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Using estimates of undocumented immigrants to study the immigration-crime relationship

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ABSTRACT

The debate about undocumented immigration and its potential relation to crime continues to boil in the United States. We study this relationship by using two sets of estimates for the 2014 undocumented foreign-born population in U.S. metropolitan areas acquired from the Pew Research Center and the Migration Population Institute, 2013-2015 FBI Uniform Crime Report data, and 2011-2015 American Community Survey data from the U.S. Census Bureau, to model the association between undocumented immigration and violent and property crime. Findings are consistent across all estimates of metropolitan undocumented populations. Net of relevant covariates, we find negative effects of undocumented immigration on the overall property crime rate, larceny, and burglary; effects in models using violent crime measures as the outcomes are statistically non-significant. Although the results are based on cross-sectional data, they mirror other research findings that immigration either reduces or has no impact on crime, on average, and contribute to a growing literature on the relationship between immigration and crime.

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Introduction

Political and scholarly debates rage about immigrants' social, economic, and cultural influences in receiving countries (see e.g., Borjas 2000; Foner, Rumbaut, and Gold 2000; Ngai 2014; Street 2017). In particular, the relationship between immigration and crime draws extensive scrutiny from scholars, politicians, and the mass media (Ousey and Kubrin 2018). The popular notion that immigrants bring crime is reiterated by nationalist-leaning politicians across the globe (see e.g., Chak 2015; Oppenheim 2017). At immigrants' peril, these debates often ignore decades of research about immigration and crime, studies dating back to the beginning of the 20th century (Hayford 1911; Wickersham Commission 1931).

A multi-disciplinary and wide-ranging literature assesses the effect of immigration on violent and property crime (see e.g., Adelman et al. 2017; Lee and Martinez 2009; Light 2017; Mears 2002; Reid et al. 2005). Ousey and Kubrin (2018) evaluate 51 aggregate-level studies published from 1994 to 2014 about the impact of immigration on crime. They find that in 62% of the studies, there is a nonsignificant relationship between immigration and crime. In those studies that find

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a significant relationship, negative effects are reported two and a half times more often than positive effects. In their meta-analysis, Ousey and Kubrin (2018, 69) note that, although the "results suggest a detectable nonzero negative association between immigration and crime", the magnitude is weak. Overall, their meta-analysis shows that most research suggests either non-effects or a negative relationship between immigration and crime.

As consistent as this research has been across the years, little research takes into account undocumented[1] immigrants' influence on crime. In fact, Ousey and Kubrin (2018, 81) finish their review by calling for research to fill the gap but remark that the difficulty of gathering data on undocumented migrants has limited this line of research. Recently, the Center for Migration Studies (CMS) (Warren 2016), the Pew Research Center (Pew Research Center 2017), and the Migration Policy Institute (MPI 2020) provided estimates of undocumented populations in the U.S., which can benefit researchers examining the immigration-crime nexus. Light and Miller (2018), for example, use state-level data to investigate the association between undocumented immigration and violence from 1990 to 2014, finding that undocumented immigration is negatively associated with violent crimes. However, the relationship between undocumented immigration and different types of crime remains largely unexamined at the metropolitan level. This represents an important subject for exploration given the demographic variation across larger geographies and other limitations of state-level data.

Although there is broad consensus about the accuracy of 'residual' estimates of the unauthorized immigrant population, this consensus pertains largely to national-level estimates broken down only by broad demographic characteristics (Van Hook et al. 2015; Capps, Bachmeier, and Van Hook 2018). More detailed population estimates and those at targeted levels of geography (especially sub-state estimates) require the use of legal status imputation methods. In recent years, social scientists have developed and employed a diverse array of imputation approaches, each of which – explicitly or implicitly – rests on specific assumptions which, if violated, pose major threats to the validity of the estimates generated by a given method. To date, these assumptions have not been subjected to peer-reviewed statistical scrutiny, despite evidence from simulations indicating substantial variation in bias across the spectrum of currently used imputation methods. Thus, it is crucial that research employing sub-state and imputation-based estimates of the unauthorized population for secondary purposes (such as estimating the empirical association between the unauthorized immigrant population in a given geography and crime) employ multiple estimates that represent the full spectrum of extant imputation methods to ensure that substantive conclusions are robust to variations in the underlying methods used to derive the population estimates.

This article contributes to the literature on the immigration-crime debate by focusing on the association between unauthorized immigration and violent and property crime at the metropolitan level, thus ensuring greater spatial proximity between covariate measures than is feasible in state-level analyses. Because – like any difficult to measure population – estimates of the unauthorized foreign-born population are subject to increased variability at progressively smaller levels of geography, we employ two sets of metropolitan-level estimates derived from different estimation methodologies. Specifically, we use the 2014 estimates of undocumented immigrants from Pew Research Center (2017) and MPI[2] (2020) in U.S. metropolitan areas to model the association between undocumented immigration and crime, net of relevant covariates. Although the data are cross-sectional, we use two estimates of metropolitan area undocumented immigrant data as described below. This is one of only a handful of studies to conduct analyses with regard to undocumented immigration and crime, adding to the existing research related to unauthorized immigration more broadly (see e.g., Chalfin 2014; Hickman and Suttorp 2008; Green 2016; Light and Miller 2018; Light, Miller, and Kelly 2017; Ngai 2014; Patler and Gonzales 2015; Spenkuch 2014; Stupi, Chiricos, and Gertz 2016; Woodrow-Lafield 2014).

The immigration-crime nexus

Research on immigration and crime, in general, takes one of two approaches. The first is at the micro-level, in which researchers ask whether immigrants have a higher propensity to commit crime than native-born individuals (e.g., Hickman and Suttorp 2008; Rumbaut et al. 2006; Sampson 2008). The second approach is at the macro-level, and assesses whether immigration affects aggregate crime rates, either directly via immigrant criminality (or the lack thereof) or indirectly, through any one of a number of mechanisms (e.g., Martinez, Stowell, and Lee 2010; Ousey and Kubrin 2009; Stowell et al. 2009).

At the micro-level, evidence demonstrates that immigrant criminality is consistently lower than that of native-born individuals (Butcher and Piehl 1998a, 1998b, 2007; Harris 1999; MacDonald and Saunders 2012; Morenoff and Astor 2006; Sampson 2008; Sampson, Morenoff, and Raudenbush 2005). This finding is robust despite social structural conditions that would lead to predictions of higher levels of criminality among the foreign-born, such as systemic discrimination and blocked pathways to social and economic mobility. Referred to as the immigrant paradox (Sampson and Bean 2006), immigrants experience better outcomes in education, health, and numerous other conditions relative to similarly situated native-born U.S. residents. These effects hold across country of origin (Vaughn et al. 2014) and characteristics of receiving communities, including level of immigrant concentration (Desmond and Kubrin 2009) and structural disadvantage (Morenoff and Astor 2006).

A number of factors may explain the immigrant paradox: (1) Those who immigrate are often highly motivated and resilient, creating a self-selection effect (Buriel 2012); (2) cultural and familial practices are protective (Rumbaut et al. 2006; Sampson 2008); (3) ethnic enclaves create strong social and economic networks and support systems (Portes 1995; Xie and Greenman 2011); and (4) for some immigrants, their ability to continue residing in the United States is contingent on maintaining a clean criminal record (Light and Miller 2018). The protective effect of immigrant status does not hold across successive generations, however, with the children and grandchildren of immigrants exhibiting levels of criminality approaching, but not exceeding, that of the native-born population (Morenoff and Astor 2006; Sampson, Morenoff, and Raudenbush 2005).The second approach to understanding the relationship between crime and immigration is at the macro-level and asks whether immigration affects aggregate crime rates, either directly or indirectly. While increased immigration could reduce crime simply because immigrants are less crime-prone than the native-born, there are other structural conditions that suggest immigration may have a more far-reaching impact on crime at the aggregate level. In particular, the immigrant revitalization perspective suggests that immigration may lessen crime by bringing businesses and jobs into communities that have been in decline (Lee and Martinez 2009; Sampson 2017; Sampson, Morenoff, and Raudenbush 2005). Likewise, immigration can revitalize predominantly poor residential areas by decreasing vacant housing, which might otherwise serve as a base for drug dealing and other crime in stressed communities (Adelman, Ozgen, and Rabii 2019; Vigdor 2014). Extant research drawing on the revitalization perspective overwhelmingly indicates that immigration either has no effect on crime or actually reduces it (Ousey and Kubrin 2018). Alternatively, immigrants could lead to increased crime rates if immigrants displace native-born workers in urban labor markets, leading to large scale un- or under-employment (Waldinger 1997).

Beyond these explanations, increasing amounts of formal social control might impact levels of crime (see Levitt 2004; Light and Miller 2018). Governments at many levels may respond to fears of criminal behavior that are associated with the perception of increased immigrant populations, by hiring more police officers or increasing the number of prisons or prisoner populations (Levitt 2004). Consequently, these and other formal social control strategies might be related to decreasing crime rates in metropolitan areas, or other aggregate levels, where documented and undocumented migrants reside (Light and Miller 2018).

Null findings may be driven by different factors. The diversification of immigrant streams in terms of both origin and destination may be an underlying cause of null findings. The crime protective shell

that Shihadeh and Barranco (2010) suggest is created by immigration does not operate the same way in all contexts. Ramey (2013), for example, finds that immigration reduces crime in places with long-standing immigration streams, but has no effect in new immigrant destinations. Likewise, research on country of origin, as well as race and ethnicity, suggest that not all dimensions of immigration create a crime protective effect (Klein, Allison, and Harris 2017; Light 2017). Alternatively, Ramos and Wenger (2018) suggest that null findings may be generated by variation across different levels of analysis. They find a negative effect of immigration on robbery at the city level, but a positive effect at the tract level. Their research suggests that immigration may yield higher crime in some neighborhoods, while the overall impact in a city is not significant.

Undocumented immigration and crime

Undocumented immigrants in the U.S.

Passel and Cohn (2018) estimate that in 2016 there were 10.7 million unauthorized immigrants living in the United States, down from a peak of 12.2 million in 2007. About half of the unauthorized population in the United States is from Mexico, although their numbers are declining (Passel and Cohn 2018; see also Cohn, Passel, and Gonzalez-Barrera 2017; Massey 2014). One region that is sending more undocumented immigrants to the U.S. is Central America, with Passel and Cohn estimating 1.85 million unauthorized immigrants as of 2016. Other top sources of immigration include Asian countries, where 1.3 million undocumented immigrants were from, and South American nations, providing another 650,000 (Passel and Cohn 2018).

Most (58%) undocumented migrants live in only six states: California, Florida, Illinois, New Jersey, New York, and Texas (Passel and Cohn 2018). Nationally, the vast majority (94%) live in metropolitan areas (Passel and Cohn 2009, 1; see also Woodrow-Lafield 2014). Although complex and beyond the scope of this paper, much of the undocumented immigration stems, in large part, from social and economic ties with Latin American countries, especially Mexico, and an assortment of U.S. public policies throughout the 20th (and 21st) century that led these migrants to remain in the U.S. rather than risk returning home (see e.g., Massey 2013, 2014). Over time, policies and public sentiments toward unauthorized migrants have grown increasingly hostile as they became demonized and viewed as threats and dangers to American society (Chavez 2013; Gonzales 2015; Massey 2014; Ngai 2014).

Gelatt and Zong (2018, 3) report that 62% of undocumented immigrants have lived in the United States for at least ten years. Forty percent of the unauthorized population 15 and older are married and living with a partner. Almost half (47%) of undocumented immigrants do not have a high school degree, but 15% have attained at least a bachelor's degree. Fifty-six percent of the group speaks English very well or well. Gelatt and Zong (2018) estimate that 67% percent of unauthorized immigrants 16 and older are employed (which is higher than the native-born population at 58%) with relatively high concentrations in industries such as accommodation and food services and construction. The group has relatively high levels of poverty in the Southwest and Southeast, but 40% of the population has household incomes twice the poverty level.

Undocumented immigrants and crime

Despite the increasing focus on undocumented immigration in the popular press, very little research has specifically examined the impact of undocumented immigrants on crime (for exceptions see our discussion of Green (2016) and Light and Miller (2018) below). The specific nature of undocumented immigration could, however, shift the theoretical expectations about the immigration-crime relationship, either bolstering or undermining the protective effects of immigration at the micro- and macro-levels.

At the individual-level, the underlying factors that support the immigrant paradox (i.e., self-selection effects, cultural and familial practices, ethnic enclaves, and maintaining clear criminal records) may operate differently for undocumented immigrants than for other immigrants. Research on selection effects suggests that those who immigrate tend to have higher skills and may be more resilient than those who do not (Chiquiar and Hanson 2005; Feliciano 2005), but the actual skill composition of immigrant streams varies based on their reasons for immigration. Orrenius and Zavodny (2005) find, for example, that economic crises in country of origin result in greater levels of outmigration and relatively higher levels of skill among those who do immigrate. This would suggest that increased unauthorized immigration due to economic instability may lead to less crime. Chiswick (2000) suggests, however, that politically-motivated immigrants, including refugees, exhibit less self-selection for labor market success than economic migrants and face greater economic disadvantages in the United States. Hence increased unauthorized immigration due to political instability and gang violence could lead to more crime. Beyond self-selection effects, cultural and familial practices that are posited to protect immigrants may equally prohibit criminal involvement of undocumented immigrants. Plus, undocumented immigrants may have a stronger incentive to abide by the laws to avoid detection by law enforcement (Light and Miller 2018).

At the macro-level, unauthorized immigration may impact the revitalization perspective in different ways. Fear of deportation can erode trust in police (Kirk et al. 2012; Menjívar and Bejarano 2004; Skogan 2009) and lead to extra-legal mechanisms of social control. Likewise, the real or perceived necessity of operating outside the purview of law enforcement may extend to disengagement with all government agencies and lower levels of civic engagement in general (Desai, Su, and Adelman 2020; DeSipio 2011). This could lead to more crime if communities with large populations of undocumented immigrants generate less capacity to leverage governmental resources to counter crime. Recent research on sanctuary cities suggests that the amelioratory effects of supports for immigrants do not come at the cost of increased crime (Gonzales, Collingwood, and El-Khatib 2019). By contrast, Light and Miller (2018) suggest that undocumented immigration could decrease crime by diluting cultural adaptations to concentrated disadvantage, the so-called 'code of the street,' among the native born thereby exhibiting an overall crime suppressing effect among both immigrants and the native born.

Empirical evidence on undocumented immigrants and crime

Previous studies about the relationship between undocumented immigrants and crime have been conducted at the state level. Using the state-level estimates of undocumented immigrants from Pew and CMS for the 1990 to 2014 period, Light and Miller (2018, 388) found that undocumented immigration is negatively associated with violent crimes, although there is some variability in the effects: "Rather than causing higher crime, increased undocumented immigration since 1990 is generally associated with lower rates of serious violence …" In their myriad of robustness checks, Light and Miller (2018) maintained that the negative association is not because of decreased reporting or selective migration.

Other studies that have examined undocumented immigrants and drug-related crime have yielded inconsistent results. For example, using 2012–2014 state-level and undocumented immigrant estimates from Migration Policy Institute (2020), Green (2016) found no association between the overall immigrant population and violent- and drug-related crime, but a small significant positive association between the undocumented immigrant population and drug-related arrests. Light, Miller, and Kelly (2017) also employed state-level data from 1990 to 2014, to investigate the association between the undocumented immigrant population (using CMS estimates) and drug and alcohol problems. Their results showed no association between undocumented migration and driving under the influence (DUI) death, and negative associations between undocumented migration and drug arrests, drug overdose deaths, and DUI arrests.

These state-level analyses may not adequately reflect metropolitan area variation because most unauthorized immigrants live in urbanized areas (Passel and Cohn 2016a). Additionally, many of the largest metropolitan areas span multiple states. Thus, state-level analyses further mask potential within-state variation in both crime rates and unauthorized immigrant population concentration and thus create potential uncertainty about any connection between the two. This is a substantial methodological concern given the tendency of unauthorized immigrants (and immigrants in general) to concentrate in certain types of geographic locations – whether due to the draw of geographically concentrated industries and occupations, or to the general tendency of immigrants to concentrate where previous waves of immigrants have established roots (Bachmeier 2013). Whatever the mechanisms linking unauthorized immigrants and the crime rate, they all assume proximity (i.e., the *presence* of unauthorized migrants increases/decreases the crime rate). Such proximal assumptions are less tenable in a state-level analysis than an approach that incorporates data for metropolitan areas.

We have found no research at the metropolitan level that has specifically examined the relationship between undocumented immigration and violent and property crime. Consequently, our goal is to deploy estimates of the undocumented foreign-born population to model the association of unauthorized immigration with violent and property crimes in U.S. metropolitan areas.

Hypotheses

Building upon prior research, we develop two hypotheses concerning the association between the undocumented foreign-born population and violent and property crime rates across U.S. metropolitan areas. The direction of our hypotheses holds for the total foreign-born association with violent and property crime as well.

Hypothesis 1: The undocumented (and the total) foreign-born population is negatively associated with the aggregate violent crime rate as well as the measures that comprise it: homicide and non-negligent manslaughter, robbery, and aggravated assault.

Hypothesis 2: The undocumented (and the total) foreign-born population is negatively associated with the aggregate property crime rate as well as the measures that comprise it: burglary and larceny-theft.

Data and methods

Data

We merged cross-sectional data[3] from a number of sources to assess the association between immigration and crime in U.S. metropolitan areas as defined by the U.S. Office of Management and Budget in 2013. We collected annually reported metropolitan-level crime data (2013–2015) from the FBI's Uniform Crime Report (UCR) program and computed three-year averages for 2013–2015. We used two sources of estimates on unauthorized immigrants in metropolitan areas in 2014 from the Pew Research Center (2017) and MPI (2020). Because estimating the size of unauthorized immigrant populations in metropolitan areas is difficult, we use both the 'residual-based' estimates from Pew and the 'survey-based' estimates from MPI (Capps, Bachmeier, and Van Hook 2018; Heer and Passel 1987; Van Hook et al. 2015). Using estimates derived from fundamentally different estimation approaches helps produce robust results and strengthens our conclusions. To assess demographic (including total immigration), social, and economic metropolitan factors, we employed 2011–2015 American Community Survey (ACS) and 2010 census data (the latter for only one measure described below). Finally, we use these data for three sets of metropolitan areas: (1) the 154

metropolitan areas used in the Pew estimates, (2) the same 154 metropolitan areas but employing the MPI estimates, and (3) a fuller set of 257 metropolitan areas using the MPI estimates.

Measurement

Violent and property crimes

The dependent variables are rates (per 100,000 people) of homicide and non-negligent manslaughter, aggravated assault, robbery, burglary, and larceny that were known to police from 2013 to 2015. Our violent crime rate is composed of three offenses: homicide and non-negligent manslaughter, robbery, and aggravated assault. Our property crime measure includes burglary and larceny-theft (Uniform Crime Reporting 2013, 2014, 2015).[4] To match Pew's 2014 estimate of the undocumented population, we calculate average crime rates across three years to account for large temporary fluctuations in crime. In some years, crime measures are missing for metropolitan areas, but there is at least one year of crime data for all 154 areas. For example, about 82% of the metropolitan areas have three years of data for homicide, around 14% have two years of data, and almost 5% have one year of data. Data for the other crime measures – robbery, aggravated assault, burglary, and larceny-theft – show similar distributions.

Undocumented Immigration

Our key independent variables are estimates of metropolitan areas' undocumented immigrant populations and total foreign-born populations. For both our measure of the total foreign-born population and the unauthorized immigrant population, we use the percentage of each as a component of the total population in our models. We use the percentage of the total foreign-born population for each metropolitan area from both the ACS 2011–2015 estimate and the MPI's 2014 estimate. While the MPI estimate is also derived from the ACS, it differs from the 2011–2015 ACS estimate in two important ways. First, the pooled 2011–2015 estimate is effectively an average across these years and reflects a mid-year (i.e., 2013) estimate, whereas the MPI estimate is for 2014. Second, and more importantly, the foreign-born estimates from MPI are inflated due to assumed undercount of the unauthorized population (described in more detail below), while the pooled ACS estimates include no such undercount adjustment. For these two reasons, the 2014 MPI estimates of the total foreign-born population are necessarily higher than the pooled estimates, despite the fact that both are based on the ACS. Due to the heterogeneity of the foreign-born population, which includes naturalized citizens, permanent residents, other legal immigrants, and unauthorized immigrants, we analyze a second measure of immigration, the unauthorized immigrant population in 2014 from Pew and MPI.

The Pew Research Center (2017) published estimates for unauthorized immigrants in 155 metropolitan areas based on 2014 ACS data.[5] This is computed by subtracting a demographic estimate of legal immigrants (based on administrative data) from the ACS survey estimate of the total foreign-born population in metropolitan areas. Known as the "residual-based method," scholars make additional adjustments (e.g., dealing with undercounts) to the estimates (Passel and Cohn 2016b, 2017; see also Passel 2016a). Pew calculated metropolitan area estimates of the undocumented population for those areas with at least 20,000 people (Passel and Cohn 2017). The CMS also estimates the undocumented population by using the residual-based method with Census Bureau data (Warren and Warren 2013). The estimates from both Pew and CMS are notably similar and consistent across years (Passel and Cohn 2016b; Warren 2014). Since CMS does not provide metropolitan-level estimates of undocumented immigrants, we use Pew's estimates in our models.

Different from Pew's residual-based method, the metropolitan-level estimates of the unauthorized population provided by MPI use a survey-based estimation approach as an alternative to the residual-based method (Capps, Bachmeier, and Van Hook 2018; Van Hook et al. 2015). Specifically, the survey-based approach employed by MPI imputes the unknown legal status of immigrants in the ACS using prediction models estimated from the Survey of Income and Program Participation

(SIPP) – a nationally representative survey that includes measures of legal status for roughly 10,000 immigrants – an approach more generally referred to as combined-sample multiple imputation (Rendall et al. 2013). After imputing the legal status for individuals in the ACS, MPI adjusts the person weights of individuals imputed to be unauthorized so that they sum to the year-specific (residual) estimate of the total unauthorized population published by the Department of Homeland Security (DHS), in effect, adjusting the MPI estimate for undercount in the ACS. Because the DHS estimate is very similar to the Pew estimate, it means that the MPI estimate will also be similar to Pew since the DHS estimate serves as a *national-level* control total in the MPI estimates. Since such controls are not applied at the sub-national level, the MPI and Pew estimates have the potential to vary at progressively smaller levels of geography as a function of differences in estimation method. Therefore, MPI estimates are sufficiently independent of Pew estimates to test the robustness of the association between the relative size of a metropolitan area's unauthorized foreign-born population and violent and property crime rates.

Covariates

We include a host of socio-demographic structural factors related to metropolitan-level crime rates identified from prior criminological research, to help understand the association between undocumented immigration and crime rates.

Economic covariates

Using ACS data, we incorporate several economic variables to control for the labor market structures and economic well-being of residents in metropolitan areas. We include the unemployment rate for the civilian population aged 16 and over; the percentage of the employed population in manufacturing industries; and the percentage of the population employed in the low-skilled service sectors, which include wholesale trade, retail trade, and arts, entertainment, and recreation; and accommodation and food services sectors.

We also include an economic deprivation measure made up of the standardized values of the natural log of median family income, the percentage of families living below poverty, the percentage African American residents, the percentage of female-headed households, and the Gini coefficient of income inequality (see also Adelman et al. 2017; Light and Miller 2018; Reid et al. 2005).

Housing and residential instability covariates

We include 2011–2015 ACS housing-related measures. Housing instability is operationalized as the share of all occupied housing units that are rented measured as the percentage of rental housing units among the total occupied housing units. We also control for the median value of owner-occupied housing units. Both variables are skewed thus we transform them using the natural logs of the values.

Incarceration rate

We use 2010 census data of the population in correctional facilities for adults to measure the incarcerated population rate for each metropolitan area.[6] This allows for the control of any crime reducing effects of aggregate rates of incarceration (Piquero and Blumstein 2007). Since the distribution of the population in correctional facilities is skewed, we transform it using the square root of the values.

Demographic and geographic covariates

We control for the population density of each metropolitan area by including the natural log of the density to adjust for skewness.[7] Because of a positive association between criminal offending and the size of the young male population (Farrell, Laycock, and Tilley 2015; Moffitt 1993; Laub and Sampson 1993, 2001), we control for the age and sex structure of the population, measured as the percentage of 18–34 years old males in the total population. We also control for region; we compare the South to all other regions.[8]

Analyses

In this study, the unit of analysis is the metropolitan level and the data are aggregated, thus our OLS models may mis-specify the mean square error and lead to the problem of heteroscedasticity (Johnston and DiNardo 1997; Messner and Blau 1987). To correct for heteroscedasticity, we apply the HC3 correction from Long and Ervin (2000) in our estimations (see also Davidson and MacKinnon 1993; MacKinnon and White 1985; Reid et al. 2005), which produce more conservative confidence intervals. Davidson and MacKinnon (1993 554–556) estimate the variance as:

$$\hat{\sigma}_j^2 = \frac{\mu_j^2}{\left(1 - h_{jj}\right)^2}$$

where $\hat{\sigma}_j^2$ is the variance of the jth observation, μ_j^2 is the calculated residual, and h_{jj} is the diagonal element of the hat (projection) matrix (see https://www.stata.com/manuals13/rregress.pdf). In addition, we performed detailed analyses of multicollinearity and none of the diagnostics show problems with the issue even though there are a few large bivariate correlation coefficients across the covariates.

Results

Descriptive statistics

Tables 1 and 2 display descriptive characteristics and bivariate correlations of the variables in our analyses. For the crime rates, we report aggregated results for them and their components. The aggregate violent crime rate is 366 per 100,000 individuals across the 154 areas with a range from

Table 1. Descriptive statistics (and data sources) for variables used in the analyses (N = 154 MSAs).

	Mean	Std. Dev.	Min	Max
Crime				
Violent Crime Rate (UCR)	366.16	148.70	44.60	971.93
Homicide Rate (UCR)	4.71	2.52	0.70	17.37
Aggravated Assault Rate (UCR)	261.06	117.98	35.60	762.75
Robbery Rate (UCR)	100.39	49.91	8.30	262.53
Property Crime Rate (UCR)	2,613.96	670.13	1,418.03	4,735.47
Burglary Rate (UCR)	604.74	203.64	209.45	1,318.60
Larceny Rate (UCR)	2,009.22	528.63	1,130.90	3,863.70
Immigrants				
Foreign Born (%, PEW)	12.48	7.78	3.29	38.33
Foreign Born (%, MPI)	14.13	8.86	3.67	42.51
Undocumented Foreign Born (%, PEW)	3.56	2.41	0.20	10.30
Undocumented Foreign Born (%, MPI)	3.73	3.07	0.31	15.60
Economics				
Unemployment Rate (%, ACS)	8.52	2.28	3.43	17.41
Manufacturing Industries (%, ACS)	9.76	4.31	2.09	25.65
Low-skill Service Sector (%, ACS)	24.67	3.40	18.16	43.64
Deprivation Index (ACS)	0.07	2.28	−6.89	7.51
Housing Characteristics				
Rental (%; Ln, ACS)	3.58	0.15	3.20	3.94
Median Housing Value (Ln, ACS)	12.13	0.41	11.28	13.44
Institutional Population (Census 2010)				
Population in Correctional Institutional Rate (√)	0.08	0.04	0.04	0.35
Demographic and Geographic Characteristics				
Population Density (Ln, ACS)	5.76	0.91	2.71	8.00
18–34 Male Population (%, ACS)	12.24	1.88	7.93	21.32
Region				
Northeast	15.58%	(N = 24)		
Midwest	14.94%	(N = 22)		
South	39.61%	(N = 62)		
West	29.87%	(N = 46)		

Table 2. Pearson correlation coefficient matrix (n = 154; all variables).

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Dependent Variables																					
1	Violent Crime Rate (UCR)	1.00																				
2	Homicide Rate (UCR)	**0.61**	1.00																			
3	Aggravated Assault Rate (UCR)	**0.95**	**0.48**	1.00																		
4	Robbery Rate (UCR)	**0.70**	**0.63**	**0.45**	1.00																	
5	Property Crime Rate (UCR)	**0.46**	**0.33**	**0.43**	**0.32**	1.00																
6	Burglary Rate (UCR)	**0.53**	**0.45**	**0.50**	**0.37**	**0.77**	1.00															
7	Larceny Rate (UCR)	**0.38**	**0.24**	**0.36**	**0.26**	**0.97**	**0.60**	1.00														
	Foreign-Born Measures																					
8	Undocumented Foreign Born (%, PEW)	0.01	−0.03	0.02	−0.01	−0.14	−0.03	**−0.17**	1.00													
9	Undocumented Foreign Born (%, MPI)	0.04	0.05	0.06	−0.02	−0.15	0.02	**−0.19**	**0.90**	1.00												
10	Foreign Born (%, PEW)	0.04	−0.08	0.01	0.10	**−0.21**	−0.13	**−0.22**	**0.82**	**0.81**	1.00											
11	Foreign Born (%, MPI)	0.03	−0.07	0.01	0.09	**−0.21**	−0.12	**−0.22**	**0.86**	**0.85**	**0.99**	1.00										
	All Other Covariates																					
12	Unemployment Rate (%, ACS)	**0.23**	**0.25**	**0.21**	**0.18**	0.09	**0.38**	−0.03	**0.21**	**0.34**	**0.35**	**0.35**	1.00									
13	Manufacturing Industries (%, ACS)	**−0.16**	−0.08	**−0.17**	−0.07	−0.15	−0.02	**−0.18**	**−0.29**	**−0.25**	**−0.33**	**−0.34**	−0.12	1.00								
14	Low-skill Service Sector (%, ACS)	0.08	0.03	0.09	0.02	0.14	**0.18**	0.11	0.12	−0.01	0.03	0.04	**0.22**	**−0.37**	1.00							
15	Deprivation Index (ACS)	**0.18**	**0.27**	0.07	**0.36**	0.01	0.00	0.02	−0.15	**−0.22**	−0.10	−0.12	−0.10	−0.07	−0.10	1.00						
16	Population Density (Ln, ACS)	−0.05	0.02	**−0.21**	**0.35**	**−0.25**	**−0.27**	**−0.22**	−0.08	−0.14	0.12	0.09	−0.11	**0.19**	−0.11	**0.38**	1.00					
17	18–34 Male Population (%, ACS)	0.03	−0.09	0.07	−0.08	0.06	−0.03	0.09	0.11	0.14	0.13	0.12	−0.12	−0.14	**−0.24**	0.08	**−0.28**	1.00				
18	Rental (%; Ln, ACS)	0.19	0.07	0.13	**0.25**	0.05	0.10	0.02	**0.39**	**0.46**	**0.53**	**0.52**	**0.19**	**−0.23**	−0.07	0.13	−0.04	**0.62**	1.00			
19	Median Housing Value (Ln, ACS)	**−0.16**	**−0.21**	**−0.23**	0.07	**−0.38**	**−0.40**	**−0.33**	**0.24**	**0.23**	**0.44**	**0.42**	−0.10	−0.13	−0.07	0.09	**0.29**	0.09	**0.39**	1.00		
20	Incarceration Rate (Census 2010)	**0.18**	0.10	**0.24**	−0.03	0.05	**0.20**	−0.02	0.14	**0.27**	0.12	0.14	**0.27**	**−0.18**	−0.08	**−0.17**	**−0.37**	**0.21**	0.14	−0.12	1.00	
21	Region (south = 1)	**0.19**	**0.24**	**0.23**	0.01	**0.35**	**0.29**	**0.33**	0.03	−0.04	**−0.17**	−0.15	−0.12	−0.16	**0.17**	**0.27**	0.08	−0.15	**−0.26**	**−0.39**	0.03	1.00

Note: Bolded coefficients indicate a significant bivariate relationship at p <.05.

about 45 in the Provo, Utah, metropolitan area to around 972 per 100,000 individuals in Memphis, Tennessee. The average homicide rate is about 5 per 100,000 people with a range between 0.70, again in Provo, to 17 in the New Orleans, Louisiana, area. The average aggravated assault rate, which is the highest among the three violent crimes, is about 261 per 100,000 people with a range from 36 (Provo) to 763 (Odessa, Texas). The average robbery rate across the areas is about 100 with the variation as low as 8 in Provo and as high as 262 in Memphis.

The aggregate property crime rate is about 2,614 per 100,000 individuals. This ranges from 1,418 in Bridgeport, Connecticut, to 4,735 in Spokane, Washington. The average burglary rate is 605 and the average larceny rate is 2,009 per 100,000 people, respectively. The burglary rate ranges from 210 in Provo, Utah, to 1,319 in Fayetteville, North Carolina, while the larceny rate varies from 1,131 in Bridgeport, Connecticut, to 3,864 in Tucson, Arizona.

Across the 154 metropolises, the average percentage total foreign-born population based on ACS estimates is 12.5 and 14 based on MPI data.[9] Half of the metropolitan areas have total foreign-born populations that are less than 10% of the total population. For example, based on ACS data, the percentage of the total foreign-born population is about 3.29% in Toledo, Ohio, followed closely by Pittsburgh, Pennsylvania (3.61%); Baton Rouge, Louisiana (3.68%); Chattanooga, Tennessee (3.79%); and Knoxville, Tennessee (3.88%). According to both estimates, the five metropolitan areas with the largest shares of foreign-born populations are Miami, Florida; San Jose, California; Los Angeles, California; El Centro, California; and Salinas, California.

The average percentage of unauthorized immigrants in these metropolitan areas is 3.56%, ranging from 0.2% to 10.3% according to Pew's estimation. MPI's estimates of unauthorized immigrants (3.73% on average) are slightly higher than Pew's. According to Pew's estimates, the five areas with the largest populations of unauthorized immigrants include Yuma, Arizona (10.3%); McAllen-Edinburg-Mission, Texas (10.2%); Salinas, California (10.2%); Gainesville, Georgia (10.1%); and Yakima, Washington (9.9%). As for MPI estimates, the five metropolitan areas with the largest unauthorized immigration populations are Salinas, California (15.60%); El Centro, California (12.31%); Merced, California (12.29%); McAllen-Edinburg-Mission, Texas (12.07%); and Gainesville, Georgia (11.43%). The bivariate correlation between the total and undocumented foreign-born for the 154 metropolitan areas is 0.82 for Pew and 0.85 for MPI.

As discussed above, other measures include key covariates of crime at the metropolitan level. The average unemployment rate, 8.5%, ranges from a high of 17% in El Centro, California, to a low of 3% in Midland, Texas. The average level of manufacturing work across these metropolitan areas is almost 10%, while the average percentage working in the low-skill service sector is about 25%. The average percentage renting is 36% and the median housing value across the areas is $204,255. Population sizes range from 140,295 in Napa, California, to about 20 million in the New York metropolitan area, however, we use population density in the models which has a statistically significant, strong, and positive correlation (0.71) with total population. The top five metropolitan areas with the highest share of their populations in correctional institutions are Hanford-Corcoran, El Centro, Madera, and Bakersfield in California and Salisbury, Maryland. The percentage of the young male population as a component of the total population is 12.24%, on average. About 40% of the metropolitan areas are in the South, 15% in the Midwest, 16% in the Northeast, and almost 30% in the West.[10]We also include a full bivariate correlation matrix in Table 2 including the dependent variables, the foreign-born measures, and the other covariates. As we describe above, there are no concerns about the strength of the correlations among the independent variables. The crime rates are, not surprisingly, strongly correlated with one another as are the foreign-born measures.

Multivariate results

Tables 3 and 4 display a series of models estimating the effect of the two immigration measures on crime net of the covariates outlined above. Table 3 shows results for the HC3 OLS regression models testing the association between the *total* foreign-born population and the violent and property

Table 3. OLS (HC3) regression results for crimes on the ACS and MPI estimates of the *total* foreign-born populations (N = 154 MSAs).

	Violent Index		Homicide		Aggravated Assault		Robbery		Property Index		Burglary		Larceny	
Panel A	Model 1a		Model 2a		Model 3a		Model 4a		Model 5a		Model 6a		Model 7a	
Total Foreign Born (%, ACS)	−2.34	(2.14)	−0.08 *	(0.04)	−1.32	(1.66)	−0.94	(0.74)	−29.61 **	(11.19)	−8.01 **	(2.91)	−21.60 *	(9.34)
Unemployment Rate (%)	8.74	(6.90)	0.28 *	(0.12)	6.42	(5.81)	2.04	(2.12)	35.38	(24.95)	29.78 ***	(7.91)	5.60	(21.09)
Manufacturing Industries (%)	−3.42	(3.87)	−0.06	(90.04)	−2.07	(3.03)	−1.28	(1.10)	−24.28	(13.37)	3.84	(3.53)	−28.12 *	(10.76)
Low-skill Service Sector (%)	−0.69	(5.50)	−0.09	(0.07)	−0.54	(3.35)	−0.05	(2.51)	−8.28	(17.52)	1.40	(4.41)	−9.67	(16.61)
Deprivation Index	9.42	(7.16)	0.22	(0.12)	3.65	(5.84)	5.54 **	(1.97)	−30.33	(28.98)	−1.90	(7.76)	−28.42	(23.30)
Population Density (Ln)	−1.38	(22.56)	0.00	(0.28)	−18.72	(16.52)	17.34 *	(7.13)	−112.51	(75.33)	−44.58 *	(22.22)	−67.93	(62.83)
18–34 Male Population (%)	−17.47	(10.18)	−0.39 *	(0.16)	−8.45	(8.37)	−8.63	(2.79)	−46.36	(38.79)	−29.36 **	(10.41)	−17.00	(32.81)
Region: South	39.09	(30.30)	0.88 *	(0.42)	49.29 *	(24.15)	−11.08 ***	(9.70)	456.39 ***	(110.79)	133.55 ***	(34.32)	322.84 ***	(89.63)
Rental (%, Ln)	406.87 **	(114.26)	6.10 **	(2.23)	238.47 **	(86.56)	162.30	(41.84)	1993.56 ***	(490.65)	738.14 ***	(136.89)	1255.42 **	(410.52)
Median Housing Value (Ln)	−69.69	(44.03)	−0.92	(0.58)	−47.09	(33.04)	−21.68	(14.95)	−384.99 *	(155.30)	−108.66 **	(38.80)	−276.32 *	(133.98)
Institutional Population Rate (√)	467.41	(356.28)	3.55	(7.00)	361.31	(268.88)	102.55	(131.42)	−2082.22	(1357.87)	185.22	(679.37)	−2267.44 *	(1012.46)
Intercept	−72.53	(521.37)	−0.36	(9.08)	135.71	(417.66)	−207.88	(167.37)	1864.09	(2248.06)	−397.08	(647.85)	2261.17	(1887.17)
R Square	0.22		0.27		0.22		0.34		0.35		0.47		0.30	
Panel B	Model 1b		Model 2b		Model 3b		Model 4b		Model 5b		Model 6b		Model 7b	
Total Foreign Born (%, MPI)	−2.58	(1.80)	−0.07 *	(0.03)	−1.62	(1.37)	−0.89	(0.64)	−27.17 **	(9.11)	−7.06 **	(2.36)	−20.11 **	(7.65)
Unemployment Rate (%)	9.17	(6.76)	0.27 *	(0.12)	6.83	(5.67)	2.06	(2.09)	35.04	(24.15)	29.39 ***	(7.69)	5.65	(20.49)
Manufacturing Industries (%)	−3.72	(3.85)	−0.06	(0.04)	−2.33	(3.02)	−1.32	(1.10)	−25.02	(12.97)	3.80	(3.43)	−28.82 **	(10.49)
Low-skill Service Sector (%)	−0.91	(5.53)	−0.09	(0.07)	−0.73	(3.38)	−0.09	(2.51)	−9.01	(17.13)	1.30	(4.38)	−10.31	(16.31)
Deprivation Index	8.84	(7.25)	0.23	(0.12)	3.14	(5.92)	5.47 **	(1.96)	−31.64	(28.24)	−1.94	(7.60)	−29.70	(22.68)
Population Density (Ln)	−1.47	(22.72)	−0.04	(0.28)	−18.52	(16.62)	17.09 *	(7.17)	−121.70	(73.09)	−47.50 *	(21.75)	−74.20	(60.98)
18–34 Male Population (%)	−18.25	(10.13)	−0.40 *	(0.16)	−9.01	(8.33)	−8.84 **	(2.78)	−52.21	(38.52)	−30.73 **	(10.27)	−21.47	(32.64)
Region: South	41.22	(30.51)	0.90 *	(0.42)	50.89 *	(24.36)	−10.57	(9.74)	470.11 ***	(109.82)	136.56 ***	(34.33)	333.55 ***	(88.79)

(*Continued*)

Table 3. (Continued).

	Violent Index			Homicide			Aggravated Assault			Robbery			Property Index			Burglary			Larceny		
Panel A	Model 1a			Model 2a			Model 3a			Model 4a			Model 5a			Model 6a			Model 7a		
Rental (%, Ln)	422.62	***	(113.06)	6.03	**	(2.20)	251.91	**	(85.37)	164.69	***	(41.56)	2045.03	***	(483.62)	744.24	***	(135.45)	1300.79	**	(405.05)
Median Housing Value (Ln)	−66.45		(43.48)	−0.94		(0.58)	−44.28		(32.45)	−21.24		(14.92)	−376.04	*	(154.00)	−107.94	**	(38.47)	−268.10	*	(132.93)
Institutional Population Rate (√)	478.46		(355.18)	3.85		(6.94)	368.22		(268.06)	106.40		(130.60)	−1964.93		(1339.67)	215.75		(670.67)	−2180.69	*	(1004.04)
Intercept	−148.01		(502.84)	0.44		(8.83)	68.03		(398.91)	−216.49		164.64	1723.47		(2202.99)	−392.00		(631.15)	2115.47		(1848.95)
R Square	0.22			0.27			0.22			0.35			0.36			0.48			0.31		

Notes: Robust HC3 standard errors in parentheses; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 4. OLS (HC3) regression results for crimes on the PEW and MPI estimates of *undocumented* foreign-born populations (N = 154 MSAs).

	Violent Index		Homicide		Aggravated Assault		Robbery		Property Index		Burglary		Larceny	
Panel C	Model 1c		Model 2c		Model 3c		Model 4c		Model 5c		Model 6c		Model 7c	
Undocumented Foreign Born (%, PEW)	−8.17	(5.86)	−0.10	(0.10)	−5.97	(4.29)	−2.10	(2.16)	−83.75 ***	(22.05)	−15.10 *	(6.95)	−68.65 ***	(18.27)
Unemployment Rate (%)	7.48	(6.50)	0.22 *	(0.12)	5.88	(5.41)	1.38	(1.95)	16.98	(21.47)	23.89 **	(7.33)	−6.90	(17.75)
Manufacturing Industries (%)	−2.96	(3.74)	−0.03	(0.04)	−1.92	(2.92)	−1.00	(1.06)	−16.80	(11.39)	6.48 *	(3.27)	−23.29 *	(9.38)
Low-skill Service Sector (%)	−0.13	(5.54)	−0.07	(0.08)	−0.26	(3.38)	0.20	(2.50)	−0.84	(16.27)	3.57	(4.52)	−4.41	(15.23)
Deprivation Index	9.38	(7.61)	0.27 *	(0.13)	3.24	(6.16)	5.87 **	(2.04)	−25.25	(27.14)	1.60	(7.90)	−26.85	(21.20)
Population Density (Ln)	−6.33	(24.38)	−0.15	(0.29)	−21.67	(17.60)	15.49 *	(7.75)	−172.62 *	(73.09)	−59.90 **	(22.01)	−112.72	(60.09)
18–34 Male Population (%)	−17.95	(9.98)	−0.37 *	(0.16)	−8.99	(8.21)	−8.59 **	(2.81)	−48.65	(38.62)	−28.51 **	(10.43)	−20.14	(32.28)
Region: South	46.02	(31.89)	0.88	(0.45)	55.05 *	(25.19)	−9.90	(10.51)	517.61 ***	(114.01)	139.92 ***	(36.48)	377.69 ***	(91.40)
Rental (%, Ln)	410.95 ***	(106.68)	4.95 *	(2.18)	250.56 **	(80.06)	155.43 ***	(40.48)	1905.80 ***	(478.27)	660.72 ***	(134.16)	1245.09 **	(392.94)
Median Housing Value (Ln)	−71.11	(42.30)	−1.20 *	(0.58)	−46.12	(31.09)	−23.79	(14.85)	−428.02 **	(140.69)	−129.98 **	(36.83)	−298.04 *	(120.82)
Institutional Population Rate (√)	470.17	(346.34)	3.60	(6.68)	363.25	(265.77)	103.32	(126.00)	−2052.87	(1228.53)	191.02	(629.12)	−2243.89 *	(952.21)
Intercept	−46.05	(453.73)	6.82	(8.32)	102.92	(352.71)	−155.80	(154.59)	2876.43	(1974.30)	137.92	(569.53)	2738.51	(1634.93)
R Square	0.22		0.25		0.22		0.34		0.36		0.46		0.32	
Panel D	Model 1d		Model 2d		Model 3d		Model 4d		Model 5d		Model 6d		Model 7d	
Undocumented Foreign Born (%, MPI)	−8.15	(5.02)	−0.02	(0.11)	−5.56	(3.83)	−2.57	(1.73)	−82.69 ***	(20.63)	−16.07 **	(5.95)	−66.63 ***	(17.65)
Unemployment Rate (%)	9.09	(6.56)	0.21	(0.12)	6.93	(5.46)	1.95	(2.01)	33.29	(22.01)	27.20 ***	(7.28)	6.09	(18.98)
Manufacturing Industries (%)	−3.05	(3.72)	−0.03	(0.04)	−1.95	(2.93)	−1.07	(1.04)	−17.65	(11.51)	6.22	(3.17)	−23.87 *	(9.61)
Low-skill Service Sector (%)	−1.42	(5.57)	−0.07	(0.08)	−1.13	(3.39)	−0.22	(2.54)	−13.89	(19.05)	1.01	(4.50)	−14.90	(17.73)
Deprivation Index	8.09	(7.76)	0.29 *	(0.13)	2.47	(6.32)	5.33 *	(2.07)	−38.10	(26.69)	−1.23	(7.71)	−36.87	(21.00)
Population Density (Ln)	−7.37	(24.98)	−0.14	(0.29)	−22.34	(18.06)	15.11	(7.82)	−183.13 *	(73.70)	−62.09 **	(22.28)	−121.04 *	(60.58)

(*Continued*)

Table 4. (Continued).

	Violent Index			Homicide			Aggravated Assault			Robbery			Property Index			Burglary			Larceny		
Panel C	Model 1c			Model 2c			Model 3c			Model 4c			Model 5c			Model 6c			Model 7c		
18–34 Male Population (%)	−19.15		(10.43)	−0.36	**	(0.16)	−9.73		(8.50)	−9.06	**	(2.90)	−60.64		(41.90)	−31.07	**	(10.84)	−29.57		(34.99)
Region: South	49.31		(31.68)	0.77		(0.46)	56.76	*	(25.26)	−8.22		(10.35)	549.88	***	(109.31)	147.77	***	(35.33)	402.11	***	(87.79)
Rental (%, Ln)	438.19	***	(114.30)	4.43	*	(2.14)	266.36	**	(85.68)	167.41	***	(42.59)	2176.69	***	(530.02)	721.65	***	(139.26)	1455.04	**	(441.83)
Median Housing Value (Ln)	−68.70		(41.35)	−1.30	*	(0.61)	−44.98		(30.53)	−22.42		(14.34)	−404.54	**	(144.87)	−123.92	**	(36.74)	−280.62	*	(125.17)
Institutional Population Rate (√)	517.15		(334.40)	3.69		(6.59)	395.21		(257.52)	118.25		(122.40)	−1576.17		(1227.87)	283.96		(625.57)	−1860.13		(964.68)
Intercept	−137.11		(450.34)	9.50		(8.48)	54.41		(345.52)	−201.01		(155.91)	1979.55		(2055.77)	−76.72		(567.52)	2056.27		(1743.44)
R Square	0.23			0.25			0.22			0.35			0.38			0.47			0.34		

Notes: Robust HC3 standard errors in parentheses; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

crime measures. Table 4 does the same but presents results testing the association between *unauthorized* immigration and the violent and property crime measures.

In Table 3, Panel A shows the results using total foreign-born from the ACS to predict the violent crime index (Model 1a) and its components (Models 2a-4a). Panel B displays the results using MPI estimates of the total foreign born to predict the violent crime index (Model 1b) and its components (Model 2b-4b). There are no significant associations between both measures of total immigration and the violent crime index, aggravated assault, and robbery (the coefficients are negative), but Models 2a and 2b, predicting the homicide rate, show significant negative coefficients (−0.08, $p < 0.05$; −0.07, $p < 0.05$). Therefore, Hypothesis 1 is partially supported based on these results: overall, the association between total foreign-born and homicide is negative.

In addition, the coefficients for percentage renters in metropolitan areas is positively and significantly associated with increases in all of the violent crimes across every model. Metropolitan areas located in the South are positively and significantly associated with the homicide rate and aggravated assault compared to the non-South areas. And we also find that the deprivation index is positively associated with the homicide and robbery rates as is unemployment with the homicide rate. Finally, the young male population shows a negative coefficient in the homicide and robbery rate models.

To test Hypothesis 2, Table 3 presents the results for the property crime index and its components as dependent variables (Models 5a-7a and 5b-7b). In Panels A and B, the coefficients across these models indicate that both measures of the total foreign-born population are negatively associated with the property crime index, burglary, and larceny. Consequently, there is clear support across these six models for Hypothesis 2.

Other coefficients are the same in both sets of models predicting the property crime measures: metropolitan areas in the South (compared to the non-South) have increased levels of all three dependent variables, places with more renters have more property crimes, and places with higher median housing values have lower property crimes, on average. In Models 6a and 6b, the coefficients for the unemployment rate suggest that as it increases, so too does the burglary rate but as the young male population increases, burglary decreases. Finally, in Models 7a and 7b, the higher the level of manufacturing jobs in a metropolitan area and the higher the institutionalized population, the lower the larceny rate.

Table 4 presents results testing the association between *unauthorized* immigrants and violent and property crime in Panel C using Pew's estimates (Models 1c-7c) and MPI's estimates (Model 1d-7d) in Panel D. All of the coefficients for the undocumented measure in the violent crime models are negative and statistically insignificant. Thus, there is no support for Hypothesis 1 in these results.

The opposite is true for the undocumented foreign-born coefficients in Models 5c-7c and 5d-7d in which all of the coefficients are negative and statistically significant. Table 4 shows that undocumented immigration (measured by Pew or by MPI) is negatively associated with the property crime index (coefficients = −83.75 and −82.69, respectively), burglary (coefficients = -15.10 and −16.07, respectively), and larceny (coefficients = −68.65 and −66.63, respectively). These findings support Hypothesis 2.

Examining the effects of other covariates across the models in Table 4 shows similar findings to those found in Table 3. In particular, larger percentages of renters predict more crime (except for homicide) in metropolitan areas as does the location of a southern metropolitan area compared to all other regions. Unemployment is a positive predictor of burglary and higher median housing values have negative effects on burglary, larceny, and the overall property index. Coefficients for the young male population are negative in the homicide and robbery models as they were in Table 3. This is a curious finding that deserves more scrutiny that we discuss below.

Supplemental analyses are shown in Appendix Tables 2 and 3 for a larger sample of metropolitan areas (n = 257) using the MPI estimates for total foreign born and undocumented foreign born (see Appendix Table 1 for descriptive statistics). These results fully mirror the results described above using the smaller, but matched samples of metropolitan areas. First, in Appendix Tables 2 and 3 the

coefficients for immigration are negative and not statistically significant in the violent crime models except in Table 3, Model 6 (homicide), which shows a small positive coefficient but which remains statistically insignificant. Second, Appendix Tables 2 and 3 show, as above, all negative and statistically significant coefficients for the immigration measures predicting property crime and its components.

Consequently, across three sets of metropolitan area data measuring the immigration population in total and as undocumented (with two different estimating procedures) predicting violent and property crimes, all statistically significant coefficients are negative. This suggests, in general, a negative association between immigration and crime but particularly with property crimes. That is, there is no evidence with these data that immigration increases crime in metropolitan areas, on average. Our results indicate undocumented immigration might even reduce it, but the cross-sectional data prevent us from being able to fully address that issue.

Sensitivity analyses

We conducted sensitivity analyses of two variables in the models to check the robustness of our results. Detailed information on these sensitivity analyses are available from the authors upon request. First, we examined our main variable, the undocumented immigrant population. In one test, we replaced the measure as a component of the total metropolitan area population with a measure of the undocumented population as a component of the total *foreign-born* population; in another measure we examined the undocumented population as a ratio of the undocumented to the legal foreign-born population (the legal foreign-born population is too highly correlated with the undocumented measure to include separately in the models). No changes are seen in model fit or specific coefficients except in the models for homicide. In the MPI 154 and 257 samples (but not in the Pew sample), the coefficients for the ratio measure and for the percentage undocumented as a component of the foreign-born population (in separate models) become positive and statistically significant. This variability in the homicide equations indicates a need for further examination as we discuss below. Nevertheless, based on previous work including Adelman et al. (2017) and Light and Miller (2018), the cross-sectional nature of the data used in these analyses, and the fact that the measure should reflect the size of the unauthorized population as a proportion of the entire metropolitan area, we believe the original measure is the most appropriate form.

Second, because of the negative coefficient in the models for percentage young male population, we substituted it with the percentage of 18–24 young population overall, a variable used by Light and Miller (2018). The results were very similar to the models in which we control for the percentage of the 18–34 young male population. In addition, as noted above, we also checked for multicollinearity in each model, and although there is a relatively strong bivariate correlation (.62) between the percentage young male population and the percentage rental in a metropolitan area, none of the diagnostics raise any concerns about multicollinearity. However, the direction of the coefficient for the young male population does switch to positive or non-significance in some of the models if we remove percentage rental as a covariate. Nonetheless, the original negative coefficient does not concern us because those metropolitan areas with higher levels of young people (overall and male only) are areas with higher levels of college students (i.e., college towns). In fact, we controlled for a metropolitan area's population 3 years and over enrolled in college (or higher) in the models (i.e., college enrollment). In these models, the coefficients for the young male population remain positive, and the coefficients for college enrollment itself are negatively associated with the crime outcomes. However, the bivariate correlation coefficient between young male population and college enrollment is 0.86 indicating a strong and positive relationship. Moreover, the VIF statistics for young male population and college enrollment are both above 5 in all models, indicating the college enrollment measure is not appropriate to use in models with the young male population. Thus, the negative coefficient is not surprising.

Discussion and conclusion

A large, multidisciplinary, and growing literature examines the relationship between immigration and crime. However, due to data limitations, few scholars have been able to investigate the effects of undocumented immigration on violent and property crimes. In this analysis, we concentrate on the association between unauthorized immigration and crime at the metropolitan level. Two sets of metropolitan-level estimates of the undocumented population (based on distinct methodologies) – from the Pew Research Center (2017) and MPI (2020) – allow us to specify models predicting seven types of crime focusing on the effects of undocumented (and documented) immigrants, net of theoretical covariates. Thus, one of our contributions is a robust assessment of the relationship between metropolitan-levels' undocumented immigrant populations and crime. The two estimates of the undocumented immigrant populations living in U.S. metropolitan areas allow us to develop a more refined understanding of the association between immigration and crime.

Although the data are cross-sectional, the associations we find mirror the larger literature: as immigration – in this case, unauthorized immigration specifically – increases in metropolitan areas, crime decreases. In particular, overall property crime, burglary, and larceny decrease with increases in undocumented immigration. We find no significant association between the undocumented immigration measures and the violent crime measures although almost all of the relevant coefficients are negative. Our findings also hold when using estimates of the total foreign-born rather than the undocumented estimates and when we employ a larger sample of metropolitan areas.

The only exception to these results occurs in sensitivity analyses using substitute measures for the undocumented population, and only in the models predicting homicide. Measured, separately, as a ratio of the undocumented to the documented foreign-born population and as the percentage undocumented as a component of the foreign-born population (using the MPI data and not with the Pew data), the coefficients are positive and significant. Nonetheless, the original specification of the undocumented measure is more robust because the denominator is the metropolitan area's full population. Although these are important exceptions to digest about the homicide equations with these substitutions, the outcomes do not change our overall conclusions given this is one, albeit important, dependent variable.

Investigating the immigration-crime nexus deserves continued scrutiny as immigration debates endure. The results presented here are one small step contributing to a wider body of scholarship showing, overall, a weak negative effect of immigration on crime measured at macro levels. Our estimates include the total immigrant populations in metropolitan areas as well as the undocumented. While our results conform to Ousey and Kubrin (2018) conclusions about the literature, the nature of the data prevents us from making definitive causal statements. Nonetheless, these pieces of data and evidence provide a fact-based counterpoint to the larger public and political discourse about the threat of, and crime among, immigrants, especially unauthorized immigrants. Expanding research on these issues – particularly regarding the undocumented – will necessitate more detailed information about them, such as their countries of origin and lengths of stay in the United States.

Of course, decreasing levels of crime in American cities is not a new story nor is immigration a particularly strong factor in that narrative. Immigration may be one of many explanations for the reduction in crime over the last 20 or so years including prison construction and technological changes (Tcherni-Buzzeo 2019). Our models elucidate, for example, that the size of a metropolitan rental market (a measure of housing instability) is a key predictor of crime (the larger the rental market, the higher the crime levels, on average). Metropolitan areas located in the southern part of the U.S., relative to those areas outside the South, have higher levels of crime. Not surprisingly, the higher the unemployment rate in a metropolitan area, on average, the higher the crime rates. These and other covariates help explain the variation in metropolitan-level crime; nonetheless, our focus has been on the debates about the role of immigration in urban crime.

The existing literature already shows that immigration tends to reduce crime in American communities. A number of scholars have attempted to explain this relationship, which our research indicates holds for all types of migrants, documented or not. For example, Sampson (2017) and

others have argued that immigrants can revitalize neighborhoods, cities, and metropolitan areas by introducing new businesses, jobs, and increased levels of home ownership to areas. Xie and Baumer (2018) assessed how concentrations of immigrants influenced the risk of violence among various socioeconomic groups, finding even disadvantaged individuals benefited from reduced crime resulting from immigration. Our data do not include measures for these and other factors influenced by immigration. Nonetheless, the benefit of relatively robust findings in a large literature means that researchers need to continue exploring these issues to clarify and correct any erroneous popular narratives that more immigrants automatically mean more crime.

Notes

1. In lieu of using 'alien' or 'illegal' to refer to such migrants, we use the terms 'undocumented' and 'unauthorized' interchangeably (see Woodrow-Lafield (2014) for more discussion of these terms).
2. Data estimated by James D. Bachmeier, Non-Resident Fellow, Migration Policy Institute; Temple University.
3. To the best of our knowledge, historical/longitudinal data of the unauthorized population at the metropolitan level are unavailable publicly.
4. Due to data limitations, we are unable to use the data for rape and motor vehicle theft. However, the UCR data include violent and property crime indexes that use rape and motor vehicle theft data. In supplemental analyses, we re-estimated the equations replacing our violent and property crime measures with the UCR measures. These results mirror the findings presented below.
5. There are no UCR crime data for the Cleveland metropolitan area for the given years, so we excluded it from our analyses.
6. Four metropolitan areas have slightly different geographic compositions in the 2010 census data compared to the ACS, MPI, Pew, and UCR data. However, our substantive conclusions do not change with or without the incarceration rate in our models.
7. Population density (ACS 2011–2015) has missing values in four metropolises, thus we input their missing values with population density data from ACS 2012–2016.
8. One limitation of this study is the inability to control for other potentially important variables at the *metropolitan* level (as predictors of crime) such as gun availability, drug activity, sanctuary status, and police force size.
9. As noted above, the sole reason for the difference in the foreign-born percentage between the ACS and the MPI data (which are imputed ACS data) is that the latter is adjusted for an assumed rate of undercount of the unauthorized population. This (upward) adjustment of approximately 15 percent is applied to the population imputed to be unauthorized in the ACS sample such that the total (national) unauthorized foreign-born population equals the average of the totals published by Pew and the Department of Homeland Security (DHS). No such adjustment was made to the ACS sample.
10. Because this sample has a relatively large proportion of southern metropolitan areas, we re-estimated the models excluding them. The results of this supplemental analysis mirror the overall results.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Table 1. Descriptive statistics (and data sources) for variables used in the analyses (N = 257 MSAs).

	Mean	Std. Dev.	Min	Max
Crime				
Violent Crime Rate (UCR)	335.18	155.68	44.60	971.93
Homicide Rate (UCR)	4.34	2.65	0.00	17.37
Aggravated Assault Rate (UCR)	245.71	123.32	35.60	762.75
Robbery Rate (UCR)	85.13	48.92	8.30	262.53
Property Crime Rate (UCR)	2,610.05	714.93	1,230.20	4,826.73
Burglary Rate (UCR)	606.91	230.10	179.07	1,383.37
Larceny Rate (UCR)	2,003.14	544.97	1,051.13	3,863.70
Immigrants				
Foreign Born (%, MPI)	10.50	8.38	0.33	42.51
Undocumented Foreign Born (%, MPI)	2.74	2.78	0.00	15.60
Economics				
Unemployment Rate (%, ACS)	8.42	2.21	2.98	17.41
Manufacturing Industries (%, ACS)	10.75	5.36	2.09	36.38
Low-skill Service Sector (%, ACS)	24.70	3.09	18.16	43.64
Deprivation Index (ACS)	−0.05	2.38	−6.89	7.51
Housing Characteristics				
Rental (%; Ln, ACS)	3.54	0.17	2.93	3.94
Median Housing Value (Ln, ACS)	12.03	0.39	11.28	13.44
Institutional Population (CENSUS 2010)				
Population in Correctional Institutional Rate (√)	0.08	0.04	0.02	0.35
Demographic and Geographic Characteristics				
Population Density (Ln, ACS)	5.48	0.92	1.99	8.00
18–34 Male Population (%, ACS)	12.15	2.28	6.64	22.02
Region				
Northeast	15.18%	(N = 39)		
Midwest	21.79%	(N = 56)		
South	39.3%	(N = 101)		
West	23.74%	(N = 61)		

Table 2. OLS (HC3) regression results for crimes on the MPI estimates of the *total* foreign-born populations (N = 257 MSAs).

	Violent Index		Homicide		Aggravated Assault		Robbery		Property Index		Burglary		Larceny	
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
Total Foreign Born (%)	−1.28	(1.52)	−0.04	(0.03)	−0.90	(1.21)	−0.35	(0.47)	−27.81***	(7.30)	−6.95**	(2.01)	−20.86**	(6.31)
Unemployment Rate (%)	13.42**	(4.68)	0.28**	(0.08)	10.85**	(3.85)	2.29	(1.40)	47.80*	(20.81)	33.13***	(6.40)	14.67	(17.04)
Manufacturing Industries (%)	−6.15**	(2.28)	−0.08**	(0.03)	−4.63*	(1.91)	−1.44**	(0.54)	−27.44**	(8.65)	−3.07	(2.67)	−24.37***	(6.89)
Low-skill Service Sector (%)	−4.83	(4.67)	−0.16*	(0.07)	−3.74	(3.04)	−0.93	(1.93)	−5.00	(15.29)	−2.62	(4.13)	−2.38	(14.41)
Deprivation Index	9.17	(5.21)	0.24**	(0.09)	4.20	(4.41)	4.73**	(1.38)	−15.07	(21.17)	4.48	(7.21)	−19.55	(16.40)
Population Density (Ln)	15.60	(12.52)	0.20	(0.19)	−5.38	(9.77)	20.79***	(3.91)	−3.14	(52.74)	−10.04	(17.96)	6.89	(44.12)
18–34 Male Population (%)	−18.98**	(5.49)	−0.39***	(0.09)	−10.79*	(4.59)	−7.80***	(1.43)	−73.21**	(27.55)	−33.47***	(7.83)	−39.75	(22.53)
Region: South	39.79	(22.30)	0.99**	(0.34)	45.76*	(18.24)	−6.96	(6.29)	297.76**	(492.81)	96.21**	(28.76)	201.55**	(73.42)
Rental (%, Ln)	379.01***	(86.11)	5.66***	(1.41)	221.36	(71.16)	151.98***	(25.23)	2313.27***	(417.67)	716.61***	(135.32)	1596.66***	(328.71)
Median Housing Value (Ln)	−78.77*	(35.91)	−1.31*	(0.51)	−53.44	(28.55)	−24.01*	(10.65)	−545.46***	(140.65)	−149.34***	(40.30)	−396.12**	(118.91)
Institutional Population Rate (√)	244.62	(200.05)	5.16	(4.03)	141.78	(176.75)	97.69	(60.62)	−268.75	(1204.95)	393.32	(414.52)	−662.07	(913.05)
Intercept	137.96	(454.77)	5.80	(7.66)	297.12	(369.22)	−164.97	(127.77)	2111.75	(1887.57)	152.43	(544.60)	1959.32	(1595.84)
R Square	0.29		0.36		0.23		0.45		0.33		0.42		0.27	

Notes: Robust HC3 standard errors in parentheses; *** p < 0.001, ** p < 0.01, * p < 0.05

Table 3. OLS (HC3) regression results for crimes on the MPI estimates of *undocumented* foreign-born populations (N = 257 MSAs).

	Violent Index		Homicide		Aggravated Assault		Robbery		Property Index		Burglary		Larceny	
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model7	
Undocumented Foreign Born (%)	−3.22	(4.10)	0.01	(0.09)	−2.09	(3.29)	−1.14	(1.23)	−68.18***	(17.72)	−11.35*	(6.00)	−56.83***	(15.28)
Unemployment Rate (%)	13.23**	(4.57)	0.24**	(0.09)	10.66**	(3.74)	2.32	(1.35)	43.21*	(19.62)	30.17***	(7.21)	13.03	(16.18)
Manufacturing Industries (%)	−5.84*	(2.25)	−0.06*	(0.03)	−4.40*	(1.90)	−1.38**	(0.52)	−20.62*	(8.16)	−0.93	(3.37)	−19.69**	(6.58)
Low-skill Service Sector (%)	−4.94	(4.66)	−0.15*	(0.07)	−3.80	(3.05)	−0.99	(1.93)	−7.21	(16.93)	−2.39	(4.04)	−4.82	(15.56)
Deprivation Index	9.24	(5.62)	0.29**	(0.09)	4.32	(4.72)	4.63**	(1.44)	−12.99	(21.15)	7.49	(6.81)	−20.48	(16.07)
Population Density (Ln)	13.02	(13.09)	0.09	(0.19)	−7.22	(10.09)	20.15***	(4.05)	−59.30	(51.47)	−25.24	(17.15)	−34.06	(42.62)
18–34 Male Population (%)	−19.29**	(5.57)	−0.38***	(0.09)	−10.97*	(4.65)	−7.94***	(1.44)	−79.48**	(29.00)	−33.92***	(10.20)	−45.57	(23.66)
Region: South	41.68	(23.10)	0.89*	(0.36)	46.86*	(18.96)	−6.06	(6.52)	336.54**	(97.86)	97.63**	(37.78)	238.91**	(77.03)
Rental (%, Ln)	378.84***	(88.49)	4.64**	(1.39)	219.87**	(73.14)	154.32***	(25.86)	2296.24***	(473.80)	662.40***	(152.67)	1633.84***	(373.96)
Median Housing Value (Ln)	−81.24*	(34.20)	−1.61**	(0.52)	−55.4*6	(27.16)	−24.18*	(10.26)	−601.94***	(132.36)	−173.94***	(36.98)	−428.01***	(111.88)
Institutional Population Rate (√)	246.81	(198.72)	4.42	(3.91)	142.21	(176.98)	100.18	(58.82)	−232.03	(1147.23)	362.70	(666.09)	−594.74	(875.26)
Intercept	181.60	(426.01)	12.84	(7.53)	335.23	(339.52)	−166.46	(124.59)	3132.00	(1755.07)	685.54	(575.05)	2446.46	(1499.20)
R Square	0.29		0.35		0.23		0.45		0.32		0.40		0.27	

Notes: Robust HC3 standard errors in parentheses; *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$