Geographic variation in sex ratios of the US immigrant population: Identifying sources of difference

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Abstract

This paper describes geographic variation in the sex composition of the foreign-born population in the US since 1990, and uses Blinder-Oaxaca decomposition to identify key sources of variation in regional sex ratios. We use data from the 1990 and 2000 US Censuses, and from the 2007-2011 American Community Survey, to create estimates of the size and characteristics of foreign-born populations at the level of Consistent Public-Use Microdata Areas. We find substantial local- and region-level variation in population sex ratios, with the highest sex ratios in the South and Midwest. This variation is partly explained by differences in the age- and national origin-composition of immigrants, but the effects of immigration history, age, and national origin on sex ratio vary substantially by region. The West in particular stands out as having high levels of unexplained difference from other regions. Future research is necessary to understand these regional differences in gendered immigration patterns.

Introduction

The 20th century witnessed two important trends in US immigration: the gradual increase in the proportion of women among the foreign-born population in the US , and—at the end of the century—the start of a substantial shift of immigration away from traditional gateway states such as New York, California, and Texas, and toward new destinations in the West, Midwest, and Southeast (Massey 2008; Singer et al. 2008; Donato et al. 2011). While both of these phenomena

have generated substantial interest among researchers, few studies have examined immigration to new US destinations as a gendered process. Comparing immigration in “new” and “traditional” destinations shows that the foreign-born population in new destination states is younger, more heavily Hispanic and includes a higher proportion of men than the foreign-born population in traditional destination states (Bump et al. 2005; Massey and Capoferro 2008). Moreover, there is regional variation within new destinations, with new destination states in the South showing the highest sex ratios (Bump et al. 2005). Understanding imbalances and shifts and sex ratios has long been a concern in migration studies, and in demography more generally (Ravenstein 1889; Houstoun et al. 1984; Donato 1992; Oishi 2005; Massey et al. 2006; Donato et al. 2011). Geographic variation in sex ratios serves as a signal of underlying variation in policy, economic context, or social norms, and imbalanced sex ratios can have substantial political and social consequences.

As a precursor to explaining the causes and consequences of geographic variation in immigrant sex ratios, in this paper we provide detailed description of sex ratio variation by geographic region, destination type, and immigrants’ region of origin. In order to document changes in the demographic characteristics of the US immigrant population, we create estimates of the size, sex ratio, age composition, and national origin composition of immigrant populations in Consistent Public Use Microdata Areas (C-PUMAs). C-PUMAs are geographic amalgamations created by the Minnesota Population Center, and allow for an examination of population trends at the sub-state level since 1990 (Ruggles et al. 2010). We document substantial local- and region-level variation in population sex ratios. We then use Blinder-Oaxaca decomposition to quantify the contributions of immigrant demographic characteristics

(age and national origin) and regional characteristics (immigration history and metropolitan status) to regional sex ratio variation (Blinder 1973; Oaxaca 1973).

Understanding the nature of sex ratio variation is important for two key reasons. First, documenting sex ratio variation serves as a necessary first step for future research on immigration as a gendered process. Existing research shows that gendered dynamics shape migration in a variety of ways: migration policies operate in gendered ways, migrant networks are gender-segregated, the ways in which migration both reflects and causes social change are expressed through gender dynamics (Hondagneu-Sotelo 1994; Kanaiaupuni 2000; Curran and Rivero-Fuentes 2003; Pessar and Mahler 2003; Curran et al. 2005; Sana and Massey 2005; Lutz 2010; Cote et al. 2015). While much of the demographic literature analyzes the effects on migration of macro-level variation in gender norms, a growing body of literature indicates that gendered migration patterns may exist at the regional or even household level (Donato 1992; Oishi 2005; Sana and Massey 2005; Massey et al. 2006; Donato et al. 2011; Hamilton 2015; Author 2016). A better understanding of sub-national patterns will drive future theory-building. Second, documenting sex ratio variation among US immigrant groups will help identify the unique needs of different immigrant communities in different locations, with important consequences for integration. Existing research shows special challenges of immigrant integration in new destinations, and imbalanced sex ratios are likely to further complicate this process (Donato et al. 2005; Dondero and Muller 2013; Hall 2013).

Literature review: How and why would immigrant sex ratios vary geographically?

Demographers have long known that the sex ratio of immigrant populations varies across US states, and that this variation is at least partly tied to the state's immigration history. In a

2005 chapter, Bump and colleagues classify US states into three categories based on the size and growth of their foreign-born populations (Bump et al. 2005). Traditional states of immigration (California, Florida, Illinois, New Jersey and New York) were home to some 70 percent of all immigrants to the US in 2005. New settlement states saw their foreign-born populations grow by more than 100 percent from 1990 to 2000, and moderate-growth states experienced growth rates of less than 100 percent. They find that in 2000, the foreign-born population of new destination states was comprised of 112 men for every 100 women, in contrast to traditional destinations where the sex ratio is just 98 men for every 100 women. Younger populations experience higher sex ratios, and the foreign-born population in new destination states is approximately 2.5 years younger than the population in traditional destination states, but this age difference is not sufficient to account for such a dramatic difference in sex ratios (Bump et al. 2005).

This finding is consistent with a long-standing theory that migrant flows “feminize” over time (Castles and Miller 2009). The high proportion of men in new destination states indicates that immigration to these states is dominated by unaccompanied, male “target-earners”, who work in low-skill jobs in order to send money to family remaining abroad (Sana and Massey 2005). While male “target-earners” dominate in new migrant streams, these men are eventually able to support the migration of their wives, children, and other relatives, leading to a higher proportion of women as the migration stream matures (Garip 2012). The pattern of early migrant streams being dominated by men, with the proportion of women (and children) increasing as the migration stream matures has been documented both in US history and in studies of post-WWII migration to Europe (Houston et al. 1984; Castles and Miller 2009). However, the idea that new destinations attract more male migrants precisely because of their “newness” is likely overly

simplistic. Existing research shows that there may be significant variation both within destination categories, and across immigrant groups from different regions of the world.

Variation within destination types

The category of “new destinations” is in fact a highly heterogeneous group. New destinations include major metropolitan areas, such as Atlanta, Minneapolis and Salt Lake City, as well as rural areas, and they are located in every geographic region of the country (Donato et al. 2007; Singer 2015). Traditional destinations, although small in number, are diverse as well. Generally, traditional destinations are defined as either a group of 5 or 6 states or as a handful of large metropolitan areas, primarily in those same states (Singer 2004; Bump et al. 2005; Massey and Capoferro 2008). Nevertheless, the immigration history, political climate, and economic circumstances of California are very different than in Florida or New York.

A key source of confusion is whether destination type is conceptualized at the state or the local level. Much of the demographic literature on new destinations in the US (especially earlier literature), defines destination type at the state level (for example, see Bump et al. 2005; Liaw and Frey 2007; Massey and Capoferro 2008; Dondero and Muller 2012; Riosmena and Massey 2012). But state-level classification hides a great deal of within-state heterogeneity. Texas, for example, is generally classified as a traditional destination state, but includes both cities with a long history of immigration (El Paso and Dallas), and cities and rural areas that qualify as new destinations (Austin and Parmer county) (Donato et al. 2007; Singer 2015). Qualitative research shows the importance of local-level factors in shaping immigration patterns (Johnson-Webb 2002; Donato et al. 2005; Griffith 2005; Schoenholtz 2005; Donato and Bankston 2008). Recent

quantitative research has also shown the value of classifying new versus traditional destinations at the sub-state level (Kritz and Gurak 2015).

Research on gender and immigration in new destinations focuses primarily on the state level, but even with this limitation, there is evidence of heterogeneity. Bump and colleagues' study demonstrates variation in the sex ratios of immigrant populations within both the new settlement and moderate growth categories. Sex ratios in the new settlement states range from 128 in North Carolina to 98 in Minnesota and Nevada (Bump et al 2005: 36-37). Riosmena and Massey (2012) also find nearly as much variation in the demographic characteristics of Mexican immigrants within settlement categories as they do across categories. Measured at the sub-state level, geographic variation could be even greater. Sub-state level description is needed to determine if gender variation is greater between or within destination types.

Variation across immigrant origin groups

The initial dispersion of immigrants to new destinations was largely driven by Latin American (especially Mexican) immigrants, but Asian immigrants are becoming increasingly dispersed as well (Liaw and Frey 2007; Light and von Scheven 2008; Massey and Capoferro 2008; Kritz and Gurak 2015). The gender patterns of emigration can vary greatly across different countries or world regions, with some countries more likely to send men and others to send women (Donato 1992; Oishi 2005; Sana and Massey 2005; Massey and Capoferro 2008). These sending-country differences are reflected in empirical research on the sex composition of US immigrant populations. Donato and colleagues (2011: 510) found that the adult immigrant population in 2000 ranged from nearly 55 percent female among immigrants from northwestern

Europe, to only 45 percent female among immigrants from Africa, with substantial variation in gender composition within these broadly defined world regions as well.

These immigrant-origin differences complicate the basic finding that male immigrants are more attracted to new destinations. Focusing on Mexican migrants only, Risosmena and Massey (2012) found that migrants to new destinations were younger and less educated, but they found no significant differences in gender across destination types. Kritz and Gurak (2015: 135) argue that the predictors of dispersion to new destinations are substantially different among different immigrant origin groups. They found that being male increased the odds of residence in a non-traditional destination among Cubans, Guatemalans and Indians, decreased the odds among Filipinos, Chinese, and Koreans, and had no effect among Mexicans and several other groups. Existing research is still unclear as to whether gender variation by region is caused by the tendency of immigrant groups with different sex ratios to settle in different places, or if certain places differentially attract either men or women, regardless of origin.

In the remainder of this paper, we describe variation in immigrant population sex ratios by geographic region, providing sub-state level nuance to existing findings of higher sex ratios in the South and Midwest. We then ask whether these regional differences can be explained by factors already well known in the literature, such as immigrants' age and national origins or the distribution of destination type by region.

Data and methods

All data in this paper are presented at the C-PUMA-level. Public-use microdata areas (PUMAs) are the smallest geographic areas for which the Census Bureau publicly releases microdata. They are contiguous geographic areas containing a population of at least 100,000.

They are nested within states, but vary substantially in size, ranging from a few census tracts to multiple counties (US Department of Commerce 1994). Because PUMA boundaries are re-drawn every 10 years, they cannot be used for comparisons across multiple Censuses. To allow for comparisons over time, the Minnesota Population Center has created developed the C-PUMA classification. C-PUMAs are the smallest geographic areas consistently identifiable in Census microdata from 1980 to 2010 (Ruggles et al. 2010). C-PUMAs are nested within states.

We use C-PUMAs as a unit of analysis because they allow (in most cases) for a distinction between major cities and other areas of states, but are large enough to contain substantial immigrant populations. However, the ability of C-PUMAs to describe meaningful regional differences varies across states, because of the huge variation in C-PUMA sizes (both geographic area and population size).

Despite their limitations, C-PUMAS have been successfully used to analyze change over time in social science research, sometimes as a complement to metropolitan areas, sometimes on their own (Flippen 2013; Li and Mroz 2013; Hakobyan and McLaren 2016; Choi and Tienda 2017). In research related specifically to international immigration, Fisher (2010) finds that immigrant students are particularly likely to drop out of high school in new destinations, as defined at the C-PUMA level. Levels of immigration enforcement, estimated at the C-PUMA-level, are associated with higher rates of poverty among immigrant households (Amuedo-Dorantes et al. 2016). Elsner et al. (2013) use C-PUMAs to model the spread of information through the social networks of Mexican migrants.

We create C-PUMA-level estimates using the 5% public-use microdata samples from the 1990 and 2000 Censuses, and from the American Community Survey (ACS) 2007-2011 5-year integrated public use microdata sample (Ruggles et al. 2010). While the use of the 5-year

combined sample for the latter period limits our ability to fully understand change over time, the larger sample size is essential for generating large-enough samples of immigrants at the C-PUMA level. The Census and ACS data allow us to identify foreign-born individuals, their country of birth, their C-PUMA of residence, and their age and sex. We aggregate this individual-level data to create sex ratio estimates for the 458 C-PUMAs in the 48 contiguous U.S. states and the District of Columbia that have an estimated foreign-born population of at least 5000 in 2007-2011. We exclude Alaska and Hawaii (3 C-PUMAs), as well as 82 PUMAs in the contiguous US where the size of the foreign-born population is too small to produce estimates of sex ratios of sub-groups of the foreign-born population. Figure 1 shows the C-PUMAs in the contiguous United States, with the excluded C-PUMAs marked with cross-hatching.

<FIGURE 1 ABOUT HERE>

In addition to estimates of immigrant sex ratio, we include other characteristics of the C-PUMAs in our decomposition analyses. A key characteristic of C-PUMAs is their classification into traditional, new, moderate, and low growth destinations, which are also shown in Figure 1. We define “traditional destinations” as those C-PUMAs where immigrants comprised at least 15 percent of the 1990 population. This includes 45 C-PUMAs, concentrated in the Northeast and West. The mean percent immigrant in traditional destinations was 22.52 in 1990, and 30.63 in 2007-11. We define “new destinations” as C-PUMAs in which the foreign-born population increased by at least 200% between 1990 and 2007-2011. There are 151 new destination C-PUMAs, spread across 33 states but most prevalent in the Southeast. New destinations had an average immigrant population of 2.46% in 1990, and 7.36% in 2007-11. Moderate growth destinations grew by at least 100% between 1990 and 2007-11, with immigrant populations

ranging from an average of 5.03% in 1990 to 9.82% in 2007-11. The remaining C-PUMAs are classified as low growth. These destinations averaged 5.50% immigrant in 1990, and 8.01% in 2007-11. In addition to destination type, we include a dummy variable for whether the C-PUMA contains a metro area with a population of 1 million or greater (as of 2000). We use this in lieu of a more typical metropolitan/non-metropolitan classification because very few C-PUMAs include no metropolitan areas.

Finally, we include several estimates of immigrant characteristics. We include the mean age of the foreign-born population due to the well known association between higher population age and lower sex ratio. In order to examine the role that national origins play in regional sex ratio variation, we include the percent of the total foreign-born population that is Mexican, Central American, Chinese, Indian, Filipino, Western European, and Eastern European. These groups were chosen because of their large population sizes; together, they represent 64% of the US immigrant population.

In order to determine how the distribution of destination types, major metropolitan areas, and immigrant characteristics independently contribute to regional variation in sex ratio, as well as explaining the overall proportion of regional variation that is explained by these factors, we use a decomposition approach. Decomposition analyses are conducted using the Blinder-Oaxaca technique, which uses separate linear regressions for each region to decompose the differences in sex ratios by region into two components: (1) the “explained” component, reflecting differences in the characteristics of C-PUMAs across regions (differences in the means or levels of explanatory variables); and (2) the “unexplained” component, reflecting differences in the associations between C-PUMA characteristics and sex ratio across regions (differences in coefficients) (Blinder 1973; Jann 2008; Oaxaca 1973). To accomplish the decomposition

analysis, we use the *oaxaca* command in Stata 14, using a pooled regression with a group-specific intercept (Jann 2008; StataCorp 2015).

Characteristics of the foreign-born population, 1990-2011

Figure 2 shows estimates of sex ratios for the foreign-born population across C-PUMAs, using 2007-2011 ACS estimates. In the interest of clarity, we classify sex ratios into 5 categories. Very low sex ratios are below 90 men per 100 women; low sex ratios range from 90 to less than 97 men per 100 women; balanced sex ratios range from 97 to less than 103 men per 100 women; high sex ratios range from 103 to less than 110 men per 100 women; and very high sex ratios are 110 or more men per 100 women. As Figure 2 shows, the sex ratio of foreign-born populations at the C-PUMA level varies substantially, from a low of 54.23 men per 100 women in the C-PUMA that includes several counties in western Kentucky, to a high of 172.53 men per 100 women in the area surrounding the city of Lubbock, Texas. There is a clear concentration of high (103-110 men per 100 women) and very high (over 110) sex ratios in the South, although there are other pockets of high sex ratio in the West (Oregon, Idaho, and central California) and the Midwest. Consistent PUMAs that include major metro areas tend to have fairly balanced sex ratios (97-103). Low (90-97) and very low (less than 90) sex ratios are most common in the Northeast, in Florida, and along both the Canadian and Mexican border regions.

<FIGURE 2 ABOUT HERE>

The well-described tendency of immigrants from different origin groups to settle in different regions of the US is one potential source of regional variation in immigrant sex ratios (Donato et al. 2007; Massey and Capoferro 2008). Figures 3 and 4 show the sex ratio distribution of two sample immigrant groups: Mexicans and Filipinos. The sex ratio of Mexican immigrants

(Figure 3) is overall much higher than the sex ratio of all immigrants, necessitating a different scaling of the map in Figure 3 than was presented in Figure 2. The map shows a distinct pattern of very high sex ratios in the East and lower ratios in the West. This is similar to the pattern observed for all immigrants, except in the Northeast, where Mexican sex ratios are high, in contrast to all-immigrant sex ratios, which are low. Filipinos, on the other hand, have very low sex ratios overall, with the highest sex ratios concentrated on the coasts and the lowest in the middle of the country (see Figure 4). These maps indicate that each immigrant group has its own gendered patterns of geographic settlement.

<FIGURE 3 ABOUT HERE>

<FIGURE 4 ABOUT HERE>

Another potential explanation for regional variation in sex ratios is the distribution of new destination C-PUMAs. The largest number of new destination C-PUMAs is located in the South. If new destinations attract a greater share of male immigrants, then the concentration of new destinations may explain the large share of very high sex ratio C-PUMAs in the South. The existence of new destination C-PUMAs in other regions may also help explain the pockets of high sex ratios shown in Figure 2. Table 1 shows sex ratios broken down by both region and destination type. Our C-PUMA-level estimates confirm previous, state-level research that argues that new destinations draw more heavily male immigrant populations, but also highlight the continued importance of region. The foreign-born population in South new destinations consists of 107 men for every 100 women, and in Midwestern new destinations the sex ratio is 105. Along with the city of Chicago (the only traditional destination in the Midwest, with a sex ratio of 105), these are the highest sex ratios in the table. Western and Northeastern new destination C-PUMAs occupy an interesting middle ground. At just over 100 men per 100 women, these

new destinations have a lower sex ratio than their counterparts in the Southeast and Midwest, but a notably higher sex ratio than other types of destination in their respective regions. Traditional destinations, particularly in the South, show the lowest sex ratios, which are generally lower than other destination types in the same region (with the exception of the Midwest). Moderate- and low-growth destinations tend to fall in the middle of the spectrum.

<TABLE 1 ABOUT HERE>

Table 1 also highlights substantial variation in sex ratios, within both region and destination type. For example, Southern new destinations have a high overall sex ratio, and over half of the 97 new destination C-PUMAs in the South are classified as very high sex ratio (over 110). However, some 20 percent of Southern new destinations are classified as having low (90-97) or very low (below 90) sex ratios. This type of variation occurs across all the regions and destination types in the table, and indicates that factors other than destination type are at play in determining immigrant sex ratios.

The data presented so far cover only the 2007-11 ACS estimate period. The immigrant population at this time has been shaped by historic patterns of immigration, patterns of internal migration and emigration of the foreign-born, and immigrant mortality. Trying to understand all of these patterns is beyond the scope of this paper, as well as the limitations of Census data. Nevertheless, we can look at how the sex ratios of immigrant populations have changed over time.

The overall increase in the foreign-born population from 1990 to 2000 was 11.6 million, of which just under 2 million were in the Northeast, 4.4 million were in the South, 1.3 million in the Midwest, and just over 4 million in the West. Growing immigrant populations were so

pervasive during that period that only 6 out of 458 PUMAs had a smaller immigrant population in 2000 than they had in 1990.

Table 2 shows sex ratios of population change by region and destination type. The total immigrant population increased by 105.49 men for every 100 women, but the increases in the South and Midwest were especially male dominated, with sex ratios of 111.96 and 120.21, respectively. Within regions, there was significant variation by destination type as well, but the destination-type patterns were not consistent across regions. In the Midwest and the Northeast, low-growth destinations saw the highest sex ratios of population increase, while in the South and West, new destinations saw the highest sex ratios. The lowest sex ratios were generally in traditional destinations, with the exception of the Midwest.

<TABLE 2 ABOUT HERE>

The picture changes dramatically when we look at population change after 2000. The overall increase in the immigrant population was much smaller—8.7 million—than it was in the decade prior. This speaks to a larger trend of both decreased immigration to the US, particularly after the 2008 recession, and a decline in the geographic dispersion of immigrants (Ellis et al. 2014). Only the South maintained nearly the same level of population growth across the two time periods; growth in the Midwest dropped substantially, and the immigrant population actually decreased in the city of Chicago. Across all regions and nearly all destination types, women played a much greater role in immigrant population change. As Table 2 shows, there were only 89.08 men per 100 women in the population increase after 2000. Regional patterns also changed after 2000, with sex ratio of population change in the Midwest dropping precipitously to become nearly equal to that of the Northeast, leaving the south with the highest sex ratio. As in 1990-

2000, the west had the lowest sex ratio of population change, at 79.39, and thus is feminizing more rapidly than other parts of the country.

These regional and temporal patterns are entirely different among the native-born population. There is almost no correlation between sex ratios of the foreign-born and native-born populations ($r=.06$ in 2007-11). Sex ratios among the native population have overall less variation than among the foreign-born, but they do vary both over time and across space. The US population became steadily more male-dominated during the period examined, going from a sex ratio of 94.94 in 1990 to 96.55 by 2007-11, unlike the foreign-born population, which gained more women than men after 2000. Spatially, the native population shows the highest sex ratios in the west (100.15 in 2007-11), with lower sex ratios in all other regions, and a particular tendency for low sex ratio C-PUMAs to cluster in the South (overall sex ratio 95.53 in 2007-11). Also unlike the immigrant population, there appears to be no association between destination type and sex ratio among the native population.

Given the unique geographic patterns of sex ratio among the foreign-born, it seems likely that some immigration-related factor or factors should explain these patterns. Regional sex-ratio variation might be related to the distribution of immigrant destination types, or to characteristics of the immigrants themselves, such as their age or national origins. In the following section, we conduct decomposition analyses to determine the accuracy of these assumptions.

Decomposing regional differences in sex ratios, 1990-2011

Table 3 shows descriptive statistics by year and region for all the variables used in the decomposition models. Immigrant sex ratios, the distribution of destination types and major metro areas, and the age and national-origin composition of immigrants all vary substantially by

region. There are also important differences over time. While the Northeast has consistently the lowest sex ratios, the West moves from having the highest sex ratio of any region in 1990, to having a lower sex ratio than both the South and Midwest in 2000 and 2007-11. In both 1990 and 2007-11, mean age and sex ratio correlate as would be expected: regions with higher sex ratios have lower mean ages. But in 2000, the Midwest has a higher sex ratio than the South does, despite having an older immigrant population. Regional patterns of national-origin composition remain largely stable over time, but overall the percent of immigrants from European countries (especially Western European countries) declines over time, while the percentages of Mexicans and Central Americans increase dramatically.

<TABLE 3 ABOUT HERE>

This variation over time indicates that it would be profitable to perform separate analyses for each period, which we show in Tables 4 and 5. Table 4 shows the results of OLS regressions predicting sex ratio, stratified by region and year. The OLS results suggest that the factors we consider are associated with sex ratio, but the associations are not consistent across region or across time. Age is the most consistent predictor, with mean age always strongly negatively associated with sex ratio, but coefficients for age still range from an insignificant $-.74$ in the Midwest in 2000 to -2.24 in the South in 2000. Other predictors are even more inconsistent. For example, the percentage of foreign-born from Mexico is generally positively related to sex ratio (although in these small samples, the association is not always significant), but the association is near zero in the South in all three years. Traditional destinations are strongly negatively associated with sex ratio in the South and less strongly but still negatively associated with sex ratio in the West, but they are weakly positively associated with sex ratio in the Northeast.

<TABLE 4 ABOUT HERE>

These regression models are used to accomplish Oaxaca-Blinder decomposition, the results of which are presented in Table 5. In Oaxaca-Blinder decomposition, only two groups can be compared at a time. In order to compare across four geographic regions, we use the Northeast as the reference population, with the three other regions each compared in turn to the Northeast. We chose the Northeast because it consistently shows the lowest sex ratios—the only region to stay in the same “place”—and because the Northeast contains the majority of traditional immigrant destinations.

Table 5 shows a number of important trends. First, the predictor variables often “over-explain” the differences in sex ratio between regions. That is, based on the distribution of metro areas and destination types, and the age and national-origin composition of immigrant populations, the regions should show greater differences in sex ratio than they actually do. The most important factors in the explained portion of the difference are age and national origin, although their relative importance ranges by region and time. Age explains as little as 42% of the difference between sex ratios in the Northeast and in the Midwest in 2000, and as much as 234% of the difference between sex ratios in the Northeast and the South in 1990. National origin, on the other hand, explains little of the difference between the Northeast and the South in 1990, but 325% of the difference between the Northeast and West in 2007-11. Immigrant characteristics are more important in explaining the differences than destination characteristics. The role of major metro areas and destination types is generally small, although destination type explains 35% of the difference between the Northeast and the South in 2000.

<TABLE 5 ABOUT HERE>

Second, the unexplained portion of the difference shows that there is substantial variation in returns to mean age and immigrant origins by region. In general, these differences in returns to

mean age and immigrant origins are most notable in the Northeast-West comparison. In general, differences between the Northeast and the South and between the Northeast and the Midwest are fairly well explained by variation in endowments. The difference between the Northeast and the West always has a large (over 100%) portion of unexplained difference; in all three periods, based on endowments the difference between the West and the Northeast should be much larger than it is. This finding remains consistent even as the gap between the actual sex ratio in the Northeast and West shrinks over time. In the Northeast-South and Northeast-Midwest comparisons, where most of the difference is explained by endowments, there are still substantial differences in returns to mean age and (in the South) to immigrant origins.

Finally, although the broad patterns discussed above are largely consistent over time, there are a number of ways in which the relationship between the variables changes in the different periods. For example, immigrant origins explains a sizeable portion (35%) of the difference between the Northeast and the South in 2007-11, but explains little of the difference in previous years. On the other hand, in the Northeast-Midwest comparison, immigrant origins explain less of the difference in 2007-11 (29%) than they do in 2000 (78%).

Discussion and conclusions

The estimates presented here show distinctly gendered patterns of immigrant population change in the post-1990 United States. As immigrant populations have spread to new regions of the country, they have also become increasingly heterogeneous, particularly in terms of gender distribution. Immigrant populations at the local level are rarely balanced between men and women, particularly outside of traditional destinations. We have identified four key factors that influence regional variation in the sex ratios of immigrant populations: destination types, age,

national origin, and time period. Destination types are associated with sex ratio, with new destinations tending to have the highest sex ratios, but this association largely occurs within, rather than across, regions. The effects of age and national origin are experienced both in terms of endowments and coefficients. That is, the distribution of different types of destinations and different types of immigrants influences regional differences in sex ratio, but the effects of destination, age, and national origin are also different in different regions.

All of these factors are also dependent on time. There is a clear national trend in which sex ratios of the immigrant population rise dramatically from 1990 to 2000, and then decline again from 2000 to 2007-11. This “feminization” after 2000 is partly consistent with the theory that migrant flows feminize over time (Castles and Miller 2009). In addition, survey data from Mexico indicates that the 2008 recession in the US had a strong dampening effect on demand for low-skilled Mexican men, in particular (Villarreal 2014). The post-2000 “feminization” that we observe may therefore be a period effect related to the 2008 recession. But this trend did not affect all regions equally, with the Northeast, for example, more immune to large swings in sex ratio than the Midwest or the South. In some cases, changing sex ratios are well explained by differences in the age or national-origin composition of immigrants, but in many cases these explanations are insufficient. Differences between the West and other regions are particularly ill-explained by the factors that we consider. The precise role that age vs. national-origins play in explaining sex ratio differences also changes over time.

Existing literature hints at potential reasons for these patterns. One potential reason for state-level variation in the gender breakdown of immigration is the types of jobs available. Immigrant workers tend to be concentrated in specific labor niches that are both dominated by immigrants and segregated by gender (Schrover et al. 2007; Andersson et al. 2014). The

tendency of immigrants to cluster in labor niches is particularly pronounced outside of traditional destinations (Christopher and Leslie 2015). In a research report on employment of unauthorized immigrants specifically, Passel and Cohn (2015) find that the niches in which unauthorized immigrants dominate vary by state. Unauthorized immigrants are concentrated in construction jobs in the southern US, in manufacturing in much of the Midwest, and in the leisure/hospitality industry in much of the West and part of the Northeast (Passel and Cohn 2015: Table A3). This regional variation in immigrant niches points to the possibility of geographic variation in immigrant sex ratios as well. Another potential driver for these patterns is gendered networks. Men benefit most from migrant ties to men, and women to women (Curran and Rivero-Fuentes 2003; Davis and Winters 2001). In addition, social ties to women are more useful to migrants from some countries, while ties to men are more useful to migrants from others (Cote et al. 2015). A final factor may be quality of life. Immigrants have been partly drawn to new destinations by issues such as low cost of living, low crime, and good schools, and these attractions may act differently on men and women, or differently on immigrants from different countries (Massey and Capoferro 2008).

There are three key limitations to these findings, arising from the nature of our data. First, sample size considerations limit the number of immigrant groups we can analyze and our definitions of destination types. Hall (2013) argues that destination typologies should be ethnic-specific; that is, a destination can be “new” to a certain immigrant group, but “traditional” or “low growth” for another group. We are not able to classify destinations in this way, and so our measures may not fully capture the effects of destination type. Second, immigrant populations are often under-counted in official data such as the Census. Most problematically for this paper, Van Hook and colleagues have argued that Census coverage of Mexican immigrants varies by

age and gender, with working-age men (the group most likely to be undocumented) most affected by under-counting (Van Hook et al. 2014). Our estimates may therefore under-estimate the extent to which the Mexican-born population is male-dominated. Although there is no current evidence to suggest that coverage of immigrants varies by geographic region of the U.S., there remains the possibility that our regional and destination-type trends are in part explained by geographic variation in coverage. Finally, we use Census data to produce 1990 and 2000 estimates, but ACS data thereafter. The ACS data is less temporally precise than the Census, making time trends somewhat suspect. Equally important, the smaller ACS samples are more likely to under-represent small populations, such as immigrants in dispersed areas (Greico and Rytina 2011; Greico et al. 2016). Nevertheless, the geographic and temporal variation in sex ratios shown by Census and ACS data are sufficiently large that it seems unlikely that any of the four key patterns that we identify are explainable by data artifacts alone.

Despite these limitations, our findings contribute to the existing literature in two ways. First, by using sub-state data and examining specific immigrant groups, we highlight just how dramatic local-level variation in immigrant sex ratios can be. In many C-PUMAs in the Eastern US, Mexican populations contain more than twice as many men as women, while along the U.S.-Mexico border, sex ratios are less than 100. In state-level analyses, and analyses that group all immigrants together, the extent of the geographic variation in sex ratios is not evident. The extent of this variation in sex ratios has policy implications for the towns, cities and states that receive immigration. Immigrant communities characterized by large proportions of young men will experience very different challenges of social integration than immigrant communities including higher numbers of women, older people, or families. In addition, knowing the extent of local and regional variation highlights the importance of understanding why they exist.

Second, our decomposition analyses show that regional variation in immigrant sex ratios cannot be easily explained away by considering either the distribution of traditional versus other types of destination, or by the demographic characteristics of immigrants. There is something about different regions of the US that make them specifically attractive to male or female immigrants that will require further research to identify. Existing research hints at reasons, as discussed above, but these explanations, and the potential interactions between them, have not yet been systematically tested. Our decomposition analyses, which show substantially different returns to national origin across regions, highlight the importance of considering the origin-destination dyad as a key unit of analysis for migration. Future research should consider potential interactions between sending-country characteristics and the economic, political, and social contexts of specific destinations. For example: housing, crime rates and local school quality might be a strong motivation for migration by Mexican women, who often migrate with family members, but not for women from the Caribbean, who are more likely to migrate alone (Massey et al. 2006; Garip 2012).

Several observers have noted that the end of large-scale Mexico-US migration flows, and increasing immigration from Asian countries, will also lead to demographic change in the US immigrant population (Passel et al. 2012). This analysis demonstrates that Asian immigration is associated with more female-heavy immigrant populations, changing the gender composition of the US immigrant population as a whole. However, we also find that this process is shaped by local and regional characteristics, making research on the precise ways in which local characteristics shape the nature of immigrant flows important for understanding future immigration patterns.

Tables and Figures

Table 1 Sex ratios by destination type and region, 2007-2011 ACS estimates

	Northeast			
	Traditional	New	Moderate growth	Low growth
Overall sex ratio	90.49	100.78	95.72	92.12
Sex ratio categories (%)				
Very low (<90)	25.00	25.00	29.17	46.34
Low (90-97)	43.75	0	25.00	36.59
Balanced (97-103)	25.00	50.00	33.33	12.20
High (103-110)	0	25.00	0	2.44
Very high sex ratio (>110)	6.25	0	12.5	2.44
<i>N</i>	16	4	24	41
	South			
	Traditional	New	Moderate growth	Low growth
Overall sex ratio	88.63	106.69	104.23	93.56
Sex ratio categories (%)				
Very low (<90)	50.00	9.28	17.50	40.00
Low (90-97)	25.00	13.40	22.50	20.00
Balanced (97-103)	16.67	6.19	7.50	12.00
High (103-110)	8.33	15.46	17.50	0
Very high (>110)	0	55.67	35.00	28.00
<i>N</i>	12	97	40	25
	Midwest			
	Traditional	New	Moderate growth	Low growth
Overall sex ratio	104.97	104.12	100.01	96.11
Sex ratio categories (%)				
Very low (<90)	-	9.38	10.00	30.95
Low (90-97)	-	9.38	27.50	19.05
Balanced (97-103)	-	25.00	27.50	28.57
High (103-110)	-	28.13	15.00	11.90
Very high (>110)	-	28.13	20.00	9.52
<i>N</i>	1	32	40	42
	West			
	Traditional	New	Moderate growth	Low growth
Overall sex ratio	95.12	100.56	95.32	95.09
Sex ratio categories (%)				
Very low (<90)	6.25	5.56	34.38	33.33
Low (90-97)	56.25	27.78	15.63	16.67
Balanced (97-103)	0	33.33	28.13	33.33
High (103-110)	25.00	11.11	12.50	11.11
Very high (>110)	12.50	22.22	9.38	5.56
<i>N</i>	16	18	32	18

Table 2 Sex ratio of foreign-born population change by region and destination type

	1990-2000	2000-2007/11
<i>Northeast</i>	<i>101.97</i>	<i>87.16</i>
Traditional destinations	94.01	60.32
New destinations	101.70	108.55
Moderate-growth destinations	109.95	93.71
Low-growth destinations	114.78	92.93
<i>South</i>	<i>111.96</i>	<i>95.78</i>
Traditional destinations	92.08	83.98
New destinations	126.54	97.34
Moderate growth destinations	110.96	97.95
Low-growth destinations	104.25	106.17
<i>Midwest</i>	<i>120.21</i>	<i>87.99</i>
Traditional destinations	117.20	-
New destinations	120.33	96.14
Moderate-growth destinations	113.22	85.46
Low-growth destinations	160.89	91.37
<i>West</i>	<i>96.40</i>	<i>79.39</i>
Traditional destinations	85.51	66.05
New destinations	115.36	85.77
Moderate-growth destinations	101.15	89.70
Low-growth destinations	101.12	83.59
<i>Total</i>	<i>105.49</i>	<i>89.08</i>

Table 3 Descriptive statistics by year and region

	1990				2000				2007-11			
	Northeast	South	Midwest	West	Northeast	South	Midwest	West	Northeast	South	Midwest	West
Sex ratio												
Mean	88.2	91.6	89.6	96.8	94.2	106.2	101.8	99.2	93.1	104.8	100.3	96.5
SD	(10.9)	(23.5)	(19.0)	(20.4)	(9.3)	(22.5)	(17.5)	(16.5)	(9.0)	(17.8)	(11.9)	(13.8)
Major metro (%)	57.7	29.3	38.3	28.6	57.7	29.3	38.3	28.6	57.7	29.3	38.3	28.6
Destination types												
Traditional (%)	18.8	6.9	.9	19.1	18.8	6.9	.9	19.1	18.8	6.9	.9	19.1
New (%)	4.7	55.8	27.8	21.4	4.7	55.8	27.8	21.4	4.7	55.8	27.8	21.4
Mod. growth (%)	28.2	23.0	34.8	38.1	28.2	23.0	34.8	38.1	28.2	23.0	34.8	38.1
Low growth (%)	48.2	14.4	36.5	21.4	48.2	14.4	36.5	21.4	48.2	14.4	36.5	21.4
Age												
Mean	46.2	40.4	45.8	40.2	42.5	37.8	39.5	38.3	43.5	39.4	40.3	41.7
SD	(5.6)	(5.6)	(6.8)	(5.0)	(3.7)	(4.4)	(5.4)	(3.5)	(3.6)	(3.7)	(4.7)	(3.2)
% Mexican												
Mean	1.5	14.4	8.2	32.2	4.7	28.5	20.2	44.6	6.3	31.6	24.3	45.7
SD	(2.3)	(22.6)	(11.8)	(23.3)	(6.4)	(24.3)	(19.0)	(23.9)	(7.6)	(23.6)	(19.7)	(22.6)
% Central American												
Mean	2.5	4.0	1.3	2.7	4.6	6.6	2.9	3.6	5.5	9.0	3.9	4.1
SD	(2.5)	(4.8)	(1.4)	(3.0)	(4.5)	(5.8)	(3.6)	(3.2)	(5.8)	(6.5)	(4.0)	(3.4)
% Chinese												
Mean	4.2	3.3	3.9	3.9	5.4	3.5	4.2	3.6	6.2	3.6	5.3	4.2
SD	(4.3)	(3.4)	(4.0)	(4.4)	(4.4)	(3.1)	(3.7)	(4.6)	(5.0)	(3.0)	(4.1)	(4.9)
% Indian												
Mean	4.7	4.4	4.8	1.5	6.9	5.3	6.6	2.6	9.0	5.7	9.0	3.0
SD	(3.0)	(3.8)	(4.1)	(1.3)	(4.3)	(3.8)	(5.0)	(1.9)	(6.1)	(4.2)	(6.7)	(2.6)
% Filipino												
Mean	2.4	3.8	3.0	5.1	2.9	3.5	2.8	5.1	3.0	3.5	3.1	5.6
SD	(2.3)	(4.9)	(2.3)	(5.8)	(2.4)	(4.1)	(1.7)	(5.8)	(2.1)	(3.8)	(1.7)	(5.2)

% W. European												
Mean	32.8	25.5	29.3	18.7	21.5	14.5	17.6	12.0	14.8	9.3	11.9	9.1
SD	(11.5)	(12.4)	(10.6)	(10.2)	(10.0)	(8.3)	(9.4)	(7.5)	(7.8)	(5.6)	(7.2)	(5.8)
% E. European												
Mean	10.6	4.2	12.1	2.9	11.0	4.6	11.2	4.5	9.8	4.5	9.8	4.8
SD	(5.6)	(4.8)	(8.2)	(2.1)	(6.0)	(5.4)	(8.5)	(5.2)	(5.6)	(4.8)	(7.5)	(5.1)

Figure 1. Consistent PUMAs in the contiguous United States

Figure 2. Foreign-born sex ratio, 2007-2011 ACS estimates

Figure 3. Mexican-born sex ratio, 2007-11 ACS estimates

Figure 4. Philippines-born sex ratio, 2007-11 ACS estimates

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