IAAEU
Institut für Arbeitsrecht
und Arbeitsbeziehungen
in der Europäischen Union

IAAEU Discussion Paper Series in Economics
No. 03/2026

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May 2026

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Immigration and Crimes against Natives: The 2015 Refugee Crisis in Germany

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May 20, 2026

Abstract. During the 2015 refugee crisis, nearly one million refugees arrived in Germany, raising widespread concern that crimes against natives would rise. Using novel county-level data, we study this question empirically in first-difference and 2SLS regressions. Our results do not support the view that Germans were victimized in greater numbers by refugees, as measured by their rate of victimization in crimes with refugee suspects. Our findings are of great policy and public interest, and also of material relevance for the broader literature on immigration and crime, which mostly considers crimes per capita or variants thereof. We show that such aggregate measures may be insufficiently informative about the actual victimization patterns of specific groups.

Keywords: Immigration, Refugees, Crimes, Crimes Against Natives
JEL Classification: F22, J15, K42.

Acknowledgement: This paper has benefited from comments received at the Annual Conference of the European Society for Population Economics in Antwerp, the European Meeting of the Econometric Society in Cologne, the China Meeting of the Econometric Society in Shanghai, the Asian Meeting of the Econometric Society in Seoul, the Annual Meeting of the Verein für Socialpolitik in Freiburg, the Spring Meeting of Young Economists in Palma de Mallorca, the online Workshop on the Relationship between Welfare State, Immigrant Integration, and Crime, the online Workshop on Refugee Migration and Integration Revisited: Lessons from the Recent Past, and seminars at RWI – Leibniz Institute for Economic Research, the University of Hamburg, Otto von Guericke University Magdeburg, and the National University of Singapore. Eren Aydin, Felix Bransch, and Robert Lange provided excellent research assistance. The research in this paper was funded by the German Research Foundation (grant no. KV 58/2-1) and supported by a data grant from Otto von Guericke University Magdeburg. All remaining errors are our own.

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1 Introduction

During the 2015 European refugee crisis, which was fueled by the conflict in the Syrian Arab Republic (Tumen 2016), nearly one million refugees poured into Germany.[1] This largest inflow of refugees to Germany since the early 1990s (Bundesamt für Migration und Flüchtlinge (BAMF) 2016a) posed great challenges for state authorities, society, and the economy. A major concern among the German public, and one particularly exploited by populist right parties, was that this mass immigration could lead to more crime by refugees against natives (Frankfurter Allgemeine 2017; Mitteldeutscher Rundfunk 2017).

Little is known, however, whether such fears were justified. Empirical studies for Germany on the 2015 refugee crisis are still rare.[2] The broader literature on immigration and crime also provides little guidance on this question, given its predominant focus on non-refugee immigration and the mixed findings it produced.[3] What is more, studies in both bodies of literature generally only make use of total crime or total victimization rates in their analyses, i.e., crimes and victims per capita, or variants thereof, but almost never of actual rates of victimization of natives by refugees or foreigners.[4] However, total crime and victimization rates include in their count also crimes confined to foreigners (crimes by and against

[1] We consider as refugees all individuals who came to Germany in 2015 and registered formally or informally as seeking protection with the intention to lodge a formal asylum application (irrespective of their later residence status and the outcome of their asylum application). We henceforth use the terms refugee and asylum seeker interchangeably in this study.

[2] Dehos (2021), Gehrsitz and Ungerer (2022), and Lange and Sommerfeld (2024) utilize data from the Central Register of Foreigners (*"Ausländerzentralregister"*, AZR), which massively under-records refugee arrivals in 2015 (see the Background section). Furthermore, Gehrsitz and Ungerer (2022) do not focus on refugee arrivals during the crisis year 2015 but rather on (the summary total of) refugee arrivals over a two-year period (2014–2015), including refugees who arrived in the pre-crisis year 2014. Lange and Sommerfeld (2024), in turn, extend the observation window even further pre- and post-crisis, analyzing refugee arrivals over a full six-year period from 2013 to 2018.

[3] See, for example, Bell et al. (2013), Bianchi et al. (2012), Butcher and Piehl (1998), Chalfin (2014), Chalfin (2015), Fasani (2018), Freedman et al. (2018), Lee et al. (2001), Light and Miller (2018), Maghularia and Uebelmesser (2023), Mastrobuoni and Pinotti (2011), Moehling and Piehl (2009), Nunziata (2015), Ozden et al. (2018), Piopiunik and Ruhose (2017), and Spenkuch (2014). For analyses focusing on the relationship between refugee inflows and crime, see also Amuedo-Dorantes et al. (2021), Pfeiffer et al. (2018), Kayaoglu (2022), Kırdar et al. (2022), and Thasinul Abedin et al. (2022).

[4] Couttenier et al. (2019) use detailed data on the nationalities and residency statuses of both victims and perpetrators to examine whether asylum seekers in Switzerland, who have experienced conflict in their countries of origin, are more prone to violence in the host country. They are able to identify crimes committed by asylum seekers against natives, co-nationals, and nationals from third countries.

foreigners), crimes confined to natives (crimes by and against natives), and crimes in which foreigners are victimized by natives (crimes by natives against foreigners), which includes even hate or anti-foreigner crimes. As each of these crimes may vary systematically in its prevalence with the level of immigration, total crime and victimization rates do not permit a direct assessment of natives' victimization risk. As we will show below, analyses based solely on aggregate measures can be little informative on the actual victimization patterns of particular groups.

Given the paucity of evidence on the matter, we draw on two novel data sets to study how the 2015 refugee crisis affected crime in Germany. The first data set comprises detailed, high-quality statistics on the regional distribution of refugees, their gender composition, age structure, and type of accommodation (decentralized or centralized, i.e. in group quarters)[5], prior to and after the mass inflow of refugees in the latter part of 2015. This data set has been constructed from special data extracts drawn from the Statistics on Asylum Seekers' Benefits (SASB) (*"Asylbewerberleistungsstatistik"*), an administrative public registry with full coverage of all refugees who seek asylum and receive such benefits in Germany—unlike other registries used in the literature, such as the Central Register of Foreigners (AZR), which failed to record nearly half of the 2015 inflow. Our special data extracts from the SASB also allow us to study compositional features of regional refugee populations, such as their gender composition and accommodation structure, which may affect crime and which can be steered directly by refugee distribution policies. The second data set comprises special data extracts from the Police Crime Statistic (PCS) (*"Polizeiliche Kriminalstatistik"*) of the Federal Criminal Police Office (BKA) (*"Bundeskriminalamt"*) in Germany, which allows us to consider not only the numbers and rates of different kinds of crime, but also associated suspects (by refugee status) and victims (by German citizenship) for a subset of crimes (cleared-up crimes with victim recording in the PCS), and therefore, what is unique, actual

[5]Centralized refugee accommodation comprises reception centers and other types of shared housing, i.e. general group quarters, and decentralized refugee accommodation in non-shared dwellings, in particular individual flats.

victimization rates of natives in crimes with refugees suspects. The richness of our data, hence, makes it possible to study in unprecedented detail potential links between crime and the size of immigration, its gender structure, age composition, and housing. Furthermore, it enables an assessment of whether the use of aggregate crime and victimization measures, which is common in the literature, may mask important heterogeneity for different groups (victim-suspect combinations), e.g., the victimization of Germans in crimes with refugee suspects.

We exploit spatial and temporal variation across counties in refugee immigration levels, as well as refugee populations' age, gender, and housing structures, in a first-difference framework comparing periods before and after the mass inflow of refugees to Germany in the latter half of 2015. We find evidence for a positive (and mildly hump-shaped) relation between the scale of refugee immigration and both the aggregate crime rate and the aggregate victimization rate in a county. This is in line with most of the literature on refugee immigration and crime.[6] We also find that decentralized accommodation of refugees, at given levels of refugee immigration to a county, tends to reduce the crime rate (while refugee sex ratios exert no effect). We do not, however, find any evidence for a systematic link between the scale of refugee immigration (and neither the type of refugee accommodation nor refugee sex ratios) and the risk of Germans becoming victims of a crime in which refugees are suspects. This result holds true not only for total crimes with victim recording in the PCS, but also for various sub-categories of such crimes, including robbery (economic crimes), bodily injury (violent crimes), and rape and sexual coercion (sex crimes). We corroborate this key finding in various robustness checks, including the measurement of victimization outcomes in 2016 (rather than 2015) and the use of IV regressions that exploit for identification information on the 2014 pre-crisis location of refugee reception centers and their aerial distance to population-weighted centroids of counties located within the same federal

[6]See Gehrsitz and Ungerer (2022), Dehos (2021), and Lange and Sommerfeld (2024) for Germany, Akbulut-Yuksel et al. (2024) for Turkey, Bell et al. (2013) for the UK, or Thasinul Abedin et al. (2022) for the USA. Exceptions include Kayaoglu (2022) and Kırdar et al. (2022) for Turkey as well as Amuedo-Dorantes et al. (2021) for the USA.

state. The persistent lack of a link between refugee immigration and refugee crimes against Germans casts doubt on whether public concerns about refugees and crimes against natives were justified. It also underscores, more generally, the importance of using detailed crime, suspect, and victim statistics for analyses of immigration and crime. Studies on refugee immigration (or other immigration) and crime generally fail to use such data and rely instead on aggregate crime measures. While such estimands have their justification,[7] they do not provide information on the actual offenders, nor on the groups that are victimized. Studies that explore crime dynamics for specific suspect-victim combinations, however, can provide such information and inform policy to better target offenders and better protect victims at risk.

2 Background

2.1 The 2015 Refugee Crisis

In the final months of 2015, a sudden and largely unexpected mass inflow of refugees to Germany set in amidst what came to develop into, and be termed, the 2015 European Refugee Crisis. Many of these refugees were Syrians seeking shelter from their war-torn country after years of brutal civil war had ravaged the Syrian Arab Republic. The refugee crisis that developed and eventually reached Europe was soon regarded as "the world's largest humanitarian crisis since World War II" (European Civil Protection and Humanitarian Aid Operations (ECHO) 2016).

The number of asylum applications had been increasing steadily but slowly already from January 2014, but it was only in the last quarter of 2015 that refugee numbers suddenly jumped dramatically (BAMF 2015). On 4 September 2015, Angela Merkel opened the German border to refugees who had been stuck in the train station of Budapest for days (Blume et al. 2016). She also announced that there was to be no upper limit on the number

[7] Amongst others, aggregate crime levels and crimes by refugees against refugees or foreigners more generally can also reduce natives' perceptions or feelings of security, particularly if such crimes concentrate in hotspots that are often frequented, such as train stations or parks. The same holds true for high-profile incidents with extensive media coverage.

of asylum seekers that would be allowed to seek shelter in Germany (Bröcker and Quadbeck 2015). In the end, approximately 890,000 refugees arrived in Germany in 2015 (BAMF 2016b). According to SASB (own calculations), 60.5% of refugees were aged between 15 and 39, and men outnumbered women in this age group by a ratio of 2.81 to 1, a quite unfavorable demographic composition, because young men tend to commit more crimes.

Upon arriving in Germany, refugees were required to register immediately with state authorities, which entitled them to benefits such as accommodation, food, and medical care (see Appendix A for more information). Our analysis uses comprehensive administrative data from the Statistics on Asylum Seekers' Benefits (SASB), a full end-of-year count covering all such benefit recipients, including those not yet formally registered as asylum seekers. The formal filing and registration of applications for asylum with the Federal Office for Migration and Refugees (BAMF) (*"Bundesamt für Migration und Flüchtlinge"*), i.e., formal registration (AZR-registration), in contrast, was often delayed for weeks. This complicated the statistical recording of actual refugee numbers in public registries, which took stock only of those refugees who had already filed their formal applications for asylum. The AZR is such a registry, and it has been used in parts of the literature, despite its severe undercount of refugees (Zeit Online 2015; Statistisches Bundesamt 2018). In fact, nearly half of all refugee inflows in 2015 recorded in the EASY (the initial and informal registration of the request for asylum) system remained unrecorded in the AZR (BAMF 2016b). Figure 1 documents the monthly inflows of asylum seekers, as recorded in the EASY data, and monthly totals of formal asylum applications filed with the BAMF, as recorded in the AZR, in Germany from 2014 to 2016. The former shows a clear and sudden surge in the second half of 2015 (the heyday of the crisis), while the latter continues to follow a smooth upward trend throughout 2015 and peaks only in summer 2016.

(Figure 1 about here)

As already noted, refugee arrivals were predominantly male (about two-thirds) and in the majority prime aged (16–39). They were also often low educated (Rich 2016). The first

two features (male sex and young age) are generally associated with a higher proclivity to commit crime or certain types of crime (Elliott 1994; Steffensmeier et al. 1989ab). According to economic models of crime (Becker 1968; Ehrlich 1973), the last feature (low education) too is expected to increase individuals' probability to engage in crime or to intensify their illegal activities. The type of refugee accommodation may also play a role in crime (proclivity and opportunity). The direction of any such impact, however, is less clear-cut and also little researched. On the one hand, decentralized housing, as opposed to centralized accommodation in group quarters, may increase opportunities for crime. On the other hand, however, it may enhance emotional stability, as living conditions are generally better in this case, reducing in turn crime propensities, at least in certain areas. In the empirical analysis, we will investigate all three of these dimensions, i.e., refugees' age, gender, and housing structure.

2.2 Criminal Activity in Germany

Figure 2 shows for the whole of Germany annual numbers of registered asylum seekers (end of year), crimes, and victims in the years 2011 to 2015, as well as annual numbers of German victims[8] in the years 2013 to 2015 (using data from the PCS of the BKA). Panel (a) in Figure 2 shows a steady but slow increase in asylum seekers per 100,000 population in the years 2011 to 2014, which is followed by a sudden and dramatic surge in the population share of refugees between 2014 and 2015. As shown in Panel (b), this surge is not accompanied by a surge in crimes excluding violations of the Residence Act, the Asylum Act, and the Freedom of Movement Act E.U., such as unauthorized entry (border crossing) and unauthorized stay. In fact, the rate of such crimes declined from 2014 to 2015. Panels (c) and (d) show that the total victimization rate and the victimization rate of Germans also declined from 2014 to 2015. These aggregate trends, therefore, do not provide any indication that crime or risks

[8]In the PCS, "German victims" are victims that hold German citizenship. These may but need not be natives. In this study, we analyse German victims, as defined in the PCS.

of victimization (overall and for Germans) increased during the 2015 refugee crisis.[9]

(Figure 2 about here)

Aggregate trends and correlations, of course, may hide important influences and causal relationships if the data-generating process is multivariate in nature and regional rather than national in kind. Moreover, changes in crime levels or risks of victimization may be little informative on whether Germans indeed faced elevated risks of being victimized in crimes committed by refugees when these arrived to Germany in large numbers in late 2015. We, therefore, turn now to regression analysis at the sub-national level and the control of various time-variant observables and time-invariant unobservables that may confound the relationship between regional refugee inflows (and their composition) and changes in criminal activity of different kinds.

3 Data and Empirical Strategy

3.1 The Data

For our first-difference regression analyses of regional refugee inflows (and their composition) and regional changes in criminal activity, we use two high-quality administrative data sources. First, county-level crime data from the PCS of the BKA, including special PCS data extracts provided by the BKA for this research project. Second, county-level refugee data from the SASB and special data extracts thereof, provided to us for this project by the 16 Statistical Offices of the German Lander.

The PCS provides annual statistics on recorded crimes (offenses), suspects, and victims.[10] In the PCS, suspects are recorded for solved (cleared-up) crimes, i.e., offenses for which a suspect was caught in the act, or the identity of a suspect has been established through

[9] See Appendix A for information on regional changes in crime and refugee numbers in 2014–2015.

[10] The PCS is compiled from individual data sets held at the Lander Criminal Police Offices and the BKA (see Appendix A for more information on PCS crime data). Only reported crimes are recorded by the police and enter into the PCS data. If refugee inflows affected victims' reporting behavior or police recording practices, estimated crime effects can partly reflect such changes, a caveat that should be kept in mind.

police investigations (BKA 2016, p. 80). Suspects are not convicted offenders. However, a suspect is recorded only if police investigations have produced substantive evidence that a person is likely to have committed an offense. The average county clearance rate for total recorded crime remained stable between 2014 and 2015 (at about 60%), and changes in such rates at the county level between 2014–2015 show no sizeable and statistically significant correlation with county-level refugee inflows between 2014–2015 (the correlation coefficient is only -0.0412). Both speak against systematic changes in clearance rates that could cause bias.

Refugee suspects are identified by their residence status and include asylum applicants, individuals with temporary suspension of deportation, and quota or civil war refugees. Victim data are recorded (and reported in the PCS) only for natural persons and certain crimes, including bodily injuries, robberies, and sex crimes, i.e., offenses that have been of prime concern to the public and also covered prominently in the media. Since 2013, victim data collected for the PCS contain information also on the citizenship of victims. Based on this information, county-level data on the number of German victims and data on the number of German victims in crimes with refugee suspects can be extracted from raw PCS files held at the BKA. For this research project, we have obtained such data in the form of special PCS data extracts from the BKA. Such data are not provided in published official PCS statistics or BKA reports and have not been used in prior research on (refugee) immigration and crime.

From the PCS data, we construct three county-level outcome measures (for a county c in state s), the 2014–2015 (respectively 2014–2016) change in the crime rate, the victimization rate, and the rate of victimization of Germans in crimes with refugee suspects ($\Delta crimerate_{cst}$, $\Delta victimrate_{cst}$, and $\Delta Gvictimrate_{cst}$ for $t = 2015, 2016$). The first two are measures of total crime (incidence) and are standardly used in the literature; the last is our prime (and novel) outcome measure and captures changes in refugee crimes against Germans. The county-level crime rate (victimization rate) is defined as the total number of crimes (victims) in a county

and year, normalized by the pre-crisis population of the county in 2014. Our key outcome variable, the victimization rate of Germans in crimes with refugee suspects, is defined as the number of German victims in crimes with refugee suspects in a county and year, normalized by the pre-crisis German population of the county in 2014.[11] We use predetermined 2014 populations for normalization because populations in 2015 and 2016 might themselves be affected by refugee immigration (treatment), either mechanically if refugees themselves enter these counts or via cross-county regional mobility responses of Germans. As discussed in the Introduction and Background sections, for analyses of natives' victimization by immigrants, such a measure is methodologically superior to measures standardly used in the literature on (refugee) immigration and crime, such as overall crime and victimization rates. Aggregate crime rates consider all crimes, not just crimes against natives by foreigners (here refugees), i.e., also crimes against natives by natives, crimes against foreigners by foreigners, and even crimes against foreigners by natives. Each of these other types of crime (victim-suspect combinations) may respond to refugee immigration, too. If so, the effect on crimes against natives by refugees cannot be isolated, i.e. identified with certainty.[12]

The second data source, the SASB, is an administrative end-of-year (EoY) public registry with full coverage of all refugees who receive asylum seeker benefits in Germany. Other data sources used in the literature to quantify refugee inflows during the 2015 crisis, such as the AZR, lack such full coverage (for details, see the Background section).[13] We use county- and municipality-level data from the SASB on EoY county-level asylum seeker populations, their demographic composition and housing in the years 2013 to 2015. Information on county-level sizes of asylum seeker populations is available online for download from the website of

[11] Panels (a) and (b) in Figure B1 in Appendix B plot $\Delta Gvictimrate_{cs2015}$ against $\Delta crimerate_{cs2015}$ and $\Delta Gvictimrate_{cs2015}$ against $\Delta victimrate_{cs2015}$. Eye-balling does not indicate any strong association between these measures at the county level, and indeed, correlation coefficients are rather low (0.2249 and 0.2811).

[12] Published PCS data do not report statistics for specific victim-suspect cells, and victim data for 2014 and 2015 do not contain information on refugee status. This precludes decompositions of total victimization rates into specific victim-suspect cells for Germans and refugees.

[13] Kürschner Rauck and Kvasnicka (2025) provide evidence that the state-level regional distribution of asylum seekers recorded in SASB also resembles fairly closely the actual allocation quotas based on the Königstein Key in 2015, which is not the case for EoY AZR numbers.

the Federal Statistical Office of Germany. All other SASB data, at county or municipality level, are special SASB data extracts we obtained from the 16 Statistical Offices of the German Lander. At county level, the data extracts provide information on the EoY number of refugees (total and male refugees) in a county who are aged 15 to 39 and the number of refugees who are living in decentralized accommodation. For data protection reasons, data extracts at the municipality level are confined to binary information on the EoY operation in a municipality of refugee reception centers or group quarter accommodation facilities.

The key explanatory variable we construct from the SASB data is the 2014–2015 change in the EoY population size of asylum seekers in a county c in state s normalized by the 2014 population of county c ($\Delta refugees_{cs2015}$). We also construct variables for changes at the county level between 2014 and 2015 in the male-to-female sex ratio of refugees aged 15–39 ($\Delta sexratio_{cs2015}$) and in the share of asylum seekers who are housed in decentralized accommodation ($\Delta decentralized_{cs2015}$), which is available only for 378 counties.

In our regression analysis, we consider several pre-crisis controls (measured either in levels or changes) that may have affected both the regional development of asylum seeker populations between 2014 and 2015 and crime dynamics between 2014 and the post-crisis years 2015 and 2016. These controls are intended to account for pre-existing socioeconomic conditions and crime trends across counties. In our baseline specifications, we include the 2013 to 2014 change in the crime rate of county c in state s ($\Delta crimerate_{cs2014}$) to capture differential pre-trends in crime. We also control for the 2013 to 2014 (approximate) population growth rate ($\Delta \ln(pop_{cs2014})$) to account for differences in demographic dynamics prior to the refugee inflow. Last but not least, we include the county-level logarithm of GDP per capita in 2014 ($\ln(GDP_{cs2014})$) and the 2014 unemployment rate ($unemployment_{cs2014}$) to control for variation in local economic conditions. These factors are relevant determinants of crime and may also influence the spatial distribution of refugees if settlement patterns are partly shaped by local economic opportunities. All regressions additionally include state fixed effects to account for unobserved and time-invariant heterogeneity and common state-

level trends, including, for example, differences in refugee allocation policies, administrative practices, and policing institutions. In sensitivity analyses, we also control for the 2014 crime clearance rate[14] ($clearancerate_{cs2014}$), which serves as a proxy for local enforcement intensity and the probability of detection. Furthermore, we include an indicator for administrative 'city-county' (*"Stadtkreis"*) status ($citycounty_{cs2014}$) to account for differences in urban structure and population density that may be correlated with both crime rates and the location of reception facilities.

(Table 1 about here)

3.2 Empirical Strategy

To study the effect that excess refugee inflows during the 2015 refugee crisis had on crime, we estimate variants of the following first-difference model:

$$\Delta Y_{cst} = \alpha + \beta \Delta refugees_{cs2015} \; + \boldsymbol{X}'_{\boldsymbol{cs2014}} \, \boldsymbol{\gamma} + \boldsymbol{\delta_s} + \varepsilon_{cst}, \tag{1}$$

where ΔY_{cst} denotes the change in a crime or victimization rate for county c in state s between pre-crisis period 2014 and crisis period 2015 ($t = 2015$) or post-crisis period 2016 ($t = 2016$), and $\Delta refugees_{cs2015}$ denotes the change between 2014 and 2015 in the EoY population stock of asylum seekers in county c in state s normalized by county c's pre-crisis population in 2014. $\boldsymbol{X_{cs2014}}$ is a vector of control variables for pre-crisis characteristics of county c, $\boldsymbol{\delta_s}$ is a set of state dummies, and ε_{cst} is an error term. Correlating outcomes and asylum seeker populations in first differences rather than in levels allows us to control for time-invariant (un-)observable factors that may be correlated with Y_{cst} and $refugees_{cst}$, such as persistent level differences between counties in demographic, economic, or geographic factors, or in crime levels, crime types, crime recording, and specific suspect-victim combinations in regional crime. As EoY asylum seeker populations approximate annual inflows

[14]The clearance rate is the ratio of cleared offenses to recorded offenses during a year. The clearance rate in a year may exceed 100% if offenses from previous years are cleared only in the current year.

of asylum seekers, such correlations also restrict the focus on 'excess' crime that may have been caused by 'excess' refugee inflows during the refugee crisis in 2015. However, unconditional correlations of outcomes and asylum seeker populations in first differences may still be confounded by pre-crisis county characteristics if such characteristics correlate with changes in criminal activity and refugee inflows over time. The use of several controls (contained in $\boldsymbol{X_{cs2014}}$) for pre-crisis differences between counties in economic performance and recent trends in crime and population growth seeks to account for such potentially confounding influences, as does the inclusion of a set of state dummies $\boldsymbol{\delta_s}$ which control for state-specific common components in the change of criminal activity at county level within states. Parameter β, the coefficient of prime interest, hence captures within-state variation across time in criminal activity that is linked to within-state variation in excess refugee inflows during the refugee crisis.

The key identifying assumption for a causal interpretation of β is that there is no unobserved factor that drives both regional refugee inflows during the 2015 refugee crisis and regional changes in criminal activity between 2014 and 2015. For several reasons, the scope for such a potentially confounding selection of refugees is arguably minor. First, refugees were allocated by public authorities to different states based on a pre-defined federal allocation quota (the "Königstein Key"), and then within states by state authorities to particular counties. Second, refugees remained for a considerable time restricted to the region they first had been assigned to (see the Background section and Appendix A for details). These administrative regulations, which governed the spatial distribution of refugee arrivals, severely limited the regional mobility of refugees, and thereby also the scope for potential and systematic self-selection of refugees into certain regions that could bias our results. The use of state fixed effects $\boldsymbol{\delta_s}$ in our first-difference regression framework controls for common state components in county-level changes within states, as may be caused, amongst others, by state quotas set by the "Königstein Key". Within-state allocation rules to counties differed somewhat between states, but generally took reference only to county populations (this does

not apply for the three city states Berlin, Hamburg, and Bremen), and in few instances also to county areas.

However, urgency, immediate need, and capacity constraints are also likely to have played a role, as a large number of refugees had to be accommodated at short notice (often within days, if not hours) at the peak of the 2015 refugee crisis. Refugees, at least in part, also might have been able to choose by feet and on their own account a state before declaring to public authorities their intention to apply for asylum. We deal with these (remaining) threats to identification in two main ways. First, we control in our regression analysis for pre-crisis county-level GDP per capita and rates of unemployment in 2014, as well as changes in crime development and population growth between 2013 and 2014. We also show in placebo regressions, which predate all variables by one year, except for our county-level refugee inflow measure, that conditional on these covariates, changes in refugee inflow rates from 2014 to 2015 are unrelated to regional crime development before the 2015 refugee crisis, which would invalidate our findings. Second, we use the 2014 pre-crisis location of refugee reception centers and their aerial distance to population-weighted centroids of counties located within the same federal state as an instrument for county-level refugee inflows between 2014 and 2015. Specifically, we use as IV in 2SLS regressions the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties in the same state that hosted a refugee reception center in 2014 ($\log(dist_{cs2014} + 1)$). In these 2SLS regressions, we hence identify causal effects of refugee immigration on crime by exploiting intra-state variation in county-level refugee inflows that are driven by pre-existing locations of reception centers and within-state refugee allocation rules during the 2015 refugee crisis. As existing reception centers became quickly used to full capacity in late 2015, new shelters were often set up in the vicinity of existing reception centers so as to be able to utilize the infrastructure already in place. This introduced a negative correlation between distance to the 2014 reception centers and regional refugee inflows. The IV we use is relevant and also arguably valid. The pre-crisis location of refugee reception centers and their aerial

distances to population-weighted centroids of counties located within the same federal state are pre-determined. While their pre-crisis location may well be correlated with unobserved (time-invariant) confounders affecting county-level crime levels, their regional distribution before the crisis arguably should affect (conditional on covariates) changes in crime in our first-difference specification only through 'excess' refugee inflows during the crisis, but not directly or via other channels that may violate the exclusion restriction required for 2SLS.

4 Results for Total Crime

Table 2 provides results from estimating our first-difference model by OLS, using two different outcome measures (total crime and victimization rates) and two different specifications (linear and non-linear models). In the linear specification, refugee inflows do not exert a statistically significant effect on the crime rate and the total victimization rate (columns (1) and (3)). If one allows for non-linearities, refugee inflows exert a statistically significant and hump-shaped effect on both crime and victimization rate. Evaluating the marginal effect of refugee inflows at the sample mean of county-level refugee inflows, a one standard deviation increase in refugee inflows raises the county-level crime rate by 0.0010 ($= 0.1633 \times 0.0064$), or 1.67% from the level it had in 2014, and the county-level victimization rate by 0.0002 ($= 0.0383 \times 0.0064$), an increase of 2.27% from its 2014 value.[15,16] Other covariates prove less consistent in their estimated effects (in terms of sign and magnitude) across the two specifications and two outcome measures considered, with one exception, the 2013 to 2014 change in the crime rate of a county ($\Delta crimerate_{cs2014}$). Its estimated coefficient is throughout neg-

[15]The marginal effect of refugee inflows on crime rates in column (2) and on victimization rates in column (4) in Table 2 are 0.1633 and 0.0383, respectively.

[16]Figure B2(a) in Appendix B shows that the positive marginal effect of excess refugee inflows declines to zero once $\Delta refugees_{cs2015}$ reaches approximately 0.035. In our sample, only 4 out of 402 counties (from four federal states) experience inflow increases above this threshold. Figure B2(b), which presents the corresponding relationship for the victimization rate, reveals a similar pattern. To further assess the role of these high-exposure counties, we present binscatter plots in Figure B3. The visual evidence in Panels (a) and (b) suggests that the hump-shaped pattern for both total crime measures may be driven by a small number of extreme observations. When we exclude high-exposure counties (or counties that appear particularly influential in our analysis) from the estimation sample, a positive linear relationship is still observable for both the total crime rate and the total victimization rate (see Table B1).

ative and highly statistically significant. Mean reversion in criminal activity may explain this negative correlation between past and current changes in crime and victimization rates.

(Table 2 about here)

In unreported regressions, we added as a further covariate the change in county-level clearance rates between 2014 and 2015. However, our main results remain qualitatively unchanged.[17] We also re-estimated our model, controlling for systematic differences between rural and urban counties by adding a dummy variable for city counties to our set of regressors. Again, our findings prove robust.

Table 3 provides results from re-estimating our first-difference models using as additional controls changes at county level between 2014 and 2015 in the sex ratio of male to female refugees aged 15–39 ($\Delta sexratio_{cs2015}$) and in the share of refugees that are housed decentrally in a county ($\Delta decentralized_{cs2015}$). Columns (1) and (2) show results from re-estimating our two baseline specifications for the reduced sample of the 378 counties with complete information on refugee inflows, accommodation, and sex ratios. They prove identical to those from our full sample. Columns (3) and (4) report results when adding $\Delta decentralized_{cs2015}$ to the set of covariates, and columns (5) and (6) report results when considering also $\Delta sexratio_{cs2015}$. As is evident, our main findings for the size of refugee inflows and its impacts remain unchanged with all expanded sets of covariates. The gender composition of regional refugee populations, in contrast, proves irrelevant for crime as well as victimization rates in both specifications and for all sets of covariates.[18] However, the share of refugee populations in decentralized accommodation shows a significant negative association with crime (albeit not victimization) rates. Housing policies that favor decentralized

[17] As the change in clearance rates between 2014 and 2015 could be affected itself by refugee inflows (i.e., be a bad control), we do not include this covariate in our baseline specification.

[18] The correlation coefficients between the changes in sex ratios and the changes in population shares of refugees and the shares of refugees in decentralized accommodation are -0.0260 and -0.0369, respectively. These low values suggest that the insignificant effect of refugee sex ratios on crime rates and victimization rates is unlikely to be caused by (high) correlations among the independent variables capturing characteristics of regional refugee populations.

over centralized accommodation may therefore have a crime-reducing effect. However, without additional information on suspects and victims, i.e., their refugee status, respectively nationality, the causes and the nature of such potential gains, and their prime beneficiaries, inevitably remain unclear.

(Table 3 about here)

What (policy) conclusions can then be drawn from the above analysis? For the research question of prime interest in this study, we think, few, if any. From a methodological perspective, analyses of total crime incidence are simply ill-suited to explore and identify the causal effects of refugee immigration on the risk of natives becoming victimized in crimes committed by refugees. Systematic associations between immigration and measures of total crime incidence, such as the positive (and mildly hump-shaped) relationships we found in the above analysis, may have multiple and confounding causes, including changes in crime incidence exclusively among natives or among refugees, or changes in anti-refugee crimes by natives if these are affected by refugee immigration too. As a consequence, little can be learned about the change in harm done to natives by refugees from such measures of crime incidence. In the following, we focus therefore on a more restrictive and suitable measure of crime incidence, the rate of victimization of Germans in crimes with refugee suspects. As we will see, its use does make a material difference.

5 Results for Refugee Crime Against Germans

In this section, we turn to the study of (changes in) county-level victimization rates of Germans in crimes with refugee suspects and how the risks of falling victim to refugee crimes were affected by spatial-temporal variation in county-level inflows of refugees because of the 2015 refugee crisis. The dependent variable we consider for this purpose is the change from 2014 to 2015 in the county-level number of Germans victimized in crimes with at least one refugee suspect, normalized by a county's pre-crisis German population in 2014.

5.1 Main Results

Table 4 provides for this restricted crime measure OLS estimation results for our first-difference model. As is evident, in both linear and non-linear specifications, refugee inflows do not exert a statistically significant effect on the victimization rate of Germans in crimes with refugee suspects (a simple binscatter plot, shown in Panel (c) in Figure B3, also indicates neither a linear nor a non-linear relationship). There is thus no indication that Germans were put at a higher risk of victimization by refugees when refugees settled in greater numbers in their county of residence in the wake of the 2015 refugee crisis. This finding is of great importance, not only for policy and public opinion, but also for research on (refugee) immigration and crime in general. It illustrates that total crime measures, the standard outcomes used in the immigration and crime literature, do not directly measure the victimization of Germans and therefore should not be interpreted as evidence on whether Germans are harmed by (refugee) immigration.

(Table 4 about here)

Before probing the robustness of this key result, we explore whether changes in rates of victimization of Germans in crimes with refugee suspects show any systematic link at the county level to changes in refugee gender ratios and refugee accommodation structures in the restricted sample of counties. Table 5 reports the results of these explorations. As is evident, neither the size of refugee inflows nor their age-gender structure and type of accommodation exerts a statistically significant effect. Again, a judgment solely based on evidence obtained from the analysis of crime and total victimization rates would have suggested otherwise. This underscores, once more, that total crime measures do not necessarily reflect the victimization of Germans and may therefore lead to misleading conclusions about whether refugees increase

crimes against Germans.[19]

(Table 5 about here)

5.2 Robustness checks

The refugee crisis, its onset and scale, caught public authorities by surprise, and rules governing the regional distribution of refugee arrivals severely circumscribed the scope for potentially confounding endogenous self-selection of refugees into specific regions. For identification and causal inference, these features are highly advantageous. However, there is still a risk that our first-difference estimates may suffer from omitted variable bias if refugees did have some degree of freedom in their regional settlement or authorities did depart from prescribed allocation rules because of bare need. In the following, we address these threats to identification in several ways and also probe the robustness of our findings to changes in the year we measure (post-)crisis outcomes.

First, we examine whether refugee inflows are correlated with pre-treatment county-level characteristics. Panels (A) and (B) of Table B3 report the relationship between refugee inflows and these characteristics, without and with baseline controls, respectively. Overall, we find little evidence of systematic correlations between refugee inflows and observable demographic, economic, or crime-related variables. While this suggests that observable differences across counties are less likely to be a primary driver of the allocation of refugees, it does not rule out the role of unobserved factors.

Second, we focus on the German victimization rate in crimes involving refugee suspects and run a placebo regression that predates all variables (dependent and independent) by one year, except for our county-level refugee inflow measure. Column (2) in Table B4 in Appendix B shows the main regression output of this exercise (to ease comparison, column

[19] Counties hosting reception centers may differ systematically from other counties, as they tend to accommodate larger numbers of refugees. Restricting the sample to these counties reduces the number of observations to just 94, which substantially reduces statistical power. We report OLS results for this restricted sample in Table B2. In both linear and non-linear specifications, we find a positive association between refugee inflows and total crime rates as well as total victimization rates. However, refugee inflows and the victimization rate of Germans in crimes involving refugee suspects remain statistically unrelated.

(1) reproduces our baseline estimates from columns (1) and (2) in Table 4). In the linear specification (in Panel (A) of column (2)), changes in refugee inflow rates from 2014 to 2015 fail to show a negative correlation with regional crime development before the 2015 refugee crisis, and in the non-linear specification (in Panel (B) of column (2)), changes in refugee inflow rates from 2014 to 2015 are unrelated to regional crime development before the 2015 refugee crisis. Both findings continue to hold true when we predate only the dependent variable (column (3)) and exclude the 2013 to 2014 change in the crime rate from our set of covariates (column (4)). There is thus no indication that county-level refugee inflows during the refugee crisis were systematically and negatively correlated with pre-crisis trends in county-level rates of victimization of Germans in crimes with refugee suspects that could have biased our baseline OLS regression estimates towards the zero effect we found. The positive association in the linear specifications between pre-crisis changes between 2013 and 2014 in rates of victimization of Germans in crimes with refugee suspects and refugee crisis immigration between 2014 and 2015, however, suggests that the spatial-temporal variation in refugee inflows during the crisis was not altogether exogenous to pre-crisis county characteristics.[20] We therefore, and in the remainder of the analysis, use IV regressions that exploit for identification only arguably exogenous county-level variation in refugee immigration during the crisis. For these, we use the linear specification from column (1) in Table 4 as our baseline model.

Third, we exploit the 2014 pre-crisis location of refugee reception centers and their aerial distance to population-weighted centroids of counties located within the same federal state as an instrument for refugee inflows between 2014 and 2015. Specifically, we use as an IV for

[20] We further explored potential determinants of changes in the regional distribution of refugees by regressing $\Delta refugees_{cs2015}$ on the change in county-level population growth between 2013 and 2014, county-level GDP per capita and unemployment rate in 2014, and the county-level changes in the total crime rate, the total victimization rate, and the victimization rate of Germans in crimes with refugee suspects between 2013 and 2014. Results are depicted in Table B5 in Appendix B. Pre-crisis GDP per capita and $\Delta Gvictimrate_{cs2014}$ turn out positively correlated with $\Delta refugees_{cs2015}$. The latter correlation is in line with our findings in Table B4. Therefore, as a test of robustness, we controlled for $\Delta Gvictimrate_{cs2014}$ in the regression specifications in Table 4 (in addition to the change in the total crime rate between 2013 and 2014). However, and reassuringly, our main findings from Table 4 remain unchanged.

$\Delta refugees_{cs2015}$ in a 2SLS regression the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties in the same state that hosted a refugee reception center in 2014 ($\log(dist_{cs2014}+1)$).[21] Column (1) of Table 6 shows the results for both the first and the second stage for our linear model specification. The first-stage results show that we do not have a weak instrument problem. In line with expectations, within-state refugee inflows to a county are larger, the closer a county is located to counties in the same state that house reception center facilities, and the F-statistic for excluded instruments is well above 10. What is more, results for the second stage confirm our findings from OLS. Germans do not suffer higher risks of victimization when refugees settled in greater numbers in their county of residence during the 2015 refugee crisis.[22,23] Our key finding hence proves robust to the use of arguably exogenous variation in intra-state county-level refugee inflows during the 2015 refugee crisis.[24,25] Moreover, we also applied the strategy in Conley et al. (2012), which allows the exclusion restriction to be somewhat violated, i.e., the IV to impact partly through other channels in the second stage the change in the rate of victimization

[21] We examined whether the IV is correlated with a large set of pre-treatment county-level characteristics. Panels (C) and (D) in Table B3 show that the instrument is mostly uncorrelated with these characteristics once baseline controls are included. No-zero correlations remain for pre-treatment sex ratios and foreigner shares. Adding these measures as further controls in our 2SLS analysis does not affect our key finding on the rate of victimization of Germans in crimes with refugee suspects.

[22] We obtain the same result when estimating the non-linear specification by 2SLS using $\log(dist_{cs2014}+1)$ and its square as IVs for $\Delta refugees_{cs2015}$ and its square. Tabulated regression results can be obtained from the authors upon request.

[23] As a further robustness check, we re-estimate our main specification using a two-period fixed effects model with state-by-year fixed effects and a shift-share style instrument. Again, we find a zero effect (see Appendix C).

[24] We also conduct placebo tests by regressing pre-treatment changes (from 2013 to 2014) in the German victimization rate in crimes with refugee suspects on our instrument. Table B6 shows that counties located closer to reception centers witness slightly higher growth in rates of victimization prior to the refugee inflow. If such higher growth did persist in 2014–2015 and confounded our refugee-inflows-crime link, then we should observe in our main regressions a positive association between refugee immigration in 2014–2015 and the 2014–2015 change in the rate of victimization of Germans in crimes with refugee suspects. Our findings, however, do not show such an association.

[25] We furthermore check the robustness of our results to two alternative instruments that exploit differently information on counties' distance to reception centers for identification. First, we use the minimum distance in kilometers (plus one) between county c and all counties within the same state s that hosted a refugee reception center in 2014. Second, we construct an inverse-distance weighted measure equal to the sum of the inverse distances between county c and all counties with a reception center within the same state s. Table B7 reports 2SLS results for this exercise. Both instruments turn out relevant and strong, but their use does not change our main finding of a zero effect of refugee immigration on the rate of victimization of Germans in crimes with refugee suspects.

of Germans in crimes with refugee suspects.[26] Our main finding turns out to still hold, however, suggesting that the IV is *plausibly exogenous* (see Figure B4).

(Table 6 about here)

Fourth, we add further controls to the set of covariates in our 2SLS estimation, which may be correlated with both refugee inflows and changes in the victimization of Germans. The first control we consider is the 2014 crime clearance rate at the county level ($clearancerate_{cs2014}$). Clearance rates may correlate with both refugee inflows and crime as well as victimization rates, both in levels and also in changes. If so, their omission could introduce bias in our 2SLS estimates of the effect that refugee inflows during the crisis had on the rate of victimization of Germans in crimes with refugee suspects. As shown in column (2) of Table 6, however, re-estimating by 2SLS our first-difference model with this expanded set of covariates also fails to produce any evidence that refugee immigration during the crisis increased the risk of Germans to be victimized in greater numbers in crimes with refugee suspects.[27] Moreover, clearance rates fail to exert a statistically significant effect on the victimization rate of Germans.[28] As shown in column (3) of Table 6, the same holds true when we add a control dummy variable for urban counties ($citycounty_{cs2014}$). Urban counties tend to be richer, more crime-prone, and have less scope to house refugees, overall and in decentralized accommodation. Controlling for city-county status, however, proves immaterial for our key finding. Changes in the rate of victimization of Germans in crimes with refugee suspects continue to show no systematic relation to county-level refugee inflows during the crisis.[29] Another potential concern is mean reversion in crime outcomes, whereby counties with relatively high (or low) victimization rates prior to the refugee inflow experience subsequent

[26] Following Nybom (2017), we define a parameter λ as the share of the reduced-form effect of the IV on the outcome variable in the second stage that is independent of the IV ($\lambda \in [0,1]$). Our results show that the coefficient on $\Delta refugees_{cs2015}$ is still statistically insignificant if λ is bigger than zero.

[27] We also report OLS estimates in Table B8, corresponding to the same specifications as in Table 6.

[28] Pre-crisis clearance rates also prove irrelevant for explaining regional refugee inflows during the crisis in the first stage (not tabulated). This indicates that the exclusion restriction should also hold if we exclude clearance rates from the regression equation.

[29] City-county status, while a significant positive predictor in the outcome equation, proves also irrelevant in the first stage (not tabulated).

declines (rises), which could explain our zero finding. We address this concern by adding a control for 2013–2014 pre-treatment changes in the German victimization rate in crimes with refugee suspects. Our key finding, however, proves robust also in this specification (see column (4) in Table 6).

Fifth, reception centers form the basis of our instrument, but are also a form of centralized housing. The within-state distance of a county to reception centers that exist pre-treatment may therefore correlate not only with changes in refugee inflow levels, but also with changes in the share of refugees that are accommodated decentrally, at least in counties that host such centers. This may cause bias if such an association is unaccounted for. To check if this is an issue, we re-run our baseline 2SLS linear regression for the victimization rate of Germans in crimes with refugee suspects, but now control also for the change in the share of refugees in decentralized accommodation in a county between 2014 and 2015. The results are virtually unchanged (see column (5) in Table 6). We still find a zero effect, i.e., Germans do not appear to suffer higher risks of victimization when refugees settled in greater numbers in their county of residence during the 2015 refugee crisis.

Sixth, we exclude the city-states Berlin, Bremen, and Hamburg from the sample. These city-states are all highly urbanized and also host major reception facilities. For these city-states, our distance-based instrument may hence partly reflect urban centrality and administrative structure rather than purely geographic proximity. Regression results for this restricted sample, reported in column (6) of Table 6, however, still show a zero effect of refugee immigration on the rate of victimization of Germans in crimes with refugee suspects.

Seventh, in our baseline analysis, we did not control for potential spatial dependence in the error term.[30] As a sensitivity check, we compute spatial standard errors that allow for spatial correlation in error terms between counties that are within 50 km, 100 km, and 150 km

[30]We also did not cluster standard errors at the state level for two reasons. First, Germany has but 16 federal states, and inference based on such a small number of clusters can be unreliable. Second, and more importantly, standard errors are likely to be correlated between counties not only within but also across state borders, if counties neighbor or lie in close vicinity of each other and share similar unobserved regional trends and commuting patterns, or are affected by spillover effects.

of each other (based on their centroids). Results, reported in Table B9, are consistent with our main results, i.e., we still find a (statistically significant) positive association between refugee immigration and aggregate measures of crime (crime and victimization rates) but no evidence that Germans were harmed in greater numbers in crimes with refugee suspects.

Finally, we consider changes between 2014 and 2016 (instead of 2015) in the rate of victimization of Germans in crimes with refugee suspects. The mass of refugee inflows during the crisis occurred in the four months of September to December 2015. Our county-level data on crime incidence (crimes and victims), however, is of annual periodicity, covering the whole of 2015.[31] Refugee arrivals in late 2015, therefore, might have had too little time to commit crimes against Germans on a scale that is of sufficient magnitude to systematically, and statistically significantly, affect annual rates of victimization of Germans in crimes with refugee suspects in 2015. This potential drawback does not apply when measuring rates of victimization in the post-crisis year 2016 instead of the crisis year 2015. 2016 represents the first full-exposure year following the end-of-2015 refugee inflow. Analyzing 2016 outcomes may therefore provide a more stringent and telling test of crime effects. Measuring outcomes in 2016 is also advantageous, because refugee arrivals in 2015 with still pending applications for asylum faced the risk of being expelled from Germany if found guilty of a serious crime or posing a threat to the security of Germany (§53 AufenthG). Note, however, that the EoY distribution of refugees in 2015 did not remain stable throughout 2016. Many temporary branches of refugee reception centers were closed down already from February 2016, when monthly inflows of refugees began to abate greatly (Zeit Online 2016). Furthermore, moving restrictions for refugee arrivals in 2015 expired for increasing numbers in the first months of 2016. The nature and scale of (potentially endogenous) refugee reallocations across regions in 2016 are unknown and cannot be reconstructed because of a lack of detailed administrative data. If systematic, they may inflate or decrease estimated treatment effects, depending on the selection processes that drove regional refugee reallocations. 2SLS estimation results for

[31] Our refugee data are also available only at annual frequency. For this reason, we cannot consider any exposure-in-months adjustment or measure in our analysis.

our first-difference model using this alternative outcome measure are shown in column (7) of Table 6. As is evident, Germans did not suffer higher risks of victimization between 2014 and 2016 when refugees flowed in larger numbers into their county of residence during the 2015 refugee crisis. Our main finding hence remains unchanged also when using 2016 data for measuring post-crisis outcomes.[32]

5.3 Effect Heterogeneity

Although we found no impact on the overall likelihood of Germans to be victimized in a crime for which the German Federal Police (*Bundeskriminalamt*) records victim information, there is still a possibility that refugee inflows might have affected victimization rates in certain subgroups of such crimes systematically. Therefore, we explore such potential effect heterogeneity of refugee inflows on rates of victimization of Germans in crimes with refugee suspects by studying three subgroups of crime, robbery (economic crimes), bodily injury (violent crimes), and rape and sexual coercion (sex crimes), using our 2SLS model specification in column (1) of Table 6. Second-stage results for all three restricted outcome measures are shown in Table 7.[33]

We first consider robberies, i.e., the unlawful taking of property from others by means of force or intimidation, and the rate of victimization of Germans in such crimes with refugee suspects. As robberies involve theft, they are a property crime; being accomplished by assault, however, they may also be counted as a violent crime.[34] In the whole of Germany, a total of 44,666 robberies were recorded in 2015, a figure slightly short of the one recorded in 2014 (BKA 2016). Column (1) of Table 7 shows the results of re-estimating our first-difference model for this alternative and crime-specific outcome measure. As is evident, the

[32]This also holds true in analyses that consider 2016 crime outcomes and use OLS rather than 2SLS for estimation (see Table B11).

[33]First-stage results are identical to those in our baseline 2SLS specification in column (1) of Table 6 and therefore not reproduced in Table 7.

[34]Robberies (crime key: 210000) include, amongst others, handbag robbery, robbery in residences, robbery or extortion resembling robbery of cash points and businesses or of transports of cash and valuables, assault of a motor vehicle driver resembling robbery, and other forms of robbery in streets, lanes or public places (BKA 2016).

results provide no indication that Germans suffered higher rates of victimization in robberies with refugee suspects when refugees settled in larger numbers in their county of residence during the 2015 refugee crisis.[35]

(Table 7 about here)

We next consider bodily injuries, which saw a slight increase in Germany from 2014 to 2015 and a total of 528,863 cases recorded in 2015 (BKA 2016). Bodily injuries (crime key: 220000) are violent crimes and include, but are not limited to, bodily injuries resulting in death, dangerous and serious bodily injuries, mistreatment of persons under offenders' care, and intentional simple bodily injury. We consider in the following a subset of crimes involving bodily injuries, (the sum of) dangerous and serious bodily injuries (crime key: 222000) and intentional simple bodily injuries (crime key: 224000). Results for rates of victimization of Germans in such crimes with refugee suspects are shown in column (2) of Table 7. Again, refugee inflows during the crisis fail to show any impact.

Finally, we consider rape and sexual coercion (crime key: 111000), i.e., sex crimes, and the likelihood of Germans being victimized in such crimes with refugee suspects. Sex crimes by refugees (both alleged and real), and a perceived increased risk of exposure to such crimes as a result of the mass inflow of predominantly prime-aged male refugees during the crisis, have received great attention in the media and have fueled both public concerns about refugee immigration and populist-right anti-refugee propaganda, in particular (though not only) after the reported mass assaults on New Year's Eve 2015/16 in Cologne and other cities. Aggregate crime and victim data for the whole of Germany show no increases in rape and sexual coercion from 2014 to 2015. For 2014, police crime statistics recorded 7,345 such crimes with 7,424 victims, of which 6,015 were German. In 2015, the respective numbers were 7,022 crimes, 7,095 victims, and 5,738 German victims.[36] Results for rates of victimization

[35]We also report OLS estimates for the heterogeneity analysis in Table B10. The results are qualitatively similar to the corresponding 2SLS estimates.

[36]These numbers were taken from PCS data provided online by the Federal Criminal Police Office at: https://www.bka.de/DE/AktuelleInformationen/StatistikenLagebilder/statistikenlagebilder_node.html.

of Germans in sex crimes (rape and sexual coercion) with refugee suspects are shown in column (3) of Table 7. Once more, refugee inflows during the crisis fail to show any impact.

Summarizing the above, we find no evidence that Germans in 2015 were victimized in greater numbers in robberies, bodily injuries, or rapes and sexual coercion when refugees flowed in larger numbers into their county of residence during the 2015 refugee crisis. As shown in columns (4) through (6) of Table 7, this also holds true if we consider changes in victimization rates between 2014 and 2016 (instead of 2015). The findings of our effect-heterogeneity analyses hence do not depend on the time we measure (post-)crisis outcomes.[37]

We also explore potential effect heterogeneity by county urbanity, county location (East vs. West Germany), and the scale of xenophobic attacks against refugees at the county level. We measure urbanity and xenophobic incidents pre-treatment (i.e., in 2014) and split samples by whether or not a county exhibits above or below median 2014 urbanity (as measured by population density) and above or below median 2014 xenophobic incidence (as measured by population-adjusted anti-refugee crime levels taken from a public chronicle of anti-refugee hate crimes in Germany collected by two NGOs (Amadeu Antonio Foundation, PRO ASYL)). Results are reported in Table B12. Consistent with our baseline findings, in no specification do we find a positive effect of refugee immigration on the rate of victimization of Germans in crimes with refugee suspects.

In addition to different crime categories, county urbanity, the geographic location of counties, and the scale of past xenophobic attacks at the county level, official refugee status and refugee education are also of potential interest for heterogeneity analyses. The refugee category in the PCS comprises asylum applicants, individuals with temporary suspension of deportation, and quota or civil war refugees. These groups may differ in terms of labor market access and also face different consequences (in terms of their residence status) when

[37] We also replicate the subgroup analyses in 2SLS with composition controls. For no subgroup do we find evidence that refugee inflows increased the victimization of Germans. The coefficients on decentralization and the male-to-female ratio among refugee inflows are also generally quite small. These composition variables are not instrumented and may themselves be endogenous. Their coefficient estimates should therefore not be interpreted causally. Estimation results are available from the authors upon request.

committing crimes, which may impact their proclivity to engage in criminal activity. Education, in turn, is an important determinant of employment opportunities, which also affects the opportunity costs of crime. Unfortunately, our data do not allow us to distinguish suspects by detailed residence status or refugees by their education, which makes it impossible to study these factors in the effect heterogeneity analyses.

6 Conclusion

The unexpected mass inflow of refugees to Germany in the 2015 refugee crisis raised widespread concern that Germans would suffer from increased levels of crime by refugees. Robust evidence on this question, however, is still lacking. Existing empirical studies for Germany are relatively few and typically rely on aggregate measures of crime that do not distinguish between different suspect and victim groups. Much of the broader literature on immigration and crime also focuses on total crime or victimization rates. Such aggregate measures are informative and of relevance for both policy and public perceptions of security, but do not allow researchers to identify and quantify crimes committed by refugees against natives. Our analysis addresses this gap by combining detailed data on refugee inflows with crime statistics for the specific victim-suspect group of interest for answering the above question, i.e., crimes with refugee suspects in which Germans are victimized.

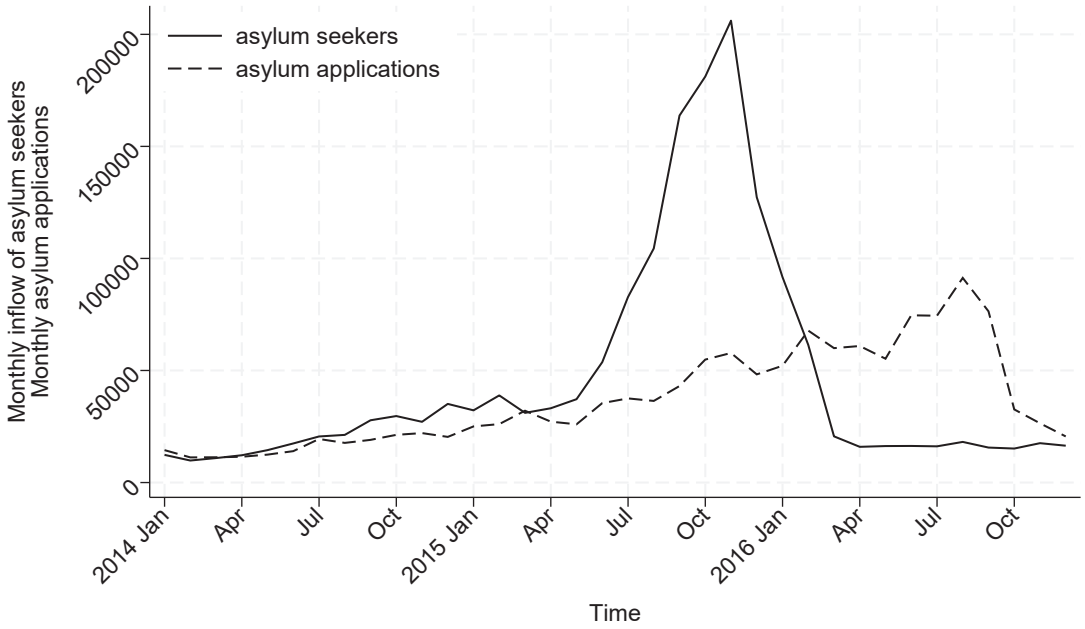
Using novel and superior data on both regional refugee distributions and regional measures of criminal activity of immigrants (refugees) against Germans, we explored the impact that the 2015 refugee crisis had on the scale and type of crime committed in Germany, in particular (but not exclusively) refugee crimes against Germans. Exploiting for identification in first-difference regressions spatio-temporal variation across counties in refugee inflows and in refugee populations' age, gender, and housing structures prior to and after the mass inflow of refugees to Germany in the latter half of 2015, we found evidence for a positive (and mildly hump-shaped) relationship between the scale of refugee immigration and both the overall crime and the overall victimization rate in a county, and that decentralized accommodation

of refugees, at given levels of refugee immigration to a county, exerted a negative effect on the crime rate (regional refugee sex ratios showed no effect). We did not find, however, any evidence for a systematic link between the scale of refugee immigration (and neither the type of refugee accommodation nor refugee sex ratios) and the risk of Germans becoming victims of a crime in which refugees are suspects. This result, which proves robust in various sensitivity checks, holds true not only for total crimes with victim recording in police crime statistics, but also for sub-categories of such crimes, such as robbery (economic crimes), bodily injury (violent crimes), and rape and sexual coercion (sex crimes).

Our results therefore do not indicate that Germans were victimized in greater numbers by refugees during the period under study. This finding is relevant for policy and contributes to the broader literature on immigration and crime, which typically studies aggregate crime measures, not crimes for specific suspect-victim groups. Our analysis shows that such aggregate measures may be little informative on the actual victimization patterns of particular groups.

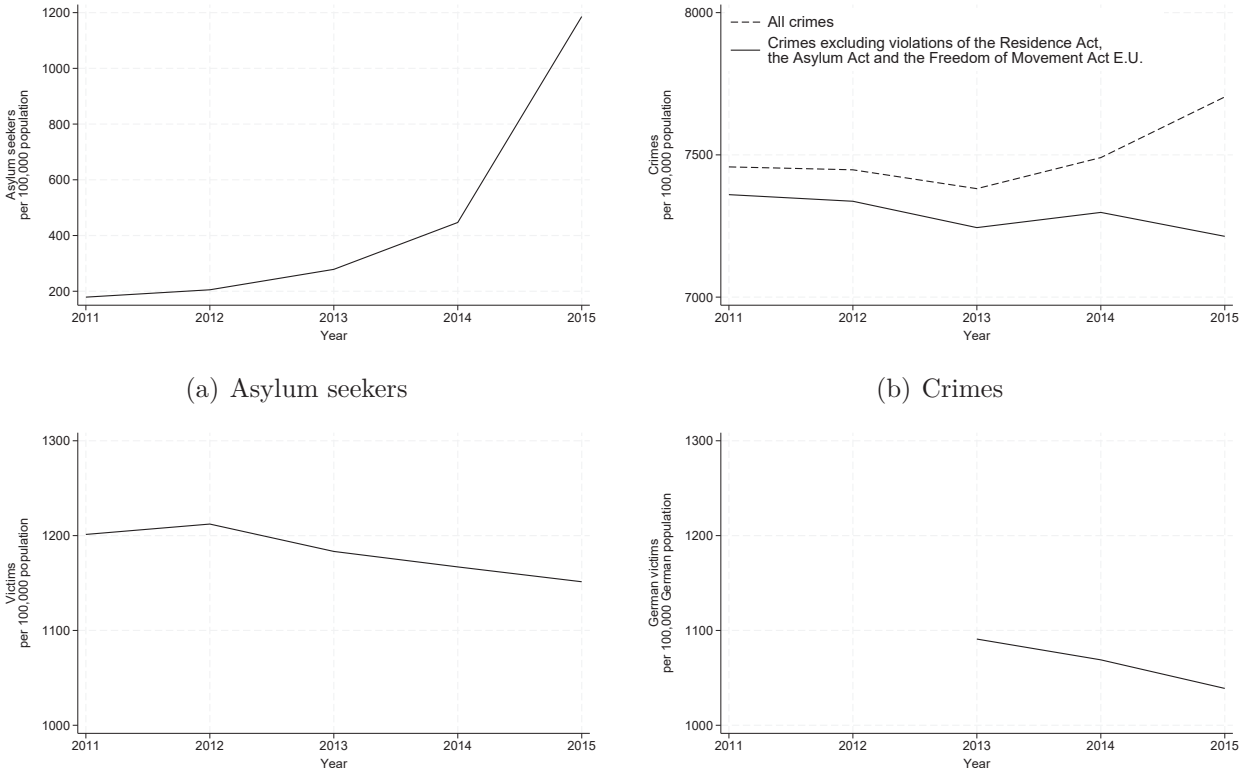
The 2015 refugee inflow into Germany was certainly larger and less stringently administered by state authorities than other refugee episodes in German history. Differences in refugees' age or gender structure, or their religious, ethnic, or linguistic composition in different episodes, also complicate episode comparisons, not only within Germany but also internationally. Estimated effect signs and magnitudes, therefore, need not generalize to other settings and times. However, the key methodological insight of our analysis clearly does have relevance also for other (refugee) immigration episodes and for other research questions concerned with the crime effects of (refugee) immigration. That is, aggregate crime rates can mask (and hence be little informative on) heterogeneous offender and victimization patterns. Distinguishing between different suspect and victim groups reveals such group heterogeneity and can aid policy to better target offenders and protect potential victims.

Figure 1: Asylum seekers and asylum applications in Germany, 2014 to 2016



Notes: The figure plots monthly inflows of asylum seekers, as recorded in the EASY data, and monthly totals of formal asylum applications filed with the BAMF, as recorded in the AZR.

Figure 2: Asylum seekers, crimes, victims, and German victims in Germany, 2011 to 2015



(a) Asylum seekers

(b) Crimes

(c) Victims

(d) German victims

Notes: Data on refugees (asylum seekers receiving regular benefits in accordance with the Act on Benefits for Asylum seekers) has been obtained from the GENESIS-Online database of the Federal Statistical Office in Germany. Data on crime, victims, and German victims are taken from PCS statistics provided online for download at the website of the BKA. Annual figures for asylum seekers, crimes, and victims are normalized per 100,000 population; numbers for German victims per annum are per 100,000 German population.

Table 1: Selected summary statistics for full estimation sample

	Observations	Mean	Std. Dev.	Min	Max
Panel A: Measures of Crime Incidence:					
$\Delta crimerate_{cs2015}$	402	−0.0005	0.0048	−0.0190	0.0210
$\Delta crimerate_{cs2016}$	402	−0.0007	0.0058	−0.0316	0.0278
$\Delta victimrate_{cs2015}$	402	0.00001	0.0009	−0.0052	0.0036
$\Delta victimrate_{cs2016}$	402	0.0009	0.0011	−0.0028	0.0063
$\Delta Gvictimrate_{cs2015}$	402	0.0001	0.0001	−0.0002	0.0009
$\Delta Gvictimrate_{cs2016}$	402	0.0003	0.0002	−0.0002	0.0014
Panel B: Refugee Immigration:					
$\Delta refugees_{cs2015}$	402	0.0076	0.0064	−0.0043	0.0739
$\Delta sexratio_{cs2015}$	378	0.2234	2.2191	−28.2691	10.6769
$\Delta decentralized_{cs2015}$	378	−0.0380	0.1574	−0.7872	0.5775
Panel C: Pre-Crisis County Characteristics:					
$\Delta crimerate_{cs2014}$	402	0.00003	0.0040	−0.0180	0.0161
$\Delta \ln(pop)_{cs2014}$	402	0.0038	0.0060	−0.0185	0.0240
$\ln(GDP)_{cs2014}$	402	10.3537	0.3438	9.6121	11.8243
$unemployment_{cs2014}$	402	6.2796	2.8822	1.4000	15.4000

Notes: The table shows selected summary statistics for the full estimation sample, which consists of the 402 counties in Germany. Variables measure changes (e.g., between 2014 and 2015, or 2014 and 2016) or levels (e.g., in 2014) for these 402 counties (c) in the 16 federal states (s) in Germany. $\Delta(\cdot)_{cs2015}$ indicates the change (in the value) of a variable from 2014 to 2015, and $\Delta(\cdot)_{cs2014}$ indicates the change in its level from 2013 to 2014. Summary statistics for changes in male-to-female sex ratios of refugees aged 15–39 ($\Delta sexratio_{cs2015}$) and shares of asylum seekers who are housed in decentralized accommodation ($\Delta decentralized_{cs2015}$) are for a restricted sample of 378 counties with non-missing information on both compositional features of county-level refugee populations. For a description of all variables and the data sources used to construct them, see the main text.

Table 2: Refugee immigration and changes in crime rates and victimization rates at county level between 2014 and 2015 (OLS regression results)

	$\Delta crimerate_{cs2015}$		$\Delta victimrate_{cs2015}$	
	(1)	(2)	(3)	(4)
$\Delta refugees_{cs2015}$	0.0427	0.2075**	−0.0053	0.0542***
	(0.0331)	(0.0804)	(0.0070)	(0.0167)
$\Delta refugees^2_{cs2015}$		−2.8888**		−1.0440***
		(1.2853)		(0.2664)
$\Delta crimerate_{cs2014}$	−0.3783***	−0.3855***	−0.0351***	−0.0377***
	(0.0548)	(0.0546)	(0.0115)	(0.0113)
$\Delta \ln(pop)_{cs2014}$	0.1596***	0.1570***	0.0153*	0.0143
	(0.0431)	(0.0429)	(0.0090)	(0.0089)
$\ln(GDP)_{cs2014}$	0.0002	0.0002	−0.0003*	−0.0003*
	(0.0008)	(0.0008)	(0.0002)	(0.0002)
$unemployment_{cs2014}$	0.0003**	0.0003***	−3.48e−06	6.46e−06
	(0.0001)	(0.0001)	(2.55e−05)	(2.52e−05)
observations	402	402	402	402
mean of dep. var. 2014	0.0627	0.0627	0.0108	0.0108

Notes: The dependent variable in columns (1) and (2) is the change in the total number of crimes in a county (excluding violations of the Residence Act, the Asylum Procedures Act, and the Freedom of Movement Act/E.U.) between 2014 and 2015, normalized by the county's 2014 population. The dependent variable in columns (3) and (4) is the change in the total number of victims in a county between 2014 and 2015, normalized by the county's 2014 population. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table 3: Refugee immigration, refugees' gender and housing structure, and changes in crime rates and victimization rates at county level between 2014 and 2015 (OLS regression results)

Panel (A):	$\Delta crimerate_{cs2015}$ (mean $crimerate_{cs2014}$: 0.0627)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta refugees_{cs2015}$	0.0366	0.1944**	0.0283	0.1750**	0.0284	0.1754**
	(0.0340)	(0.0866)	(0.0341)	(0.0871)	(0.0342)	(0.0873)
$\Delta refugees^2_{cs2015}$		−2.6728**		−2.4720*		−2.4775*
		(1.3509)		(1.3523)		(1.3547)
$\Delta decentralized_{cs2015}$			−0.0029*	−0.0026*	−0.0029*	−0.0026*
			(0.0015)	(0.0015)	(0.0015)	(0.0015)
$\Delta sexratio_{cs2015}$					9.06e−06	1.41e−05
					(9.83e−05)	(9.80e−05)
$\Delta crimerate_{cs2014}$	−0.3328***	−0.3398***	−0.3279***	−0.3348***	−0.3279***	−0.3348***
	(0.0566)	(0.0565)	(0.0565)	(0.0564)	(0.0566)	(0.0565)
$\Delta \ln(pop)_{cs2014}$	0.1733***	0.1713***	0.1651***	0.1639***	0.1651***	0.1639***
	(0.0439)	(0.0437)	(0.0440)	(0.0438)	(0.0440)	(0.0439)
$\ln(GDP)_{cs2014}$	−0.0005	−0.0005	−0.0006	−0.0006	−0.0006	−0.0006
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)
$unemployment_{cs2014}$	0.0003**	0.0003***	0.0003**	0.0003**	0.0003**	0.0003**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Panel (B):	$\Delta victimrate_{cs2015}$ (mean $victimrate_{cs2014}$: 0.0108)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta refugees_{cs2015}$	−0.0081	0.0498***	−0.0073	0.0524***	−0.0075	0.0519***
	(0.0071)	(0.0179)	(0.0072)	(0.0181)	(0.0072)	(0.0181)
$\Delta refugees^2_{cs2015}$		−0.9802***		−1.0075***		−1.0018***
		(0.2797)		(0.2807)		(0.2810)
$\Delta decentralized_{cs2015}$			0.0003	0.0004	0.0003	0.0004
			(0.0003)	(0.0003)	(0.0003)	(0.0003)
$\Delta sexratio_{cs2015}$					−1.68e−05	−1.48e−05
					(2.07e−05)	(2.03e−05)
$\Delta crimerate_{cs2014}$	−0.0289**	−0.0315***	−0.0294**	−0.0322***	−0.0294**	−0.0322***
	(0.0119)	(0.0117)	(0.0119)	(0.0117)	(0.0119)	(0.0117)
$\Delta \ln(pop)_{cs2014}$	0.0145	0.0138	0.0153*	0.0148	0.0153*	0.0148
	(0.0092)	(0.0091)	(0.0092)	(0.0091)	(0.0093)	(0.0091)
$\ln(GDP)_{cs2014}$	−0.0004**	−0.0004**	−0.0004**	−0.0004**	−0.0004**	−0.0004**
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$unemployment_{cs2014}$	−1.14e−05	−5.71e−07	−9.32e−06	2.57e−06	−8.52e−06	3.21e−06
	(2.58e−05)	(2.56e−05)	(2.59e−05)	(2.57e−05)	(2.60e−05)	(2.58e−05)

Notes: The table shows regression results for the restricted estimation sample of 378 counties with non-missing information on county-level sex ratios of refugees aged 15-39 and county-level shares of refugees who are housed in decentralized accommodation. Panel (A) reports results for the county-level crime rate and Panel (B) for the county-level victimization rate. Columns (1) and (2) consider our baseline covariates used in Table 2, columns (3) and (4) add to this set of controls the change between 2014 and 2015 in the share of asylum seekers who are housed in decentralized accommodation in a county ($\Delta decentralized_{cs2015}$), and columns (5) and (6) add in addition also the change at county level between 2014 and 2015 in the male-to-female sex ratio of refugees aged 15-39 ($\Delta sexratio_{cs2015}$). *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table 4: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2014 and 2015 (OLS regression results)

	$\Delta Gvictimrate_{cs2015}$	
	(1)	(2)
$\Delta refugees_{cs2015}$	0.0007	0.0014
	(0.0009)	(0.0021)
$\Delta refugees^2_{cs2015}$		−0.0131
		(0.0342)
$\Delta crimerate_{cs2014}$	−0.0023	−0.0023
	(0.0014)	(0.0015)
$\Delta \ln(pop)_{cs2014}$	0.0034***	0.0034***
	(0.0011)	(0.0011)
$\ln(GDP)_{cs2014}$	0.0001***	0.0001***
	(0.0000)	(0.0000)
$unemployment_{cs2014}$	7.08e−06**	7.21e−06**
	(3.21e−06)	(3.23e−06)
observations	402	402
mean of dep. var. 2014	0.0001	0.0001

Notes: The dependent variable in columns (1) and (2) is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2014 and 2015, normalized by the county's 2014 German population. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table 5: Refugee immigration, refugees' gender and housing structure, and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2014 and 2015 (OLS regression results)

	$\Delta Gvictimrate_{cs2015}$ (mean $Gvictimrate_{cs2014}$: 0.0001)					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta refugees_{cs2015}$	0.0004	0.0003	0.0005	0.0005	0.0004	0.0004
	(0.0009)	(0.0022)	(0.0009)	(0.0022)	(0.0009)	(0.0022)
$\Delta refugees^2_{cs2015}$		0.0015		−0.0011		0.0001
		(0.0341)		(0.0343)		(0.0342)
$\Delta decentralized_{cs2015}$			3.41e−05	3.43e−05	3.28e−05	3.28e−05
			(3.88e−05)	(3.90e−05)	(3.88e−05)	(3.90e−05)
$\Delta sexratio_{cs2015}$					−3.17e−06	−3.17e−06
					(2.47e−06)	(2.48e−06)
$\Delta crimerate_{cs2014}$	−0.0010	−0.0010	−0.0010	−0.0010	−0.0010	−0.0010
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
$\Delta \ln(pop)_{cs2014}$	0.0030***	0.0030***	0.0031***	0.0031***	0.0032***	0.0032***
	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)
$\ln(GDP)_{cs2014}$	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$unemployment_{cs2014}$	5.80e−06*	5.78e−06*	6.07e−06*	6.08e−06*	6.22e−06**	6.22e−06**
	(3.09e−06)	(3.12e−06)	(3.11e−06)	(3.14e−06)	(3.11e−06)	(3.14e−06)

Notes: The table shows regression results for the restricted estimation sample of 378 counties with non-missing information on county-level sex ratios of refugees aged 15-39 and county-level shares of refugees who are housed in decentralized accommodation. The dependent variable in columns (1) through (6) is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2014 and 2015, normalized by the county's 2014 German population. Columns (1) and (2) consider our baseline covariates used in Table 2, columns (3) and (4) add to this set of controls the change between 2014 and 2015 in the share of asylum seekers who are housed in decentralized accommodation in a county ($\Delta decentralized_{cs2015}$), and columns (5) and (6) add in addition also the change at county level between 2014 and 2015 in the male-to-female sex ratio of refugees aged 15-39 ($\Delta sexratio_{cs2015}$). *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table 6: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level (2SLS regression results for expanded sets of covariates, restricted samples, and 2014 to 2016 changes in crime incidence measures)

	$\Delta Gvictimrate_{cs2015}$						$\Delta Gvictimrate_{cs2016}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Second Stage:							
$\Delta refugees_{cs2015}$	−0.0022	−0.0023	−0.0031	−0.0001	−0.0021	−0.0022	−0.0068
	(0.0028)	(0.0028)	(0.0027)	(0.0027)	(0.0028)	(0.0028)	(0.0047)
$clearancerate_{cs2014}$		−0.0002					
		(0.0001)					
$citycounty_{cs2014}$			0.0001***				
			(0.0000)				
$\Delta Gvictimrate_{cs2014}$				−0.3629***			
				(0.0660)			
$\Delta decentralized_{cs2015}$					3.29e−05		
					(4.41e−05)		
First Stage:							
$\log(dist_{cs2014}+1)$	−0.0033***	−0.0033***	−0.0034***	−0.0032***	−0.0033***	−0.0033***	*see column (1)*
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	
F statistic	40.78	40.79	42.19	38.35	41.10	40.94	
observations	402	402	402	402	400	398	402
mean of dep. var. 2014	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Notes: The dependent variable in the second stage equation in columns (1) – (6) (column (7)) is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2014 and 2015 (2014 and 2016), normalized by the county's 2014 German population. The IV used for $\Delta refugees_{cs2015}$ in the respective first stages is the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties within the same state s as county c in 2014 host a refugee reception center ($\log(dist_{cs2014}+1)$). All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county, and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. We exclude Berlin, Bremen (2 counties), and Hamburg in column (6). *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table 7: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2014 and 2015 (or 2016) (2SLS regression results for different subgroups of crime)

Second Stage:	$\Delta Gvictimrate_{cs2015}$			$\Delta Gvictimrate_{cs2016}$		
	(1) *Robbery*	(2) *Bodily Injury*	(3) *Rape/ Sexual Coercion*	(4) *Robbery*	(5) *Bodily Injury*	(6) *Rape/ Sexual Coercion*
$\Delta refugees_{cs2015}$	0.0004	−0.0010	0.0001	0.0006	−0.0038	2.60e−05
	(0.0006)	(0.0017)	(0.0002)	(0.0007)	(0.0027)	(0.0002)
$\Delta crimerate_{cs2014}$	−0.0009***	−0.0010	−0.0003**	−0.0008**	−0.0013	−1.04e−05
	(0.0003)	(0.0009)	(0.0001)	(0.0003)	(0.0014)	(0.0001)
$\Delta \ln(pop)_{cs2014}$	0.0005**	0.0015**	0.0001	0.0005**	0.0037***	0.0001
	(0.0002)	(0.0007)	(0.0001)	(0.0003)	(0.0011)	(0.0001)
$\ln(GDP)_{cs2014}$	6.85e−06	4.34e−05***	4.93e−07	6.68e−06	0.0001***	3.67e−06**
	(4.50e−06)	(1.30e−05)	(1.55e−06)	(5.00e−06)	(2.06e−05)	(1.86e−06)
$unemployment_{cs2014}$	2.46e−06***	2.01e−06	3.08e−07	1.99e−06***	1.09e−05***	3.31e−07
	(6.78e−07)	(1.96e−06)	(2.34e−07)	(7.53e−07)	(3.11e−06)	2.81e−07
observations	402	402	402	402	402	402
mean of dep. var. 2014	0.00001	0.000065	2.50e-06	0.00001	0.000065	2.50e-06

Notes: The dependent variables in the second stage equations measure changes between 2014 and 2015 (columns (1) – (3)), respectively between 2014 and 2016 (columns (4) – (6)), in the total number of Germans victimized in different crimes with refugee suspects in a county, normalized by the county's 2014 German population. Columns (1) and (4) consider robbery (crime key: 210000), columns (2) and (5) dangerous bodily injury (crime key: 222000) and simple bodily injury (crime key: 224000), and columns (3) and (6) rape and sexual coercion (crime key: 111000). The IV used for $\Delta refugees_{cs2015}$ in the respective first stages is the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties within the same state s as county c that in 2014 host a refugee reception center ($\log(dist_{cs2014}+1)$). First-stage results are identical to those in our baseline 2SLS specification in column (1) of Table 6 and therefore not reproduced. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

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Immigration and Crimes against Natives:

The 2015 Refugee Crisis in Germany

Supplementary Material

Appendix A Refugee registration and regional distribution, PCS crime data, and regional changes in crime and refugee numbers in 2014–2015

Refugee registration and regional distribution

When refugees arrived in Germany, they had to report to a state organization immediately or within short notice. They could report directly at the border when crossing it, and border authorities then sent them to the nearest refugee reception center (BAMF 2016c), or post entry at one of several state institutions, including the police, a branch office of the Federal Office for Migration and Refugees (BAMF) (*"Bundesamt für Migration and Flüchtlinge"*), or a reception facility (BAMF 2016c). Asylum procedures only commenced if refugees had made such an initial declaration. All individuals who declared their intend to seek asylum in Germany were registered and received a proof of arrival, the so-called Asylum-Seeker Registration Certificate (BüMA) (*"Bescheinigung über die Meldung als Asylsuchender"*), an official identification document that entitled its holders to reside in Germany and receive asylum benefits in accordance with the Act on Benefits for Asylum Seekers (AsylbLG) (*"Asylbewerberleistungsgesetz"*) and the Asylum Act (AsylG) (*"Asylgesetz"*), which include, amongst other things, accommodation, medical treatment, and food (BAMF 2016b; BAMF 2016c; §55(1) AsylG; §1 AsylbLG).

The initial registration of the request for asylum was registered in the EASY system (*"Erstverteilung der Asylbegehrenden"*), whose records provided the basis for the initial distribution of asylum seekers onto the federal states in accordance with the "Königstein Key" (*"Königsteiner Schlüssel"*). The "Königstein Key" is a pre-determined quota set by the Federation-Länder Commission based on the tax revenues and population sizes of federal states two years prior so as to achieve an adequate and fair distribution of asylum seekers across states (BAMF 2016c).

Asylum seekers were obliged to live in the reception center to which they were allocated for up to three months, a limit that was extended to six months by the Act on the Ac-

celeration of Asylum Procedures (*"Asylverfahrensbeschleunigungsgesetz"*, or *AsylVfBeschlG*) on 24 October 2015 (§47 AsylG). They were also obliged to reside (*"Residenzpflicht"*) for the first three months of the asylum procedure within a designated area, which could be a county, an administrative district or the entire state in which they lived, depending on the state to which they had been allocated (§56 AsylG; §61 Aufenthaltsgesetz (AufenthG)). These spatial restrictions were lifted when asylum seekers had been continuously allowed, tolerated or permitted to stay in Germany for three months (§61 AufenthG). Applicants received a residence permit for three years (§§25(1) or (2), 26 AufenthG) if they were entitled to asylum (*"Asylberechtigter"*) (Art. 16a(1) Grundgesetz (GG)), or granted refugee status (*"Anerkannter Flüchtling"*) (§3(1) AsylG). With such a permit, refugees qualified for the receipt of social benefits in accordance with *"Sozialgesetzbuch"* (SGB) II and XII (§7 SGB II, §19 SGB XII) and ceased to receive asylum seeker benefits. If applicants got only subsidiary protection (§4(1) AsylG), were allowed to stay because of a ban that prevents their deportation (§60(5) or (7) AufenthG), or their deportation was temporarily delayed (§60a AufenthG), they continued to be entitled to asylum seeker benefits in case the residency title granted to them did not exceed six months (§1(2) AsylbLG). If a temporary right to reside was issued (i.e. *"Aufenthaltsgewährung"*) based on international law or on humanitarian grounds (§1(1) no. 3 AsylbLG; §§23(1), 24, 25(4) or (5) AufenthG), the latter restriction did not apply.

PCS crime data

Crimes are classified in the PCS by 6-digit crime keys. In the crime statistics, summary crime key 890000 denotes all crimes excluding violations of the Residence Act, the Asylum Act and the Freedom of Movement Act E.U. (crime key: 725000). Crime key 725000 covers offenses such as unauthorized entry (border crossing), unauthorized stay, commercial and gang-type subornation of fraudulent application for asylum, provision of incorrect or incomplete information, or the fraudulent use of residence permits in legal transactions, entry (border

crossing), or stay despite being refused freedom of movement (BKA 2018, pp. 35–36). We use offenses covered by crime key 890000 for the construction of county-level crime rates. For 2015, the PCS records a total of 5,927,908 crimes that do not constitute violations of the Residence Act, the Asylum Act and the Freedom of Movement Act E.U. (i.e., offenses against foreigners law).

Suspects are recorded in the PCS for solved (cleared-up) crimes, i.e. offenses for which a suspect was caught in the act or the identity of a suspect has been established through police investigations (BKA 2016, p. 80). A suspect is recorded only if police investigations have produced substantive evidence that a person is likely to have committed an offense. For 2015, the PCS provides information on 2,011,898 suspects. Refugee suspects are identified by their residence status and include asylum applicants, individuals with temporary suspension of deportation, and quota or civil war refugees. Victim data are recorded (and reported in the PCS) only for natural persons and certain crimes. According to the *Catalogue of Definitions* of the BKA, victims are "persons injured/directly affected by specially defined violations of highly personal legally protected interests (life, physical integrity, freedom, reputation, sexual self-determination) and offenses involving resistance" (BKA 2017, p. 9), provided the *Catalogue of Offences* of the BKA contains a mark for victim recording. Offenses linked with crime keys areas[1] 0000** (offenses against life), 1000** (offenses against sexual self-determination), 2000** (offenses involving brutality and crimes against personal freedom), and 6210** (resistance to public authority) are, as a rule, victim-related (BKA 2017). In 2015, a total of 946,133 victims were recorded in the PCS. Crimes with victim recording account for a sizeable fraction of all crimes (about 14% in 2015) and cover offenses such as bodily injuries, robberies, and sex crimes.[2] Since 2013, victim data collected for the PCS contain information also on the nationality of victims. Based on this information, county-

[1](**) in the last two digits of these keys are placeholders for key sub-categories.

[2]Bodily injuries comprise, amongst others, bodily injuries that result in death, dangerous and serious bodily injuries, and intentional simple bodily injuries. Robberies, i.e., the unlawful taking of property from others by means of force or intimidation, include handbag robbery, robbery in residences, as well as robberies in streets, lanes or public places. Sex crimes cover rape and other forms of sexual coercion.

level data on the number of German victims and data on the number of German victims in crimes with refugee suspects can be extracted from raw PCS files held at the BKA.

Regional changes in crime and refugee numbers in 2014–2015

As shown graphically in administrative maps of Germany in Panels (a) to (d) in Figure A1, changes at county level between 2014 and 2015 in population shares of asylum seekers, crime rates, population victimization rates, and rates of victimization of Germans were far from uniform across Germany.[3] What is more, changes in measures of crime incidence between 2014 and 2015 are also negative for the majority of the 402 counties in Germany (although nearly all counties saw a rise in the population share of asylum seekers between these two years (393/402 counties)). 229/402 counties witnessed a decline in the crime rate between 2014 and 2015, 193/402 a decline in the population victimization rate, and 253/402 a decline in the rate of victimization of Germans. According to these measures, therefore, life got safer between 2014 and 2015, not less safe, also in most parts of Germany. Crude eye balling also suggests no clear correlations between regional patterns in the population shares of asylum seekers and any of the three measures of crime incidence across time, and neither do respective bivariate correlation coefficients.[4]

However, refugee populations did not only increase across counties at different rates between 2014 and 2015. There was also great heterogeneity in compositional changes of refugee populations at county level. Figure A3 documents, again graphically, two such compositional changes, changes in male-to-female sex ratios among prime-aged refugees, and changes in the share of refugees who live in decentralized accommodation. Data on both compositional features of regional refugee populations stem from special data extracts

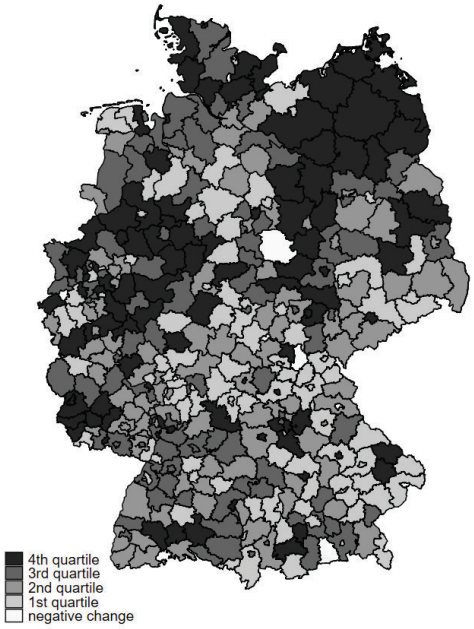
[3] In Figure A1, negative county values for a measure are indicated by a light grey shading, and positive county values are classified into 4 quartiles (the darker the color of a county, the larger is the change in a measure).

[4] Correlation coefficients are small and mostly negative. For changes in crime rates, the correlation coefficient with refugee inflows is 0.0631, for victimization rates −0.0472, and for the victimization rate of Germans −0.0714. See also Panels (a) to (c) in Figure A2, which plot the change at county level between 2014 and 2015 in the population share of asylum seekers against the change in the crime rate, the victimization rate and the victimization rate of Germans, respectively.

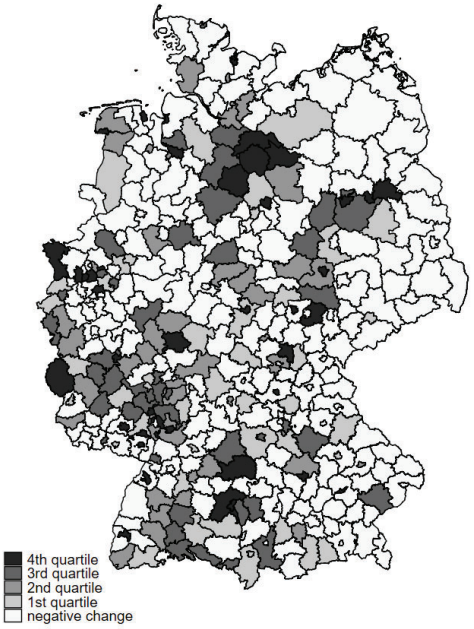
drawn from the Statistics on Asylum Seekers' Benefits (SASB), provided for this project by the 16 Statistical Offices of the German Lander. Details on these special data extracts are provided in the Data section. 22 counties in the SASB data lack information on refugee sex ratios, and 2 counties lack information on decentralized refugee accommodation. Counties with missing information are colored white in the two maps in Figure A3. Positive county values for each measure are classified once more into 4 quartiles (the darker the color of a county, the larger is the change in a compositional feature), and negative county values are indicated by a light grey shading. Again, crude eye balling suggests no clear correlations between these features of regional refugee populations. The same holds true for both features and changes in the population share of refugees, as well as changes in crime exposure and changes in rates of victimization (overall and for Germans) shown in Figure A1.[5] Being the port of entry to Germany for most refugee arrivals in 2015, it is remarkable, if not surprising, that the south-eastern federal state of Bavaria housed less refugees in group quarters in 2015 than in 2014, both overall and in most of its counties.

[5]The correlation coefficient between county-level changes in refugee sex ratios and decentralized refugee accommodation is −0.0369. The correlation coefficient between county-level changes in asylum seeker populations and refugee sex ratios (decentralized refugee accommodation) is −0.0260 (−0.1325). Correlation coefficients between changes in refugee sex ratios, respectively decentralized refugee accommodation, and changes in crime rates, population victimization rates, and rates of victimization of Germans are 0.0245, −0.0465, and −0.0215, respectively −0.1736, 0.0321, and 0.0538. All reported correlation coefficients are for the 378 counties with non-missing data on refugee sex ratios and decentralized refugee accommodation.

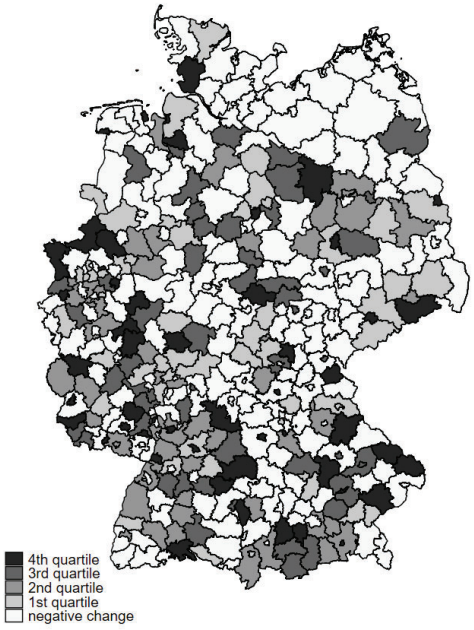
Figure A1: County-level changes in asylum seekers, crime rates, total victimization rates, and rates of victimization of Germans, 2014–2015



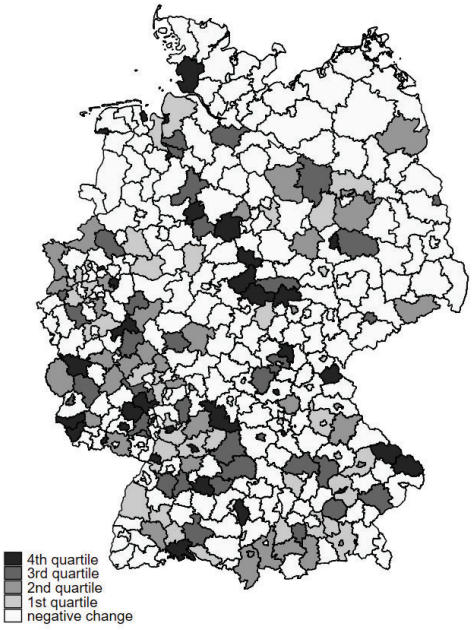
(a) Asylum seekers



(b) Crimes

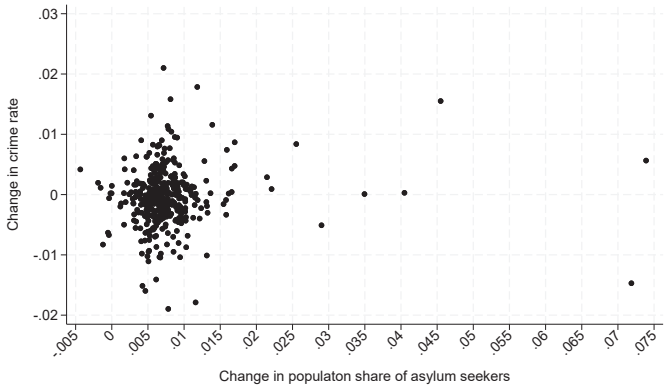


(c) Victims

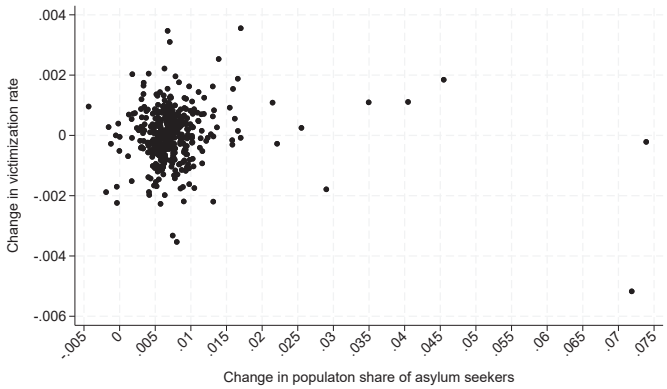


(d) German victims

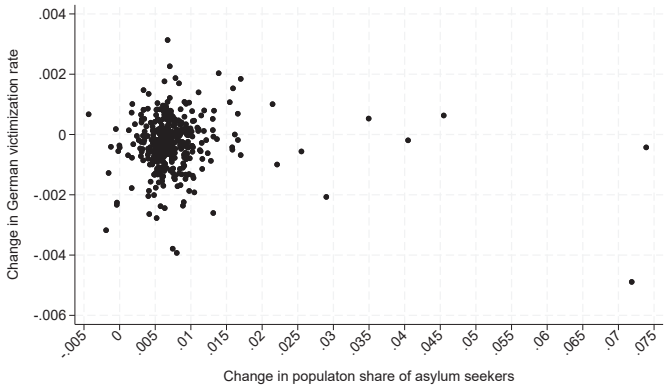
Figure A2: Scatter plots of county-level changes in asylum seekers, total crime rates, total victimization rates and rates of victimization of Germans, 2014–2015



(a) Crimes



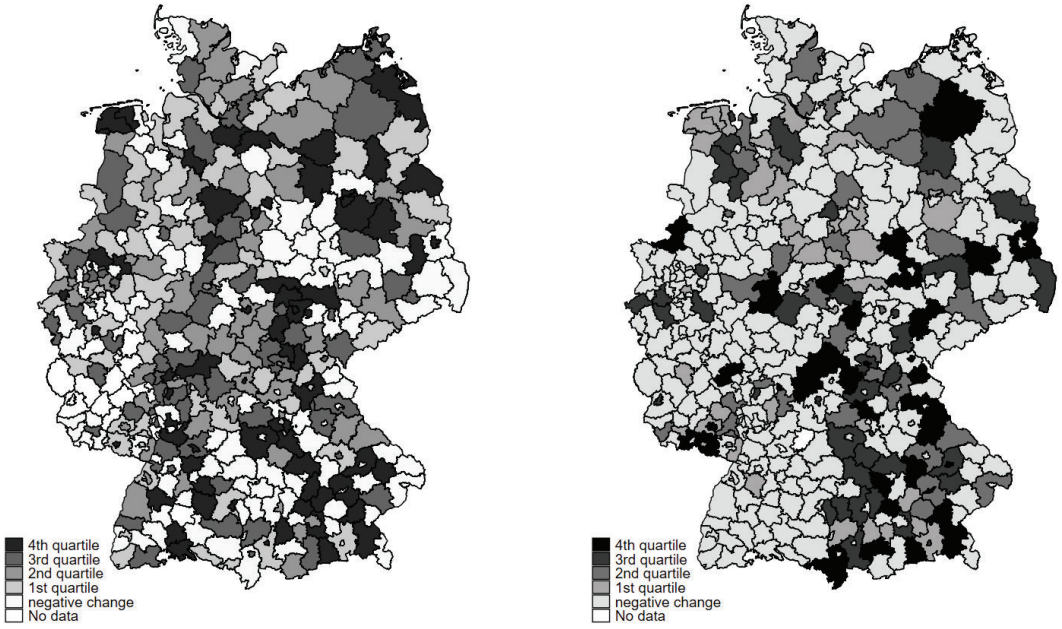
(b) Victims



(c) German victims

Notes: This figure shows the correlation between changes in the population share of asylum seekers and changes in the total crime rate (Panel (a)), changes in the total victimization rate (Panel (b)), and changes in the German victimization rate (Panel (c)).

Figure A3: County-level changes in refugee sex ratios and refugee decentralized accommodation, 2014–2015

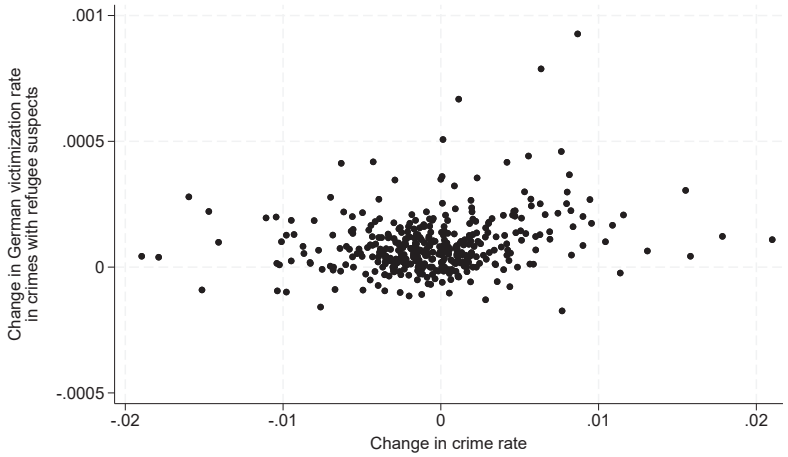


(a) Refugee sex ratios (15 – 39)

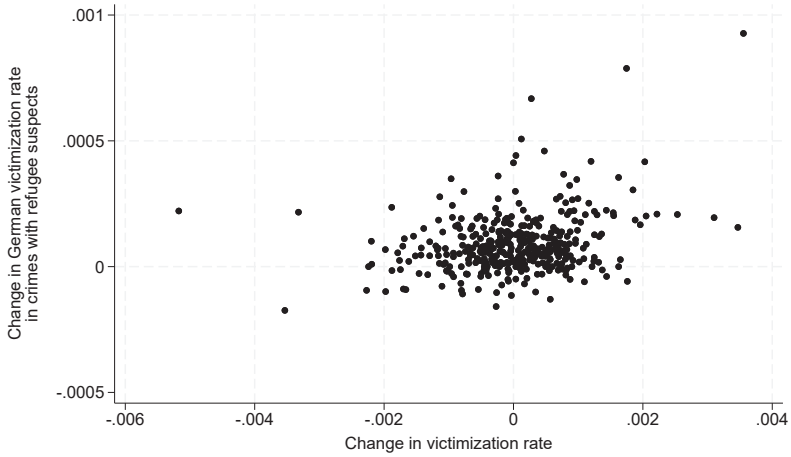
(b) Refugee decentralized accommodation

Appendix B Figures and tables cited in the main text

Figure B1: Scatter plots of county-level changes in victimization rates of Germans in crimes with refugee suspects, total crime rates, and total victimization rates, 2014–2015



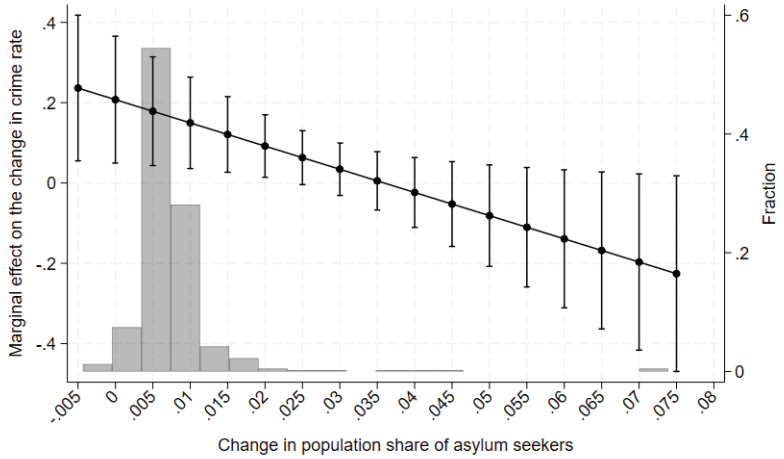
(a) Crimes



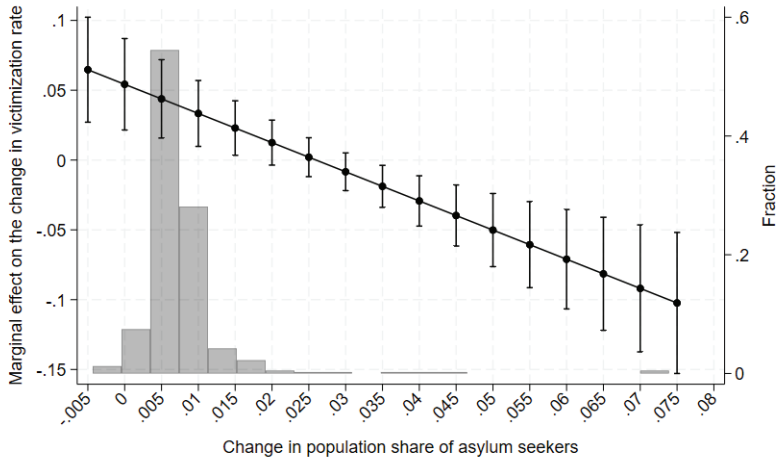
(b) Victims

Notes: Panel (a) of this figure illustrates the correlation between changes in the total crime rate and changes in the German victimization rate in crimes with refugee suspects from 2014 to 2015. Panel (b) shows the correlation between changes in the total victimization rate and changes in the German victimization rate in crimes with refugee suspects between 2014 and 2015.

Figure B2: Marginal effects of changes in asylum seeker populations between 2014 and 2015



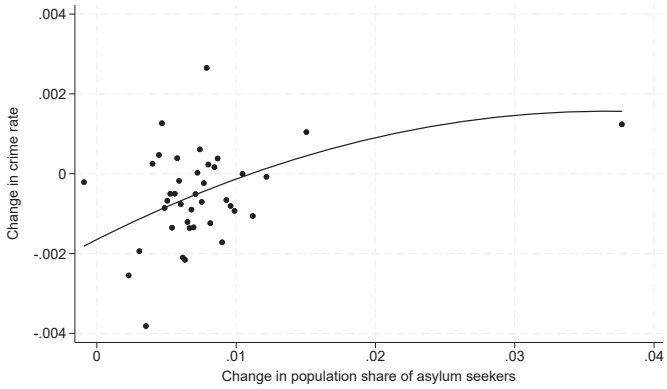
(a) marginal effect of $\Delta refugees_{cs2015}$ on $\Delta crimerate_{cs2015}$



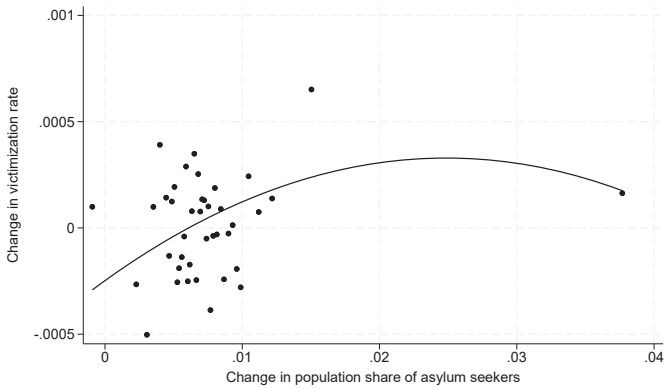
(b) marginal effect of $\Delta refugees_{cs2015}$ on $\Delta victimrate_{cs2015}$

Notes: This figure shows the marginal effects of changes in asylum seeker populations on changes in the total crime rate (in Panel (a)) and total victimization rate (in Panel (b)) between 2014 and 2015 and associated 95% confidence intervals. The distribution of changes in the population share of asylum seekers is also depicted in the two panels.

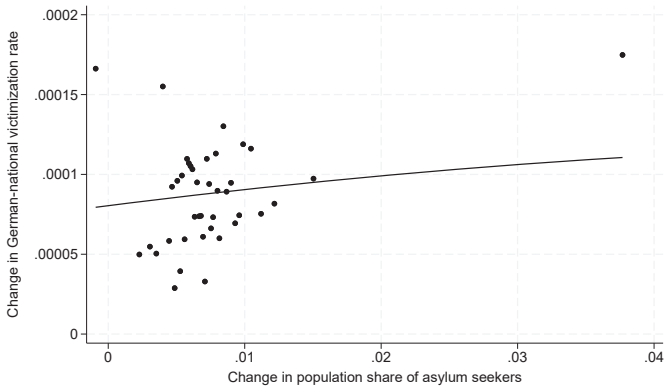
Figure B3: Binscatter plots



(a) Crimes



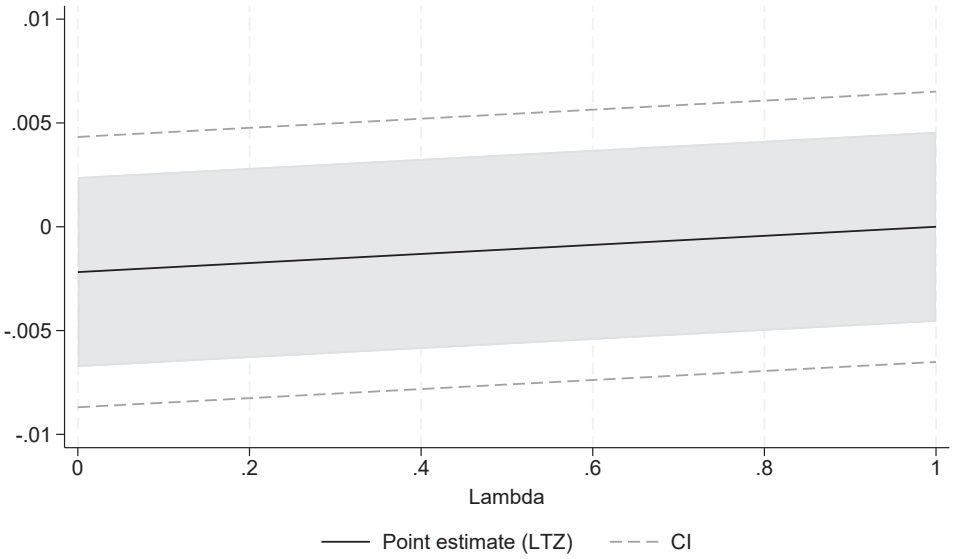
(b) Victims



(c) German victims

Notes: This figure presents *binscatter* plots of the change in the total crime rate (Panel (a)), the total victimization rate (Panel (b)), and the German victimization rate in crimes with refugee suspects (Panel (c)) between 2014 and 2015. All covariates are included as control variables. The plots are constructed using 40 equal-sized bins, and a quadratic fitted line is overlaid to illustrate the functional form.

Figure B4: Instrument exogeneity



Notes: We use the Stata command *plausexog* to compute the point estimates and corresponding confidence intervals and to generate the figure. The parameter λ denotes the share of the reduced-form effect of the instrument on the outcome ($\Delta Gvictimrates_{cs2015}$) that is assumed to operate independently of the change in the refugee inflow ($\Delta refugees_{cs2015}$). The black line displays the implied point estimate of the effect of $\Delta refugees_{cs2015}$ for different values of λ. The grey solid areas represent the 90% confidence intervals under the assumption that the variance of the direct effect of the instrument on victimization rates is zero. The grey dashed lines show the 90% confidence intervals when the variance of the reduced-form coefficient is used instead. As shown in the figure, the estimated effect of $\Delta refugees_{cs2015}$ on $\Delta Gvictimrates_{cs2015}$ remains statistically insignificant across a wide range of λ values.

Table B1: OLS regression results with outliers dropped

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	$\Delta crimerate_{cs2014}$				$\Delta victimrate_{cs2014}$				$\Delta Gvictimrate_{cs2014}$			
Panel (A): Linear model												
$\Delta refugees_{cs2015}$	0.0985*	0.1314*	0.1012	0.0887**	0.0200*	0.0372**	0.0277*	0.0301***	−0.0001	0.0014	−0.0011	0.0018
	(0.0583)	(0.0746)	(0.0810)	(0.0424)	(0.0120)	(0.0152)	(0.0163)	(0.0106)	(0.0016)	(0.0020)	(0.0020)	(0.0012)
Panel (B): Non-linear model												
$\Delta refugees_{cs2015}$	0.1672	0.1250	0.2190	0.1681*	0.0290	−0.0279	−0.0284	0.0119	0.0014	−0.0093*	−0.0088*	0.0013
	(0.1343)	(0.1893)	(0.2115)	(0.0973)	(0.0276)	(0.0383)	(0.0423)	(0.0233)	(0.0036)	(0.0051)	(0.0053)	(0.0026)
$\Delta refugees^2_{cs2015}$	−2.9301	0.4104	−8.3105	−2.7914	−0.3837	4.1239*	3.9571	0.8086	−0.0639	0.6787**	0.5409	0.0195
	(5.1569)	(11.0098)	(13.7724)	(3.0804)	(1.0588)	(2.2287)	(2.7568)	(0.9237)	(0.1393)	(0.2939)	(0.3461)	(0.0872)
controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
observations	398	394	390	371	398	394	390	374	398	394	390	383

Notes: The dependent variable in columns (1)–(4) is the change in the total number of crimes in a county between 2014 and 2015 (excluding violations of the Residence Act, the Asylum Procedures Act, and the Freedom of Movement Act/E.U.), normalized by the county's 2014 population. In columns (5)–(8), the dependent variable is the change in the total number of victims in a county between 2014 and 2015, normalized by the county's 2014 population. In columns (9)–(12), the dependent variable is the change in the total number of German victims in crimes involving refugee suspects in a county between 2014 and 2015, normalized by the county's 2014 German population. In columns (1), (5), and (9), we exclude counties in the top 1% of the distribution of changes in refugee shares; in columns (2), (6), and (10), we exclude counties in the top 2%; and in columns (3), (7), and (11), we exclude counties in the top 3%. For columns (4), (8), and (12), we estimate the non-linear specification using the full sample, compute Cook's D for each observation, and retain only counties with Cook's D below $4/N$, where $N = 402$. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5%, and 1% level.

Table B2: Refugee immigration and changes in the crime rate, victimization rate, and victimization rate of Germans in crimes with refugee suspects at county level between 2014 and 2015) (OLS regression results for counties with reception centers)

	$\Delta crimerate_{cs2015}$		$\Delta victimrate_{cs2015}$		$\Delta Gvictimrate_{cs2015}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta refugees_{cs2015}$	0.1576**	0.1550**	0.0235*	0.0281**	0.0015	0.0018
	(0.0686)	(0.0758)	(0.0132)	(0.0127)	(0.0020)	(0.0016)
$\Delta decentralized_{cs2015}$		−0.0019		0.0005		0.0001
		(0.0034)		(0.0006)		(0.0001)
$\Delta sexratio_{cs2015}$		−0.0001		0.0002*		−0.0000
		(0.0008)		(0.0001)		(0.0000)
controls	Yes	Yes	Yes	Yes	Yes	Yes
observations	94	89	94	89	94	89

Notes: The dependent variables are changes between 2014 and 2015 in the total number of crimes, victims, and German victims in crimes with refugee suspects in a county, normalized by the county's 2014 (German) population. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. In columns (2), (4), and (6), we additionally control for the 2014 to 2015 change in the share of asylum seekers who are housed in decentralized accommodation in a county and the change at county level between 2014 and 2015 in the male-to-female sex ratio of refugees aged 15–39. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B3: Pre-treatment characteristics, refugee inflows, and IV

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	$\ln(\text{pop}_{14})$	sex ratio_{14}	$\Delta\text{sex ratio}_{14-13}$	foreigner_{14}	$\Delta\text{foreigner}_{14-13}$	$\Delta\ln(\text{GDP})_{14-13}$	$\Delta\text{unemploy}_{14-13}$	crime rate_{14}	clear rate_{14}	$\Delta\text{clear rate}_{14-13}$	victim_{14}	$\Delta\text{victim}_{14-13}$	Gvictim_{14}	$\Delta\text{Gvictim}_{14-13}$
Panel (A): Refugee inflow – Without control variables														
$\Delta refugees_{cs2015}$	-2.0425	-0.0599	0.0302	-0.2913	0.0084	-0.3265*	-1.2946	0.2693	-0.4485	0.1205	0.0494	-0.0020	0.0484	-0.0022
	(5.1004)	(0.1977)	(0.0205)	(0.3673)	(0.0216)	(0.1875)	(2.1449)	(0.2038)	(0.5201)	(0.1851)	(0.0335)	(0.0071)	(0.0322)	(0.0070)
Panel (B): Refugee inflow – With control variables														
$\Delta refugees_{cs2015}$	-2.1273	0.0433	0.0312*	-0.2556	0.0123	-0.3272*	0.1377	-0.0663	0.0361	0.0997	-0.0046	-0.0020	-0.0059	-0.0023
	(3.6716)	(0.1802)	(0.0186)	(0.1835)	(0.0160)	(0.1889)	(1.6701)	(0.0930)	(0.2976)	(0.1792)	(0.0181)	(0.0064)	(0.0175)	(0.0063)
Panel (C): IV – Without control variables														
$\log(dist_{cs2014}+1)$	-0.2045***	0.0021	-0.0003	-0.0003	-0.0001	-0.0005	0.0533***	-0.0079***	0.0261***	-0.0017	-0.0007***	-0.0000	-0.0007***	-0.0000
	(0.0393)	(0.0016)	(0.0002)	(0.0029)	(0.0002)	(0.0015)	(0.0169)	(0.0016)	(0.0039)	(0.0015)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Panel (D): IV – With control variables														
$\log(dist_{cs2014}+1)$	-0.0558	0.0008	-0.0005**	-0.0048**	-0.0004**	0.0005	-0.0180	-0.0007	0.0021	-0.0019	0.0001	0.0001	0.0001	0.0001
	(0.0388)	(0.0019)	(0.0002)	(0.0019)	(0.0002)	(0.0020)	(0.0177)	(0.0010)	(0.0032)	(0.0019)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
observations	402	402	402	402	402	402	402	402	402	402	402	402	402	402

Notes: This table reports unconditional and conditional (based on baseline covariates) correlations from OLS regressions between county-level pre-treatment characteristics and refugee inflows (Panels (A) and (B)) as well as the instrument (Panels (C) and (D)). The dependent variables are: the logarithm of total population in 2014 (1), the sex ratio in 2014 (2), the change in the sex ratio between 2013 and 2014 (3), the share of foreigners in 2014 (4), the change in the share of foreigners between 2013 and 2014 (5), the change in the logarithm of GDP per capita between 2013 and 2014 (6), the change in the unemployment rate between 2013 and 2014 (7), the crime rate in 2014 (8), the clearance rate in 2014 (9), the change in the clearance rate between 2013 and 2014 (10), the victimization rate in 2014 (11), the change in the victimization rate between 2013 and 2014 (12), the victimization rate of Germans in 2014 (13), and the change in the victimization rate of Germans between 2013 and 2014 (14). Panels (A) and (C) report specifications without additional covariates. Panels (B) and (D) include state fixed effects and baseline controls, i.e., the change in the county-level crime rate and in population between 2013 and 2014, GDP per capita in 2014, and the unemployment rate in 2014. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B4: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2013 and 2014 (OLS placebo regression results)

	$\Delta Gvictimrate_{cs2015}$	$\Delta Gvictimrate_{cs2014}$		
	(1)	(2)	(3)	(4)
Panel (A):				
$\Delta refugees_{cs2015}$	0.0007	0.0012*	0.0011*	0.0011*
	(0.0009)	(0.0007)	(0.0007)	(0.0007)
Panel (B):				
$\Delta refugees_{cs2015}$	0.0014	0.0013	0.0009	0.0011
	(0.0021)	(0.0016)	(0.0016)	(0.0016)
$\Delta refugees^2_{cs2015}$	−0.0131	−0.0012	0.0039	0.0007
	(0.0342)	(0.0260)	(0.0258)	(0.0259)
observations	402	402	402	402
mean of dep. var. 2014	0.0001	0.0001	0.0001	0.0001

Notes: Panel (A) shows results for our linear specification, and Panel (B) for our non-linear specification. Column (1) reproduces our baseline estimates from columns (1) and (2) in Table 4. Columns (2) through (4) report results from placebo regressions. The dependent variable in these placebo regressions is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2013 and 2014, normalized by the county's 2013 German population. All placebo regressions control for state fixed effects, the change in the crime rate of a county and the (approximate) growth rate of its population between years $j-1$ to j, county-level GDP per capita in year j, and the unemployment rate of a county in year j. In column (2), year j is 2013, in columns (3) and (4), it is 2014. Column (4) excludes $\Delta Crime_{cs2014}$ from the list of covariates. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B5: Refugee immigration and changes in county-level characteristics between 2013 and 2014

	(1)	(2)	(3)	(4)
$\Delta crimerate_{cs2014}$	0.0071			0.0033
	(0.0847)			(0.0943)
$\Delta victimrate_{cs2014}$		−0.0921		−0.1223
		(0.3684)		(0.4082)
$\Delta Gvictimrate_{cs2014}$			6.7497*	6.7823*
			(3.9127)	(3.9462)
$\Delta \ln(pop)_{cs2014}$	−0.0420	−0.0405	−0.0515	−0.0490
	(0.0665)	(0.0668)	(0.0664)	(0.0675)
$\ln(GDP)_{cs2014}$	0.0028**	0.0028**	0.0027**	0.0026**
	(0.0012)	(0.0012)	(0.0012)	(0.0012)
$unemployment_{cs2014}$	−0.0002	−0.0002	−0.0002	−0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
observations	402	402	402	402

Notes: The dependent variable is the change in the total number of refugees in a county between 2014 and 2015, normalized by the county's 2014 population. All regressions control for state fixed effects, the 2013 to 2014 change in the (approximate) growth rate of a county's population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. Additionally, we account for the change in the total crime rate between 2013 and 2014 in column (1), the change in the victimization rate between 2013 and 2014 in column (2), the change in the victimization rate of Germans in crimes with refugee suspects between 2013 and 2014 in column (3), and all the three aforementioned variables in column (4). *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B6: County-level IV and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2013 and 2014

	$\Delta Gvictimrate_{cs2014}$		
	(1)	(2)	(3)
$\log(dist_{cs2014}+1)$	$-1.82\text{e}-05^{**}$	$-1.92\text{e}-05^{***}$	$-1.79\text{e}-05^{**}$
	$(7.03\text{e}-06)$	$(6.96\text{e}-06)$	$(6.98\text{e}-06)$
observations	402	402	402

Notes: This table shows the relationship between the IV and changes in the rate of victimization of Germans in crimes with refugee suspects at the county level between 2013 and 2014. The dependent variable is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2013 and 2014, normalized by the county's 2013 German population. All regressions control for state fixed effects, the change in the crime rate of a county and the (approximate) growth rate of its population between years $j-1$ to j, county-level GDP per capita in year j, and the unemployment rate of a county in year j. In column (1), year j is 2013, in columns (2) and (3), it is 2014. Column (3) excludes $\Delta Crime_{cs2014}$ from the list of covariates. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B7: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level (2SLS regression results for alternative IV definitions)

	$\Delta Gvictimrate_{cs2015}$	
	(1)	(2)
Second Stage:		
$\Delta refugees_{cs2015}$	−0.0018	0.0008
	(0.0033)	(0.0034)
First Stage:		
log(minimum $dist_{cs2014} + 1$)	−0.0014***	
	(0.0003)	
Inverse-distance weighted sum of reception centers		0.0053***
		(0.0011)
F statistic	28.48	24.87
controls	Yes	Yes
observations	402	402
mean of dep. var. 2014	0.0001	0.0001

Notes: The dependent variable in the second stage equation is the change in the total number of German nationals victimized in crimes with refugee suspects in a county between 2014 and 2015, normalized by the county's 2014 German population. The IV used for $\Delta refugees_{cs2015}$ in column (1) is the logarithm of the 2014 minimum distance in kilometers (plus one) between county c and all counties within the same state s as county c that host a refugee reception center and in column (2) the inverse-distance weighted sum of all reception centers in state s to county c. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county, and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B8: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level (OLS and 2SLS regression results for expanded sets of covariates and 2014 to 2016 changes in crime incidence measures)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel (A): $\Delta Gvictimrate_{cs2015}$ – **OLS**						
$\Delta refugees_{cs2015}$	0.0007	0.0007	0.0007	0.0006	0.0009	0.0007
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
$clearancerate_{cs2014}$		−0.0002				
		(0.0002)				
$citycounty_{cs2014}$			0.0001***			
			(0.0000)			
$\Delta Gvictim_{cs2014}$				−0.0119*		
				(0.0071)		
$\Delta decentralized_{cs2015}$					0.0001	
					(0.0000)	
Panel (B): $\Delta Gvictimrate_{cs2016}$ – **OLS**						
$\Delta refugees_{cs2015}$	0.0019	0.0019	0.0021	0.0019	0.0019	0.0020
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0014)
$clearancerate_{cs2014}$		0.0002				
		(0.0002)				
$citycounty_{cs2014}$			0.0002***			
			(0.0000)			
$\Delta Gvictim_{cs2014}$				0.0122		
				(0.0115)		
$\Delta decentralized_{cs2015}$					−0.0000	
					(0.0001)	
Panel (C): $\Delta Gvictimrate_{cs2016}$ – **2SLS**						
Second Stage:						
$\Delta refugees_{cs2015}$	−0.0068	−0.0067	−0.0089*	−0.0065	−0.0068	−0.0068
	(0.0047)	(0.0047)	(0.0046)	(0.0047)	(0.0047)	(0.0047)
$clearancerate_{cs2014}$		0.0002				
		(0.0002)				
$citycounty_{cs2014}$			0.0001***			
			(0.0000)			
$\Delta Gvictim_{cs2014}$				0.0109		
				(0.0117)		
$\Delta decentralized_{cs2015}$					−0.0001	
					(0.0001)	
First Stage:						
$\log(dist_{cs2014}+1)$	−0.0033***	−0.0033***	−0.0034***	−0.0033***	−0.0033***	−0.0033***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
F statistic	40.78	40.79	42.19	40.53	41.10	40.94
observations	402	402	402	402	400	398

Notes: The dependent variable in Panel (A) (Panels (B) and (C)) is the change in the total number of Germans victimized in crimes with refugee suspects in a county between 2014 and 2015 (2014 and 2016), normalized by the county's 2014 German population. The IV used for $\Delta refugees_{cs2015}$ in the respective first stages is the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties within the same state s as county c in 2014 host a refugee reception center ($\log(dist_{cs2014}+1)$). All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county, and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. We exclude Berlin, Bremen (two counties), and Hamburg in column (6). *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B9: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2014 and 2015 (OLS and 2SLS regression results allowing for spatial correlation)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$\Delta crimerate_{cs2015}$		$\Delta victimrate_{cs2015}$		$\Delta Gvictimrate_{cs2015}$		
Panel (A): 50 km							
$\Delta refugees_{cs2015}$	0.0427	0.2075**	−0.0053	0.0542**	0.0007	0.0014	−0.0022
	(0.0664)	(0.0907)	(0.0174)	(0.0217)	(0.0010)	(0.0030)	(0.0020)
$\Delta refugees^2_{cs2015}$		−2.8888		−1.0440**		−0.0131	
		(1.8297)		(0.5171)		(0.0452)	
Panel (B): 100 km							
$\Delta refugees_{cs2015}$	0.0427	0.2075**	−0.0053	0.0542***	0.0007	0.0014	−0.0022
	(0.0640)	(0.0887)	(0.0167)	(0.0193)	(0.0015)	(0.0033)	(0.0017)
$\Delta refugees^2_{cs2015}$		−2.8888		−1.0440**		−0.0131	
		(1.8864)		(0.4872)		(0.0400)	
Panel (C): 150 km							
$\Delta refugees_{cs2015}$	0.0427	0.2075**	−0.0053	0.0542**	0.0007	0.0014	−0.0022
	(.)	(0.0834)	(0.0056)	(0.0260)	(0.0015)	(0.0026)	(0.0020)
$\Delta refugees^2_{cs2015}$		−2.8888***		−1.0440**		−0.0131	
		(1.1214)		(0.4353)		(0.0162)	
controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
observations	402	402	402	402	402	402	402

Notes: The dependent variables are the changes between 2014 and 2015 in the total crime rate (columns (1)–(2)), the total victimization rate (columns (3)–(4)), and the victimization rate of German nationals in crimes involving refugee suspects (columns (5)–(7)). We account for spatial correlation in the error terms and report adjusted standard errors. The distance cutoffs in Panels (A), (B), and (C) are 50 km, 100 km, and 150 km, respectively. Columns (1)–(6) report OLS estimates, while column (7) presents 2SLS estimates. The IV used for $\Delta refugees_{cs2015}$ in the respective first stages is the logarithm of the 2014 average distance in kilometers (plus one) between county c and all counties within the same state s as county c that in 2014 host a refugee reception center ($\log(dist_{cs2014} + 1)$). All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B10: Refugee immigration and changes in the rate of victimization of Germans in crimes with refugee suspects at county level between 2014 and 2015 (or 2016) (OLS regression results for different subgroups of crime)

Second Stage:	$\Delta Gvictimrate_{cs2015}$			$\Delta Gvictimrate_{cs2016}$		
	(1) *Robbery*	(2) *Bodily Injury*	(3) *Rape/ Sexual Coercion*	(4) *Robbery*	(5) *Bodily Injury*	(6) *Rape/ Sexual Coercion*
$\Delta refugees_{cs2015}$	-0.0003^{*}	0.0009	-0.0000	-0.0001	0.0013	0.0000
	(0.0002)	(0.0005)	(0.0001)	(0.0002)	(0.0008)	(0.0001)
$\Delta crimerate_{cs2014}$	-0.0009^{***}	-0.0010	-0.0003^{**}	-0.0008^{**}	-0.0014	-0.0000
	(0.0003)	(0.0009)	(0.0001)	(0.0003)	(0.0014)	(0.0001)
$\Delta \ln(pop)_{cs2014}$	0.0005^{*}	0.0016^{**}	0.0001	0.0005^{*}	0.0039^{***}	0.0001
	(0.0002)	(0.0007)	(0.0001)	(0.0003)	(0.0011)	(0.0001)
$\ln(GDP)_{cs2014}$	0.0000^{**}	0.0000^{***}	0.0000	0.0000^{*}	0.0001^{***}	0.0000^{**}
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$unemployment_{cs2014}$	0.0000^{***}	0.0000	0.0000	0.0000^{**}	0.0000^{***}	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
observations	402	402	402	402	402	402

Notes: The dependent variables in the second stage equations measure changes between 2014 and 2015 (columns (1) – (3)), respectively between 2014 and 2016 (columns (4) – (6)), in the total number of Germans victimized in different crimes with refugee suspects in a county, normalized by the county's 2014 German population. Columns (1) and (4) consider robbery (crime key: 210000), columns (2) and (5) dangerous bodily injury (crime key: 222000) and simple bodily injury (crime key: 224000), and columns (3) and (6) rape and sexual coercion (crime key: 111000). All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B11: Refugee immigration and changes in the crime rate, victimization rate, and victimization rate of Germans in crimes with refugee suspects at the county level between 2014 and 2016) (OLS regression results)

	$\Delta crimerate_{cs2016}$		$\Delta victimrate_{cs2016}$		$\Delta Gvictimrate_{cs2016}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta refugees_{cs2015}$	0.3085***	0.1719	0.0809***	0.0747***	0.0019	0.0010
	(0.1026)	(0.1109)	(0.0204)	(0.0220)	(0.0014)	(0.0015)
$\Delta refugees^2_{cs2015}$	−4.1997**	−2.5033	−1.3865***	−1.3090***		
	(1.6411)	(1.7211)	(0.3257)	(0.3406)		
$\Delta decentralized_{cs2015}$		−0.0060***		0.0002		0.0000
		(0.0020)		(0.0004)		(0.0001)
$\Delta sexratio_{cs2015}$		0.0001		−0.0001**		−0.0000
		(0.0001)		(0.0000)		(0.0000)
controls	Yes	Yes	Yes	Yes	Yes	Yes
observations	402	378	402	378	402	378

Notes: The dependent variables are changes between 2014 and 2016 in the total number of crimes, victims, and German victims in crimes with refugee suspects in a county, normalized by the county's 2014 (German) population. All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. In columns (2), (4), and (6), we additionally control for the 2014 to 2015 change in the share of asylum seekers who are housed in decentralized accommodation in a county and the change at the county level between 2014 and 2015 in the male-to-female sex ratio of refugees aged 15–39. *, **, *** denote statistical significance at the 10%, 5% and 1% level.

Table B12: Effect heterogeneity by urbanity, region, and xenophobia (2SLS regression results)

	(1) Urban	(2) Rural	(3) West Germany	(4) East Germany	(5) More xenophobic	(6) Less xenophobic
Panel (A): $\Delta Gvictimrate_{cs2015}$						
$\Delta refugees_{cs2015}$	−0.0009	−0.0028	0.0058	−0.0039*	−0.0128**	0.0013
	(0.0055)	(0.0024)	(0.0092)	(0.0022)	(0.0064)	(0.0029)
Panel (B): $\Delta Gvictimrate_{cs2016}$						
$\Delta refugees_{cs2015}$	−0.0100	−0.0068*	0.0011	−0.0076**	−0.0071	−0.0053
	(0.0097)	(0.0039)	(0.0149)	(0.0031)	(0.0082)	(0.0051)
controls	Yes	Yes	Yes	Yes	Yes	Yes
F statistic in 1st stage	10.68	42.44	4.41	30.92	12.02	35.11
observations	201	201	325	77	126	276

Notes: This table reports heterogeneous effects of refugee inflows on the German victimization rate in crimes with refugee suspects. The dependent variable in Panel (A) is the change in the German victimization rate between 2014 and 2015, and in Panel (B) the change in the same rate between 2014 and 2016. Columns (1) and (2) show results for urban and rural counties (defined by having a population density in 2014 that is above, respectively, below the median). Columns (3) and (4) show results for counties in West and East Germany. Columns (5) and (6) show results for more and less xenophobic counties (defined by having population-standardized anti-refugee crime levels in 2014 that are above, respectively, below the median). All regressions control for state fixed effects, the 2013 to 2014 change in the crime rate of a county and the (approximate) growth rate of its population, county-level GDP per capita in 2014, and the 2014 unemployment rate of a county. *, **, *** denote statistical significance at the 10%, 5%, and 1% level.

Appendix C Two-period fixed effects and shift-share IV specification

As a robustness check, we re-estimate our main specification using a two-period two-way fixed effects county-level panel framework. This formulation is closely related to the first-difference specification used in the main text, but allows for a richer set of fixed effects, including state-by-year fixed effects. Specifically, we estimate variants of the following model:

$$Y_{cst} = \alpha + \beta\ refugees_{cst} + \boldsymbol{X}'_{\boldsymbol{cs,t-1}}\boldsymbol{\gamma} + \delta_c + \lambda_t + \varepsilon_{cst},$$

where Y_{cst} denotes the victimization rate of Germans in crimes with refugee suspects in county c in state s in year t, with $t = 2014, 2015$. The variable $refugees_{cst}$ denotes the end-of-year population stock of asylum seekers in county c in state s in year t, normalized by the pre-crisis population of county c in 2014. The vector $\boldsymbol{X_{cs,t-1}}$ includes pre-crisis county-level characteristics, including the logarithm of total population, the logarithm of GDP per capita, and the unemployment rate in year $t-1$, as well as the number of total crimes in year $t-1$ normalized by total population in 2013. The terms δ_c and λ_t denote county and year fixed effects, respectively, and ε_{cst} is an error term.

To address potential endogeneity of refugee inflows, we construct a shift-share instrumental variable defined as:

$$IV_{cst} = \left(\frac{1}{dist_{cs2014} + 1} \times \text{state refugee inflow}_{st}\right),$$

where $dist_{cs2014}$ denotes the average distance (in kilometers) between county c and all counties within the same state that hosted a refugee reception center in 2014. The first component of the instrumental variable captures pre-treatment county-level exposure to reception center locations. The second component, state refugee inflow_{st}, captures arguably exogenous refugee inflows in state s in year t as measured by recorded end-of-year state-level stocks of

asylum seekers. The interaction of the two components hence generates variation in refugee inflows across counties over time.

Table C1: Two-period fixed effects and shift-share IV regressions

	(1)	(2)	(3)	(4)
	FE		IV FE	
$refugees_{cst}$	0.0010	0.0008	−0.0015	−0.0030
	(0.0009)	(0.0009)	(0.0027)	(0.0024)
$crimerate_{cs,t-1}$	−0.0010	−0.0013	−0.0009	−0.0012
	(0.0014)	(0.0015)	(0.0014)	(0.0015)
$\ln(pop)_{cs,t-1}$	0.0037***	0.0043***	0.0037***	0.0043***
	(0.0010)	(0.0011)	(0.0010)	(0.0011)
$\ln(GDP)_{cs,t-1}$	−0.0003	−0.0004	−0.0004	−0.0005*
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
$unemployment_{cs,t-1}$	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
			First stage	
IV_{cst}			7.17e − 07***	9.09e − 07***
			(1.03e − 07)	(1.17e − 07)
F statistic			48.19	59.85
observations	804	804	804	804

Notes: This table reports fixed effects (FE) estimates in columns (1) and (2) and IV FE estimates in columns (3) and (4) using panel data. The dependent variable is the German victimization rate in crimes involving refugee suspects, and the main explanatory variable is the population share of refugees. All specifications control for the logarithm of total population, the logarithm of GDP per capita, the unemployment rate, and the crime rate in the previous year and include county and year fixed effects. Columns (2) and (4) control in addition also for state-by-year fixed effects. *, **, *** denote statistical significance at the 10%, 5%, and 1% level.

Table C1 reports effect estimates for four different models, two two-way fixed models, one without and one with state-by-year fixed effects (columns (1) and (2)), and two two-way fixed models with a shift-share IV, again one without and one with state-by-year fixed effects (columns (3) and (4)). Consistent with our baseline first-differences results, all four specifications show a zero effect of refugee immigration on the rate of victimization of Germans in crimes with refugee suspects. Our core finding hence proves robust to the use of a fixed-effect framework for estimation and a shift-share instrumental variable for identification that interacts county-level exposure to reception centers with exogenous shifts in refugee inflows at state level.

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[published as: de Pinto, M., L. Goerke and A. Palermo (2024). Informational Rents and the Excessive Entry Theorem: The Case of Hidden Action. *Scottish Journal of Political Economy* 71(2), 237-252.]

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[published as: Chadi, A. and L. Goerke (2023). Seeking Shelter in Times of Crisis? Unemployment, Perceived Job Insecurity and Trade Union Membership. *Economica* 90(359), 1041-1088.]

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