect the interaction between MSA and threat to enter positively for voluntary courses, but not for mandatory ones. This is precisely what we observe in columns 1 and 2 of Table 4. Both for voluntary (column 1) and for BAMF (column 2) courses, the coefficient on MSA is positive and statistically significant. However, the interaction term between MSA and threat is positive and precisely estimated only for the former. Moreover, the size of the coefficient on the interaction term is more than four times larger for voluntary than for BAMF courses.

Next, in column 3, we ask whether refugees' proficiency in German, as assessed by the interviewer, is higher among individuals assigned to regions with a higher threat index. The coefficient on MSA is positive and statistically significant, indicating that

refugees become more proficient in German over time. However, the interaction between MSA and threat, albeit positive, is small and noisy. One interpretation is that, even though refugees can exert effort to learn German, locals must be willing to interact with them, for the former to become fluent. In more threatening environments, it may be harder for refugees to interact with locals, either because the former are worried about approaching the latter or because of stronger discrimination and segregation against minorities (or both). Furthermore, the additional effort exerted by refugees in regions with higher threat might be directed to learning region-specific norms, and is thus not captured in German speaking ability.

Columns 4 to 6 turn to different proxies for inter-group contact. Refugees are more likely to interact with Germans (column 4) and to have a German-born partner (columns 5 and 6) as they spend time in Germany.[45] Yet, despite the faster cultural convergence prevailing in more threatening regions, the interaction between MSA and threat is never statistically significant and is always quantitatively small. That is, in spite of the higher cultural similarity, refugees are not more likely to have close contact with locals in regions with a higher threat index.

Finally, columns 7 and 8 provide suggestive evidence that refugees experience a higher degree of labor market segregation in regions with higher levels of threat. First, we document that refugees in more threatening regions end up working in more ethnically segregated firms, where, arguably, lower levels of cooperation with (or, acceptance from) locals are needed (column 7).[46] Second, we find that refugees assigned to regions with higher threat are less likely to work in "interactive non-routine" occupations, which involve more interactions with both coworkers and consumers (column 8).[47]

Heterogeneous effects. Next, we focus on cultural assimilation, and explore heterogeneity by respondents' characteristics. In Table 5, we cut the data along four dimensions: gender, age, presence of children when entering Germany, and education obtained in the country of origin.[48] In columns 1 and 2, we report results separately for women and men. Although both groups converge to local culture as they spend more time in a region, only women seem to respond to higher threat. This can be because women may

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[45]In column 5 (resp. column 6), the sample is restricted to female (resp. male) respondents.

[46]To produce this result, we use data from Keita & Trübswetter (2020) that links refugees in our survey to administrative data at the firm level to identify the share of immigrant workers in a company.

[47]Based on Dengler et al. (2014), we classify occupations that are characterized by interactive non-routine tasks, analytical non-routine tasks, cognitive routine tasks, manual routine tasks, and manual non-routine tasks following Autor et al. (2003). Our findings are consistent with those in Peri & Sparber (2009) and Haas et al. (2013), according to which it is particularly hard for immigrants to be employed in interactive tasks.

[48]Since these socio-demographic characteristics may be correlated with many other variables, we interpret the evidence presented here as suggestive.

be more vulnerable, and thus more likely to react to threat (consistent with Figure A.3). Another possibility, not in contrast with the previous one, is that external threat lowers the pressure faced by women from other family members to retain their home-country culture. In columns 3 and 4, we show that, instead, threat has no differential effect for young (18 to 30 years-old) and old individuals.

Next, in columns 5 and 6, we split the sample between individuals who arrived in Germany with and without children. The coefficient on the interaction between threat and MSA is more than twice as large for refugees who arrived in Germany with children than for those who did not. Moreover, it is statistically significant for the former, but not for the latter. This is consistent with the idea that the threat-induced convergence should be stronger among parents, who may be worried about harassment against their offspring, or that discrimination and physical violence may impair their ability to take care of their children.[49] In columns 7 and 8, we turn to education (acquired before leaving the country of origin), splitting the sample between respondents without and with a school-leaving certificate, respectively. Consistent with less educated individuals being more vulnerable to discrimination and harassment, the interaction between threat and MSA is larger for this group than for individuals with higher levels of education, even though the difference is not statistically significant at conventional levels.

Finally, in columns 9 and 10, we consider the size of the ethnic enclave, splitting respondents who live in districts with the share of individuals born in their country of origin above and below the sample median, respectively. Our results indicate that threat-induced convergence is driven by refugees living in areas with smaller enclaves. This is consistent with refugees feeling more vulnerable to local hostility, and thus responding by exerting more effort.[50] Instead, where the ethnic community is larger, refugees may feel less exposed to, and better able to insulate from, natives' harassment.

Convergence to group-specific local culture. In Table 6, we ask whether local convergence is "global" or if, instead, refugees are more likely to converge to the preferences of locals that belong to similar economic or demographic groups. In columns 1 to 4, we create group-specific CSI along two dimensions: gender and age. In column 1 (resp., column 2), the dependent variable is the CSI for an individual and locals of the same (resp., opposite) gender. Both the coefficient on MSA and that on the interaction between threat and MSA are very similar when considering the own and the other group

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[49]It is also possible that parents learn about local conditions, including both threat and social norms, indirectly, as their offspring interact with native-born children.

[50]Note that also the coefficient on MSA is large and statistically significant only in the sample with a smaller ethnic network.

CSI. In columns 3 and 4, we replicate this exercise using age to create one's own and other group. In particular, we calculate CSI to the pool of locals within (outside) a range of minus 5 to plus 5 years around the age of the refugee. Also in this case, convergence to local culture is independent of the reference group considered.

Finally, we test whether refugees converge faster to the preferences of locals who are employed (column 5), relative to those who are not (column 6).[51] The coefficient on MSA is similar when considering the CSI constructed with the preferences of the employed and with those of the non-employed. However, the coefficient on the interaction between threat and MSA is quantitatively larger (and statistically significant) for the employed-related CSI. This is consistent with at least two (non-mutually exclusive) interpretations. First, refugees view employed locals as "role models", and try to converge to the preferences of the group that is perceived as more successful. Second, employment status may be associated with authority: when facing higher threat, refugees may thus try to conform to the norms set by the individuals that they perceive as "resource-holding", or leaders. The latter interpretation is also in line with the effort-success framework, where refugees strategically invest in cultural assimilation effort in order to access economic opportunities.

6.2 Refugee Inflows and Locals' Preferences

In this section, we turn to the attitudes and the behavior of locals. We can no longer exploit variation in months spent by refugees in a German region using an ITT design and relying on the quasi-random allocation of refugees over time. Instead, we analyze if the relationship between refugee inflows and natives' attitudes and behavior varies with the pre-existing level of threat in the region by estimating panel regressions that include district and survey year fixed effects. All regressions also include the share of refugees (measured at the end of the year prior to that of the interview), individual controls, and baseline district characteristics interacted with year dummies.[52] Since this analysis is admittedly less cleanly identified than that conducted above, results should be interpreted with caution – as suggestive evidence on locals' response to refugee inflows.

Locals' attitudes. We begin by examining how the views of locals in regions with different levels of threat change in response to refugee inflows. We report results in Table 7, considering different measures of attitudes towards refugees, which were asked

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[51]The sample of non-employed locals includes both unemployed individuals and those who are not in the labor force.

[52]District characteristics are the same as before. Individual controls include: age, age squared, gender, nativity, and education (classified in 4 categories). The main effect of threat is absorbed by the district fixed effects.

in survey years 2016 and 2018. In columns 1 to 3, we focus on locals' assessment of the impact of refugees on the economy, cultural life, and Germany as a place to live. In columns 4 and 5, we turn to respondents' opinion on whether refugees represent a risk for the short- and the long-run, respectively. In all columns, higher values refer to more positive views towards refugees.

The coefficient on the refugee share is positive (albeit, never statistically significant); instead, the interaction term is strongly negative and precisely estimated. That is, along all dimensions we consider, following the inflow of asylum seekers, locals living in regions with a higher threat index view refugees more negatively. In light of our findings for refugees' cultural convergence, this pattern is striking: even though refugees converge faster in regions with higher threat, locals' attitudes become more negative following refugee inflows in these regions. The worsening of locals' views may, at least in part, also explain why refugees are unable to enjoy a faster economic or social assimilation in more threatening regions, despite faster cultural convergence.

Locals' behavior. Next, we turn to locals' behavior, examining if the inflow of refugees influences the prevalence of endogamous mating among German-born locals. Inter-marriage, or inter-group mating more generally, is considered the "final stage of assimilation" by sociologists (Gordon, 1964). The increase in refugee population might change the pattern of inter-group mating by altering sex-ratios, since refugees are more likely to be both male and young, relative to locals (Table 1).[53] Mechanically, changes in sex-ratios should increase the probability of inter-group mating for native-born women and reduce it for native men. However, in the presence of highly segmented marriage or mating markets, the direct effect of refugee inflows on sex-ratios would be muted. Since only .2% of the German-born SOEP respondents in our sample report having a relationship with an individual of refugee background, we expect changes in sex-ratios to play a negligible role, if at all, on inter-group mating.

In Table A.21, we restrict the sample to German-born individuals who report being in a relationship, and define the dependent variable as a dummy equal to one if the partner was born in Germany. We then estimate the same regression described above, where the main regressor of interest is, again, the interaction between the threat index and the district-year refugee share. The coefficient on this term is positive and statistically significant at the 10% level, with a p-value of .062 (column 1). This indicates that refugee inflows increase the prevalence of endogamous mating, but only in areas characterized by a higher threat index. Said differently, the inflow of refugees induces natives in more

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[53]Sex-ratios are typically defined as the relative number of men and women in the marriage market (Angrist, 2002).

threatening regions to turn inward, possibly explaining why, in spite of higher cultural similarity, refugees are unable to integrate faster in these areas.

Splitting the sample by gender reveals that results are entirely driven by women (column 2): the coefficient on the interaction term is twice as large as in the full sample and statistically significant at the 1% level. When considering native men (column 3), instead, results are noisy and quantitatively small. One interpretation is that native women in areas with a higher threat index react more than men to the presence of outsiders, and decide to start a new relationship with a partner who shares a similar cultural background. Another possibility, not in contrast with the previous one, is that families in regions with a higher threat index exert stronger pressure on women – but not on men – to start a new relationship with a native partner when ethnic diversity is higher, so as to preserve cultural homogeneity.

Locals' counter-mobilization. We have thus far conjectured that the faster cultural convergence of refugees in regions with higher threat was driven by fear and anxiety, instilled by locals' hostility. This is consistent with the negative relationship between refugee inflows and (changes in) locals' attitudes and behavior in more threatening areas documented above. An alternative interpretation is that the stronger hostility prevailing in high-threat regions led some locals and non-profit organizations to coordinate efforts to facilitate the cultural integration of refugees (Vüllers & Hellmeier, 2022).

To test this hypothesis, in columns 4 to 6 of Table A.21, we restrict attention to locals. We estimate the same regressions described above, using as dependent variable a dummy equal to one if the respondent: *i*) donated to a refugee specific cause (column 4); *ii*) volunteered for a refugee related cause (column 5); *iii*) demonstrated to support refugees (column 6).[54] While higher refugee inflows are associated with fewer donations to refugee causes, there is no differential effect for locals living in regions with a higher threat index. Results for the other two proxies for counter-mobilization are imprecisely estimated.

In Appendix D.3, we corroborate the (lack of) evidence on counter-mobilization among locals by examining the relationship between refugee inflows and both pro-refugee tweets and the presence of NGOs across regions. While only suggestive, this analysis does not support the idea that refugees' faster cultural convergence in regions with a higher threat index was driven by (pro-refugee) counter-mobilization among locals.

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[54]These questions were available only for years 2016 and 2018. In addition to district fixed effects, interactions between year dummies and baseline district controls, and individual characteristics, we include respondents' overall willingness to volunteer in associations and engage politically at baseline in 2010 and 2012, respectively. Results are unchanged when dropping these additional controls.

7 Conclusion

In this paper, we study how local hostility influences the convergence to local culture and the economic assimilation of refugees. We exploit plausibly exogenous variation in the allocation of refugees across German regions between 2013 and 2016, and rely on novel survey data to measure the preferences of both refugees and locals as well as their economic performance. We find that refugees converge to local culture and assimilate economically as they spend more time in Germany. However, this process is not uniform: cultural convergence is faster among refugees assigned to areas where locals display higher hostility against minorities. Yet, despite the higher cultural convergence, refugees are not more likely to integrate economically in these regions.

These patterns are consistent with a framework where refugees respond to pressure by exerting more effort to learn and adopt local culture. However, in order for refugees to successfully assimilate (socially and economically), locals must be willing to accept them in the majority group. If discrimination against minorities is higher in regions characterized by higher threat, refugees may not be able to achieve faster integration, even if they exert more effort to learn and adopt local culture. The second part of the paper provides different pieces of evidence consistent with this interpretation.

Our paper has no normative implications, and our results do not imply that minority groups should (or should not) assimilate to the culture of receiving countries. At the same time, our work casts doubts on the effectiveness of pressure and hostility as tools to promote integration. While minorities may exert more effort to learn and adopt local values and social norms, they may not successfully assimilate in host societies if locals take actions that hinder inter-group interactions. Our findings also open the door to several fascinating questions. Does cultural convergence generated by threat in the short-run persist also in the long-run? Or, does backlash among minorities arise? Can inter-group interactions induce locals to accept more diversity, and reduce pressure exerted (directly or indirectly) on migrants and refugees to assimilate?

As the number of forcibly displaced individuals is projected to rise exponentially in the years to come, answering these questions will be of first order importance.

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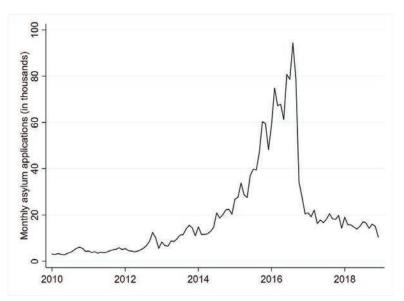
Figure 1. Monthly asylum applications in Germany (in thousands)

Notes: The graph plots the number of monthly asylum applications in Germany by month. Asylum applicants are adult individuals from outside the EU-28, who may have also applied for asylum in other EU countries. *Source:* Authors' calculation from Eurostat (2021).
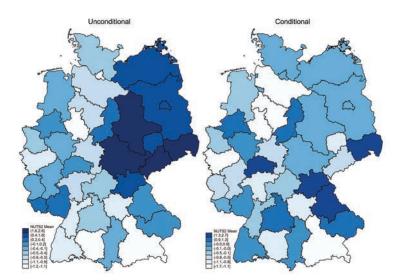
Figure 2. Conditional and unconditional threat map across NUTS-2 regions

Notes: The maps plot the unconditional (left) and conditional (right) z-standardized threat index described in the text for each of the 38 NUTS-2 regions. Conditional means partial out Federal State fixed effects.
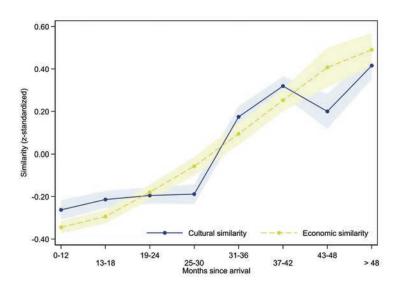
Figure 3. Economic and cultural convergence

Notes: The graph shows the evolution of cultural (in blue solid line) and economic (in green dashed line) similarity between refugees and locals since refugee arrival. Economic and cultural similarity are z-standardized.
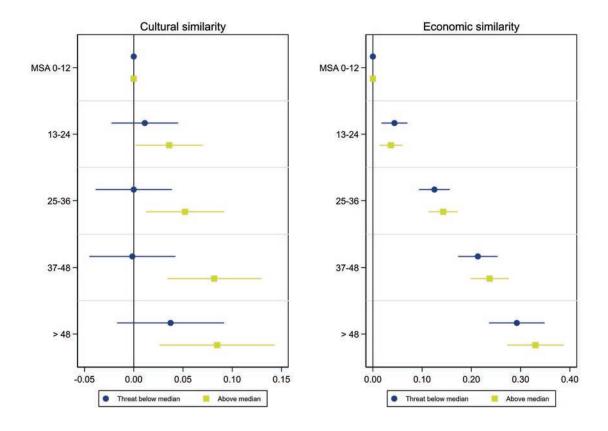
Figure 4. Cultural and economic assimilation by arrival cohorts

Notes: The figure compares cultural similarity (resp. economic assimilation in terms of employment similarity) of refugees from different arrival cohorts in the presence of above versus below median threat. Threat is defined as in the main analysis. The figure plots the coefficients of 12-months bins for months since arrival (MSA) from separate regressions for the below and above median sample in terms of threat. The mean value of cultural similarity is -1.91 (resp. -1.90) for refugees in regions with threat below (resp. above) the median. The mean value of economic assimilation is -0.53 (resp. -0.48) for refugees in regions with threat below (resp. above) the median.

Table 1. Descriptive statistics

	All					Below median threat					Above median threat				
	Mean	Std. dev.	Min	Max	N	Mean	Std. dev.	Min	Max	N	Mean	Std. dev.	Min	Max	N
Panel A. Refugees															
Main variables															
Cultural similarity index	-1.91	0.48	-6	-1	12,334	-1.91	0.46	-5	-1	6,022	-1.90	0.49	-6	-1	6,312
Months since arrival to Germany	28.96	13.12	0	72	12,334	29.42	13.15	0	72	6,022	28.51	13.07	0	72	6,312
Employment similarity	-0.50	0.39	-1	0	12,334	-0.53	0.39	-1	0	6,022	-0.48	0.38	-1	0	6,312
Additional outcomes															
Wage gap (based on survey)	-838.53	957.77	-2,326	12,675	2,201	-918	1,004	-2,326	12,675	1,124	-755.60	899.87	-2,076	8,348	1,077
Mandatory integration course	0.53	0.50	0	1	12,243	0.53	0.50	0	1	5,983	0.54	0.50	0	1	6,260
Voluntary integration course	0.56	0.50	0	1	12,101	0.55	0.50	0	1	5,935	0.56	0.50	0	1	6,166
Time spent with Germans (1 never - 6 daily)	3.72	1.88	1	6	12,302	3.75	1.88	1	6	6,007	3.69	1.88	1	6	6,295
Partner German born	0.14	0.35	0	1	2,171	0.15	0.35	0	1	1,050	0.13	0.34	0	1	1,121
Worried about xenophobia (1 low - 3 high)	1.35	0.60	1	3	12,124	1.33	0.58	1	3	5,921	1.37	0.62	1	3	6,203
Language skills:(1 bad - 5 good, interviewer)	3.01	1.37	1	5	12,334	3.05	1.35	1	5	6,022	2.98	1.39	1	5	6,312
Additional characteristics															
Country of birth: Syria	0.53	0.50	0	1	12,334	0.50	0.50	0	1	6,022	0.56	0.50	0	1	6,312
Afghanistan	0.12	0.32	0	1	12,334	0.13	0.33	0	1	6,022	0.11	0.32	0	1	6,312
Iraq	0.13	0.33	0	1	12,334	0.15	0.35	0	1	6,022	0.11	0.32	0	1	6,312
Other	0.22	0.41	0	1	12,334	0.22	0.42	0	1	6,022	0.21	0.41	0	1	6,312
Gender: female	0.38	0.49	0	1	12,334	0.39	0.49	0	1	6,022	0.38	0.48	0	1	6,312
Age	34.01	10.22	18	66	12,334	33.79	10.29	18	66	6,022	34.22	10.14	18	66	6,312
School certificate:															
None	0.44	0.50	0	1	12,279	0.47	0.50	0	1	5,994	0.42	0.49	0	1	6,285
Compulsory school leaving certificate	0.24	0.43	0	1	12,279	0.22	0.41	0	1	5,994	0.25	0.44	0	1	6,285
Secondary school leaving certificate	0.32	0.47	0	1	12,279	0.31	0.46	0	1	5,994	0.33	0.47	0	1	6,285
Panel B. Locals															
Cultural similarity index	-1.38	0.46	-6	-1	18,300	-1.38	0.47	-6	-1	9,058	-1.38	0.45	-6	-1	9,242
Additional outcomes															
Gender: female	0.54	0.50	0	1	253,368	0.55	0.50	0	1	129,672	0.54	0.50	0	1	123,696
Age	42.53	13.01	18	66	253,368	42.16	12.85	18	66	129,672	42.92	13.16	18	66	123,696
Country of birth: Germany	0.83	0.38	0	1	253,313	0.79	0.41	0	1	129,643	0.86	0.34	0	1	123,670
Other	0.17	0.37	0	1	253,313	0.20	0.40	0	1	129,643	0.13	0.34	0	1	123,670
Highest education: Lower secondary	0.14	0.35	0	1	220,272	0.15	0.36	0	1	113,384	0.14	0.34	0	1	106,888
Short cycle non-tertiary	0.61	0.49	0	1	220,272	0.59	0.49	0	1	113,384	0.63	0.48	0	1	106,888
Bachelors or higher	0.25	0.43	0	1	220,272	0.26	0.44	0	1	113,384	0.23	0.42	0	1	106,888
School certificate: None	0.14	0.35	0	1	244,252	0.17	0.37	0	1	124,800	0.12	0.32	0	1	119,452
Compulsory school leaving certificate	0.01	0.11	0	1	244,252	0.01	0.11	0	1	124,800	0.01	0.11	0	1	119,452
Secondary school leaving certificate	0.85	0.36	0	1	244,252	0.82	0.38	0	1	124,800	0.87	0.33	0	1	119,452
Panel C. District-level and NUTS-2-level variables															
Unemployment rate (district, Dec-2012)	6.87	2.98	1	16	12,334	6.07	2.62	1	14	6,022	7.63	3.09	2	16	6,312
Population density (district, Dec-2012)	960.55	1,114	38	4,468	12,334	1,075	1,098	40	4,468	6,022	851.63	1,119	38	3,785	6,312
Share of refugees (district, Dec-2012)	0.75	0.37	0	2	12,334	0.85	0.40	0	2	6,022	0.65	0.30	0	2	6,312
Threat principal component (NUTS-2)	0.00	2.04	-3	6	12,334	-1.55	0.62	-3	-1	6,022	1.48	1.82	-1	6	6,312

Notes: The table reports summary statistics for the refugees (Panel A) and locals (Panel B) for: i) the full sample in columns 1 to 5; and, ii) separately for regions with the threat index above (resp. below) the sample median in columns 6 to 10 (resp. in columns 11 to 15). Panel C reports summary statistics for the main district-level variables used as controls in the analysis. The threat index is defined at the regional level (see Section 3.2). Language skills refer to ability to read, write, and speak in German. See Table A.8 for descriptives of variables not included here.

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Table 2. Assimilation and local threat: Main results

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Cultural similarity index (mean: -1.905)					
MSA	0.081**	0.076*	0.094**	0.113***	0.118***	0.125***
	(0.040)	(0.042)	(0.041)	(0.041)	(0.042)	(0.042)
MSA × Threat						0.075**
						(0.032)
Person-Year observations	12,334	12,334	12,334	12,334	12,334	12,334
Person observations	6,691	6,691	6,691	6,691	6,691	6,691
R2 adjusted	0.344	0.347	0.368	0.374	0.392	0.392
	Panel B. Refugees' relative employment (mean: -0.504)					
MSA	0.778***	0.757***	0.760***	0.776***	0.771***	0.772***
	(0.029)	(0.042)	(0.041)	(0.041)	(0.042)	(0.042)
MSA × Threat						0.016
						(0.032)
Person-Year observations	12,334	12,334	12,334	12,334	12,334	12,334
Person observations	6,691	6,691	6,691	6,691	6,691	6,691
R2 adjusted	0.155	0.161	0.172	0.181	0.196	0.195
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects						
Federal-State	No	No	Yes	No	No	No
NUTS-2	No	No	No	Yes	No	No
District	No	No	No	No	Yes	Yes
District controls × survey year	No	Yes	Yes	Yes	Yes	Yes

Notes: The sample consists of 6,691 refugees for a total of 12,334 refugee-year observations. The dependent variable is the cultural similarity index (resp. refugees' relative employment) in Panel A (resp. Panel B). MSA refers to months since arrival. Threat is the threat index described in the text, and is z-standardized within each model. Positive coefficients indicate a reduction in distance to locals. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables and individual characteristics (gender, age, age squared, kids born before arrival in Germany living in the household, country of origin, marital status and location of partner as well as work experience and education upon arrival). Column 2 adds interaction between year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012. Columns 3, 4, and 5 add respectively federal state, NUTS-2 region, and district fixed effects to the specification of column 2. Column 6 includes the interaction between months since arrival and the standardized threat index. Panel A always controls for dummies for the composition of questions included in the cultural similarity index. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3. Cultural change: "core values"

	(1)	(2)	(3)	(4)
	Women's rights	Importance of democracy	Importance of religion (1 low - 4 very important)	Freq. church and relig. events attendance (1 never - 5 daily)
MSA	0.528***	0.189	-0.247	0.392***
	(0.143)	(0.169)	(0.153)	(0.137)
MSA × Threat	0.164	0.477***	0.039	-0.211*
	(0.137)	(0.158)	(0.145)	(0.120)
Person-Year observations	5,925	4,737	4,954	8,004
Person observations	5,925	4,737	4,954	5,127
R2 adjusted	0.079	0.089	0.086	0.176
Individual controls	Yes	Yes	Yes	Yes
Fixed Effects				
District	Yes	Yes	Yes	Yes
District controls × survey year	Yes	Yes	Yes	Yes

Notes: The dependent variables are variables constructed from refugees' survey that reflect agreement of refugees' for 3 "core" values: women's rights (column 1), importance of democracy (column 2), importance of religion (column 3), and frequency of church and religious events attendance (column 4). The exact definition of each variable is reported in Appendix C.2. MSA refers to months since arrival. Threat is the threat index described in the text, and is z-standardized within each model, along with the dependent variable. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables, individual characteristics (gender, age, age squared, kids born before arrival in Germany living in the household, country of origin, marital status and location of partner as well as work experience and education upon arrival), district fixed effects, and the interaction between year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4. Assimilation outcomes: One-sided vs cooperative

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Voluntary integration course	Mandatory integration course	Language skills (1 bad - 5 good)	Time spent with Germans (1 never - 6 daily)	Partner German born (among females)	Partner German born (among males)	Percentage foreigners in company	Main task interactive non-routine
MSA	0.507***	0.619***	3.296***	2.291***	0.380*	0.278*	10.985	0.080
	(0.061)	(0.056)	(0.128)	(0.203)	(0.216)	(0.144)	(12.624)	(0.080)
MSA × Threat	0.090**	0.021	0.048	0.041	0.075	-0.079	20.197*	-0.110*
	(0.042)	(0.040)	(0.100)	(0.157)	(0.112)	(0.074)	(10.471)	(0.066)
Person-Year observations	12,101	12,243	12,334	12,302	773	1,398	1,143	2,058
Person observations	6,605	6,665	6,691	6,683	440	734	855	1,516
R2 adjusted	0.117	0.211	0.299	0.117	0.498	0.478	0.136	0.070
Dep. var. mean	0.556	0.534	3.012	3.721	0.173	0.121	33.321	0.102
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects								
District	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District controls × survey year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is i) attendance to non-BAMF integration courses (column 1); ii) attendance to BAMF integration courses (column 2); iii) the German level of the interviewee assessed by the interviewer (column 3); iv) the self-reported time spent with Germans (column 4); *v*) a dummy for having a German-born partner for females and males, obtained from the self-declaration of the partner in the survey (columns 5 and 6); *vi*) the percentage of non-German citizens among employees who are foreign-born in the refugee's company (column 7); and, having occupations which require a higher frequency of interactions with both coworkers and consumers (column 8). Threat is the threat index described in the text, and is *z*-standardized within each model. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables, individual characteristics (gender, age, age squared, kids born before arrival in Germany living in the household, country of origin, marital status and location of partner as well as work experience and education upon arrival), district fixed effects, and the interaction of year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Heterogeneous effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Gender		Age		Child in household		Education abroad		Network size	
	Female	Male	18-30	> 30	Yes	No	Non-certified	Certified	Above	Below
MSA	0.144**	0.096*	0.123*	0.105*	0.087	0.149**	0.059	0.106*	0.061	0.194***
	(0.064)	(0.058)	(0.067)	(0.056)	(0.056)	(0.070)	(0.065)	(0.058)	(0.056)	(0.065)
MSA × Threat	0.126**	0.032	0.076	0.074*	0.094**	0.046	0.091*	0.054	-0.046	0.149***
	(0.053)	(0.040)	(0.048)	(0.043)	(0.044)	(0.050)	(0.051)	(0.041)	(0.040)	(0.051)
Person-Year observations	4,719	7,615	5,175	7,159	7,074	5,007	5,449	6,830	6,537	5,796
Person observations	2,663	4,028	3,107	3,830	4,015	2,888	3,026	3,636	3,612	3,078
R2 adjusted	0.396	0.389	0.378	0.408	0.391	0.391	0.415	0.376	0.396	0.402
Dep. var. mean	-1.945	-1.880	-1.885	-1.920	-1.929	-1.876	-1.943	-1.875	-1.911	-1.898
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects										
District	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District controls × survey year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is the cultural assimilation index. Each column presents the regression on a different subsample. The sample is restricted to refugee respondents that are: i) female and male (columns 1 and 2); ii) below and above the age of 30 (columns 3 and 4); iii) with and without children (columns 5 and 6); and, iv) with and without a certified education degree (columns 7 and 8); v) above or below the median of the share of individuals from the same country of origin of the respondent (columns 9 and 10). MSA refers to months since arrival. Threat is the threat index described in the text, and is z-standardized within each model. Positive coefficients indicate a reduction in distance to locals. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables, individual characteristics (gender, age, age squared, kids born before arrival in Germany living in the household, country of origin, marital status and location of partner as well as work experience and education upon arrival), district fixed effects, the interaction of year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012, and dummies for the composition of questions included in the cultural similarity index. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6. Group-specific cultural convergence

	(1)	(2)	(3)	(4)	(5)	(6)
	Gender		Age		Employment of locals	
	Own group	Other group	Own group	Other group	Yes	No
MSA	0.111***	0.138***	0.119***	0.129***	0.130***	0.109***
	(0.043)	(0.044)	(0.044)	(0.042)	(0.043)	(0.040)
MSA × Threat	0.076**	0.074**	0.082**	0.072**	0.090***	0.041
	(0.033)	(0.032)	(0.034)	(0.032)	(0.033)	(0.030)
Person-Year observations	12,334	12,334	12,334	12,334	12,334	12,334
Person observations	6,691	6,691	6,691	6,691	6,691	6,691
R2 adjusted	0.376	0.395	0.366	0.394	0.379	0.421
Dep. var. mean	-1.900	-1.897	-1.895	-1.906	-1.895	-1.922
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects						
District	Yes	Yes	Yes	Yes	Yes	Yes
District controls × survey year	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The sample consists of 6,691 refugees for a total of 12,334 refugee-year observations. The dependent variable is the cultural similarity index between locals and refugees within and outside each specific group. Columns 1 and 2 (resp. 3 and 4) define cultural distance for own and other gender (resp. age group). Age groups are defined as 10-year windows. Columns 1 and 2 measure distance to locals of the same and opposite gender, respectively. Column 3 (resp. 4) measures the distance to locals of the same (resp. different) age group. Columns 5 and 6 consider cultural similarity between each refugee and employed & non-employed locals, respectively. MSA refers to months since arrival. Threat is the threat index described in the text, and is z-standardized within each model. Positive coefficients indicate a reduction in distance to locals. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables, individual characteristics (gender, age, age squared, kids born before arrival in Germany living in the household, country of origin, marital status and location of partner as well as work experience and education upon arrival), district fixed effects, the interaction of year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012, and dummies for the composition of questions included in the cultural similarity index. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7. Locals' response to refugees: Attitudes towards refugees

	(1)	(2)	(3)	(4)	(5)
	Impact of refugees on			Refugee risk or chance	
	Economy (1 bad - 11 good)	Cultural life (1 undermine - 11 enrich)	Germany as a place to live (1 worse - 11 better)	Short-run (1 risk - 11 chance)	Long-run (1 risk - 11 chance)
Refugee share	2.308	-4.330	-4.561	0.823	5.156
	(5.070)	(5.062)	(4.569)	(4.702)	(5.114)
Refugee share × Threat	-13.223***	-8.023***	-11.812***	-11.172***	-7.499**
	(2.933)	(2.974)	(2.774)	(2.823)	(3.063)
Person-Year observations	39,287	39,287	39,287	39,287	39,287
Person observations	25,009	25,009	25,009	25,009	25,009
R2 adjusted	0.114	0.128	0.114	0.059	0.140
Dep. var. mean	5.571	5.580	5.081	3.922	5.403
Individual controls	Yes	Yes	Yes	Yes	Yes
Fixed Effects					
District	Yes	Yes	Yes	Yes	Yes
District controls × survey year	Yes	Yes	Yes	Yes	Yes

Notes: The sample consists of 25,009 locals for a total of 39,287 person-year observations for years 2016 and 2018 where all 5 questions used as dependent variables were asked. The dependent variable is locals' opinion about: i) the impact of refugees on: the economy, cultural life and Germany as a place to live (columns 1 to 3); and, ii) refugees representing a risk in the short and in the long run (columns 4 and 5). Refugee share, in percent, is the refugee share in the district population, measured on December 31st of the year prior to the interview. Threat is the threat index described in the text, and is z-standardized. Positive coefficients indicate a more positive view of refugees. Coefficients and standard errors are multiplied by 100 for presentation. All regressions include dummies for missing control variables, individual characteristics (gender, age, age squared, highest education among 4 categories, and migration background: none, indirect, 5 years ago or less, 6-10 years, more than 10 years), district fixed effects, and the interaction of year dummies and district controls (unemployment rate, share of refugees, and population density), all measured in December 2012. Standard errors, in parentheses, are clustered at the person-level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.