Women's Schooling and Employment Gains During the Great Mexican Migration Era

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ABSTRACT:

Between 1965-2005, the share of women in Mexico who completed secondary schooling increased from 1% to over 20%. The percentage of women working in managerial positions tripled. These long-run gains have been attributed to multiple factors; among them, the disproportionate departure of men from migrant-sending regions. In high migration areas, the male-to-female sex-ratio among young adults fell below 75 per 100 over this four-decade period. Scholars have argued that attendant structural and normative changes shifted opportunities and expectations for women to increase schooling, employment, and in some cases, assume leadership roles in their communities. And then, abruptly, the gender composition of these communities shifted. The 2008 recession slowed emigration and hastened return migration; over a few years the relative presence of men increased markedly.

We study the effects of these sharp reversals on women's ongoing socioeconomic mobility in Mexico. We use population data from Mexico and the U.S. for the period spanning 1990-2015 to assess whether women's long-run socioeconomic gains are maintained across cohorts alongside these population shifts. In so doing, we consider (i) where these are primarily family or community effects and (ii) several possible explanations for their direction and magnitude. We test robustness using a set of instruments that capture employment conditions in the U.S. We find that the post-recession increase in the relative presence of men is associated with cross-cohort reductions in Mexican women's schooling, employment, and earnings. The findings operate at the community level; that is, the effects of return migration are not limited to women partnered with returning migrants. We find some evidence that changes in family formation contribute to these reductions. The magnitude of post-recession changes are meaningful in relation to the gains attributed to male departure between 1970-2005, raising important questions about the normative persistence of opportunities created for women by the disproportionate absence of men.

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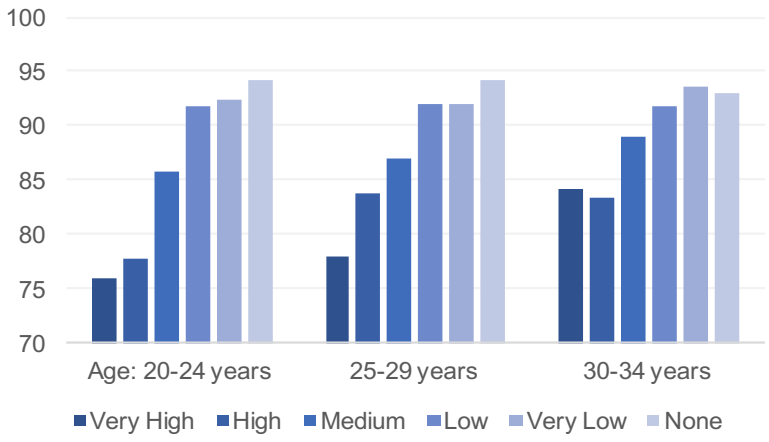
The age and sex structure of populations influence the relative standing of men and women across a wide range of institutions, including marriage markets, labor markets, and higher education (Angrist 2002; Guttentag and Secord 1983). In some contexts, declines in the relative presence of men create opportunities for women to make gains in otherwise gender-segregated institutions. Shifts in the population structure may change incentives for men and women to seek schooling, employment, and career development through several mechanisms, including expectations about partnering and mate choice. At younger ages, population gender composition may shift parental practices, and more broadly, societal norms about investing in girls relative to boys (Fong 2002).

Studies have investigated the relationship between population structure and aggregated individual outcomes in several well-known cases. Changes to the U.S. population during World War II encouraged long-run trends in women's labor market entry (Fernández et al. 2004; Goldin 2006). The rise of mass incarceration of Black men in the U.S. is associated with increases in schooling and employment in young adulthood among Black women, as well as changes in partnering, fertility, and disease risk (Charles and Luoh 2010; Johnson and Raphael 2009; Lee and Wildeman 2013; Mechoulan 2011). China's national "one-child policy" combined with sex selection practices among parents shaped financial practices and markets, including reserve savings and housing markets (Wei and Zhang, 2011).

Empirically attributing micro-level changes in individual outcomes to macro-level changes in the population structure requires navigating a number of threats to inference. Variability in population composition is often driven by phenomena—e.g., civil conflict, natural disaster—that influence men and women's lives through multiple pathways, including fundamentally restructuring work and schooling (Mattina 2017; Frankenberg et al. 2011). In this study, we examine links between population gender composition and women's socioeconomic outcomes in a context that experienced large-scale population change largely driven by economic conditions abroad.

During the four-decade period spanning 1965-2005, numerically male-dominated migration between Mexico and the United States resulted in the departure of several million residents. By 2005, 10.5% of the Mexican-born population lived in the United States. Between 55-60% of these residents were male (Hanson and McIntosh 2010; Fry 2006; Gonzalez-Barrera 2015). Figure 1 plots the average municipal male-to-female sex ration by age and by the magnitude of U.S. migration in 2000. In some communities in Mexico, the male-to-female sex-ratio fell below 70 per 100. These communities generated both scholarly and public interest in the welfare of residents in towns with striking asymmetries

Figure 1. Municipal male-to-female sex ratio by age and by municipality US migration intensity, 2000



Note: Average number of men per 100 women in municipalities aggregated by CONAPO-estimated levels of U.S. migration.
Source: Censo de Población y Vivienda 2000 and CONAPO Indices de Intensidad Migratoria (here).

in population structure (Cohen 2008; Frank and Wildsmith 2005).

And then these patterns changed abruptly. The 2008 economic recession dramatically reduced labor demand and labor recruitment in the U.S. By early 2009, 2.1 million U.S. immigrants had lost jobs; these losses were clustered among temporary migrants from Mexico (Camarota and Jensenius 2009). The recession resulted in a 72% decline in male out-migration to the U.S. from Mexico (Villarreal 2014) and a three-fold increase in return migration to Mexico (Gandini et al. 2014). Increased deportations under the new Obama administration grew these numbers further (Golash-Boza 2015). Net migration between the two countries dropped from 2.3 million during 1995-2000 to -20,000 during 2005-2010 and to -130,000 during 2010-2014 (Gonzalez-Barrera 2015). As expected, these changes impacted the sex-composition of Mexican communities. Between 2000 and 2010, the male-to-female ratio of 18-25 year olds shifted from .9 to .94 for the *entire Mexican population*, masking much larger changes in high-migration regions of the country (Conover et al. 2015).

We study the implications of these sharp changes to municipal-level population gender composition on women's schooling and labor market outcomes in Mexico. Doing so allows us to study the trajectories of women's welfare in Mexico, while extending the broader scholarship linking population structure and individual outcomes in several ways. Prior to the economic recession, Mexico-U.S. migration is credited with several changes to women's relative standing in Mexican households and communities. At the micro-level, women partnered with migrant men assumed head-of-household roles, community leadership roles, and gained some autonomy in household decision-making (Dreby 2010, Andrews 2014). At the macro-level, the sex-ratio shift led to increases in women's schooling, women's employment, the movement of women into white-collar jobs, and increases in women's wages at the top of the income distribution (Raphael 2013, Conover et al. 2015).

We ask whether longer-term gains in women's standing associated with multi-decade changes in sex-ratios *persist*—or whether these can be reversed by an increase in the relative presence of men. We also heed potential level differences in how these effects may operate. We differentiate between the effects in *households and partnerships* with returned migrants versus the effects in unchanged household and partnerships in communities with rising sex ratios. These tests ask whether changes to population structure are in fact working primarily through household and intrapartner dynamics, or are also operating through broader changes in labor and schooling opportunities for women. Finally, we consider the role the family formation behavior may play in shaping these patterns.

DATA AND METHOD

We draw on multiple data sets that allow us to characterize female schooling and labor market outcomes in municipalities across Mexico during the period from 1990-2015. Municipalities are a geopolitical subdivision of Mexican states; the average population size is 75,000 with considerable variation between rural and urban regions (interquartile range of 2,500-1.2 million). The municipality better represents a local context in which population composition plausibly influences labor market conditions, relative to states, which are large and diverse, and contain wide variation in the size and composition of migration flows to the U.S.

We use data from population censuses in 1990, 2000, and 2010 as well as intercensal data collected by CONTEO in 2005 and 2015 to construct the population sex-ratio in 5-year age intervals among persons aged 15-49. These estimates divide the number of males age *a* in municipality *m,* by the number of females age *a,* in municipality *m*. We focus the analysis on young adult ages under 50 because migration between Mexico and the U.S. is concentrated in this age range.

We then use the Census and CONTEO data to construct a set of schooling and labor-market outcomes for women. We measure the average years of completed schooling (mean=7.1) and the percent of women in the municipality with any college attendance (mean 5.5%). Both are measured for the 5-year age intervals between 15-24. We measure the percentage of women who are employed outside the home (mean=24%) and we measure women's average monthly earnings in 2010 peso values (logged) (mean=8.7, or ~6000 pesos a month). We also measure the percentage of women working in professional or managerial positions (mean 6.3%). These are measured for women in the 5-year age intervals between 15-44.

We estimate a set of specifications predicting women's labor market outcomes, represented by θ_{mat}, observed in municipality *m,* age group *a*, and year *t* (Eq. 1). We regress these outcomes on the population male-to-female sex ratio (SR_{mat}), time- and age-varying characteristics of municipal populations (X_{mat}), age-group specific fixed effects (η_a), year fixed effects (Y_t), and municipality fixed effects (μ_m).

1. $\theta_{mat} = \alpha + \lambda_1 SR_{mat} + \beta' X_{mat} + Y_t + \eta_a + \mu_m + \varepsilon_{mat}$

The fixed effects sweep out variation at the municipality level that is time- and age-invariant, any variation across age groups that is place- and time-invariant, and any period changes over time that are constant across places and across age-groups. A time-varying municipal characteristic of interest (X_{mat}) is the population size; our research question concerns the relative size of the male to female population, *net* of the labor market effects of a population that grows quickly via return migration. We log the population size measure.

The identifying assumption of Eq. 1 requires that λ_1 is not correlated with the error term; that is, something else correlated with changes in the sex-ratio over time and across place that also predicts female labor market outcomes. At least two threats warrant further attention. One possibility is that women move in response to changing labor market conditions. To sidestep this issue, we measure the labor market outcomes of women who are living in the same state as they lived 5 years earlier. This mobility characteristic is measured in each year observed in the data.

A second threat is that changing labor market conditions in Mexican communities may encourage return migration and also influence women's labor market outcomes. To better capture changing labor market traits, we construct measures of the proportion of persons in each age group working in each of 12 major employment sectors (also represented by X_{mat} in Eq. 1).

That the temporal discontinuities in return-migration to Mexico and outmigration from Mexico were

largely due to reductions in labor demand in the United States provides some further leverage against this issue. Following Card (2001) and Conover et al. (2015), we test a set of instrumental variable specifications that use *predicted* estimates of the number of emigrants of age *a* in year *t* from each Mexican state to instrument for the observed sex-ratio. These predictions are constructed from what is effectively a Bartik-style instrument that exploit the long-standing spatial patterning of migration flows between particular regions in Mexico and particular regions in the United States. The measure multiplies the observed number of men in U.S. state *s* in age group *a* in year *t* who report a birthplace of Mexico (M_{sat}) by the proportion of men age *a* in state *s* who migrant from Mexican state *m* (π_{sm} , Eq. 2).

2. $\sum_s (M_{\text{sat}}\, \pi_{\text{sm}})$

The state-to-state transitions in the second term must be observed *before* the labor market change of interest, here the 2008/2009 economic downturn. As a result, the measures do not capture the changes in Mexican labor market conditions that redirect migrants to new places. The instrument requires the assumption that, conditioning on the other measures in the specification, including population size, these predicted emigration counts operate on labor market outcomes only through their effect on the municipal sex-ratio.

We measure the quantities in Eq. 2 using two different sources. The first term, $M_{sat,}$ is measured using U.S. census data (1990, 2000, 2010) and data from the American Community Survey (2005, 2011-2015) (IPUMS 2017). The second term is measured with data from the 2006 Encuesta Nacional de Dinámica y Demográfica (ENADID), a nationally-representative household survey conducted every 3-5 years by INEGI, the Mexican National Institute for Statistics and Geography. In the ENADID, household members are asked to report on nonresident, migrant household members' locations in the U.S. With these data, it is possible to calculate $\pi_{sm.}$ Across the specifications used in the analysis, the instrument has first-stage F-test values that fall between 32 and 45 (available from authors), well above the recommended value of 10 for sufficient predictive power (Wooldridge 2001).

Having established associations spanning the 1990-2015 period, which should display some similarity to the average state-level effects measured in earlier periods in previous research (see Raphael 2013; Conover et al. 2015), we ask whether return migration and during the post-recession period reversed the gains attributed to sex-ratio reductions between 1970-2005. We test a specification that introduces an interaction between an indicator of the post-recession observations (2010 and 2015) and the sex-ratio (Eq. 3). If the sex-ratio effects are symmetric in a pre-recession, post-recession period in which the sex-ratio is, on average, increasing and then decreasing, the λ_3 estimate will be close to zero. If, in the post-recession period, sex-ratio increases were associated with excess reductions in women's schooling or labor-force participation—that is reductions beyond the proportionate gains observed between 1990-2005—λ_3 will be negative.

3. $\theta_{mat} = \alpha + \lambda_1 SR_{mat} + \lambda_2 PR_t + \lambda_3 (SR_{mat} \times PR_t) + \beta' X_{mat} + Y_t + \eta_a + \mu_m + \varepsilon_{mat}$

We then turn to the second research question: do population sex-ratio effects operate through changes to the structure of households or do they also operate through spillover effects at the municipality level? That is, do women who live in households without returned migrants also have schooling and labor

market outcomes that are responsive to municipal population characteristics? We test this question by calculating θ_{mat} in Eq. 3 for several sub-populations: women who live in a household with a recently returned migrant from the U.S. (5 years prior to the date of interview); women who live in a household without returned migrants; women who are partnered with a recently returned migrant, women who are partnered with someone living in Mexico five years earlier, and unpartnered women.

Finally, we consider whether the patterns are observed could be plausibly influenced by family formation patterns. That is, when the relative presence of men increases, do women marry earlier and have children at younger ages? Though neither is incompatible with continuing schooling and employment trajectories in contemporary Mexico—and certainly less resourced women often engage in informal employment after marriage and childbearing—both may have a deterrent effect on the margin. We test this by estimating Eq. 3 with two outcomes: the proportion of women married at the time of data collection (mean=65%) and the proportion of women with any children under the age of 5 (to correspond to 5-year age and time intervals); mean=36%. Both are estimated for the cohorts of women ages 15-44 in each period.

We subject all of the aforementioned specifications to an additional check. The fixed effect estimates in Eqs. 1 and 3 address time-invariant variation at the municipal level. We also consider that some regions in Mexico may be changing in a way over time that pre-dates the recession, that shapes women's outcomes, and that encourages or discourages return migration. We introduce state-specific linear trends to Eq. 1 by interacting state-level fixed effects with a linear time trend. We find that all of the results presented below are robust to their inclusion.

PRELIMINARY RESULTS

Table 1 displays selected unstandardized regression coefficients predicting women's average completed years of schooling and the proportion of women in the cohort who have completed any college-level training. These specifications are limited to women ages 15-24 in each period; the contemporaneous sex ratio is unlikely to be associated with completed schooling at later ages after which formal schooling is largely completed. The first and third columns are estimated using Eq. 3; the second and fourth reflect two-staged least squares estimates in which the sex ratio is instrumented using the predicted size of the absent male population from U.S. data on age-specific, state-specific migrant counts and the pre-recession probabilities of moving from Mexican states to U.S. states (Eq. 2). Though not displayed, each of the specifications includes age, year, and municipality fixed effects, as well an industry-specific controls, and a control for the total population size of the municipality (logged).

Note that the specifications generate comparisons across space and *across cohorts*. Completed schooling can decline over time because 20-24 year olds in one cohort could obtain lower average completed schooling relative to the group of women who were 20-24 years old 5 years earlier.

In the first column, we observe an average negative association between the sex ratio and the average years of completed schooling spanning the 1990-2005 period. The IV estimate in column 2 is also negative but much larger, indicating that as the relative presence of men (or the sex ratio) declines across cohorts within a municipality, female completed schooling increases. In the post-recession

period, when the sex ratio *increases,* the estimate takes a larger negative value (the sum of the zero-order and interaction term). In both specifications the interaction term is large and nonzero. The magnitude of the post-recession term is sizeable; a sex ratio increase of 7-per-100 is associated with a half-year less completed schooling relative to the expected value. This is roughly equivalent to about a quarter standard deviation of the variation in schooling among 15-24 year olds over the period studied.

Table 2 presents the results from similar specifications predicting employment outcomes. We observe a similar pattern. The negative association in the pre-recession period indicates increases in employment, managerial employment, and earnings for women in communities with declining share of men between 1990-2005. In the post-recession period, however, the association is not only symmetric, it is much larger. The interaction terms are nonzero and large in size. In each specification, these at least double the size of the negative association. The IV estimates, for example, indicate a share employed that is nearly 7 percentage points (or roughly 25%) lower in municipalities in which the sex-ratio increased by 7 between 2005-2015. The same sex-ratio increase is associated with a 1.5 percentage point lower share of women in managerial positions (relative to mean of 6.3%).

Table 1. Unstandardized coefficients predicting average completed years of school and share with college attendance, female cohorts age 15-24 in Mexico, 1990-2015

	Years of Schooling		College attendance	
	OLS	IV	OLS	IV
Sex Ratio: Men per 100 Women	-0.00031	-0.03369	0.00004	0.00004
	[0.00053]	[0.00894]	[0.00002]	[0.00030]
Sex Ratio x Post Recession	-0.00383	-0.04459	-0.00016	-0.00219
	[0.00143]	[0.00571]	[0.00004]	[0.00024]
Industry-specific Controls	√	√	√	√
Age, Year, and Municipality Fixed Effects	√	√	√	√
N	23,979	23,955	23,979	23,955

Table 2. Unstandardized coefficients predicting share employed, employed in managerial positions, and average earned income, female cohorts age 15-44 in Mexico, 1990-2015

	Employment		Managerial Employment		Earned Income (log)	
	OLS	IV	OLS	IV	OLS	IV
Sex Ratio: Men per 100 Women	-0.00000	-0.00314	-0.00001	-0.00167	0.00154	-0.02978
	[0.00003]	[0.00067]	[0.00001]	[0.00029]	[0.00087]	[0.00757]
Sex Ratio x Post Recession	-0.00053	-0.00685	-0.00010	-0.00111	-0.00144	-0.01958
	[0.00008]	[0.00058]	[0.00003]	[0.00019]	[0.00119]	[0.00677]
Industry-specific Controls	√	√	√	√	√	√
Age, Year, and Municipality Fixed Effects	√	√	√	√	√	√
N	55,877	55,821	55,880	55,824	51,642	51,586

Notes for Tables 1, 2: Standard errors in brackets. All specifications include controls for the share of the municipal population working across each of 11 industries, for the total municipal age-specific population size (logged), and for age-, year-, and municipality fixed effects. Sample sizes vary across specifications because of incomplete data on the outcome measures in a small fraction of municipalities.

We turn to the second question this study asks: are these associations the result of changing behavior in migrant homes? Or are these effects operating in the larger labor market? To test this, we re-estimate the specifications shown in Tables 1 and 2, in which municipality level averages are generated separately for women in homes with migrants who have returned in the past five years and women in homes without returned migrants. For each of the outcomes, we find similar estimates across the two groups (results not shown here). We repeat the exercise for married women who are partnered with returned migrants and women partnered with non-migrants. Again, we find statistically indistinguishable associations across the two groups. We conclude, then, that the associations in Tables 1 and 2 are not limited to women in migrant homes. That is, the changing sex ratio at the municipality level shapes the outcomes of women in the municipality at large. The results point to a set of processes that are not driven solely by intrahousehold substitution but instead point to community-level processes.

In ongoing work, we ask whether community-level partnership and childbearing appear to be shaped by the changing population sex ratios as well. We assess to what extent these contribute to the sizeable reversals in women's schooling and employment generated by post-recession population change.

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