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Its Impact on Crime**

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The Refugee Wave to Germany and Its Impact on Crime

Abstract

Does refugee migration cause crime? I address this question drawing on recent refugee migration to Germany during the years 2010 to 2015. Based on administrative data records, I add to the literature by disentangling the direct crime impact of asylum seekers and recognized refugees separately. For the group of asylum seekers, I exploit dispersal policies and locational restrictions and find no impact on crime except for migration-specific offenses. For the group of recognized refugees, who may endogenously move, I use a shift-share instrument and find a positive association between the share of recognized refugees and the overall crime rate, which is driven by non-violent property crimes and frauds. The empirical results prove robust along several robustness checks and are consistent with predictions of the Becker model.

JEL Classification: F22, K42, J15

Keywords: Refugee migration; crime

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1 Introduction

"There's a big problem in the world. You look what's happening with the migration in

Europe. You look at Germany, it's crime-riddled right now."

Donald Trump, May 4th, 2016

The concern over a positive connection between immigration and crime is widespread (Fitzgerald et al., 2012; Bianchi et al., 2012). Following the recent influx of refugees to European countries, the fear of increasing crime has loomed large in the public debate. During the 2016 presidential campaign, Donald Trump claimed (Aug. 15): *"What a disaster this massive immigration has been to Germany and the people of Germany – crime has risen to levels that no one thought they would ever see."* Anti-immigration movements and right-wing parties in Europe used similar statements in recent election campaigns. *"Germany has become more unsafe because of the refugees,"* noted Alice Weidel, head of the far-right party "Alternative for Germany" (2016, Dec. 7). While the debate on the causal relationship between refugee migration and crime is heated, research on this topic is scarce.

This paper provides empirical evidence on the crime impacts of the recent refugee wave to Germany. The analysis comprises the years 2010 to 2015, and thus covers a time period that was characterized by dramatic increases in the number of refugees living in Germany. I investigate asylum seekers and recognized refugees separately. This is crucial because average effects may mask important heterogeneities: Following the idea of Becker (1968) and Ehrlich (1973), criminal engagement is a rational decision based on expected benefits and sanctions as well as legal outside options. Since both groups face different regulations and crime potentials despite of seemingly similar characteristics, their crime impacts could differ.

My analysis is based on detailed administrative data on the county level and combines information on refugees with information on crime. I take data from the Central Register of Foreigners (AZR) that provide detailed information on the refugee population. Comprehensive annual crime records come from the German Federal Police

Office. The crime data include the number of reported offenses as well as the number of suspects for several crime categories and migratory subgroups. Thus, I can disentangle the direct crime impact of asylum seekers and of recognized refugees.

To identify the crime impact of both groups separately, I draw on exogenous variation in the allocation of asylum seekers as well as a shift-share instrument for recognized refugees. In Germany, asylum seekers are initially dispersed to federal states and subsequently within states according to predefined quotas. Because applicants are obligated to live in the assigned location, self-selection does not pose a threat to identification.[1] The mobility of recognized refugees, in contrast, is unrestricted and they tend to cluster in specific areas. Following Altonji and Card (1991) and Card (2001), I construct a shift-share instrument to overcome endogeneity issues in migrants' location choice. This identification strategy is frequently applied in the migration literature (Saiz, 2007; Bianchi et al., 2012; Gonzalez and Ortega, 2011; Bell et al., 2013; Tabellini, 2017).

My results reveal important heterogeneities in the crime impacts of the recent refugee wave. Asylum seekers do not increase crime except for migration-specific offenses, that is, violations against the residence act, the asylum procedure act or the law on free movement. I do not detect crime effects along other types of offenses either. Thus, the non-existing overall impact on crime does not mask mutually opposing effects that compensate each other. The shift-share estimates, in contrast, reveal a positive relationship between the share of recognized refugees and local crime. This includes any type of crime except migration-specific misconduct. An analysis of the underlying crime categories reveals that this effect is driven by non-violent property crimes and frauds.

These differences in the direct crime outcomes between groups of refugees are in line with predictions of the standard economic model of crime (Becker, 1968; Ehrlich, 1973). The estimation strategy I use for asylum seekers yields an average treatment effect (ATE) while the IV approach identifies a local average treatment effect (LATE) for the subgroup of compliers. As outlined in earlier studies, the shift-share instru-

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[1]In the very different context of Ethnic German migration to Germany in the 1990s, similar allocation policies have already been exploited by Glitz (2012) and Piopiunik and Ruhose (2017).

ment induces compliers who tend to be negatively selected on education. Within the Becker model, poorer educational achievements have a crime-enhancing impact which is consistent with the positive LATE identified for the group of recognized refugees. This explanation is further strengthened because I do not detect interactions with pre-existing ethnic networks. Thus, spillovers do not seem to drive the crime propensity of recognized refugees as captured by the LATE.

In addition, I do not find an indirect crime response of German residents. On average, Germans do neither react to the presence of asylum seekers nor to recognized refugees through increased criminal behavior. The effect is precisely estimated and centered around zero, ruling out quantitatively meaningful crime impacts. This finding suggests that refugee migration has neither an economic harm nor disturbances that native residents could respond to.

The empirical results prove robust along several dimensions. In particular, I tackle the impact of crime-spreading mechanisms across county borders as emphasized by the spatial literature on the determinants of crime (e.g. Zenou, 2003) by including the spatially lagged outcome ratio. In addition, I control for the clear-up rate of each type of offense to approximate the time varying effort of the police as well as potential costs of criminal engagement. The results are qualitatively identical to the main estimates.

Further checks strengthen the identification assumptions behind the two different empirical strategies. My results are, for instance, robust to the inclusion of the lagged outcome ratio. This alleviates the concern of a systematic allocation of asylum seekers or acceptance of requests based on criminal engagement in the previous year. It also stresses the stability of both approaches with respect to further unobservables that are captured by the lagged outcome ratio. I also vary the parameters to construct the instrument and date the locational distribution of compatriots to a more distant point that is considerably before the recent refugee wave. Since the findings prove robust, the concern of confounding pre-wave issues seems unfounded.

My paper contributes to the economic literature examining the immigration-crime

relationship in two important ways. Firstly, I extend existing studies by using substantially more nuanced data. Most notably, I do not restrict my analysis to asylum seekers but consider recognized refugees, too. This has largely been overlooked when analyzing the crime impact of refugee migration (Bell et al., 2013; Gehrsitz and Ungerer, 2017). However, it is crucial because refugees are not limited to asylum seekers. Such a distinction also facilitates the interpretation of the results in the light of economic theory because both groups face different incentives to engage in crime. For policy makers, it provides more specific information on how different subgroups impact crime. Complementing this, I can disentangle the direct crime impact of refugee migration from the indirect response of residents. Compared to previous studies (see Butcher and Piehl, 1998 and Spenkuch, 2013 for the US; Bianchi et al., 2012 for Italy; Bell et al., 2013 for the UK, and Piopiunik and Ruhose, 2017 for Germany) this is an improvement because I do not restrict my analysis to the aggregate crime impact that captures direct and indirect channels jointly. In summary, I thus provide a more comprehensive picture on the crime impacts of refugee migration.

Secondly, I provide credible evidence to a heated public debate. Research on the consequence of the recent migratory wave is scarce, although it is already considered the worst refugee crisis faced by European countries since WWII.[2] Recent papers by Steinmayr (2016) and Gehrsitz and Ungerer (2017) provide first analyses on the European refugee wave investigating how the presence of refugees affects voting behavior in Austria and Germany, respectively. Gehrsitz and Ungerer (2017) also examine certain types of crime. In comparison to their paper, my analysis extends to recognized refugees, shows heterogeneous impacts of different potentially affected groups and therefore identifies underlying mechanisms. This provides well-grounded facts to a debate that has sparked global interest.

The remainder of the paper is structured as follows. Section 2 describes the institutional background as well as recent migratory trends. Section 3 presents my data and the empirical strategy. Section 4 reports the results as well as robustness checks and

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[2]See, inter alia, Kingsley (2015) or European Commission (2016).

offers an interpretation of the findings. Section 5 concludes.

2 Refugee migration to Germany

2.1 The German asylum law and its allocation policies

In Germany, the right to asylum is not only based on the Geneva Convention, but also anchored in the constitution. The legal framework and the practical implementations are regulated by the Federal Asylum Law (Asylgesetz), formerly the Asylum Procedure Act (Asylverfahrensgesetz). Following the German Asylum Law, refugees have to register as asylum seekers directly upon their arrival in Germany. Subsequently, they are assigned to one of the 16 federal states according to predefined quotas known as the "Königsteiner Schlüssel". The underlying allocation scheme is adjusted annually and it is determined by two thirds of tax revenues and by one third of the population size of a federal state in the penultimate year.

After being allocated to a federal state, refugees are accommodated in special reception facilities where they submit their asylum request. By this means, they are officially considered as asylum seekers and receive a *permission to reside* (Aufenthaltsgestattung) which guarantees their right to stay in Germany during the time of the asylum process. Following the Asylum Law, states have to provide accommodation and social assistance to asylum seekers. Since the initial accommodation in a reception facility is restricted to three months, asylum seekers have to be dispersed within the state in a subsequent step.[3] The allocation to different counties (Kreise) is individually governed by each state based on regulations defined in its state law.[4] Most states employ either fixed allocation keys or flexible quotas based on the population size.

Asylum seekers in Germany are also subject to restrictions. During the asylum pro-

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[3]Since 23 October 2015, the maximum time in a reception facility can be extended to six months. Due to further changes in the legislation, it is also possible to retain asylum seekers in the reception facility if the applicant's origin country is statutorily defined as safe.

[4]Some states disperse asylum seekers to smaller regional entities, i.e. to municipalities (Gemeinden). Municipalities are administrative subunits that compose a county.

cess, applicants are obligated to live in the location they were assigned to. This *domicile requirement* (Wohnsitzauflage) is further strengthened by a *residence obligation* (Residenzpflicht), which substantially curtails the asylum seeker's mobility. Without further permission, the applicant is not allowed to leave a predefined area. In case of misconduct, sanctions are imposed, which contradicts the principle of free movement demanded by the Geneva Convention.[5] In recent years, the *residence obligation* has been relaxed and residential areas have been expanded by some states. The *domicile requirement*, however, remains unaffected for the whole asylum process across Germany.[6]

Decisions on individual asylum applications are made by the Federal Office for Migration and Refugees (BAMF). In 2013 and 2014, the average asylum process lasted more than seven months varying greatly in duration depending on the applicant's nationality (Thränhardt, 2015). If the country of origin is considered as safe, the prospects of a successful asylum application are relatively low. Nevertheless, each application is examined individually based on a personal interview and a detailed revision of documents. If the legal requirements are not fulfilled, the asylum seeker is requested to leave the country and receives a deportation notice. In case of a positive decision asylum is granted, which officially recognizes the refugee status. In this case, all residential restrictions are lifted, and recognized refugees are free to choose their preferred place of living within the entire Federal Republic.[7] In addition, full access to the labor market is granted, which was restricted during the asylum process.

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[5]Violations against the *residence obligation* can be sanctioned of up to EUR 2 500. In case of repeated infringement, further fines or imprisonment of up to one year can be imposed.

[6]Since 1 January 2015, the *residence obligation* has been reduced to three months. If independent subsistence cannot be assured, however, the *domicile requirement* is still binding for the whole asylum process; this is the case for almost all applicants.

[7]On 6 August 2016, the German Integration Act came into force. For recognized refugees, it meant an abolition of the previous right to freely choose their place of residence. Since the analyzed time period (2010 to 2015) remains unaffected of these changes, it does not impose any restriction on the identification strategy described in detail in section 3.2.

2.2 Recent migratory trends and the current refugee wave

The history of immigration to Germany can be divided into different phases.[8] The recent development during the mid-2000s was characterized by a constant stock of approximately 6.7 million foreigners living in Germany (see Figure 1). Since 2010, persistent inflows have led to a considerable rise by 2.4 million foreigners to a total of 9.1 million as of December 2015.[9]

The recent refugee wave is a driving factor of this development, which is reflected by a sharp rise in asylum applications. From 2010 to 2015 the number of asylum claims increased almost tenfold in Germany, up to a total of more than 477 000 annual applications in 2015 (see Figure 1). Migrants from precarious origin countries file most of the requests. These countries are characterized by internal conflicts and the presence of wars or its aftermaths. During the time period from 2010 to 2015, about 48 per cent of all initial asylum applications in Germany can be assigned to nationalities that score at the bottom five percent of the Global Peace Index, including several Arab and Middle Eastern countries, such as Syria, Iraq, and Afghanistan.[10]

The focus of the present study is exclusively directed on refugee migration, although internal migration within the European Union (EU) is a further source for the recent increase of foreigners in Germany. The EU enlargement towards the East and the abolition of labor market restrictions for eight EU accession countries in May 2011 has raised the stock of Eastern European migrants in Germany since 2010 by approximately 1 million up to a stock of 1.8 million on December 2015.[11] A minor impact can also be attributed to inflows from other EU countries that were particularly affected by the adverse effects of the 2009 world economic crisis, such as Spain and Greece.

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[8]For the years between 1945 and 2000, four migration periods can be distinguished (see Schmidt and Zimmermann, 1992; Bauer et al., 2005). These are: war adjustment (1945-54), manpower recruitment (1955-73), consolidation or restrained migration (1974-88), and the dissolution of socialism and its aftermath (since 1988).

[9]Statistics are based on the Central Register of Foreigners (AZR).

[10]Own calculations based on German asylum statistics provided by Eurostat (2010-2015) and the Global Peace Index (IEP, 2010-2015).

[11]Own calculations based on numbers of the Central Register of Foreigners (AZR) including accession countries of the fifth and sixth EU-enlargement.

2.3 Spatial distribution of refugees across Germany

Refugees' choice of location depends on their legal status (see subchapter 2.1). Asylum seekers are subject to dispersal policies and they are tied to the abode they were initially assigned to. The mobility of recognized refugees, in contrast, is unrestricted within the analyzed time frame of the years 2010 to 2015 and they can freely choose where they want to live.

Figure 2 plots the spatial distribution of asylum seekers and recognized refugees across German counties for the time period under observation. The average share of recognized refugees tends to be higher in metropolitan areas (e.g. Ruhr Area, Rhine-Main metropolitan area) and in large cities such as Berlin, Munich, Hamburg or Cologne. Besides, an east-west disparity is evident with a considerably higher concentration of recognized refugees in western counties. The share of asylum seekers, in contrast, is more evenly distributed across Germany, which suggests that the allocation policies as well as the residential constraints meet their objective. Only few outliers can be observed, and eight out of the top ten counties with the highest share of asylum seekers are also locations with a reception facility.

The spatial concentration of recognized refugees in urban areas has also been found for other migrants, and can often be explained by the existence of ethnic enclaves (e.g. Bartel, 1989; Stark, 1991; Bauer and Zimmermann, 1997; Borjas, 1998; Zavodny, 1999; Bauer et al., 2007) providing a "warm embrace" (Borjas, 2000). This seems to be a plausible mechanism for recognized refugees, too. Following Altonji and Card (1991) and Card (2001), I exploit this spatial pattern to construct a shift-share instrument for recognized refugees. In the migration literature, this approach is commonly used to account for endogeneity issues that come along with a free choice of location as it is the case for recognized refugees. The analysis of asylum seekers, in contrast, draws on variation generated by allocation quotas and residential restrictions as described in the next chapter.

3 Data and Empirical Strategy

3.1 Data

The empirical analysis is based on different data sources that provide information on each German county over the period from 2010 to 2015. German counties correspond to the Eurostat NUTS 3 definition and represent the smallest common territorial unit for which the following data are available.[12]

Detailed information on the migrant population stems from the Central Register of Foreigners (AZR) which is administrated centrally by the Federal Office for Migration and Refugees (BAMF). The database covers all foreign nationals registered in Germany and is published at an aggregated level by the Federal Statistical Office on an annual basis. The administrative data include for each county the total stock of foreigners classified by nationality and migratory status. The later information is used to confine the sample of interest into asylum seekers and recognized refugees. Since asylum seekers are the only group of migrants with a temporary resident permit (Aufenthaltsgestattung), they can unambiguously be identified in the data set. In a similar way, I can detect all recognized refuges. They belong to a unique category which comprises all foreigners who obtained asylum based on humanitarian or political reasons or following international law. Out of these two groups, all nationalities are considered.

Detailed annual police records come from the German Federal Criminal Police Office (BKA, 2010-2015). The data include the number of reported offenses for several crime categories. Offenses break down into the number of individuals engaged in crime and their migratory status. In the German crime statistics, criminal individuals are referred to as suspects to indicate that they are not necessarily convicted yet. To be recorded as a suspect, however, mere suspicion is not sufficient. Investigations of the police have to provide substantial evidence that elements of an offense are present and that a violation of the law is likely to have been committed. The number of suspects is

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[12]After adjusting for territorial reforms and data-specific issues, the final sample consists of 405 different counties (see data appendix A.1.1).

thus an essential component of the German crime statistic and a meaningful measure of criminal activity. Data on suspects further divides into Germans, asylum seekers, and other migratory subgroups. By this means, I can identify the indirect crime response of Germans as well as the direct crime impact of asylum seekers. Ideally, one would also consider recognized refugees as an entirely separate group to identify their direct impact on crime. However, they are assigned to a subgroup of legal non-German suspects who are neither tourist, nor students, nor employees, nor businessmen, nor soldiers, nor asylum seekers.[13] Thus, I can only approximate their direct crime impact because it could potentially be confounded to a minor degree.

Additional demographic and socioeconomic determinants of a county, such as the size of the resident population, its age structure, the overall share of foreigners, the employment rate, and GDP are provided by the Federal Statistical Office. I also include data on the total inflow of refugees who sought asylum in Germany. This information is provided by Eurostat (2010-2015) and it is used on an annual basis for each nationality to construct an instrument for the group of recognized refugees (see subchapter 3.3).

Appendix A.1.1 explains further specifics on the data construction. Panels A to E of Table1 present summary statistics of the different crime outcomes. Panel F provides an overview on all other included variables. Following Piopiunik and Ruhose (2017), I also report for each variable the adjusted standard deviation which accounts for permanent county differences as well as year-specific shocks. As outlined in the next subsection, this is the identifying variation my analysis draws on.

3.2 Empirical Strategy

In order to identify the crime impact of recent refugee migration to Germany, I apply a first difference approach following Bell et al. (2013). Equation (1) serves as a starting

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[13]The German Federal Criminal Police Office (BKA) does not provide information on the proportion of recognized refugees belonging to this sub-category.

point of the analysis:

$$\Delta crime_{ct} = \beta_1 \Delta ref_{ct} + \Delta X'_{ct} \beta_2 + \tau_t + \kappa_s + \varepsilon_{ct} \tag{1}$$

where $crime_{ct}$ indicates a measure of criminal activity in year t and county c, that is either the number of offenses or the number of suspects divided by the total resident population. The variable of interest ref_{ct} captures the stock of migrants within a county divided by the total resident population. Depending on the group of refugees analyzed, ref_{ct} takes on the share of asylum seekers or the share of recognized refugees, accordingly.

X includes additional county-specific determinants which might influence criminal behavior. As a measure for the integration into the labor market and potential earnings, I include the county-specific unemployment rate and GDP per capita (Bianchi et al., 2012). Additionally, X contains demographic variables which have been found to determine criminal activities, such as the population density (Glaeser and Sacerdote, 1999), the share of young males (Grogger, 1998; Freeman, 1999) as well as the overall share of foreigners within a county (Piopiunik and Ruhose, 2017).

Time-invariant characteristics of a county are eliminated by first differences. The inclusion of τ_t, which denotes a set of year dummies, further controls for year-specific shocks that are common to all counties. The combination of first differences and year dummies also accounts for structural over- or underreporting that is constant within counties over time or constant across counties in each time period included.

κ_s captures dummy variables for each of the 16 German federal states. Within the first-difference framework, κ_s accounts for state-specific time trends (Bell et al., 2013). This is crucial following the arguments proposed by Piopiunik and Ruhose (2017). First, German states decide independently on the expenditure allocated to the police. Thus, states can implement different security strategies in response to the massive inflow of refugees which affects all counties within a state. Second, states differ in their exposure to neighboring countries. In the light of the EU enlargement, for instance, this may

translate into different state-specific crime trends.

The identifying variation of the first-differences approach rests on within-county changes in the specific group of refugees that is analyzed. Such changes are determined by county-specific in- and outflows. Since the time period under consideration is characterized by an increasing number of asylum seekers as well as recognized refugees, I am left with sufficient variation (see Table 1).

Asylum seekers are obligated to live in the county they are assigned to for the entire asylum process. They can hardly influence changes in their own share since the allocation to a county as well as the approval of an application are beyond the asylum seekers' control. All steps of the asylum process follow a standardized procedure (see subchapter 2.1) such that changes in the number of applicants are unlikely to be correlated with unobservables that might determine changes in crime. In the robustness section, I further address this assumption and provide supportive evidence that β_1 is likely to reveal the causal impact if asylum seekers are considered.[14]

Reverse causality does not bias the analysis of asylum seekers either. The number of asylum seekers cannot be reversely determined by criminal engagement because offenses committed by an applicant have generally no adverse effect on the asylum process.[15]

Recognized refugees, in contrast, can freely choose their place of residence and potentially select into counties based on unobserved and time-varying factors. Thus, changes in the share of recognized refugees are likely to depend on strategic in- and outflow patterns that are also correlated with changes in criminal activities. To overcome this endogeneity issue, I apply an instrumental variables approach. The construction of the instrument and the underlying assumptions are outlined in the next subsection.

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[14]Due to missing official data on the county-specific inflows of asylum seekers, I cannot instrument changes in the number of asylum seekers by its inflow component as it is done by Bell et al. (2013). However, this does not pose a threat to identification since the exogeneity generated by the dispersal policies and the subsequent asylum process are already incorporated in the first difference estimates. This reasoning is in line with Bell et al. (2013) who study a similar setting for the UK.

[15]Exceptions are made if the asylum seeker is regarded as a danger to the security of the country or if the applicant committed a crime against peace, a war crime, or a crime against humanity (Wissenschaftliche Dienste, 2015). With the entry into force of the Asylum Law II (Asylpaket II) in March 2016, however, the expulsion of delinquent asylum seekers has been substantially facilitated.

3.3 IV approach

Recognized refugees are not bound by dispersal policies. They can freely choose where they want to live and thus endogenously move. Following Altonji and Card (1991) and Card (2001), I construct a shift-share instrument that is frequently applied in the migration literature to overcome endogeneity issues (Saiz, 2007; Bianchi et al., 2012; Gonzalez and Ortega, 2011; Bell et al., 2013; Tabellini, 2017). The core of the instrument is a measure to predict the inflow of recognized refugees to county c in year t:

$$\widehat{Infl}_{ct} = \sum_n \phi_{ct_0}^n \, INFL_{Ger\,t}^n \tag{2}$$

where $INFL_{Ger\,t}^n$ indicates the total inflow of refugees of nationality n to Germany in a specific year t, i.e. the total number of asylum requests filed. $\phi_{ct_0}^n$ denotes for some prior baseline year (t_0) the fraction of migrants of nationality n in county c with respect to all migrants of nationality n living in Germany. The county-specific inflow of recognized refugees is predicted by splitting the inflow at the national level according to prior settlement patterns which are captured by $\phi_{ct_0}^n$. Because of potential delays in the asylum process I also consider national inflows of the previous year (i.e., $INFL_{Ger\,t-1}^n$) to stress the robustness of the results. In a final step, I divide the predicted inflow, $\widehat{Infl}_{ct}$, by the resident population within the county to obtain the aspired instrument. A first graphical inspection of the instrument reveals a strong correlation with the potentially endogenous variable - the first difference of the share of recognized refugees (see Figure 3).

The exogeneity of the instrument rests on two assumptions. First, the locational distribution of immigrants in a past reference year (t_0) has to be uncorrelated with future changes in the crime measure. This implies that immigrants in the base year did not self-select into a county based on time-varying characteristics that are correlated with upcoming changes in criminal activities. In an initial step, the instrument is constructed using the locational distribution in 2009 as the baseline, i.e. the year before the actual time period analyzed. To prove the robustness of this choice, the base year is dated back which leaves the results unchanged. As a second identifying assumption it has to hold

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that inflows at the national level are independent of unobservable county-specific differences that might determine crime. This is likely to hold since recent refugee migration was triggered by political and social turmoil in the countries of origin where refugees come from.

Under these assumptions, the IV approach identifies an internally valid estimate, that is, a local average treatment effect (LATE) for the subgroup of compliers. For a discussion on the external validity of the IV results, one has to consider the underlying mechanism of the instrument. In the present setting, the group of compliers consists of recognized refugees whose locational choice is induced by a pre-existing share of compatriots, i.e. an ethnic network. Since this is a rather specific group, IV results have to be interpreted in the light of potential treatment effect heterogeneity.

4 Results

Section 4.1 presents regression results for the group of asylum seekers. Section 4.2 outlines the crime impact of recognized refugees using an IV approach. Section 4.3 stresses the robustness of the results and provides further evidence that the identification strategies for asylum seekers as well as recognized refugees are likely to reveal the causal effects. Section 4.4 discusses the findings.

4.1 Asylum Seekers

In a first step, I investigate the crime impact of asylum seekers. The estimates of the first-difference equation (1) are shown in Table 2. Column 1 considers the ratio of committed crimes for different types of offenses.[16] The following three columns refer to the ratio of suspects including all nationalities (column 2), German suspects (column 3), and suspects being asylum seekers (column 4).[17]

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[16]See data appendix A.1.2 for a detailed definition of all crime outcomes used.

[17]Recall that mere suspicion is not sufficient to be recorded as a suspect. Since investigations of the police have to provide substantial evidence that elements of an offense are present, the ratio of suspects reflects a meaningful measure of criminal activity.

Results of the first two columns can be interpreted as the overall crime impact without further differentiation between direct and indirect channels. In order to isolate the direct effect I consider only those suspect who are asylum seekers (column 4). By this means, I rule out any indirect response of residents who might react to the presence of asylum seekers. Compared to previous studies (see Bell et al., 2013; Bianchi et al., 2012; Piopiunik and Ruhose, 2017) this is an improvement because they can only identify the combined crime impact as reported in column 1 and 2 of Table 2. Additionally, I also report the indirect response of German residents who could have changed their criminal engagement, too (column 3).

Panel A considers all types of criminal offenses. The share of asylum seekers is positively and significantly associated with the committed crime rate (column 1), the overall ratio of all suspects (column 2), and the ratio of suspects being asylum seekers (column 4). For German suspects, in contrast, the relationship is close to zero and statistically insignificant (column 3) sucht that the null-hypothesis of a zero effect cannot be rejected. The effect is precisely estimated with an elasticity of 0.001 as an upper bound of the 95% confidence interval. Thus, Germans do not respond to the presence of asylum seekers. Column 4 represents the preferred specification capturing the direct channel. The coefficient indicates an increase of the ratio of suspects being asylum seekers by 0.1 units if the county-specific share of asylum seekers rises by 10 percentage points. Considering the average share of asylum seekers as well as the average ratio of suspects belonging to this group within the time period analyzed, one obtains a more intuitive interpretation in terms of an elasticity: A one percent increase of the share of asylum seekers is associated with an increase in the respective ratio of suspects by two percent.[18]

At first sight, this seems to be a strong impact suggesting that almost every newly arriving asylum seeker engages in at least one criminal activity. In fact, any undocumented entry or stay of an asylum seeker within Germany is already regarded as a crim-

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[18]Given an average ratio of 0.0008 suspects being asylum seekers and an average share of 0.0016 asylum seekers within a county (see Table 1 as well as the regression coefficient of 1.0, one obtains an elasticity of [2=(0.0016/0. 0008)*1.0].

inal offense. Since asylum seekers are subject to several restrictions (see chapter 2), they easily engage in further criminal activities natives cannot commit. To abstract from such crimes, I consider violations against the residence act, the asylum procedure act or the law on free movement as a separate category as outlined in Panel B. Once again, no crime effect can be detected for German suspects (column 3), which is reasonable given that they cannot break these laws. For the rate of committed crimes (column 1), the overall ratio of all suspects (column 2), and the ratio of suspects being asylum seekers (column 3) the relationship is strongly positive and statistically significant.

Panel C considers all types of crimes except migration-specific offenses of Panel B. By this means, I want to check whether the overall positive crime impact - as detected in Panel A - still reveals. This is not the case because all estimates of Panel C prove slightly negative. The preferred specification of column 4, that reveals the direct channel, is close to zero and economically negligible.[19] The coefficient on the committed crime rate (Panel C, column 1), however, turns negative and significant. But since it is the least preferred and less precise outcome measure and due to the small effect size, I refrain from an economic interpretation.

At this point, two conclusions can be drawn. Firstly, Germans do not change their criminal engagement in response to increases in the share of asylum seekers. This suggests that the immigration of new asylum seekers does neither harm natives economically nor in any other way. Secondly, the positive crime effect of asylum seekers is entirely driven by migration-specific offenses.

Yet, the overall non-existing impact on the adjusted crime category in Panel C could also be a result of mutually opposing effects that compensate each other. Asylum seekers could be attracted by certain types of offenses but refrain from committing others. To address this issue, I evaluate the crime impact of the preferred specification along further crime categories as shown in column 1 of Table 4. Across almost all types of offenses the coefficient is slightly negative and close to zero ruling out mutually opposing

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[19]Table 7 of the appendix provides a detailed overview of the preferred specification using the adjusted crime ratio as an outcome. All included coefficients reveal a reasonable sign that coincides with what is proposed in the literature.

crime effects. Only for robberies the crime effect proves weakly significant and points to a minor reduction of the share of asylum seekers who are detected as a suspect of such crime.

4.2 Recognized Refugees

As opposed to asylum seekers, recognized refugees can freely choose where to live. To overcome potential selection issues, I apply an instrumental variables approach as described in chapter 3.3. For the sake of comparison, OLS results of baseline equation (1) are also shown in Panel A of Table 3 for the adjusted crime category including all types of offenses except migration-specific misconduct.[20] Across all specifications (column 1 to 4), the signs of the OLS estimates (Panel A) coincide with the IV results (Panel B), but OLS coefficients are considerably smaller and prove insignificant.

In the following, the focus is directed at the IV results due to severe endogeneity concerns related to OLS. The instrument is able to predict the potentially endogenous share of recognized refugees. The F-statistic is considerably larger than 10 indicating that the estimates do not suffer from a weak instrument problem.[21] As reported in Panel B of Table 3, the share of recognized refugees is positively and significantly associated with the committed crime rate (column 1), the overall ratio of all suspects (column 2), and the ratio of suspects that comprises a subgroup of legal non-Germans including recognized refugees (column 4). As outlined in section 3.1, column 4 most closely resembles the direct crime impact of recognized refugees. Given the average share and the respective ratio of suspects engaged in offenses belonging to the adjusted crime category (see Table 1), the coefficient of the preferred specification (column 4) translates into an elasticity of 0.32. Thus, even if I adjust for migration-specific offenses there is a positive crime impact of recognized refugees; a result contrary to what I found for asylum seekers. For German suspects (column 3), the effect is centered around zero

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[20]That is, violations against the residence act, the asylum procedure act or the law on free movement are excluded.

[21]Column 2 of Table 7 provides a detailed overview of the first stage showing all included coefficients.

such that the null hypothesis of a zero effect cannot be rejected. The effect is precisely estimated ruling out quantitatively meaningful crime impacts. This result is in line with asylum seekers where I do not detect an effect on German suspects either.

The IV estimate of column 4 is of particular interest because it most closely approximates the direct crime impact of recognized refugees.[22] To investigate this channel further, I aim to detect those types of offenses underlying the overall positive effect identified for the adjusted crime category. Column 2 of Table 4 reports the coefficients of the preferred specification considering different types of offenses. The share of recognized refugees is positively and statistically significantly associated with the ratio of suspects engaged in thefts and frauds. The effect on drug crimes is also positive though insignificant. The estimates concerning robberies, sexual abuse, and violent crimes, in contrast, prove negative and significant for robberies only.

A comparison between thefts and robberies illustrates the apparent pattern best. Both types of offenses target an economic benefit whereas robberies are complemented by the threat or use of violence. For robberies, the impact is slightly negative and statistically significant, suggesting that recognized refugees refrain from committing violence to take someone's property. Frauds and, to a certain extent, drug crimes are not directly connected with physical force neither but offer financial benefits which seem to attract criminal engagement as observed for thefts.

Sexual abuse, in contrast, does not involve any pecuniary advantage and a zero effect cannot be rejected for this crime category, though it has been perceived as a severe problem in the recent public debate.[23] For violent crimes no significant effect can be detected either, which is in line with the previous observation that recognized refugees refrain from physical force. A further comparison of the results in the light of the standard economic model of crime (Becker, 1968; Ehrlich, 1973) and a discussion regarding the LATE interpretation is outlined in section 4.4. The next subsection presents several

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[22]Table 7 of the appendix provides a detailed overview on all included coefficients for the preferred specification of the IV approach.

[23]The mass sexual assaults of the 2015/2016 New Year's Eve celebration in Cologne and other German cities triggered an emotional debate on this type of offense.

robustness checks.

4.3 Robustness Checks

The present subchapter stresses the stability of the previous findings along different dimensions. Most robustness checks are similar for both groups and scrutinize the different assumptions inherent in the two identification strategies. The results are reported in Table 5 and 6 for asylum seekers and recognized refugees separately, considering for each specification the preferred outcome measure, i.e. the ratio of suspects, to identify the direct crime impact. For the sake of comparison, I report the preferred baseline specification in the first column of both tables along the different crime categories.

The second column replicates the baseline regression excluding all covariates except year dummies. For both groups of migrants, the crime impact remains robust across all types of offenses ruling out covariate-specific distortions. Solely the direct impact of asylum seekers on sexual abuses changes its sign along the present and all remaining robustness checks (column 2 to 6 of Table 5). The slightly positive and insignificant coefficient of the baseline specification turns negative but remains close to zero such that the null hypothesis of a zero effect cannot be rejected.

The next robustness check tackles the impact of spatial correlation. So far, potential interactions or crime-spreading mechanisms across county borders have been implicitly excluded. The spatial literature on the determinants of crime (see Zenou, 2003), however, emphasizes such connections and the possibility of crime trips. Following Bianchi et al. (2012) as well as Piopiunik and Ruhose (2017), I include the spatially lagged outcome ratio using the travel time in minutes by car between population centers of counties as a weighting device.[24] Since interactions are more likely to occur between neighboring and nearby counties, the spatial lag is calculated assuming an inverse distance-squared relationship. As reported in the third column of Table 5 and 6, results hardly change independently of whether asylum seekers or recognized refugees

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[24]A population center of a county is defined as the population weighted centroid.

are considered.[25]

As a third check, I include for each type of offense the clear-up rate to approximate the time varying effort of the police, which could have changed in response to increased migration inflows. The clear-up rate also captures potential costs of criminal engagement which are expected to have a deterring effect (Eide et al., 2006). As reported in column 5 of Table 5 and 6, the overall pattern remains robust and coefficients do not change.

The fourth robustness check stresses the exogeneity of the variable of interest with respect to unobservables that are approximated and implicitly captured by the lagged outcome ratio. It also addresses the concern whether a systematic allocation of asylum seekers or acceptance of requests - based on criminal engagement of asylum seekers in the previous year - distorts the findings. To dispel such mechanism, the inclusion of the lagged outcome ratio should not change the variable of interest. Within the IV approach, a non-biased estimate provides further suggestive evidence that the untestable exogeneity assumption is likely to hold. Column 4 of Table 5 and 6 reports the coefficients including for each specification and migratory group the lagged outcome, that is, the change in the ratio of suspects in year $t-1$.[26] The overall pattern remains robust which strengthens the empirical approach.

Column 6 of Table 5 and 6 reports the results of the baseline regression weighted by the current population size. By this means, counties with more inhabitants are given more weight. This might reduce the inherent noise of low-population counties where changes in the total number of suspects have a higher impact on the outcome ratio (Lott, 2013). The coefficients vary slightly but remain robust along all specifications. Only the negative coefficient of frauds (sexual abuse) turns weakly significant if asylum seekers (recognized refugees) are analyzed.

The last two robustness checks refer to the IV approach. As stated above, the exo-

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[25]Using the jump distance in kilometers between county-specific population centers as a weighting devise, reveals a similar pattern and does not change the results as compared to the baseline specification.

[26]The German Federal Police Office does not provide crime statistics for years earlier than 2010. Thus, missing values of the year 2009 are linearly interpolated to calculate the change of the lagged outcomes. Results prove robust to different types of interpolation.

geneity condition is based on the assumption that a migrant's settlement decision in the past did not depend on future changes in criminal outcomes. Although it is questionable that these changes can be foreseen at all, a common critique of the instrument refers to this issue. In order to check for such time persistence, a more distant baseline year is considered. I choose the distribution of the year 2004, which is a point in time considerably before the recent refugee wave.[27] In this way, I also stress whether the previous selected baseline distribution picks up a year-specific component that might lead to the strong first stage and the subsequent IV results. The outcomes to this robustness check are presented in Colum 6 of Table 6. The F-statistic remains strong but the point estimates decrease slightly such that the effect on thefts turns insignificant. The overall pattern, however, remains robust across all crime categories.

The construction of the instrument also depends on the inflow of refugees at the national level (see subchapter 3.3). In the baseline specification current inflows are considered. But due to potential delays in the asylum process it could also be the case that numbers of the previous year are a better predictor. The last column of Table 6 stresses this issue using an instrument based on inflows that are lagged by one year. The F-statistic declines but remains bigger than 10 indicating that the IV estimates do not suffer from a weak instrument problem. All in all, coefficients remain robust along the different crime categories, but due to a significantly weaker first stage they are less precisely estimated. Thus, inflows of the current year are preferred to predict changes in the share of recognized refugees.

4.4   Discussion and Interpretation

The robustness checks of the previous subchapter strengthen the stability of the results along several dimensions. For asylum seekers no crime effect can be detected except for migration-specific offenses. The positive crime impact of recognized refugees, in contrast, is driven by non-violent property crimes and frauds.

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[27]The present robustness check reveals a similar pattern if the year 1998 is chosen as a baseline, that is, the first year I can access in great detail.

But why do the results differ between asylum seekers and recognized refugees? A major distinction between both groups is their legal status. Since asylum seekers are not yet officially recognized they might fear the risk of deportation during the asylum process (see Butcher and Piehl, 2013). Within the time period analyzed, however, violations against the law have generally no adverse effect on the asylum process in Germany. Thus, threats of deportation do not differ structurally between asylum seekers and recognized refugees.

A simple comparison of the coefficients is also misleading since different treatment effects are identified. The estimation strategy used for asylum seekers yields an ATE. The IV approach, in contrast, delivers a LATE for the subgroup of compliers, i.e. for those recognized refugees whose residential choice is induced by a pre-existing share of compatriots. As outlined in earlier studies, this is a rather specific group because ethnic networks tend to attract low-skilled migrants (Bartel, 1989; Beine et al., 2011; McKenzie and Rapoport, 2010; Bertoli, 2010). Against this background, differences in outcomes are likely to reflect specifics inherent to the complier subgroup.

Within the Becker model, lower educational achievements have a crime enhancing impact because they translate into inferior labor market characteristics and consequently into poorer legitimate earning opportunities as well as reduced employment probabilities. Since compliers induced by the shift-share instrument tend to be negatively selected on education, they are more likely to engage in crime.[28] This consideration coincides with the positive LATE identified for the adjusted crime ratio and the underlying subcategories thefts and frauds, that is, offenses rewarding a financial payoff. For all other types of crime including violence or physical force, I cannot detect a positive and significant crime impact independent of whether asylum seekers or recognized refugees are considered.

Recent research also identifies social interactions as a key determinant of individual criminal behavior (e.g. Bayer et al., 2009; Damm and Dustmann, 2014). As stated

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[28]Due to missing individual data on the educational performance of recognized refugees, I cannot provide a separate complier analysis to verify their educational background.

above, the residential decision of compliers is induced by a pre-existing share of compatriots. The positive LATE obtained for recognized refugees could also be upward driven by interactions of an underlying ethnic network.

I aim to address the crime enhancing impact of ethnic concentration while looking at asylum seekers. Given the dispersal policies, pre-existing differences in the share of compatriots are likely to occur by chance and beyond the asylum seekers' control. Following the IV approach, I define a network as the average baseline fraction of compatriots within a county as captured by parameter $\phi_{c\,t_0}^n$ (see chapter 3.3). Drawing on the year 2009, I choose the same baseline year which is used to construct the instrument. In a subsequent step, I interact this measure with the variable of interest to test whether criminal engagement of asylum seekers increases with ethnic concentration.

Table 8 presents the estimates of the preferred outcome equation (Panel A) as well as the specification including the interaction terms (Panel B). Just for migrant specific offenses (column 8) a strongly significant and negative interaction term can be observed. For all other crime categories, the interaction term is close to zero. This finding indicates that new asylum seekers are neither harmed nor fostered in their criminal engagement by spillovers through an extended network. As compared to the preferred baseline specification, the coefficient of interest proves robust across all types of offenses if interactions are included. If anything, a higher ethnic concentration has merely an informative nature to prevent new asylum seekers from committing offenses they are potentially not aware of, that is, violations against the residence act, the asylum procedure act or the law on free movement. At first sight, the interaction term seems to have a substantial impact if migrant specific offenses are considered. Given the county-specific average of compatriots, however, the overall marginal effect of the share of asylum seekers amounts 1.03 which is similar to the coefficient of the baseline specification.[29]

In conclusion, potential interactions through a network do not seem to explain the positive crime impact of adjusted offenses as identified for recognized refugees. In

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[29]The average fraction of compatriots within a county as captured by parameter $\phi_{c\,t_0}^n$ amounts 0.0023 in the year 2009.

the light of the Becker model, differences in outcomes between asylum seekers and recognized refugees are likely to reflect treatment effect heterogeneity. As outlined above, this consideration is in line with previous findings in the migration literature.

5 Conclusion

Did the recent refugee wave to Europe increase crime? Despite a heated public debate, research on this topic is scarce. This paper contributes empirical evidence on the recent influx of refugees to Germany and its impact on crime. My analysis comprises the years 2010 to 2015 and assembles administrative data from various sources to disentangle the direct crime impact of asylum seekers and recognized refugees separately.

My results reveal important heterogeneities in the crime impacts of refugee migration. While asylum seekers do not increase crime except migration-specific offenses, I find a positive impact of recognized refugees on local crime. The latter finding is driven by non-violent property crimes and frauds. My estimates are robust to a variety of confounders and differences in the crime outcomes between both groups are consistent with predictions of the standard economic model of crime (Becker, 1968; Ehrlich, 1973). In addition, Germans do neither react to the presence of asylum seekers nor to recognized refugees through increased criminal behavior. This suggests that refugee migration has neither an economic harm nor disturbances that native residents could respond to.

Since I draw on annual changes in the number of refugees, my analysis reveals the immediate impact on crime. While the worst fears are unfounded in the short run, long-term consequences remain unclear. A lower crime impact of recognized refugees, however, is a desired objective of policy makers. Following previous research on the economic integration of migrants (Dustmann and Fabbri, 2003; Dustmann and Glitz, 2011), it may require further investments into their human capital or a better integration into the labor market.

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Appendix A   Appendix

A.1   Data-Appendix

A.1.1   Sample Construction

The analysis covers the time period from 2010 to 2015. Since the unit of investigation is the county (Kreis), one has to account for territorial reforms in the state of *Mecklenburg-Western Pomerania* in the year 2011. Conversion factors to the reference year 2010 are provided by the *Federal Institute for Research on Building, Urban Affairs and Spatial Development*. Migration data for the federal state of *Saarland* are only available on an aggregated basis and cannot be distinguished separately for each of the six counties. Information on the counties of *Kassel City* and *Kassel rural district* as well *Cottbus City* and *Spree-Neiße rural district* are reported jointly on an aggregated basis. Thus, the final sample consists of 405 different counties.

A.1.2   Definitions of Variables and Data Sources

Ratio of committed crimes: total number of reported crimes of a specific crime category committed within a year in a county divided by the county population, as of December 31 of each year. *Source*: Police Crime Statistics - German Federal Criminal Police Office (BKA).

Ratio of suspects: total number of reported suspects engaged in a specific crime category within a year in a county divided by the county population, as of December 31 of each year. To be recorded as a suspect, investigations of the police have to provide substantial evidence that elements of an offense are present and that a violation of the law is likely to have been committed. *Source*: Police Crime Statistics - German Federal Criminal Police Office (BKA).

Share of asylum seekers: total number of asylum seekers in a county divided by the county population, as of December 31 of each year. *Source*: Central Register of Foreigners (AZR) - German Federal Statistical Office.

Share of recognized refugees: total number of recognized refugees in a county divided by the county population, as of December 31 of each year. *Source*: Central Register of Foreigners (AZR) - German Federal Statistical Office.

Crime categories
Adjusted offenses: crime category including all types of offenses except migration-specific offenses.

Drug crimes: crime category including drug dealing and offenses against the narcotics law.

Fraud: crime category including fraudulent misconduct such as acquisition of services by false pretences, insurance abuse or fare dodging.

Migration-specific offenses: crime category including migration-specific misconduct, that is, violations against the residence act, the asylum procedure act or the law on free movement.

Overall offenses: crime category including all types of offenses.

Robberies: crime category including the attempt or the taking of someones property by means of force or fear.

Thefts: crime category including the attempt or the taking of someones property.

Sexual abuse: crime category including undesired sexual behavior such as rape.

Violent crimes: crime category including grievous bodily harm, murder, sexual abuse and robberies.

County-specific controls

GDP per capita: annual county-specific GDP in Euro per capita. *Source*: Working group "Regional Accounts" (VGRdL) - German Federal Statistical Office.

Overall proportion of foreigners: number of non-German residents within a county divided by the overall population in a county, as of December 31 of each year. *Source*: Annual Population Statistics - German Federal Statistical Office.

Population density: total population in a county divided by the total county size in square kilometers, as of December 31 of each year. *Source*: Annual Population Statistics - German Federal Statistical Office.

Share of young males: number of young males aged 15 to 40 divided by all males in a county, as of December 31 of each year. *Source*: Annual Population Statistics - German Federal Statistical Office.

Unemployment rate: annual average of the county-specific unemployment rate. *Source*: Federal Employment Agency - German Federal Statistical Office.

A.2 Tables

Table 1: Summary Statistics

	mean	min	max	sd	ajd. sd
Panel A: Ratio of committed crimes					
Overall offenses	0.0651	0.0228	0.3721	0.0289	0.0101
Adjusted offenses	0.0633	0.0219	0.2939	0.0263	0.0089
Migration-specific offenses	0.0018	0.0000	0.2898	0.0107	0.0054
Panel B: Ratio of all suspects					
Overall offenses	0.0283	0.0116	0.3270	0.0142	0.0088
Adjusted offenses	0.0265	0.0115	0.0604	0.0087	0.0014
Migration-specific offenses	0.0018	0.0000	0.2896	0.0107	0.0089
Panel C: Ratio of German suspects					
Overall offenses	0.0214	0.0084	0.0566	0.0070	0.0012
Adjusted offenses	0.0214	0.0084	0.0566	0.0070	0.0012
Migration-specific offenses	0.0000	0.0000	0.0006	0.0000	0.0000
Panel D: Ratio of suspects being asylum seekers ($\cdot 10$)					
Overall offenses	0.0076	0.0000	1.0749	0.0330	0.0253
Adjusted offenses	0.0045	0.0000	0.0748	0.0060	0.0030
Migration-specific offenses	0.0031	0.0000	1.0348	0.0314	0.0248
Thefts	0.0022	0.0000	0.0457	0.0036	0.0020
Robberies	0.0001	0.0000	0.0032	0.0002	0.0001
Fraud	0.0010	0.0000	0.0291	0.0020	0.0012
Drug crimes	0.0002	0.0000	0.0058	0.0005	0.0003
Sexual abuse	0.0002	0.0000	0.0076	0.0006	0.0005
Violent crimes	0.0005	0.0000	0.0098	0.0008	0.0005
Panel E: Ratio of suspects including i.a. recognized refugees ($\cdot 10$)					
Overall offenses	0.0303	0.0015	0.1969	0.0251	0.0043
Adjusted offenses	0.0291	0.0015	0.1931	0.0244	0.0040
Migrant specific offenses	0.0011	0.0000	0.0594	0.0026	0.0016
Thefts	0.0088	0.0001	0.0522	0.0075	0.0018
Robberies	0.0005	0.0000	0.0052	0.0006	0.0002
Fraud	0.0080	0.0003	0.0672	0.0082	0.0018
Drug crimes	0.0023	0.0000	0.0346	0.0028	0.0010
Sexual abuse	0.0001	0.0000	0.0012	0.0001	0.0001
Violent crimes	0.0025	0.0000	0.0186	0.0025	0.0006
Panel F: Covariates					
Number of asylum seekers	324.10	0.0000	30405	801.64	544.71
Share of asylum seekers	0.0016	0.0000	0.0557	0.0021	0.0012
Number of recognized refugees	547.63	4.0000	27345	1414.8	263.15
Share of recognized refugees	0.0021	0.0000	0.0109	0.0016	0.0004
Instrument (Predicted share of recognized refugees)	0.0021	0.0001	0.0254	0.0025	0.0012
Unemployment rate	0.0663	0.0120	0.1740	0.0318	0.0040
GDP per capita	32052	13151	139556	14106	1297
Population density	515.19	35.568	4668.11	675.56	13.860
Young male population share	0.2946	0.2295	0.4341	0.0330	0.0057
Foreign population share	0.0722	0.0066	0.3360	0.0469	0.0047

Note: Summary Statistics cover the time period from 2010 to 2015 and include for each row 2430 observations of all German counties (405). For a detailed definition of the crime outcomes and all included covariates refer to the data appendix A.1.2. The adjusted standard deviation (adj. sd) represents the standard deviation of the residuals resulting from a regression of the denoted variable on year and county fixed effects. *Source*: Police Crime Statistics - German Federal Criminal Police Office (BKA); Annual Population Statistics - German Federal Statistical Office; Central Register of Foreigners (AZR), Federal Employment Agency, Working group "Regional Accounts" (VGRdL), Annual Population Statistics - German Federal Statistical Office.

Table 2: Crime impact of Asylum Seekers

	(1)	(2)	(3)	(4)
		Δ ratio of...		...suspects being asylum seekers
	...committed crimes	...all suspects	...German suspects	
Panel A: All types of offenses				
Δ Share of asylum seekers	2.1216***	2.2792***	-0.0301	1.0393***
	(0.5525)	(0.5841)	(0.0217)	(0.2798)
Adjusted R^2	0.087	0.129	0.103	0.388
Panel B: Migrant specific offenses				
Δ Share of asylum seekers	2.3180***	2.3157***	-0.0000	1.0426***
	(0.6019)	(0.5999)	(0.0006)	(0.2715)
Adjusted R^2	0.134	0.134	0.006	0.387
Panel C: Adjusted offenses				
Δ Share of asylum seekers	-0.1964***	-0.0365	-0.0301	-0.0033
	(0.0663)	(0.0226)	(0.0213)	(0.0105)
Adjusted R^2	0.031	0.052	0.103	0.413
Covariates	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
State dummies	yes	yes	yes	yes

Note: All first-difference regressions include 2025 observations and are run over the period 2010-2015 comprising all German counties (405). The dependent variable denotes for each type of offense the outcome ratio as defined in the column header. The included control variables are the county-specific unemployment rate, gdp per capita, the population density, the share of young males, and the overall proportion of foreigners. Within the first-difference framework, state dummies account for state-specific time trends. Standard errors in parentheses are clustered at the county level. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 3: Crime Impact of Recognized Refugees

	(1)	(2)	(3)	(4)
		Δ ratio of...		...suspects including i.a. recognized refugees
	...committed crimes	...all suspects	...German suspects	
		Panel A: OLS		
Adjusted offenses				
Δ Share of recognized refugees	0.1045	0.0212	-0.0347	0.0423
	(0.4379)	(0.1046)	(0.0860)	(0.0300)
Adjusted R^2	0.029	0.051	0.102	0.077
		Panel B: IV 2SLS		
Adjusted offenses				
Δ Share of recognized refugees	3.7899***	0.7600**	-0.2830	0.4435***
	(1.2866)	(0.3762)	(0.2787)	(0.1366)
1st stage F-stat.	29.47	29.47	29.47	29.47
Covariates	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes
State dummies	yes	yes	yes	yes

Note: All first-difference regressions include 2025 observations and are run over the period 2010-2015 including all German counties (405). The dependent variable denotes for the category of adjusted offenses the outcome ratio as defined in the column header. The included control variables are the county-specific unemployment rate, gdp per capita, the population density, the share of young males and the overall proportion of foreigners. Standard errors in parentheses are clustered at the county level. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4: Heterogeneous Crime Effects

	Δ ratio of...	
	...suspects being asylum seekers	...suspects including i.a. recognized refugees
	(1)	(2)
Panel A: Thefts		
Δ Share of asylum seekers	-0.0007 (0.0042)	
Δ Share of recognized refugees		0.1116 (0.0548)**
Adjusted R^2	0.131	
Panel B: Robberies		
Δ Share of asylum seekers	-0.0005 (0.0003)*	
Δ Share of recognized refugees		-0.0186 (0.0069)***
Adjusted R^2	0.080	
Panel C: Frauds		
Δ Share of asylum seekers	-0.0122 (0.0096)	
Δ Share of recognized refugees		0.2526 (0.0844)***
Adjusted R^2	0.155	
Panel D: Drug crimes		
Δ Share of asylum seekers	-0.0005 (0.0004)	
Δ Share of recognized refugees		0.0476 (0.0346)
Adjusted R^2	0.153	
Panel E: Sexual abuse		
Δ Share of asylum seekers	-0.0000 (0.0001)	
Δ Share of recognized refugees		-0.0037 (0.0031)
Adjusted R^2	0.015	
Panel F: Violent crimes		
Δ Share of asylum seekers	0.0025 (0.0019)	
Δ Share of recognized refugees		-0.0008 (0.0154)
Adjusted R^2	0.210	
Covariates	yes	yes
Time dummies	yes	yes
State dummies	yes	yes
1st stage F-stat.		29.47
Observations	2025	2025

Note: All first-difference regressions include 2025 observations and are run over the period 2010-2015 comprising all German counties (405). The dependent variable denotes for each type of offense the outcome ratio as defined in the column header. Column (1) reports the crime impact or asylum seekers; column (2) the results of an IV approach fir the group of recognized refugees. The included control variables are the county-specific unemployment rate, gdp per capita, the population density, the share of young males, and the overall proportion of foreigners. Standard errors in parentheses are clustered at the county level. $^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 5: Robustness Checks of the Preferred Specification Considering Asylum Seekers

	(1) Baseline	(2) Baseline w/o covariates	(3) Spatial lag (ride time)	(4) Clear up rate	(5) Time lag	(6) Population weight
Panel A: Adjusted offenses						
Δ Share of asylum seekers (÷10)	-0.0328 (0.1045)	-0.0551 (0.1141)	-0.0340 (0.1065)	-0.0321 (0.1044)	-0.0612 (0.1088)	-0.2546 (0.1749)
Panel B: Thefts						
Δ Share of asylum seekers (÷10)	-0.0073 (0.0420)	-0.0246 (0.0421)	0.0098 (0.0457)	-0.0073 (0.0420)	-0.0201 (0.0487)	-0.0403 (0.0727)
Panel C: Robberies						
Δ Share of asylum seekers (÷10)	-0.0049 (0.0029)*	-0.0060 (0.0033)*	-0.0045 (0.0029)	-0.0049 (0.0029)*	-0.0048 (0.0030)	-0.0081 (0.0055)
Panel D: Fraud						
Δ Share of asylum seekers (÷10)	-0.1197 (0.1061)	-0.1266 (0.0938)	-0.1253 (0.0984)	-0.1215 (0.0955)	-0.1286 (0.0938)	-0.2377 (0.1251)*
Panel E: Drug crimes						
Δ Share of asylum seekers (÷10)	-0.0146 (0.0168)	-0.0075 (0.0048)	-0.0058 (0.0042)	-0.0055 (0.0042)	-0.0059 (0.0047)	-0.0157 (0.0116)
Panel F: Sexual abuse						
Δ Share of asylum seekers (÷10)	0.0012 (0.0021)	-0.0006 (0.0007)	-0.0005 (0.0007)	-0.0003 (0.0008)	-0.0011 (0.0007)	-0.0012 (0.0013)
Panel G: Violent crimes						
Δ Share of asylum seekers (÷10)	0.0129 (0.0214)	0.0236 (0.0203)	0.0267 (0.0194)	0.0254 (0.0195)	0.0263 (0.0168)	-0.0184 (0.0358)
Panel H: Migrant specific offenses						
Δ Share of asylum seekers	1.0426 (0.2715)***	1.0228 (0.2760)***	1.0423 (0.2710)***	1.0426 (0.2715)***	0.9865 (0.2943)***	0.6185 (0.3030)**
Covariates as in preferred specification	yes	no, solely year dummies	yes	yes	yes	yes
Observations	2030	2030	2030	2030	2030	2030

Note: All first-difference regressions are run over the period 2010–2015 comprising all German counties (405). The dependent variable denotes for each type of offense the ratio of suspects being asylum seekers. All specifications include the county-specific unemployment rate, gdp per capita, the population density, the share of young males, and the overall proportion of foreigners as control variables if not otherwise stated. The column header indicates the specific robustness check that is conducted. Standard errors in parentheses are clustered at the county level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Robustness Checks of the Preferred Specification Considering Recognized Refugees

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Baseline	Baseline w/o covariates	Spatial lag (ride time)	Clear up rate	Time lag	Population weight	Lagged spatial distribution	Lagged inflow
Panel A: Adjusted offenses								
Δ Share of recognized refugees	0.4435 (0.1366)***	0.5575 (0.1370)***	0.4656 (0.1377)***	0.4495 (0.1367)***	0.4264 (0.1307)***	0.4685 (0.1612)***	0.2741 (0.1093)**	0.7850 (0.2520)***
Panel B: Thefts								
Δ Share of recognized refugees	0.1116 (0.0548)**	0.1853 (0.0575)***	0.1179 (0.0545)**	0.1156 (0.0551)**	0.1148 (0.0555)**	0.1612 (0.0583)***	0.0405 (0.0477)	0.1751 (0.0846)**
Panel C: Robberies								
Δ Share of recognized refugees	-0.0186 (0.0069)***	-0.0185 (0.0066)***	-0.0184 (0.0069)***	-0.0188 (0.0069)***	-0.0187 (0.0070)***	-0.0051 (0.0077)	-0.0152 (0.0065)**	-0.0220 (0.0099)**
Panel D: Fraud								
Δ Share of recognized refugees	0.2526 (0.0844)***	0.2996 (0.0793)***	0.2719 (0.0856)***	0.2333 (0.0803)***	0.2575 (0.0862)***	0.2104 (0.0856)**	0.1732 (0.0665)***	0.4178 (0.1513)***
Panel E: Drug crimes								
Δ Share of recognized refugees	0.0476 (0.0346)	0.0608 (0.0371)	0.0459 (0.0345)	0.0467 (0.0343)	0.0560 (0.0369)	0.0580 (0.0499)	0.0318 (0.0294)	0.1062 (0.0689)
Panel F: Sexual abuse								
Δ Share of recognized refugees	-0.0037 (0.0031)	-0.0030 (0.0021)	-0.0037 (0.0031)	-0.0037 (0.0030)	-0.0032 (0.0030)	-0.0049 (0.0026)*	-0.0028 (0.0026)	-0.0061 (0.0057)
Panel G: Violent crimes								
Δ Share of recognized refugees	-0.0008 (0.0154)	-0.0115 (0.0144)	-0.0007 (0.0154)	-0.0025 (0.0155)	0.0007 (0.0155)	0.0244 (0.0152)	0.0015 (0.0158)	0.0027 (0.0220)
Covariates as in preferred specification	yes	no, solely year dummies	yes	yes	yes	yes	yes	yes
1st stage F-stat.	29.47	26.12	29.19‡	29.32‡	28.69‡	11.98	36.29	10.34
Observations	2025	2025	2025	2025	2025	2025	2025	2025

Note: All first-difference regressions are run over the period 2010-2015 comprising all German counties (405). The dependent variable denotes for each type of offense the ratio of legal non-German suspects comprising i.a. recognized refugees. All specifications include the county-specific unemployment rate, gdp per capita, the population density, the share of young males, and the overall proportion of foreigners as control variables if not otherwise stated. The column header indicates the specific robustness check that is conducted. Standard errors in parentheses are clustered at the county level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
♯The indicated column includes for each panel one differing explanatory variable, i.e. the spatial lag, the clear up rate ,or the lagged outcome ratio. Thus, F-statistics differ slightly along the different crime dimensions.
The reported F-statistic presents the most conservative one out of the different panels analyzed within a column.

Appendix B   Appendix

Table 7: Preferred Specifications Showing all Covariates

	(1)		(2)		(3)	
	OLS		IV approach			
	Δ ratio of suspects being asylum seekers		1st stage: Δ share of recognized refugees		2nd stage: Δ ratio of suspects including i.a. recognized refugees	
Adjusted offenses						
Δ share of asylum seekers	-0.0033	(0.0105)				
Δ share of recognized refugees					0.4435	(0.1366)***
Δ predicted share of recognized refugees			0.0578	(0.0106)***		
Δ unemployment rate	-0.0003	(0.0021)	0.0028	(0.0026)	0.0096	(0.0030)***
Δ gdp per capita ($\div 10^6$)	0.0148	(0.0045)***	0.0246	(0.0107)**	-0.0018	(0.0108)
Δ population density ($\div 10^3$)	0.0030	(0.0007)***	0.0002	(0.0010)	-0.0019	(0.0012)
Δ share of young males	0.0030	(0.0020)	0.0060	(0.0024)**	0.0002	(0.0028)
Δ overall proportion of foreigners	0.0045	(0.0027)*	0.0067	(0.0024)***	-0.0024	(0.0029)
Time dummies	yes		yes		yes	
State dummies	yes		yes		yes	
Adjusted R^2	0.413					
1st stage F-stat.			29.47			

Note: All first-difference regressions include 2025 observations and are run over the period 2010-2015 comprising all German counties (405). The dependent variable denotes for the category of adjusted offenses the outcome as defined in the column header. Standard errors in parentheses are clustered at the county level.$^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 8: Interaction

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Δ ratio of suspects being asylum seekers engaged in...							
	Adjusted offenses	Thefts	Robberies	Fraud	Drug crimes	Sexual abuse	Violent crimes	mig spec offenses
Panel A: Baseline								
Δ Share of asylum seekers	-0.0033	-0.0007	-0.0005*	-0.0122	-0.0005	-0.0000	0.0025	1.0426***
	(0.0105)	(0.0042)	(0.0003)	(0.0096)	(0.0004)	(0.0001)	(0.0019)	(0.2715)
Adjusted R^2	0.413	0.282	0.080	0.155	0.153	0.015	0.210	0.387
Panel B: Interaction								
Δ Share of asylum seekers	-0.0033	-0.0010	-0.0005*	-0.0122	-0.0007*	-0.0000	0.0026	1.0592***
	(0.0105)	(0.0041)	(0.0003)	(0.0095)	(0.0004)	(0.0001)	(0.0020)	(0.2698)
Δ Share of asylum seekers × network share	0.0349	0.2235	0.0327	0.0083	0.1479	-0.0082*	-0.0069	-14.3582***
	(0.3839)	(0.2671)	(0.0288)	(0.2115)	(0.1206)	(0.0047)	(0.0961)	(5.3179)
Adjusted R^2	0.412	0.282	0.080	0.155	0.155	0.014	0.209	0.390
Covariates	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	yes	yes	yes	yes	yes	yes
State dummies	yes	yes	yes	yes	yes	yes	yes	yes

Note: All first-difference regressions include 2025 observations and are run over the period 2010-2015 comprising all German counties (405). The dependent variable denotes for each type of offense the share of suspects being asylum seekers. The included control variables are the county-specific unemployment rate, gdp per capita, the population density, the share of young males, and the overall proportion of foreigners. Standard errors in parentheses are clustered at the county level.$^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

B.1 Figures

Figure 1: Asylum applications and stock of foreigners in Germany over time.
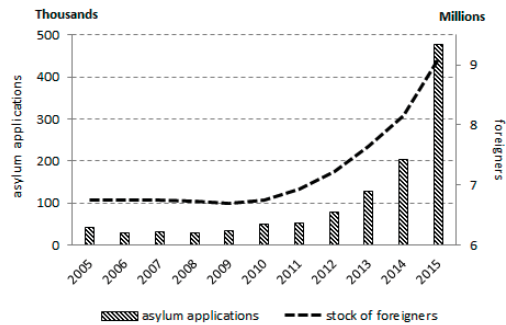
Note: The figure covers the time period from 2005 to 2015 and presents for each year the total number of asylum applications filed and the annual stock of foreign nationals registered in Germany. *Source*: Asylum statistics - Federal Office for Migration and Refugees (BAMF); Central Register of Foreigners (AZR) - German Federal Statistical Office.
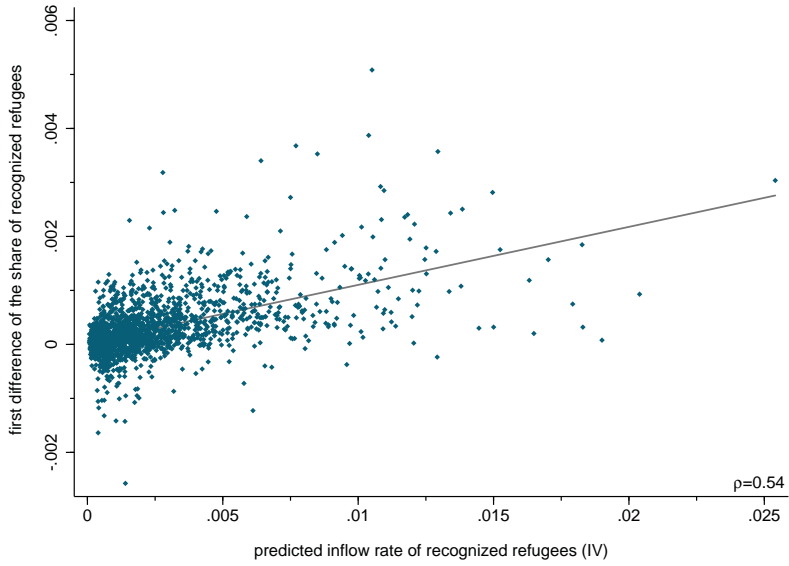
Figure 2: Spatial distribution across Germany

(a) average share of recognized refugees   (b) average share of asylum seekers
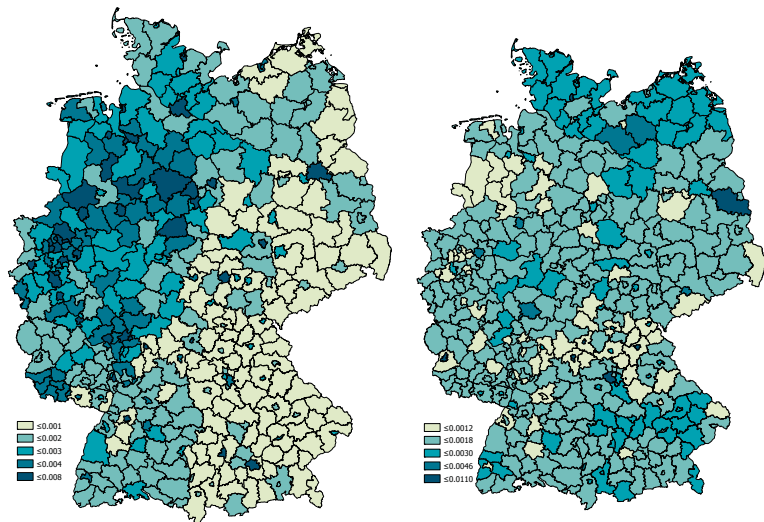
Note: The share of recognized refugees (asylum seekers) is defined as the total number of recognized refugees (asylum seekers) over the total resident population. For each county the average share is calculated over the time period from 2010 to 2015. *Source*: Central Register of Foreigners (AZR) - German Federal Statistical Office.

Figure 3: First stage correlation of the IV approach