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Measuring Geographic Migration Patterns Using *Matrículas Consulares*

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Abstract In this article, we show how to use administrative data from the *Matrícula Consular de Alta Seguridad* (MCAS) identification card program to measure the joint distribution of sending and receiving locations for migrants from Mexico to the United States. Whereas other data sources cover only a small fraction of source or destination locations or include only very coarse geographic information, the MCAS data provide complete geographic coverage of both countries, detailed information on migrants' sources and destinations, and a very large sample size. We first confirm the quality and representativeness of the MCAS data by comparing them with well-known household surveys in Mexico and the United States, finding strong agreement on the migrant location distributions available across data sets. We then document substantial differences in the mix of destinations for migrants from different places within the same source state, demonstrating the importance of detailed substate geographical information. We conclude with an example of how these detailed data can be used to study the effects of destination-specific conditions on migration patterns. We find that an Arizona law reducing employment opportunities for unauthorized migrants decreased

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emigration from and increased return migration to Mexican source regions with strong initial ties to Arizona.

Keywords International migration · Immigration law · Mexico · United States

Introduction

Research on immigration is often hampered by data limitations. For example, large-scale individual-level surveys in the United States do not ask about immigrants' legal status, and government records on legal permanent residents are presented as aggregate tabulations with no individual-level information. The strategic use of alternative administrative data sets can help fill such gaps, facilitating innovative research questions (National Academies of Sciences, Engineering, and Medicine 2017). In this article, we follow this approach by examining administrative data providing uniquely detailed information on sources and destinations for migrants from Mexico to the United States. After we establish the data's appropriateness, we provide an initial example of the type of novel research that is possible with these data, documenting the international migration consequences of the Legal Arizona Workers Act.

Specifically, we evaluate data on geographic migration patterns from the *Matrícula Consular de Alta Seguridad* (MCAS) program, which issues identity cards to Mexican citizens living in the United States. Massey et al. (2010) introduced and described this data source, which features complete geographic coverage of Mexico and the United States, detailed information on migrants' source and destination regions, and very large sample sizes. The more than 7 million observations spanning 2006 to 2013 separately identify 75 U.S. destinations and all the more than 2,000 source *municipios* in Mexico. However, the data's primary disadvantage is that they represent administrative records from a voluntary program, rather than a stratified random sample from a well-defined population, raising concerns about data quality, coverage, and representativeness (Riosmena and Massey 2012). Our first contribution is to resolve these concerns by showing strong agreement on migrant source and destination distributions between MCAS and a variety of standard data sources, including nationally representative household surveys in Mexico and in the United States. These comparisons establish the quality and representativeness of the MCAS data and confirm its usefulness as a source of information on detailed geographic migration patterns.

For research questions requiring measures of subnational migration patterns with broad geographic coverage and/or large sample sizes, MCAS data are uniquely well suited. Large-scale household surveys such as the Mexican Census and the American Community Surveys (ACS) record subnational geography only for their respective countries, with only national geographic information for foreign places. These surveys therefore cannot be used to measure migration flows between subnational locations. More specialized surveys such as the *Encuesta Nacional de la Dinámica Demográfica* (ENADID) and the *Encuesta sobre Migración en la Frontera Norte* (EMIF) report migrants' sources and destinations, but they suffer from small samples and quite aggregate geographic information.[1] The Mexican Migration Project (MMP) provides unparalleled detail regarding migration experiences for those surveyed, but this impressive detail comes at the cost of covering only a small number of communities in Mexico (Massey and Zenteno 2000).[2]

Our second contribution is to demonstrate the empirical benefit of calculating geographic migration patterns for detailed source locations. Whereas the ENADID and EMIF report migrants' sources at the relatively aggregate state level, the MCAS data provide source information at the much more detailed *municipio* level. We calculate the distribution of destinations for all migrants from a given Mexican state and compare it with the destination distributions for migrants from each *municipio* within that state. We find that as a general rule, the state-level distribution differs substantially from the *municipio*-level measures. In fact, the typical source *municipio*'s destination distribution differs from its state's distribution by as much as the typical state differs from the destination distribution of all Mexican emigrants. Thus, assigning all migrants their source state's average destination distribution introduces substantial measurement error into an analysis of the role of preexisting local migration patterns in an individual's migration experience.

We anticipate that these data will open the door to numerous additional lines of research, especially in the literature focused on the influence of prior international migrants' destination choices on the experience of subsequent migrants. As it stands, this literature already contains a number of important findings. Larger numbers of previous migrants from the same sending community increase the probability of migrating internationally by lowering the costs of migration.[3] Previous migration has a wide variety of other effects, including altering the set of individuals choosing to migrate, affecting migrants' approach to crossing the border, and increasing investment in origin communities.[4] Similarly, migrants' destinations and eventual success in the United States are strongly influenced by the destinations and occupations of previous migrants from their sending community.[5] Garip (2016) provided a detailed typology of underlying mechanisms that influence these empirical relationships, including social facilitation, normative influence, and network externalities, with many examples pertaining to the context of Mexico–U.S. migration.

In addition to concerns about data quality, one reason researchers have likely avoided using the MCAS data is that the tabulations do not provide individual-level information other than place of birth and U.S. residence. The final contribution of this

[1] In the case of EMIF, the data record the planned destinations of those intending to migrate.

[2] As of October 2015, the MMP had surveyed 154 communities whose combined populations accounted for 1.03 % of the Mexican population in 2010.

[3] See, for example, Garip and Asad (2016), Massey (1986), Massey and Espinosa (1997), Palloni et al. (2001), and Winters et al. (2001). DiMaggio and Garip (2012) provided a survey of the sociology literature on networks.

[4] McKenzie and Rapoport (2010) showed that the presence of previous migrants disproportionately increases migration probability for less educated individuals. Dolfin and Genicot (2010) examined the effects of family and community contacts on migration with and without the assistance of smugglers. Woodruff and Zenteno (2007) showed that migration increases microenterprise development in source locations.

[5] See Bartel (1989), Bauer et al. (2002), McConnell (2008), Jaeger (2000), Lafortune and Tessada (2014), and Patel and Vella (2013) on destination choices; and Mundra and Rios-Avila (2016) and Munshi (2003) on labor market success.

article, therefore, is to demonstrate that the MCAS data can nevertheless be used in combination with traditional household survey data to address important questions related to Mexico–U.S. migration. As an initial example, we study the international migration response to the Legal Arizona Workers Act (LAWA). This law requires employers throughout Arizona to submit an electronic request to confirm every prospective employee's legal authorization to work in the United States. The passage of this law thus reduced the attractiveness of Arizona relative to other destinations for potential migrants without legal status. Prior work has shown that restrictions like these reduced the local immigrant population (Bohn et al. 2014) and decreased planned border crossings with Arizona as the intended destination (Hoekstra and Orozco-Aleman 2017).

We use the MCAS migration measure to analyze the effects of this policy on sending communities within Mexico. We begin by calculating the share of migrants from each source region (state or *municipio*) that selected Arizona as a destination prior to LAWA's passage. We then use Mexican Census data to determine how changes in regional migration flows depend on the importance of Arizona in a source region's initial distribution of migrant destinations. The results reveal that source areas with stronger pre-LAWA migration connections to Arizona experienced larger decreases in emigration to the United States and larger increases in return migration from the United States than sources with initially weaker connections to Arizona.

This example further validates the quality of the MCAS-based measure of migration patterns and confirms its value to researchers in a variety of ways. First, the fact that we find differential migration responses based on a source's MCAS-measured connection to Arizona directly reinforces our conclusion that these migration connection measures are informative. Second, this analysis shows how the data can be used to expand the scope of questions that can be answered. No previous analysis of LAWA or similar restrictions has examined migration responses at the source level because the policy change affected job prospects for all potential migrants throughout Mexico to some degree. The place-to-place migration measure allows us to form hypotheses about which sending communities are most affected by LAWA. This approach allows us to show that not only did migrants shift away from Arizona as a destination, but the policy also led to an overall decline in net migration to the United States from connected source regions. Third, we demonstrate the value of the geographic detail in the MCAS data by comparing the robustness of state-level analysis with *municipio*-level analysis. Not only does the *municipio*-level analysis yield greater precision and less influence of high-leverage outliers, but it also allows us to control for any time-varying unobservable push or pull factors common to *municipios* within the same Mexican state.

Matrícula Consular de Alta Seguridad (MCAS)

Background

The *matrícula consular* is a document issued by the Mexican government that provides its citizens abroad with a form of identification in their country of residence. In the United States, the *matrícula* provides proof of citizenship, identity, and residence without conferring any immigration status on the cardholder. It is used primarily for returning to Mexico; opening bank accounts; obtaining loans and home mortgages; as identification to law enforcement officials; and, in some U.S. states and cities, to obtain a driver's license and to access basic government services. The many benefits of *matrículas* may explain both the high take-up rates among unauthorized immigrants and broad representativeness of the *matrícula*-holding population that we document later herein.

The Mexican government has been issuing *matrículas* since 1871, but in the 1990s, they were transformed into wallet-sized laminated cards resembling a driver's license. In 2002, a more secure version called the *Matrícula Consular de Alta Seguridad* (MCAS) was introduced (Institute for Mexicans Abroad (IME) 2004), and additional security measures were added in 2006. Since the most recent security update, all MCAS issuances are recorded and verified through a centralized database, accessed by the issuing consulate (National Immigration Law Center 2015). This database of MCAS issuances forms the basis for the data set we use to measure Mexico–U.S. migration patterns.

To obtain a card, the applicant must make an appointment and attend the Mexican consulate corresponding to their place of residence in the United States. The applicant must provide proof of Mexican citizenship, identity, and residence in the relevant consular area, and must not have a criminal record or be subject to judicial or administrative actions in the United States or Mexico (Secretaría de Relaciones Exteriores n.d.). Cards are issued to all qualifying Mexican citizen applicants irrespective of age or immigration status, although it is generally assumed that the majority of MCAS holders are unauthorized immigrants who have limited access to other official forms of identification in the United States (Massey et al. 2010). The card is valid for five years; it can be renewed when it expires, when the cardholder moves to another consular jurisdiction, or if it is lost or damaged. MCAS are considered valid proof of identification by a wide variety of financial institutions and police departments in the United States, and 12 states and the District of Columbia accept them as proof of ID to obtain a driver's license (National Conference of State Legislatures 2015).[6]

Data

The recorded information from each approved MCAS application includes each card recipient's *municipio* (similar to county) of birth in Mexico and the U.S. state and consular area of current residence. Consular areas refer to the geographic area of the United States within the jurisdiction of each Mexican consulate. The governmental Institute for Mexicans Abroad (*Instituto para los Mexicanos en el Exterior*, IME) uses this database to produce publicly available tabulations of the numbers of cards issued in each year.[7] These tabulations include the count of cards issued for each birth *municipio* and U.S. location pair, omitting any additional individual-level information that might

[6] These 13 jurisdictions are CA, CO, CT, DC, DE, HI, IL, MD, NM, NV, UT, VT, and WA. The take-up rate is likely somewhat higher in these destinations compared with the rest of the country. Our analysis focuses on differences in destinations selected by migrants from different sources. As long as any higher take-up in these destinations occurs for individuals from all sources, our central conclusions will be unaffected.

[7] As of October 2017, the tabulations are available online at http://www.ime.gob.mx/gob/estadisticas/2016/usa/estadisticas_usa.html.

raise confidentiality concerns.[8] By combining published tabulations based on U.S. state of residence with separate tabulations based on consular area of residence, one can generate counts of card issuances to individuals living in the 75 mutually exclusive and exhaustive destination areas in the United States, shown in Fig. S1 of Online Resource 1. With more than 2,000 Mexican *municipios* and 75 U.S. destinations represented, the card issuance data provide very detailed information on point-to-point migration patterns between Mexico and the United States.

A large number of MCAS are issued each year, and more than 7 million cards were issued during the 2006–2013 period. Nearly all these issuances are new applications rather than renewals.[9] To assess the scale of these numbers, we calculate the stock of valid cards outstanding in each year from 2011 to 2013. Because MCAS are valid for five years, we can measure the stock of valid cards in a given year by summing the numbers of cards issued during the preceding five years. For example, all cards issued in 2006–2010 are still valid during at least a portion of 2011. Table S1 (Online Resource 1) compares the number of valid cards in 2011–2013 with the estimated Mexican-born population of the United States (calculated from the ACS) and the Pew Research Center's estimates of the unauthorized Mexican-born population of the United States (Gonzalez-Barrera 2015; Passell and Cohn 2014). We find a quite consistent 38 % share of Mexican-born population holding a valid MCAS in each year. This share is similar to the 46 % share reported in Suro and Escobar (2006), and the difference may reflect either a modest decrease in take-up between 2006 and 2011 or the fact that we observe the population of cards issued rather than a sample. Massey et al. (2010) concluded that it is safe to assume that all *matrícula* holders are unauthorized immigrants because "persons legally in the United States would have no need for such documentation" (p. 132). Under this assumption, the MCAS data cover 75 % to 80 % of the unauthorized Mexican immigrants living in the United States.

Nevertheless, applying for a MCAS is voluntary, and the cards are distributed to a self-selected population. To understand the potential selection into take-up, we analyze data from another Pew Research Center survey, which interviewed individuals applying for *matrículas* at various Mexican consulates in 2004–2005 (Suro 2005).[10] Table S2 (Online Resource 1) shows mean demographic and educational characteristics for this sample of *matrícula* applicants in comparison with all Mexican-born U.S. residents in the 2005 ACS. Men, younger adults, and those with lower educational attainment are overrepresented among *matrícula* applicants in comparison with the overall Mexican-born population. Additionally, *matrícula* applicants were more likely to have arrived in the late 1990s and early 2000s compared with the overall Mexican-born population. Together, these results are consistent with the idea that *matrícula* applicants are primarily drawn from the population of recently arrived unauthorized immigrants, who are most likely to benefit from having access to an official identification card under the MCAS program.

[8] The tabulations are similar in structure to those provided by the U.S. Internal Revenue Service, reporting counts of migrants for each source-destination pair in the United States. See Kaplan and Schulhofer-Wohl (2012) for an example.

[9] Table S3 (Online Resource 1) provides an annual breakdown of the number of card issuances. In addition, officials at IME were kind enough to provide annual summary statistics on the share of card issuances reflecting new cards versus renewals. In every year, less than 3 % are renewals.

[10] The survey covered consulates in Los Angeles, New York, Chicago, Atlanta, Dallas, Raleigh, and Fresno.

MCAS Data Quality

The preceding results suggest that the MCAS data provide very good coverage of the recently arrived unauthorized immigrant population. In this section, we examine the quality of the data in measuring the strength of migration ties between sources in Mexico and destinations in the United States, while contrasting the MCAS data with other nationally representative data sources that one might use as alternatives.[11] We use a variety of data sources, and Table 1 provides a reference guide for which data sources, periods, and migration measures are used in each set of results.

MCAS Data Match High-Quality Survey Data

We begin by comparing the migration patterns measured using MCAS with those in the largest and highest-quality household surveys in the United States and Mexico. With these data sets, we can compare estimates of the marginal distributions (i.e., source locations in Mexico and destination locations in the United States).[12]

Figure 1 provides the first such comparison, showing strong agreement between MCAS data and ACS data regarding the distribution of Mexicans across U.S. destination states. To construct this figure, we use the MCAS cards issued in 2006–2010, all of which were still valid on January 1, 2011. We then calculate the share of these cards reporting a migrant's residence in each of the 50 U.S. states plus the District of Columbia at the time of application. We construct a similar measure of the share of Mexican-born residents living in each state using the 2010 and 2011 ACS. Because the ACS is conducted throughout the year, by combining the 2010 and 2011 samples, we obtain a measure centered on January 1, 2011. We then compare the two distributions using a scatterplot, with the MCAS-based shares on the y-axis and the ACS-based shares on the x-axis. Because Mexican population is distributed unevenly across U.S. states, we plot the natural log of the state shares, allowing for a visual comparison of the two data sources for large and small states on the same figure.[13] We include a 45-degree line, which shows how the two sets of shares would relate if the data sets agreed perfectly. The two data sets strongly agree, with only minor deviations from the 45-degree line.[14] Moreover, the largest differences appear in states with very small numbers of Mexican immigrants. We create similar figures for each of the periods available in the data, centered on the beginning of 2012, 2013, and 2014; these figures show similar agreement between the two data sources.

[11] We do not compare MCAS and the Mexican Migration Project (MMP) data because MMP communities are generally far smaller than and not necessarily representative of their *municipios*, so there is no comparable geographic unit across the two data sets.

[12] Throughout this analysis, we use the U.S. state as the destination-level geography. Much of the analysis relies on the public-use microdata version of the ACS (Ruggles et al. 2010), and the substate geographical definitions in that data source (PUMAs) do not align well with the consular areas. For consistency, therefore, we adopt the U.S. state as the definition of a destination. The consular areas, however, are composed of U.S. counties, and future work can match U.S. data sets with county-level coverage to the destination geography shown in Fig. S1 (Online Resource 1).

[13] We report the R^2 for both the logged and nonlogged version of these comparisons in each figure.

[14] Because the shares sum to one across states in each data set, states whose shares are larger in MCAS than in the ACS are offset by states whose MCAS shares are smaller than in the ACS. Because the log function is concave, states with larger shares in the MCAS appear closer to the 45-degree line than states with smaller shares in the MCAS.

Table 1 Data sources and measures used

Data Source	Description	Period	Geography	Measure	Figure/ Table
Matrícula Consular de Alta Seguridad (MACS)	Administrative data from the MCAS program	2006–2010	U.S. state	Share of unexpired cards issued to residents of each U.S. state as of 2011	Fig. 1
			Mexican state/county	Share of unexpired cards issued to emigrants from each state/county as of 2011	Fig. 2, panels a and b
			U.S. state by Mexican state/county	Share of unexpired cards issued to emigrants from each state/county as of 2011(for each source)	Fig. 5, panels a and b
		2009–2013	U.S. state by Mexican state/county	Share of unexpired cards issued to residents of each U.S. state as of 2014 (for each source)	Fig. 4
		2006	Mexican state/county	Share of cards issued to residents of Arizona	Fig. 6, panels a and b; Fig. 7, panels a and b
American Community Survey (ACS)	IPUMS version of annual 1 % survey of U.S. residents	2010–2011	U.S. state	Share of Mexican-born individuals living in each U.S. state	Fig. 1
		2014	U.S. state	Share of Mexican-born individuals living in each U.S. state	Fig. 3, panel a
Mexican 7Census	Decennial population census microdata conducted by the Mexican Statistics Office (INEGI)	2010	Mexican state/county	Share of 2005–2010 emigrants from each Mexican state or county	Fig. 2, panels a and b; Fig. 3, panel b
			Mexican county	Return migration rate = number of return migrants from 2005 to 2010 divided by county population in 2005	Fig. 6, panels a and b
			Mexican county	Emigration rate in 2005 and 2010 = number who emigrated divided by county population	Fig. 7, panels a and b
Encuesta Nacional de la Dinámica Demográfica (ENADID)	National household survey from the Mexican Statistics Office (INEGI); representative at the Mexican state level	2014	U.S. state	Share of 2009–2014 emigrants living in each U.S. state	Fig. 3, panel a

Table 1 (continued)

Data Source	Description	Period	Geography	Measure	Figure/ Table
			U.S. state by Mexican state	Share of 2009–2014 emigrants living in each U.S. state (for each source)	Fig. 4
		2009	Mexican state	Share of 2004–2009 emigrants from each Mexican state	Fig. 3, panel b
Mexican *Conteo de Población y Vivienda*	Population census conducted by the Mexican Statistics Office INEGI	2005	U.S. state by Mexican state	Return migration rate = number of return migrants from 2000 to 2005 divided by county population in 2000	Fig. 6, panels a and b

Panel a of Fig. 2 examines the distribution of Mexican source states for migrants to the United States. We use the 2010 Mexican Census for this comparison, taking advantage of a question that asks respondents whether anyone currently or formerly living in the household migrated internationally between June 2005 and June 2010. Because we know the household's location, we can calculate each Mexican state's

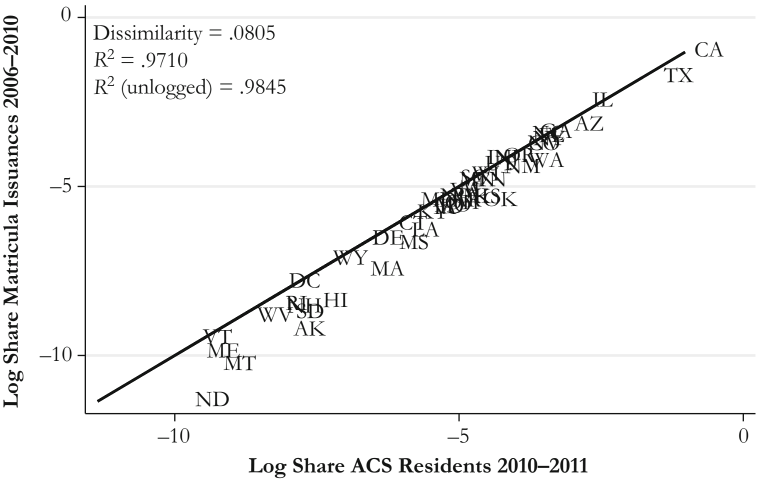

Fig. 1 Comparison of U.S. destination distribution: MCAS versus ACS. The figure plots the distribution of Mexican-born individuals across U.S. destinations. Each point represents the natural log of the share of individuals in each data set living in each U.S. state. The ACS sample includes Mexican-born individuals sampled in 2010 or 2011. The MCAS data include the universe of identity cards issued during 2006–2010. These cards were valid through the 2010–2011 time frame covered by the ACS sample. The 45-degree line, which would indicate perfect agreement between the two data sources, is shown for reference. The dissimilarity index, shown in the upper left corner, is defined in Eq. (1) in the text and is interpreted as the share of individuals that would need to be reallocated to make the two data sets' distributions match exactly. The R^2 value corresponds to the specification shown in the figure, and the "unlogged" version applies to a comparison of raw unlogged shares

share of individuals observed leaving for the United States during this period. We compare the log of this share with similar source-state shares from the MCAS data covering 2006–2010. Again, the close agreement across data sets is visually apparent from the figure, with only minor deviations from the 45-degree line.

Panel b of Fig. 2 repeats the analysis of panel a but changes the geographic definition to the Mexican *municipio*. Although these measures are somewhat noisier, especially in *municipios* with smaller populations, the agreement between MCAS and the Mexican Census at this fine level of geographic detail is remarkable and reflects the very large number of migrants present in the MCAS data, which facilitates high-quality measures of migration patterns even for small geographic areas. These results show that the MCAS data closely coincide with the best available measures of source and destination information for Mexican migrants to the United States.

ENADID and EMIF as Alternatives

We next consider whether either of the other two data sets with complete geographic coverage of sending and receiving locations compares as well with these census distributions. We begin with the *Encuesta Nacional de la Dinámica Demográfica* (ENADID), which reports each migrant's state of residence in the United States in addition to his/her source location. The question identifying migrants is similar to the one in the Mexican Census, and it allows us to observe migrants who left for the United States between August 2009 and August 2014. Panel a of Fig. 3 is constructed analogously to Fig. 1 and compares the distribution of destination states among migrants in the ENADID who left during 2009–2014 to the 2014 ACS. The ENADID destination measure performs reasonably well, but the MCAS data in Fig. 1 align more closely with the baseline ACS distribution in important ways. First, panel a of Fig. 3 includes only 41 U.S. states, because 10 U.S. states were not reported as the destination for any migrants observed in the ENADID. Second, the figure shows that the distribution aligns closely for large-population states, such as Texas and California, but noticeably more disagreement exists between the two data sources for mid-range population states (those with log shares between –4 and –6). The MCAS data match very closely in this range; larger differences from the ACS are observed only for very small states that the ENADID omits entirely. These differences highlight the primary shortcoming of the ENADID: a much smaller sample of migrants than in the MCAS database.[15]

Panel b of Fig. 3 provides a comparison of source states analogous to panel a of Fig. 2, using the ENADID in place of the MCAS. Again, the ENADID performs reasonably well, although the share comparisons are not as tightly clustered around the 45-degree line as are the observations using the MCAS data, likely resulting from the ENADID's smaller sample size. Figs. S2 and S3 (Online Resource 1) present analogous comparisons using the EMIF. The EMIF performs no better than the

[15] The different number of covered migrants is not surprising because the sample size for the ENADID is calibrated to ensure accurate reporting of domestic fertility rates rather than migration rates. We thank Fernando Riosmena for helpful discussion on the design of the ENADID.

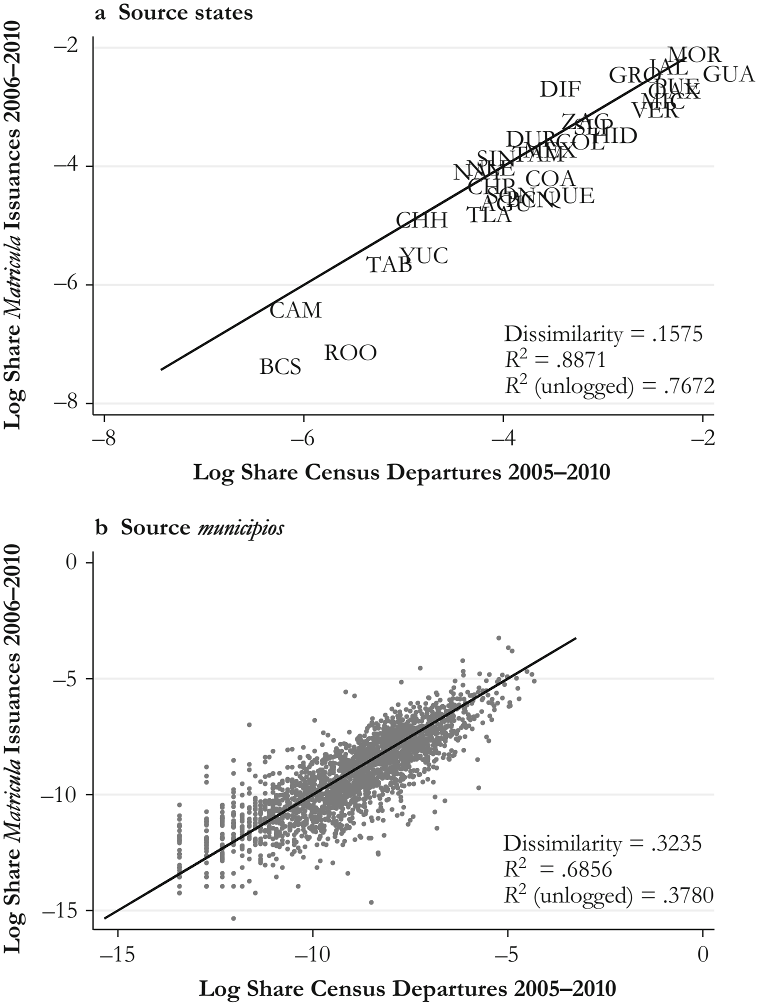

Fig. 2 Comparison of Mexican source state and source *municipio* distributions: MCAS versus Mexican Census. The figures plot the distribution of Mexican source states and source *municipios* for migrants to the United States. Each point represents the natural log of the share of individuals in each data set from each Mexican state or *municipio*. The Mexican Census sample includes individuals who moved to the United States during the five-year period from June 2005 to June 2010. The MCAS sample includes the universe of identity cards issued during 2006–2010. Vertical striping in panel b reflects *municipios* with very small numbers of observations. The 45-degree line, which would indicate perfect agreement between the two data sources, is shown for reference. The dissimilarity index, shown in the lower right corner of each panel, is defined in Eq. (1) in the text and is interpreted as the share of individuals that would need to be reallocated to make the two data sets' distributions match exactly. The R^2 value corresponds to the specifications shown in the figure, and the "unlogged" version applies to comparisons of raw unlogged shares

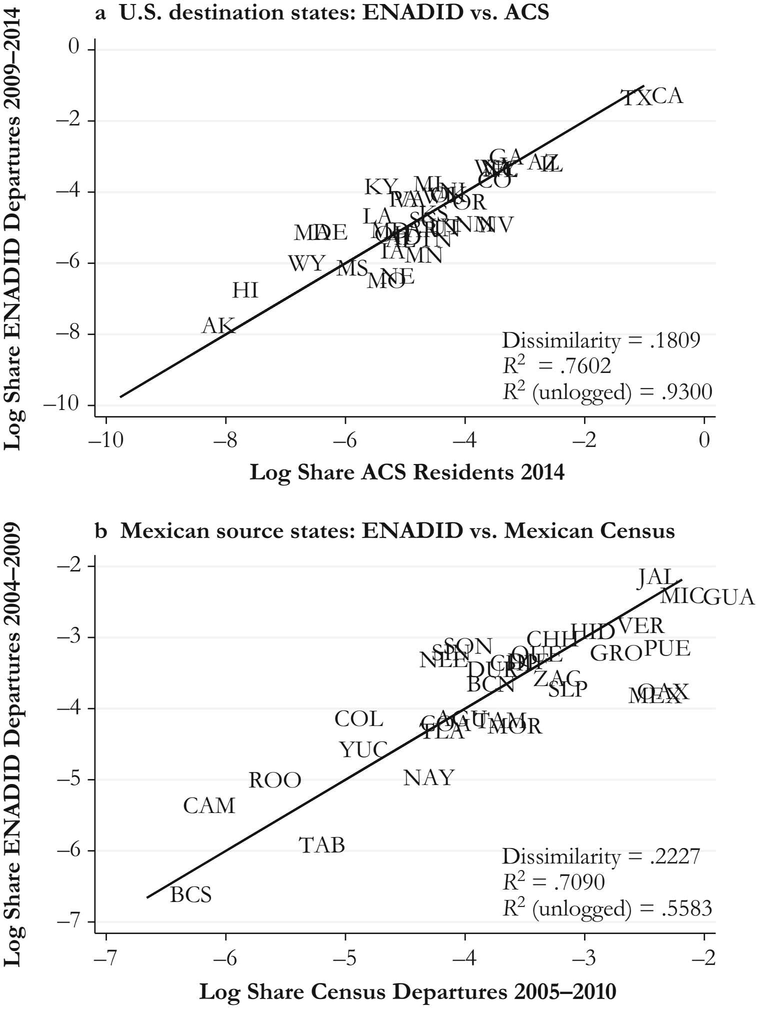

Fig. 3 Comparisons of ENADID source and destination distributions. Panel a plots the distribution of Mexicans across U.S. destination states. Each point represents the natural log of the share of individuals in each data set living in each U.S. state. The ACS sample includes Mexican-born individuals living in the United States by 2014. In both panels, the ENADID sample includes those who moved to the United States during the five-year period from May 2009 through May 2014. Panel b plots the distribution of Mexican source states for migrants to the United States. The Mexican Census sample includes individuals who moved to the United States during the five-year period from June 2005 through June 2010. The 45-degree line, which would indicate perfect agreement between the two data sources, is shown for reference. The dissimilarity index, shown in the lower right corner of each panel, is defined in Eq. (1) in the text and is interpreted as the share of individuals that would need to be reallocated to make the two data sets' distributions match exactly. The R^2 value corresponds to the specifications shown in the figure, and the "unlogged" version applies to comparisons of raw unlogged shares

ENADID data, and the EMIF destination distribution is much less consistent with the ACS.[16] Because the ENADID appears to be the best survey option, we focus our remaining comparisons on the MCAS and ENADID data.

Comparison of Joint Distributions in MCAS and ENADID

We next turn to a comparison of the joint distributions available in both the MCAS and ENADID. Our analysis focuses on each data set's measure of where migrants from a given Mexican state are likely to locate within the United States. Using MCAS applications from 2009–2013 and ENADID data from 2014, we calculate for each source state the share of migrants selecting each U.S. state as their place of residence. Figure 4 graphs the relationship between the natural log of these shares for each source-destination combination, labeling each observation with the U.S. destination state. Although there is some agreement between these two data sources, the influence of the ENADID's smaller sample size is readily apparent. Notably, relatively few observations appear in the lower-left quadrant of the figure. These "missing" observations reflect destinations that are relatively uncommon in the ENADID or that fail to appear at all because of its small sample size.

In fact, the sample sizes in the ENADID are sufficiently small that empty cells are guaranteed to occur. Mexican states with fewer than 51 observed out-migrants must have at least some empty source-destination cells. As shown in detail in Fig. S4 (Online Resource 1), nearly 80 % of Mexican source states have fewer than 51 observed migrants in the ENADID. In contrast, every Mexican state has at least 51 individual MCAS issuances observed over the five-year period, and the vast majority of states have more than 100,000 observed migrants. Even at the relatively aggregate state level, the ENADID simply does not observe a sufficient number of migrants to credibly estimate source-specific destination distributions for the majority of Mexican sources.

Taken together, the results in this section imply that the MCAS data provide an excellent way of measuring place-based migration patterns between Mexico and the United States. The distributions of both sources and destinations closely match the highest quality available survey data sets, and the joint distribution of sources and destinations corresponds reasonably well with the distribution observed in the ENADID, despite the latter data source's small sample size. Finally, the number of observations per cell is orders of magnitude larger in the MCAS data, which both increases the precision of the estimated share of migrants from a source choosing a particular destination and also greatly reduces the potential for entirely missing source-destination pairs with small numbers of migrants.

The Value of Detailed Source Data

Having established that MCAS data are a superior resource for examining Mexico–U.S. migration patterns, we next examine the importance of using fine rather than coarse geography. Our primary analytical tool is a measure of the dissimilarity of two

[16] This discrepancy likely occurs because the EMIF asks about a migrant's *intended* destination, which is subject to change.

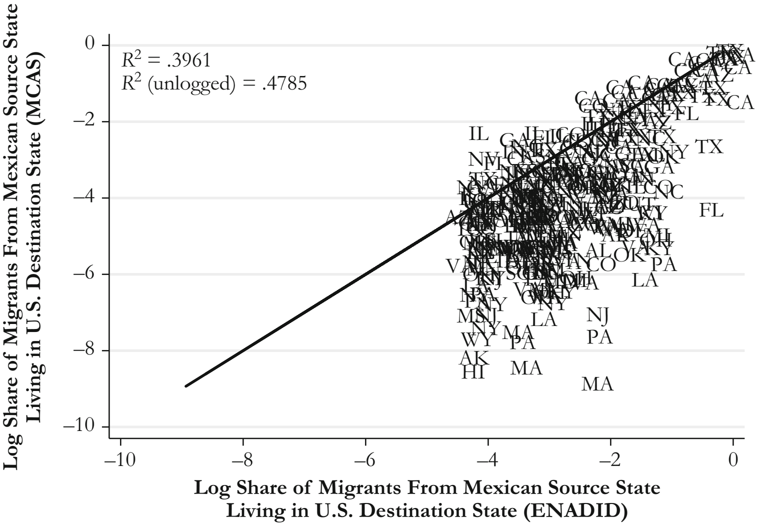

Fig. 4 Comparison of joint source and destination state distribution: MCAS versus ENADID. The figure plots the distribution U.S. destination states for migrants from each Mexican source state. Each point represents the natural log of the share of migrants living in the labeled U.S. state for each Mexican source state, from each data set. MCAS data include the universe of identity cards issued during 2009–2013. The ENADID sample includes individuals who moved to the United States in the five-year period from May 2009 through May 2014. The 45-degree line, which would indicate perfect agreement between the two data sources, is shown for reference. Source-destination pairs with no observations in the ENADID are omitted. The R^2 value corresponds to the specification shown in the figure, and the "unlogged" version applies to a comparison of raw unlogged shares

discrete distributions, as described by Duncan (1957). This index quantifies the difference in the destination distribution between individuals from source s and individuals from a reference group:

$$\Delta_s \equiv \frac{1}{2} \sum_{d=1}^{D} \left| \pi_{sd} - \pi_d^{ref} \right|, \quad (1)$$

where $\pi_{sd} \equiv \frac{N_{sd}}{N_s}$ is the share of emigrants from source s residing in destination d, and π_d^{ref} is the share of the reference population in destination d. This index is bounded between 0 and 1, with 0 representing identical distributions and 1 representing distributions with no overlap whatsoever. The magnitude of the measure can be interpreted as the share of migrants from source s who would need to be reallocated across destinations in order to exactly match the destination distribution of the reference group. Figures 1–3 report this dissimilarity measure for the comparisons reflected in each figure.

We begin by using the MCAS data from 2006–2010 to document the variation in chosen U.S. locations based on migrants' state of birth. Specifically, we examine how each Mexican state's distribution of migrant destinations in the United States compares with the destination distribution of all Mexican emigrants. In this case, s in Eq. (1) refers to Mexican states, d refers to U.S. destination states, and ref refers to all Mexican migrants in the United States. To clarify how this measure is calculated, Online Resource 1, section 6, steps through the calculation of $\pi_{sd} - \pi_d^{ref}$ for migrants from Michoacán, relative to all Mexican migrants. Compared with the average Mexican migrant, migrants from Michoacán are more likely to live on the West Coast and in Illinois, and they are much less likely to live in Texas. Summing the absolute value of these differences yields a value of $\Delta_s = 0.21$, indicating that 21 % of the migrants from Michoacán would need to relocate within the United States in order to match the overall distribution of Mexican migrants' chosen destinations. We repeat this analysis for each sending state, and panel a of Fig. 5 provides a histogram showing the distribution of Δ_s for all Mexican source states. The values of the index range from 0.09 to 0.63, with a mean of 0.31. Thus, most states' measures are reasonably high, indicating that the various Mexican source states send migrants to quite different sets of locations in the United States.

The histogram with solid bars in panel b of Fig. 5 provides the distribution of the same dissimilarity measure calculated at the *municipio* rather than state level, and it shows that the destination distributions for source *municipios* are even more different than are the distributions for source states. Although a few *municipios* have destination distributions close to the national average (the minimum dissimilarity measure is 0.08), most are quite different (the mean dissimilarity measure is 0.46, and the maximum is 0.99). Many source *municipios* would require more than one-half of their migrants to choose different destinations in order to match the destination distribution of all Mexican migrants.

We next examine variation in migrant destinations among *municipios* in the same sending state. For each *municipio*, we calculate a new version of Δ_s using the Mexican state containing the source *municipio* as the reference group. The histogram with hollow bars in panel b of Fig. 5 provides the distribution of these within-state dissimilarity measures.[17] This distribution is noticeably shifted to the left compared with the solid bars, which confirms that the destinations selected by migrants from a given *municipio* are, in general, more similar to their state's distribution than they are to the national average. Yet, the histogram reveals that it is very common for *municipios* within the same state to have very different destination distributions: the values of this version of the dissimilarity index range from 0.03 to 0.99 with a mean of 0.34. Thus, for many *municipios*, the state distribution is a poor proxy for the true *municipio*-level distribution.[18]

As an example, consider two *municipios* in the state of Michoacán: Ciudad Hidalgo and Tiquicheo. These source locations are only a three-hour drive apart, but their destination distributions differ sharply. Migrants from Hidalgo settle primarily in Illinois (likely Chicago), and more than two-thirds of emigrants from Tiquicheo reside in Texas.[19] This difference in destinations occurs *within* the same

[17] For more detail on the data points underlying this histogram, see Online Resource 1, section 6, which includes example *municipio* distributions and the relevant comparisons with those *municipios'* state.

[18] Random variation could account for some observed differences between *municipio*-level and state-level destination distributions, particularly because some *municipios* are quite small. In Online Resource 1, section 7, we implement a permutation test to demonstrate that the observed differences are far larger than those that could plausibly be explained by small *municipio* samples and random variation.

[19] For the full distribution of destinations chosen by migrants from these two sources, see Figs. S8 and S9 (Online Resource 1).

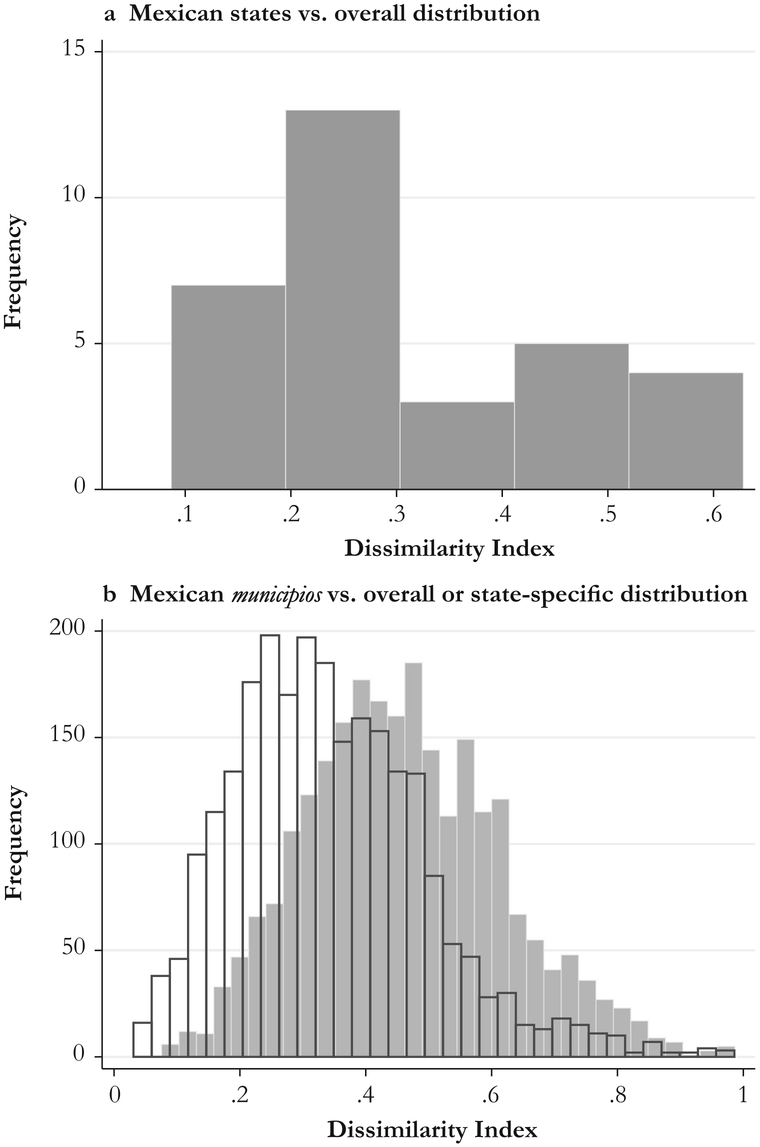

Fig. 5 Distribution of dissimilarity index. Panel a shows the distribution of dissimilarity indexes for the 32 Mexican states, using the national distribution as the reference. Panel b shows distributions of dissimilarity indexes for the 2,442 Mexican *municipios*, compared with either the national reference distribution (filled bars) or the reference distribution for the state containing each *municipio* (hollow bars). All analyses use the universe of MCAS identity cards issued from 2006–2010. In both panels, the *x*-axis represents the dissimilarity index, indicating the share of individuals that would need to be reallocated across destinations for a given source's destination distribution to match the reference distribution

source state, ruling out the possibility that it arises because of other factors affecting destination choice, such as distance, climate similarity, and so on. Also noteworthy is that neither distribution is particularly close to the state-level distribution, which is more concentrated in California.

The results in this section have important implications for researchers using previous settlement patterns as a source of identifying variation. State of birth destination measures are, in general, a poor proxy for settlement patterns that operate at a finer level of geography. In fact, the typical *municipio*'s destination distribution is as different from its state's as the typical state's distribution is different from the overall distribution. The ability to construct a measure of the destinations chosen by previous migrants from an individual's *municipio* of birth, therefore, makes the MCAS data a particularly valuable resource for researchers studying Mexico–U.S. migration.

Effects of LAWA on Migration in Connected Mexican Sending Regions

As an example of the value of this level of geographic detail, this section examines the effect of the Legal Arizona Workers Act (LAWA) on migration rates into and out of sending regions in Mexico. This act, passed by the Arizona state legislature in 2007 with an effective date of January 2008, led to a decline in the "likely unauthorized" population living in Arizona (Bohn et al. 2011). Data limitations, however, prevented an analysis of whether this decline reflected changes in international migration or simply the movement of unauthorized immigrants into different U.S. states. Our analysis leverages the MCAS data to show that emigration fell and return migration rose in source locations that were more exposed to LAWA through migration connections. Thus, the decline in destination labor market opportunity driven by LAWA reduced the number of Mexican immigrants living in the United States from regions with ties to Arizona.

The Legal Arizona Workers Act

LAWA mandates the use of *E-Verify*, an online system administered by the federal government, to verify prospective employees' identity and authorization to work in the United States. The E-Verify system compares Social Security numbers and names of new workers against a centralized database from the Social Security Administration (SSA) and the Department of Homeland Security (DHS). When there is no match between the employee's name or Social Security number and the official records, the system sends a report of nonconfirmation to the employer. The law imposes sanctions on employers who hire unauthorized workers, ranging from business license suspensions for the first offense to license revocation (Bohn et al. 2011).

LAWA's main purpose was to increase the costs for employers hiring unauthorized migrants and for unauthorized employees looking for jobs. As a result, Arizona became a less-desirable destination to live and work for immigrants without legal status. We examine the effect of LAWA on *international* migration by assessing whether Mexican sending regions initially more connected to Arizona experienced larger increases in return migration and larger decreases in emigration rates after LAWA was passed. Importantly, these analyses use Mexican Census data to measure migration rates in and out of Mexico; the MCAS data are used only to characterize the degree to which a sending location was initially connected to Arizona.

Effects of LAWA on Migration Rates

Our analysis treats the implementation of LAWA as a quasi-experiment that manipulates Mexican-born individuals' U.S. job prospects. We expect that LAWA negatively affects the job prospects for all Mexican-born individuals without U.S. work authorization, but that these effects will be larger for individuals with strong network connections to Arizona. Because we cannot observe an individual's social network contacts directly, we rely on the geography-based networks observable in MCAS data. Specifically, we assume that LAWA's effect on the labor market prospects in the United States for the average migrant from region s is proportional to the share of MCAS card recipients from the same sending region who lived in Arizona in 2006.

We use the following specification to relate changes in migration rates from 2005 to 2010 to the importance of Arizona as a destination:

$$\Delta Y_s = \beta_0 + \beta_1 \pi_{s,2006} + \varepsilon_s, \tag{2}$$

where $\Delta Y_s = \ln(y_{s,2010}) - \ln(y_{s,2005})$ is the change in the log of the return migration or emigration rate from 2005 to 2010 in Mexican sending region s. We calculate migration rates using the 2010 Mexican Census and the 2005 *Conteo de Población y Vivienda*. $\pi_{s,2006}$ is the share of emigrants from source s selecting Arizona as a residence in 2006, before LAWA was passed, using the MCAS data. ε_s is an error term. $\hat{\beta}_1$ therefore captures the differential change in migration rates for Mexican source locations that were more connected to Arizona prior to LAWA. We conduct this analysis using states or *municipios* as source regions, treating states as independent observations and computing standard errors clustered at the state level when using *municipios* as the unit of analysis.[20]

Return Migration Rates

The first specification uses return migration rates as the outcome variable. Return migrants are defined as individuals living in Mexico during the 2010 census or 2005 *Conteo* reference period, but who lived in the United States five years before. The return migration rate is then the number of return migrants divided by the source's population at the beginning of each period (2000 or 2005).[21]

Panel a of Fig. 6 presents the underlying data and the fitted values for Eq. (2) using the change in the natural log of this measure from 2005 to 2010 as the dependent variable. Consistent with expectations, return migration rates rose more in sending states with stronger network connections to Arizona. The first column of panel A of Table 2 provides the coefficient estimates from this specification. To understand the

[20] In Online Resource 1, section 8, we corroborate the regression analysis following Eq. (2) with summary statistics on the time-series evolution of return migration and emigration rates for *municipios* with initially higher and lower rates of connection to Arizona.

[21] Return migration flows are identified in the 2005 *Conteo* and in the 2010 Mexican Census through a question that records country of residency five years prior to the date when the survey was administered. The count of return migrants does not include any individuals who were living in Mexico five years previously but who moved to the United States and back within the five-year window.

magnitude of this effect, bear in mind that this period saw dramatic declines in net migration to the United States overall, both through increased return migration and through decreased emigration. The average Mexican state's return migration rate nearly quadrupled over this period: on average, rates were 0.3 % in 2005 and 1.13 % in 2010. Yet these results imply that Mexican states with strong connections to Arizona saw larger increases in return migration than in states with weaker connections. For example, roughly 50 % of migrants from Sonora had historically settled in Arizona, and Sonora experienced 30 % larger growth in its return migration rate compared with a Mexican state with no connection to Arizona.[22]

Columns 2 and 3 of Table 2 examine the robustness of this result. The second column in panel A shows results when the observations are weighted by the 2000 Mexican population.[23] The third column provides results from a robust regression technique that reduces the effect of high-leverage outliers.[24] The point estimates are positive and quite similar across all three specifications, but the large standard error in column 3 makes clear that these state-level results are highly dependent on the inclusion of a single high-leverage observation (Sonora).

We now take advantage of the finer geographical detail available in the MCAS to conduct similar analysis using the Mexican *municipio* as the unit of analysis. Panel B of Table 2 presents similar estimates for the change in log return migration rates from 2005 to 2010 at the Mexican *municipio* level. The first column provides the baseline estimates using *municipios* as observations, and panel b of Fig. 6 provides the raw data and fitted line from this regression. The point estimate is comparable in magnitude with the first column of panel A, Table 2. Notably, the standard error is substantially smaller, and the scatterplot makes clear that no particular high leverage outlier is driving the results. In fact, implementing the same robust regression technique used in the state-level analysis (column 3) leads to standard errors that are not much different from those in the baseline results in column 1.

An additional advantage of conducting a *municipio*-level analysis is the ability to add controls for other changes over time that affect return migration rates. Changing conditions in sending regions will alter individuals' incentives to return or to leave for the United States. To the extent that these changes in conditions are correlated with a location's ties to Arizona, they represent a threat to the causal interpretation of these regression results. In columns 4–6, we therefore add Mexican state fixed effects as additional controls. Because the dependent variable is already expressed as a difference within *municipios*, these fixed effects remove the influence of any *changes* in the sending areas that affected migration rates similarly for all *municipios* within a Mexican state. For example, this specification controls for changes in state-level labor market conditions and changes in state-

[22] The percentage difference in the growth of return migration rates would be $100 \times e^{0.5 \times 0.558} - 1 = 32.1$ %. Compared with growth rates of roughly 300 % in untreated states, this treated state would see a growth rate of roughly 400 %.

[23] This weighting addresses the fact that population growth rates are heteroskedastic, with smaller populations experiencing more variable percentage growth in migration rates.

[24] Specifically, we use the *rreg* command in Stata, which implements the robust regression procedure described by Li (1985).

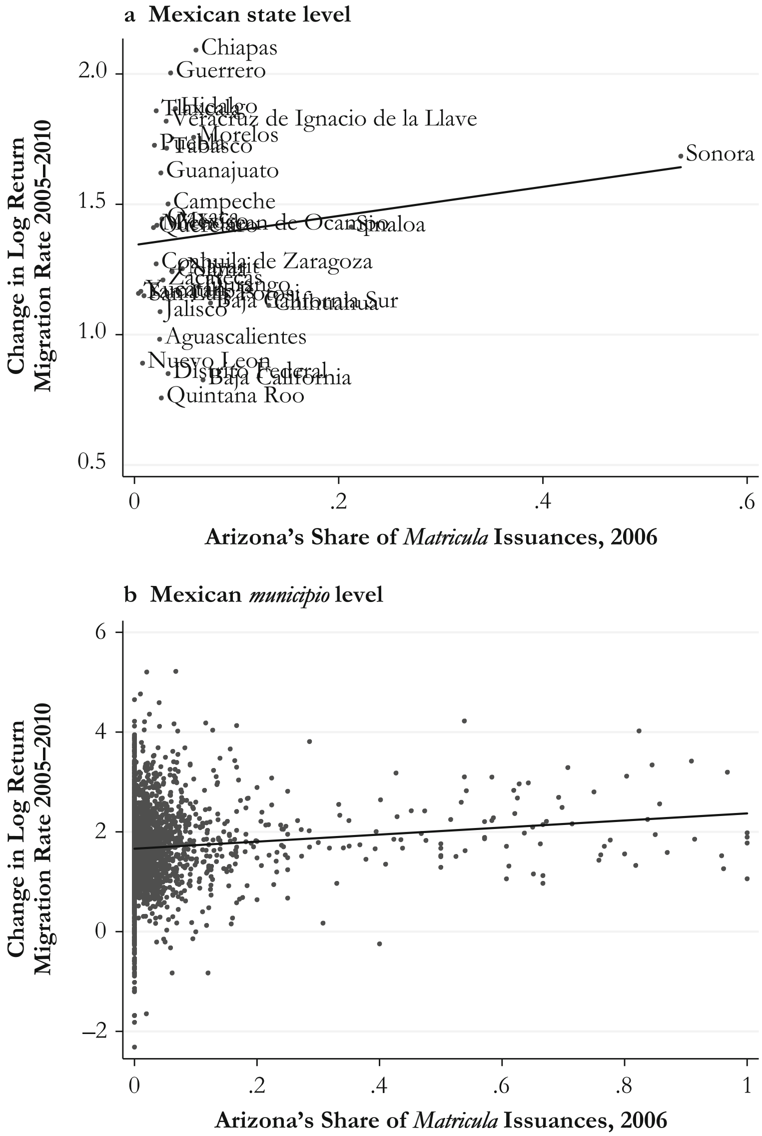

Fig. 6 Change in log return migration rates vs. initial share of migrants living in Arizona. The figures plot the relationship between the change in log return migration rate from 2005 to 2010 in Mexican sending regions (ΔY_s) versus Arizona's initial share of emigrants from each Mexican sending region (π_s) in 2006, before LAWA went into effect. Migration rates were calculated using the 2005 Mexican *Conteo de Población y Vivienda* and the 2010 Mexican Census, whereas π_s was calculated using the 2006 MCAS. Panel a shows the relationship at the Mexican state level, and panel b shows the relationship at the *municipio* level. The regression lines are based on the regression model in Eq. (2), with no controls. See Table 2 for alternative specifications

level crime. This specification leverages the within-state variation in destinations shown in panel b of Fig. 5 and compares *municipios* that are geographically close

Table 2 Estimated effect of LAWA on return migration rates

	Change in Log Return Migration Rate					
	Unweighted	Weighted by 2000 Population	Control for Outliers	Unweighted	Weighted by 2000 Population	Control for Outliers
	(1)	(2)	(3)	(4)	(5)	(6)
A. Mexican State-Level Estimates						
Arizona's share of migrants in 2006	0.56*	0.54†	0.57			
	(0.22)	(0.29)	(0.78)			
Constant	1.34**	1.37**	1.33**			
	(0.07)	(0.09)	(0.09)			
Number of observations	32	32	32			
R^2	.02	.02	.02			
B. Mexican *Municipio*-Level Estimates						
Arizona's share of migrants in 2006	0.72**	0.85**	0.66**	0.79**	1.24**	0.56*
	(0.13)	(0.21)	(0.14)	(0.24)	(0.40)	(0.23)
Constant	1.66**	1.35**	1.65**	1.09**	0.89**	1.09**
	(0.07)	(0.09)	(0.02)	(0.00)	(0.01)	(0.2)
State fixed effects	No	No	No	Yes	Yes	Yes
Number of observations	2,189	2,189	2,189	2,189	2,189	2,189
R^2	.01	.02	.01	.14	.36	.16

Notes: The reported coefficients come from a regression of the change in log return migration rate from 2005 to 2010 on Arizona's initial share of migrants from the Mexican source region. Positive regression coefficients indicate that regions with a stronger initial connection to Arizona experience a larger increase in return migration following the implementation of LAWA. The return migration rate is calculated using data from the 2000 and 2010 Mexican Census and the 2005 Conteo, as the number of return migrants during 2000–2005 or 2005–2010, divided by the source region's initial population. Arizona's initial migrant share is calculated using the 2006 MCAS. Panel A examines Mexican state-level source regions; panel B examines *municipio*-level sources. Columns 1 and 4 estimate unweighted (equally weighted) regressions across source regions. Columns 2 and 5 weight sources by their 2000 population, and columns 3 and 6 use robust regression (*rreg* in Stata) to reduce the influence of high leverage outliers. In panel B, columns 4–6 control for Mexican state fixed effects. Heteroskedasticity-robust standard errors are shown in parentheses. In panel B, the standard errors are clustered by Mexican state.

†$p < .10$; *$p < .05$; **$p < .01$

to each other and yet are differentially connected to Arizona's labor market. In each case, the results in columns 4–6 are similar to the corresponding results without fixed effects in columns 1–3. The ability to conduct analysis at the *municipio* level thus strengthens the results by increasing precision, decreasing the importance of outliers, and allowing for flexible controls for unobserved changes that could be correlated with the strength of a location's ties to Arizona.

Emigration Rates

Having shown that LAWA increased the rate at which individuals return to Mexico, we now turn to the other component of net migration: emigration to the United States. Emigration is measured using the 2010 census, which reports the year in which household members traveled to the United States. We calculate the emigration rate as the number of people who reported emigrating in a given year divided by the source-area population in that year, for 2005 and 2010.[25]

Table 3 is analogous to Table 2 and examines changes in the log of the emigration rate from 2005 to 2010 at the Mexican state and *municipio* levels. The scatterplot and fitted line for the regression in the first column of Table 3, panel A, is provided in panel a of Fig. 7; panel b of Fig. 7 provides a similar graph for the specification in the first column of Table 3, panel B. On the whole, the results for emigration mirror the results for return migration, with sources more connected to Arizona seeing larger decreases in emigration from 2005 to 2010. Again, the importance of a single observation (Sonora) in the state-level results is apparent both visually in the scatterplot and in the large standard error in the third column of panel A. In contrast, the *municipio*-level results are robust to mitigating the influence of high leverage outliers (columns 3 and 6 of panel B). Further, the results are robust to the addition of state fixed effects (columns 4–6 of panel B) and are in fact stronger when these controls are included.

Together, these results demonstrate that the LAWA-induced declines in Arizona's likely unauthorized population documented by Bohn et al. (2014) occurred partly through substantial changes in international migration patterns. Return migration rose more sharply in Mexican source locations from which migrants had historically settled in Arizona, and emigration fell more in those same locations. These effects of LAWA are, to our knowledge, a novel result, and they imply that policies affecting migrants' job opportunities can be effective at deterring or reversing the flow of unauthorized migrants into the United States.[26] Moreover, these results further strengthen our conclusion that source-specific destination distributions based on MCAS data are informative. Had the data been sharply nonrepresentative or highly noisy, we would not observe these important differences across Mexican source regions with strong initial connections to Arizona.

[25] A small number of emigrants who left in 2005 are not observable because the survey asks only about the start date of the most recent trip, so individuals who emigrated first in 2005, returned to Mexico, and then emigrated again are treated as having emigrated in the year of their most recent trip to the United States.

[26] Hoekstra and Orozco-Aleman (2017) examined a related question using a later Arizona law, SB 1070, which imposed unprecedented immigration enforcement measures. They used EMIF data to document decreased intended migration to Arizona among unauthorized Mexican migrants after the law's passage. Our novel contribution is to document changes in realized return migration and emigration at the Mexican source level. Given the shortcomings of EMIF described in the section MCAS Data Quality, such an analysis would not be feasible using that data source.

Table 3 Estimates of the effect of LAWA on emigration rates

	Change in Log Emigration Rate					
	Unweighted	Weighted by 2005 Population	Control for Outliers	Unweighted	Weighted by 2005 Population	Control for Outliers
	(1)	(2)	(3)	(4)	(5)	(6)
A. Mexican State-Level Estimates						
Arizona's share of migrants in 2006	–1.01*	–0.88†	–0.98			
	(0.38)	(0.51)	(1.25)			
Constant	–0.23†	–0.36*	–0.23			
	(0.13)	(0.17)	(0.14)			
Number of observations	32	32	32			
R^2	.03	.01	.02			
B. Mexican *Municipio*-Level Estimates						
Arizona's share of migrants in 2006	–0.83*	–0.58	–0.83**	–1.18*	–1.69*	–1.29**
	(0.31)	(0.46)	(0.24)	(0.55)	(0.79)	(0.41)
Constant	–0.03	–0.57**	–0.05	0.41**	0.25**	0.47
	(0.11)	(0.17)	(0.03)	(0.01)	(0.02)	(0.31)
State fixed effects	No	No	No	Yes	Yes	Yes
Number of observations	1,752	1,752	1,752	1,752	1,752	1,752
R^2	.01	.00	.01	.18	.25	.17

Notes: The reported coefficients come from a regression of the change in log emigration rate from 2005 to 2010 on Arizona's initial share of migrants from the Mexican source region. Negative regression coefficients indicate that regions with stronger initial connection to Arizona experience a larger decline in emigration following the implementation of LAWA. The emigration rate is calculated using data from the 2010 Mexican Census, as the number reporting emigration in 2005 or 2010, divided by the source region's population in that year. Arizona's initial migrant share is calculated using the 2006 MCAS. Panel A examines Mexican state-level source regions; panel B examines *municipio*-level sources. Columns 1 and 4 estimate unweighted (equally weighted) regressions across source regions. Columns 2 and 5 weight sources by their 2000 population, and columns 3 and 6 use robust regression (*rreg* in Stata) to reduce the influence of high-leverage outliers. In panel B, columns 4–6 control for Mexican state fixed effects. Heteroskedasticity robust standard errors are shown in parentheses. In panel B, the standard errors are clustered by Mexican state.

†$p < .10$; *$p < .05$; **$p < .01$

Conclusion

In this article, we evaluate the use of administrative data from the *Matrícula Consular de Alta Seguridad* (MCAS) program to measure geographic migration patterns between Mexico and the United States. Unlike other available data sets that one could use to characterize these patterns, the MCAS data provide very large sample sizes, detailed geographic identifiers, and complete geographic coverage of both Mexico and the

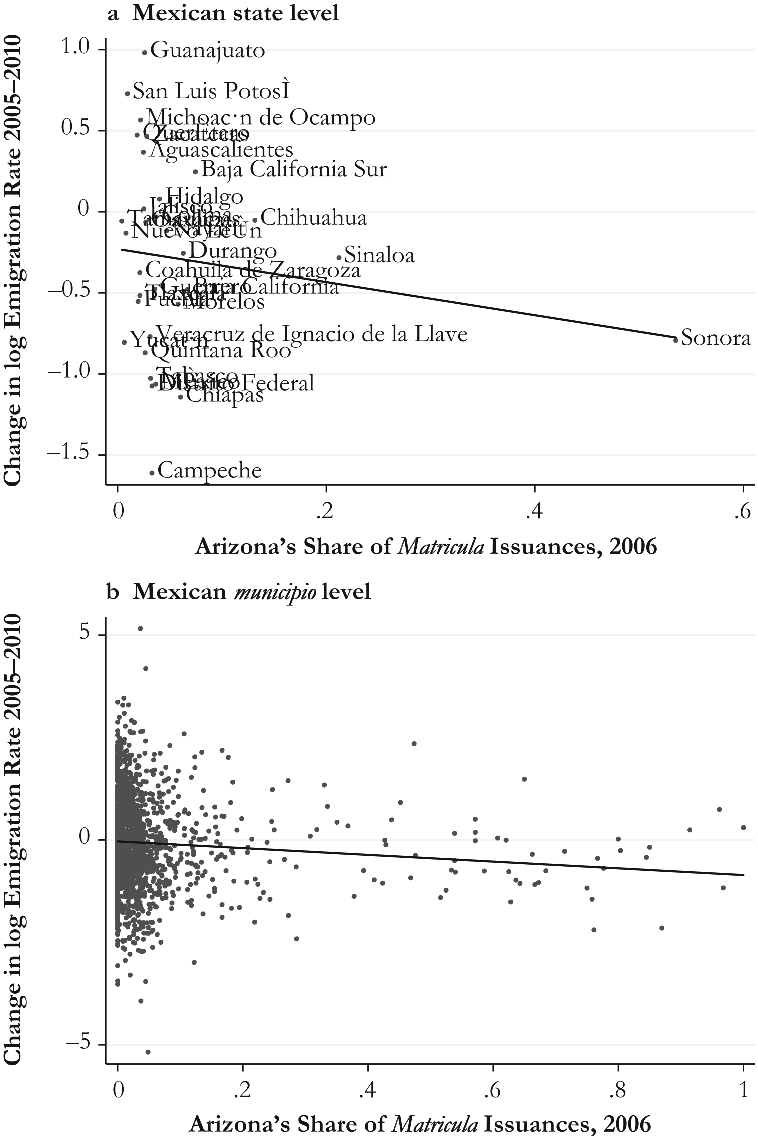

Fig. 7 Change in log emigration rates versus initial share of migrants living in Arizona. The figures plot the relationship between the change in log emigration rate from 2005 to 2010 in Mexican sending regions (ΔY_s) versus Arizona's initial share of emigrants from each Mexican sending region (π_s) in 2006, before LAWA went into effect. Migration rates were calculated using the 2005 Mexican *Conteo de Población y Vivienda* and the 2010 Mexican Census, whereas π_s was calculated using the 2006 MCAS. Panel a shows the relationship at the Mexican state level, and panel b shows the relationship at the *municipio* level. The regression lines are based on the regression model in Eq. (2), with no controls. See Table 3 for alternative specifications

United States. We find strong agreement between the MCAS and each country's census of population when measuring the distributions of migrants' Mexican source states and U.S. destination states. We then demonstrate that different sending regions within the same Mexican state regularly send migrants to very different sets of locations in the

United States. In fact, the typical *municipio*'s distribution matches its state's distribution only as well as the typical state matches the overall destination distribution. Using more aggregate state-level migration information would therefore obscure the differences between detailed sending regions, likely reducing the apparent influence of previous migration choices on a variety of outcomes.

We demonstrate the practical usefulness of these data by using information on source-specific migrant destinations to study the effects of the 2008 Legal Arizona Workers Act (LAWA) on international migration between Mexico and the United States. We find increased return migration to and decreased emigration from Mexican regions with stronger preexisting migration ties to Arizona. These findings indicate that labor market interventions can strongly affect international migration patterns and confirm the value of the MCAS data in measuring meaningful links between source and destination regions.

The MCAS data therefore represent a valuable resource for researchers seeking to understand the influence of previous migration patterns on a variety of subsequent outcomes. As in our analysis of LAWA, one could use these data to examine the effects of local enforcement measures on international migration to and from the most affected source areas. These data can also be used to track the evolution of migration patterns to examine new migrant sources and destinations and the relationships among them. Alternatively, source-specific or source-destination–specific measures of previous migration could be included as second-level measures in multilevel models. For example, these data provide an excellent measure of the intensity of previous migration out of a source community, which has been shown to affect both the likelihood that an individual migrates and the composition of migrants (McKenzie and Rapoport 2010). Because these data do not contain information at the individual level, however, they have important limitations. For instance, they could not be used to examine the relative labor market success of migrants based on whether they follow previous migrants from their home town (Munshi 2003). For these types of questions, the Mexican Migration Project continues to be the best available source of individual-level data.

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