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Abstract

This paper assesses whether international migration from Mexico impacts the marital, fertility, schooling, and employment outcomes of the Mexican women who remain behind. To estimate the impact of the relative supply of men on female outcomes, I exploit variation over time as well as across Mexican states in the demographic imbalance between men and women. I construct a gauge of the relative supply of men for women of different age groups based on state-level male and female population counts. Potential male spouses are allocated across female age groups based on the empirically-observed propensity of men of specific ages to marry women of specific ages. Using data from the 1960, 1970, 1990, and 2000 Mexican censuses, I estimate a series of models where the dependent variable is the inter-census change in an average outcome for Mexican women measured by state and for specific age groups and the key explanatory variable is the change in the relative supply of men to women in that state/age group. To address possible bias from selective out-migration of women in response to the scarcity of men, I also present results where the gauge of the relative supply of males is instrumented using a similar gauge calculated based on one's state of birth rather than one's current state of residence. I find that the declining relative supply of males positively and significantly impacts the proportion of women who have never been married as well as the proportion of women who have never had a child. In addition, states experiencing the largest declines in the relative supply of men also experience relatively large increases in female educational attainment and female employment rates. However, I find little evidence that women who do marry match to men that are younger or less educated than themselves.

1. Introduction

Between 1970 and 2007, the foreign-born Mexican population residing in the United States increased over fourteen fold, from approximately 820,000 to 11.9 million.[1] Over the comparable period, the resident population of Mexico increased 2.2 times, from 50.6 to 108.7 million. Thus the net migration out of Mexico and into the United States has increased well beyond what one would have expected based on Mexican population growth alone.

The Mexican immigrant population in the United States is hardly a cross section of the national Mexican population. To start, the migrant population is disproportionately of working age (between 15 and 45). In addition, the Mexican migrant population in the U.S. is disproportionately male. Among Mexican foreign-born residents of the U.S. in 2007, the ratio of males to females is roughly 1.43 among those 16 to 20 years of age, 1.56 among those 21 to 25 years of age, and 1.49 among those 26 to 30 years of age.

The sheer size of the migratory flow between Mexico and the U.S. coupled with this documented gender imbalance implies that migration is likely altering the internal demographic composition of the population remaining in Mexico. In particular, international migration has lowered the ratio of males to females. The increasing relative scarcity of men may impact the behavioral choices of non-migrant Mexican women along a number of dimensions. To start, young women may delay marriage and child-bearing. To the extent that changes in the relative supply of men alter the perceived likelihood of marriage, women may invest more in schooling to ensure future economic self-sufficiency, and exhibit greater attachment to the formal labor markets. Alternatively, via a change in the gender terms-of-trade in the marriage market, women may marry men to whom they are less suitably matched (for example, men that are younger or less educated, or men who exhibit less loyalty).

[1] All figures cited in this paragraph are based on tabulations of census data from the United States and Mexico.

Much research effort has been devoted to studying the impacts of immigration on social and economics outcomes in the receiving country, such as labor markets (Borjas 2003, Card 2001, 2005, Ottaviano and Peri 2008), economics assimilation (Borjas 1995, Lubotsky 2007, Raphael and Smolensky 2009), crime (Butcher and Piehl 2007), and public expenditures (Smith and Edmonston 1997). Several authors have investigated these outcomes specifically for Mexican immigrants (see the collection of papers in Borjas 2007). Considerably less effort has been devoted to studying the effects of a mass migration on the sending country. In this paper, I assess whether international migration from Mexico impacts the marital, fertility, schooling, and employment outcomes of the Mexican women who remain behind.

To estimate the impact of the relative supply of men on female outcomes, I exploit variation over time as well as across Mexican states in the demographic imbalance between men and women. As has already been noted, migration from Mexico has increased at a rate far in excess of Mexican population growth, providing key inter-temporal variation in gender composition. Equally important to my estimation strategy is the variation in migration rates across Mexican states. For example, tabulations from the 2000 Mexican census reveal that less than one percent of households in the Mexican state of Campeche had a migrant abroad, compared with over 15 percent of households in the state of Michoacán. Generally, central Mexican states and a few northern states have historically contributed disproportionate shares to the northern flow of migrants. Consequently, there is considerable heterogeneity across states in the change in sex ratios in recent decades.

I construct a gauge of the relative supply of men for women of different age groups based on state-level male and female population counts. Potential male spouses are allocated across female age groups based on the empirically-observed propensity of men of specific ages to marry

women of specific ages. Using data from the 1960, 1970, 1990, and 2000 Mexican censuses, I estimate a series of models where the dependent variable is the inter-census change in an average outcome for Mexican women measured by state and for specific age groups and the key explanatory variable is the change in the relative supply of men to women in that state/age group. To address possible bias from selective out-migration of women in response to the scarcity of men, I also present results where the gauge of the relative supply of males is instrumented using a similar gauge calculated based on one's state of birth rather than one's current state of residence.

I find that the declining relative supply of males positively and significantly impacts the proportion of women who have never been married as well as the proportion of women who have never had a child. In addition, states experiencing the largest declines in the relative supply of men also experience relatively large increases in female educational attainment and female employment rates. However, I find little evidence that women who do marry match to men that are younger or less educated than themselves.

2. The Impact of the Relative Supply of Men on Female Socioeconomic Outcomes

Central to the current empirical analysis is an economic model of the process by which men and women match in the marriage market and the derivative decisions that women make based on marriage market conditions. One can frame the marriage market in terms of search theory, whereby heterogeneous men and women seek out potential mates and where search is costly and new prospects present themselves in some time-delayed manner (i.e., with search friction). From the female perspective, prospective partners present themselves at a rate that is determined by the relative supply of men. When men are abundant relative to women, the arrival

rate will be relatively high and visa versa when men are relatively scarce. Assuming that prospective spouses can be ranked according to some gauge of quality, a woman searching for a partner will have a reservation quality level below which a prospective spouse will be rejected and above which the prospect will be accepted. For a prospect exceeding the woman's reservation threshold, a match will form if the woman exceeds the corresponding threshold of the potential male suitor.

This simple framework can be used to theorize about how declining Mexican sex ratios may be influencing key socioeconomic outcomes for non-migrant Mexican women. Gender biased migration reduces the relative supply of men which in turn should reduce the rate at which women encounter prospective suitors. For a given reservation quality threshold, a specific woman must search longer to find a suitable spouse, thus delaying time until marriage. Alternatively, women searching for spouses may lower their standards and on average marry lower quality men as a result. Most likely, adjustments will occur along both margins; that is to say, women will be less likely to marry and, on average, marry lower quality men. These impacts will be further exacerbated by the upward adjustment of the reservation quality thresholds of men.

While this discussion focuses on the likelihood of marriage and the average quality of male spouses, changes in the relative supply of men may also impact outcomes occurring within marriages as well as women's behavioral choices outside of marriage. For example, Chiappori, Fortin, and Lacroix (2002) present a model of household decision making whereby the bargaining position of spouses within the household is influenced by "distribution factors" external to the household. Distribution factors, such as the ease with which one can divorce or the ratio of men to women, influence the reservation or fall-back position of each spouse should

the marriage dissolve and thus determine bargaining power over any welfare surplus generated within the marriage. In particular, the authors find empirical evidence that variation in the ratio of men to women is empirically associated with the labor supply choices of women in a manner suggesting that when men are scarce, women's bargaining power is diminished. In other words, holding the quality of one's spouse constant, women stand to benefit less from marriage when men are relatively scarce.

A scarcity of male suitors may also improve the bargaining position of men when it comes to negotiating personal relationships outside of marriage. For example, men may find it easier to find sexual partners and may be required to demonstrate less loyalty in personal relationships when they are abundant relative to women. Indeed, prior empirical research has found significant inverse relationships between sex ratios and the rates of teen pregnancy (Sampson 1995), syphilis (Kilmarx et. al. 1997) and gonorrhea (Thomas et. al. 2003). With regard to the teen-pregnancy finding, however, the impact on teen pregnancy will depend in part on the mechanism that is impacting the sex ratio. For example, Kamdar (2007) finds that the massive increase in black male incarceration in the U.S. has reduced black female teen pregnancy rates, a pattern the author attributes to the particular promiscuity of those most likely to be incarcerated.

Regarding female behavioral choices outside of marriage, one's marriage prospects are clearly contemporaneously and dynamically related to one's labor supply and human capital choices. For example, the expectation of a lengthier period until marriage, or perhaps an increased probability of never marrying is likely to induce women to make human capital investments that will ensure their future economic self-sufficiency. When men are relatively scarce, it would be rational to invest more in formal education and to acquire experience in the

formal labor market. Moreover, to the extent that marriage brings task specialization in home production as well as child bearing, lower marriage rates may contemporaneously free-up women's time for other pursuits, including education and formal work.

Several recent papers have analyzed the impact of the ratio of men to women on the marital and economic outcomes of women in varying social and historical contexts. Angrist (2002) tests for an impact of immigrant-induced variation in sex ratios in the United States on the marital outcomes of the second-generation U.S. children of immigrants. Based on an analysis of eleven ethnic groups defined by country of origin with a large immigrant presence in the U.S., the author finds that second generation women are more likely to marry, less likely to work, and more likely to have high incomes when immigration increases the sex ratio of their ethnic group.

Charles and Luoh *(forthcoming)* analyze the effect of variation in male incarceration rates on the marital outcomes of African-American women in the U.S. The authors find that in states experiencing particularly large increases in black male incarceration rates, women are less likely to marry and more likely to marry men who are less educated than themselves. Abramitzky, Delavande, and Vasconcelos (2009) assess the impact of geographic variation in sex ratios across French regions caused by variation in WW-I war casualties on the marital outcomes of men and women. The authors find that in those regions suffering the most war casualties, men were more likely to marry women from a higher social class than their own.

Rao (1993) presents a particularly novel assessment of the impact of marriage market conditions on the surplus that women derive from marriage. The author investigates the determinants of dowry payments from the family of the bride to the family of the groom for a set

of villages in central India. The author finds an association between the relative supply of women and the size of the dowry, with a glut of women associated with rising dowry costs.[2]

As we will soon see, migration between Mexico and the U.S. has certainly lowered the ratio of men to women, consequently shifting the terms-of-trade in the Mexican marriage market decisively in favor of Mexican men. Whether this change has impacted average outcomes for Mexican women is an empirical question to which we now turn.

3. An Empirical Portrait of Trends in Outcomes for Mexican Women

The analysis presented in this paper is based on microdata from the 1960 (1.5 percent), 1970 (1 percent), 1990 (10 percent), and 2000 (10.5 percent) Mexican Censuses. With the exception of the 1960 census which was drawn from a sample of individuals, all censuses are based on household samples and permit matching between spouses within households (an important feature for constructing the relative supply of males index in subsequent sections). Data from census year 1980 is unavailable as large portions of the data base from that year were destroyed in the 1985 Mexico City earthquake (Rabell 2001). All of the data for this project were downloaded from the IPUMS international webpage and the University of Minnesota.

Before turning to a discussion of estimation methodology in the next section, here I present a series of stylized facts that describe trends in key social and economic outcomes for Mexican women over the last forty years of the 20th century. I also characterize trends in Mexican sex ratios and document the relationship between geographic variation in migration and geographic variation in the relative supply of men.

[2] Several authors have also investigated the impact of marriage market conditions on the likelihood of becoming a single parent, although Neal (2004) argues that these regressions are fundamentally flawed.

Trends in Female Outcomes

Figures 1 through 6 depict trends in several socioeconomics and demographic indicators for Mexican women over several decades. With the exception of employment rates and school enrolment rates (Figures 5 and 6), tabulations are presented for 1960, 1970, 1990 and 2000. Employment and enrolment data was not collected in the 1960 census.

Figures 1 and 2 reveal that the proportion of Mexican women who have never been married as well as the proportion that have never had a child has increased among relatively young women. For women in their late teens and early twenties, the proportion never married increases by 8 to 13 percentage points between 1960 and 2000. Changes since 1960 in the proportion that have not had children are more modest, although using 1970 as a base yields larger increase in these outcomes.

To gauge changes in out-of-wedlock childbearing, for each census year I tabulated the proportion of women by age that have children yet have never been married (Figure 3). The proportion of women in this category increases quite steadily in Mexico between 1960 and 2000. However, even in 2000 the proportion of women who are unmarried and who have children is generally low, with the highest incidence for women in their early 20's in 2000 never exceeding 4.5 percentage points.

We observe more notable changes in female educational attainment (Figure 4), school enrolment (Figure 5), and female employment rates (Figure 6). Between 1960 and 2000, the proportion of women ages 15 to 50 with no formal education declines from 39 percent to 6 percent while the proportion of women with at least seven years of completed schooling increases from 8 percent to 58 percent. Moreover, the proportion of women with more than twelve years of schooling increases from one percent in 1960 to 11 percent in 2000. Figure 5

depicts quite large increases in the proportion of women under 25 that are enrolled in school at the time of the census. For the youngest women depicted, increases between 1970 and 2000 are on the order of 30 percentage points, though even for women in their early 20s increases of five percentage points or more are observed.

There are very large increases in female labor force participation (Figure 6). Interestingly, the increases in the employment rates for women are such that they have altered the age-employment profile relative to the earliest year analyzed. In 1970, female employment rates increase between the ages of 14 and 19 and decline thereafter; likely reflecting the relationships between employment, age, marriage, and fertility. In contrast, the 1990 data reveal a relatively flat age-employment profile after 20 years of age, with modest declines in employment rates through age 50. By 2000, female employment rates increase with age at a decreasing rate through the early 40s.

The theoretical discussion above suggests that changes in the relative supply of men may also impact the quality of the spouses that women choose when they do marry due to the endogenous determination of their reservation quality threshold when searching for a spouse. With the 1970, 1990, and 2000 data,[3] I am able to explore two dimensions of formed marriages: the age of husbands relative to wives, and the relative level of educational attainment. Presumably, women would prefer to marry men that are at least as educated as themselves as a wealth of empirical labor market research has documented strong causal effects of formal schooling on earnings (Card 1999).

With regards to age, it is difficult a priori to predict how the average age difference between married men and women would change in response to a decline in the relative supply of

[3] Since the 1960 data is based on a sample of individuals with no household identifiers, I cannot marriage married women to their husbands for this year.

men. Empirical research consistently finds that women appear to prefer to marry men that are on average slightly older then themselves (Charles and Luogh *forthcoming).* Thus, one might hypothesize that when men are scarce, women may be more likely to marry men that are younger than they are, inducing a positive relationship between average husband-wife age differences and male-to-female sex ratios. On the other hand, women may prefer to not marry men that are too much older. In response to a relative scarcity of men, women may search further up into the age distribution of available potential spouses, thus inducing negative correlation between the relative supply of men and the average age difference between husbands and wives. Given this ambiguity, the descriptive analysis here as well as the more formal analysis to follow explores several aspects of the distribution of within-marriage age differences.

Table 1 depicts key percentiles of the distribution of husband-wife differences in educational attainment (measured in years of completed schooling) as well as husband-wife difference in age for 1970, 1990, and 2000. These tabulations are based on all married women between the ages of 14 and 50. With regards to educational attainment, the median husband-wife difference in years of schooling completed is zero in all years, while the average difference is slightly positive (less than one year for each census). While there are no clear trends in the median or average, the proportion of women married to men who have completed less schooling than themselves increases. Regarding age, the overwhelming majority of women in each year marry older men. Both the mean as well as the median age difference declines over the thirty year period depicted, with the median dropping by one year and the mean declining by approximately two years.

Table 2 presents an alternative set of characterization that explores how age and educational disparities within marriage varies for groups of married women defined by age.

Rather than describing the entire distribution, for each outcome the table splits marriages into three groups and presents the relative frequency distribution across each. For educational disparities, the table depicts the proportion of marriages where women are more educated than their husbands, where women have the same level of educational attainment as their husbands, and where women have less education than their husbands. Similarly for age, the table show the proportion of marriages where women are older than their husbands, of the same age as their husbands, and younger than their husbands.

Within each age group, the proportion of marriages where women are more educated than their husbands increases between 1970 and 2000. The largest increase of approximately 7.5 percentage points is observed for married women between 31 and 40 years of age, although increases on the order of 5 percentage points occur for each age group. Interestingly, there are slight increases in the proportion of marriages where men are more educated than their wives for all age groups, suggesting an increase in overall variance.

The tabulations by age group similarly reveal increases in the proportion of marriages characterized by women marrying younger men. For all marriages, the proportion characterized by a relatively older wife increases from 0.098 in 1970 to 0.150 in 2000. Again the largest increase in this outcome is observed for women between 31 and 40 years of age (a change of 5 percentage points).

Thus we observe increases in the proportion of women who have never been married and have never had children, especially among relatively young women. We also observe an increase in the incidence of never married women with children, large increases in education attainment and school enrolment, and large increases in female labor force participation. We have also shown that women who do marry are increasingly likely to be more educated and older

than their spouses. To be sure, these trends are perhaps largely driven by factors other than changing sex ratios, as similar trends in marriage, fertility, education, and formal labor force participation are observed for women in other countries (for example, the U.S.). Nonetheless, as we will soon see, these trends coincide with sizable declines in the relative supply of resident Mexican men.

Trends in Mexican Sex Ratios and the Relationships to Migration Abroad

As was noted in the introduction, the population of Mexican nationals residing in the Untied States is disproportionately working age and male. Moreover, this migrant population has grown considerably over the past four decades. Here I document the consequent impact on the ratio of men-to-women in Mexico and explore the relationship within Mexico between the proportion of households that send migrants abroad and the relative supply of men.

Figure 7 presents the ratio of males-to-females for five year age groups in each of the census years between 1960 and 2000. Even in 1960 the ratio of males to female declines between the age groups of 11 to 15 and 21 to 25, likely reflective of the presence of migrant men in the U.S. and elsewhere. From 1960 to 2000, however, these ratios decline further, especially for age groups above 20 years of age. For example, the ratio of men to women between 21 and 25 years of age declines from 0.93 to 0.88 between 1960 and 2000. Among those 31 to 35 years of age, the sex ratio declines from 0.98 to 0.90.

The changing sex ratios in Mexico mirror changes in the sex ratio among Mexican nationals residing in the U.S. Figure 8 presents comparable sex ratios for the foreign-born Mexican population in the U.S. tabulated from the 1970 and 1990 U.S. Census of Population and Housing as well as from the 2007 American Community Survey.[4] The 1970 census reveals a fair degree of balance between Mexican-born men and women residing in the U.S. for all age groups.

[4] The micro data for these tabulations were downloaded from the IPUMS webpage at the University of Minnesota.

In 1990 and 2007, however, there are notable increases (to above 1.2, but in some instances above 1.4) in the ratio of men-to-women especially among those in their twenties.

The low sex ratios beyond 15 years of age observed in Mexico also appears to be unique relative to other Latin American countries. Figure 9 depicts sex ratios for five year age groups up through age 50 for Mexico as well as for four other Spanish-speaking Latin American countries. In all comparisons, Mexican sex ratios among those over 15 are relatively lower, with particularly large differences relative to Panama, Costa Rica, and Venezuela.

Unfortunately, the Mexican census does not contain detailed information on migrants abroad. Thus it is not possible to depict the gender composition of the migratory outflow. However, the 2000 Mexican census does include a question at the household level inquiring whether the household currently has one of its members residing in a foreign country. With this variable it is possible to estimate a migration rate[5] defined specifically as the proportion of households with a migrant abroad, and to then analyze the geographic relationship for one census year between the overall migration rate and the region sex ratio.

To the extent that migration is gender biased, one should observe a negative correlation between a state's overall migration rate and the state's sex ratio. To see this point, define M^b_i as the population total at time of birth for a given male birth cohort in state i, and M^c_i as the current population of males from this birth cohort in state i. Assume that the difference between these two totals, $M^m_i = M^b_i - M^c_i$, is due entirely to international migration out of the state. Define the comparable totals, W^b_i, W^c_i, and W^m_i, for the corresponding birth cohort of women in state i.

[5] To be sure, to estimate a precise migration rate one would want the count of migrants over the some count of the base population. The census does include information on the number of migrants from each household that are living abroad, permitting an estimate of the total migrant population sent by each state which can then be divided by the sum of the total current population and the migrant population. In the calculations to follow, I explored the geographic variation using this alternative estimate of the migration rate as well as the migration rate based on the proportion of households with a migrant abroad. Both yielded similar results.

Assume for the moment that only men migrate internationally. Under this assumption, one can derive the following linear relationship between the sex ratio of the specific birth cohort and the overall migration rate as follows:

$$\frac{M^c_i}{W^c_i} = \frac{M^b_i - M^m_i}{W^b_i}$$

(1)
$$\frac{M^c_i}{W^c_i} = \frac{M^b_i}{W^b_i} - \frac{M^m_i/(M^b_i + W^b_i)}{W^b_i/(M^b_i + W^b_i)}$$

$$\frac{M^c_i}{W^c_i} = \frac{M^b_i}{W^b_i} - \left[\frac{M^b_i}{W^b_i} + 1\right] migration_i$$

where $migration_i$ is the total migration rate for the cohort under the assumption that only males migrate. Equation (1) tells us that with perfectly gender imbalanced migration, the current sex ratio for a given birth cohort in state *i* equals the sex ratio at birth minus one plus the sex ratio at birth times the overall migration rate. Assuming that males and females are born in proportion to one another,[6] equation (1) implies that a regression of sex ratios on the overall migration rate should yield a slope coefficient of approximately -2.

Similarly, it is easy to show that with gender balanced migration, the current sex ratio should not depend on the migration rate. Specifically, assuming that both males and females of a given birth cohort leave state *i* at rate $migration_i$, the following holds:

(2)
$$\frac{M^c_i}{W^c_i} = \frac{M^b_i - migration_i M^b_i}{W^b_i - migration_i W^b_i} = \frac{M^b_i(1 - migration_i)}{W^b_i(1 - migration_i)} = \frac{M^b_i}{W^b_i}.$$

[6] The natural odds ratio of a males birth is slightly greater than one, with sex ratios at birth without selective aborting around 1.05 (Almond and Edlund 2008).

That is to say, with gender-balanced migration the current sex ratio will equal the sex ratio at birth. Consequently, a regression of state sex ratios against state migration rate should yield a slope coefficient of zero.

Figures 10 and 11 present scatter plots of sex ratios measured at the state level in 2000 against the proportion of households in each state with a migrant living in a foreign country. Figure 10 presents a scatter for those between 20 and 25 years of age while figure 11 presents a similar scatter for those between 31 and 35. The figures reveal several notable patterns. First, there is a great degree of variation across states in the male-to-female ratio within the age groups depicted. Among those 31 to 35 years of age, the sex ratio varies from below 0.85 to nearly 1.05 while the range among states for 20 to 25 year olds ranges from below 0.8 to above one. There is also a considerable degree of heterogeneity across states in the proportion of households with a migrant abroad (with a range from under one percent of households to over 15 percent of households).

The figures also reveal a strong inverse relationship between each sex ratio and the proportion of households with a migrant abroad. In figure 10, the slope coefficient on the line fit through the data cloud equal -0.901 and is significant at the one percent level of confidence. The corresponding coefficient in Figure 11 is -0.921 and is also highly significant. While these slope coefficients fall considerably short of -2, they are certainly statistically distinguishable from zero and strongly indicate that gender-biased international migration is altering Mexican sex ratios in a geographically concentrated manner.[7]

[7] Note, migration of Mexican women between states in response to the relative scarcity of men may attenuate the relationship between international migration and the sex ratio, to the extent that Mexican women move from states with low sex ratios to states with high sex ratios. Indeed, this poses a key identification problem in the models we estimate below. The next section presents a discussion of the implication of such inter-state migration and lays out an instrumental variables strategy designed to address this concern.

4. Estimation Strategy

The methodological strategy employed in this paper involves exploiting the cross-state variation in changes in the relative supply of men. Specifically, let *c* index three age groups (16 to 19, 20 to 25 and 26 to 30), *s* index the 32 Mexican states, and *t* index time. Define the variable $rsupply_{cst}$ as the relative supply of men to women in age group *c* in state *s* in year *t*, and $\Delta rsupply_{cst}$ as the change in the relative supply of men between periods *t-1* and *t*. My estimates of the impact of the relative supply of men on outcomes for Mexican women derive from estimation of the equation

$$\Delta Outcome_{cst} = \alpha_c + \psi_t + \delta_s + \beta \Delta r\sup ply_{cst} + \varepsilon_{cst}, \quad (3)$$

where $\Delta Outcome_{cst}$ measures the change in an outcome variable between period *t-1* and *t* measured at the state/age group level, α_c is an age-specific intercept permitting linear time trends that vary by age group, ψ_t are time period fixed effects, δ_s is a state-specific intercept, β provides the key estimate of the marginal effect of the change in the supply of men on the outcome variable, and ε_{cst} is a mean-zero disturbance term.

Estimation of equation (3) relies on cross-state variation in the change in the relative supply of men. That is to say, I am assessing how within-state changes in outcome variables correlate with within-state changes in the key explanatory variable. By specifying equation (3) in first differences, average state-level variation in outcomes levels are differenced out of the equation. Moreover, the inclusion of state-specific fixed effects in the change specification controls for linear-time trends in the outcome levels that vary across states. The inclusion of age-specific fixed effects permits linear time trends in each outcome variable that may vary across age groups. Finally, the inclusion of year fixed effects permits the average changes to differ across census-year pairings. This is particularly important given that for one of our

comparisons, the temporal change spans a twenty-year period (in particular the change between the 1970 and 1990 censuses).

The identifying assumption behind equation (3) is that the cross-state variation in the between census-year changes in the relative supply of men, after purging the portion of variance in this explanatory variable attributable to variation across age groups, states, and census year pairings, is exogenous. Perhaps the key threat to the internal validity of the regression model in equation (3) comes from the possibility that women may internally migrate within Mexico in response to changes in marriage market conditions within their home state as well as in response to cross-state differences in marriage market conditions.

For example, suppose that women vary with respect to their desire to be married and/or to have to children. In response to a decline in the relative supply of men, those women who are set on marrying may migrate to states with marriage market conditions more favorable to women. Such endogenous selection of women across states results in women with strong preferences for marriage locating in states with favorable marriage market conditions and women less determined to marry in states with relatively poor conditions. Unobservable heterogeneity along this dimension of preferences may induce spurious correlation between variation in the relative supply of men and the outcome variable of interest. That is to say, averages preference towards marriage should exert a negative impact on the proportion never married and be positively correlated with the relative supply of men. Thus, the omission of geographic variation in such preferences would exert a negative bias on the estimate of the relative supply of men on the proportion of women who have never married.

To address such concerns, I exploit the fact that in each census year the Mexican census collects information on both one's state of residence as well as one's state of birth. Variation in

the relative supply of men in one's age group based on one's state of birth (and the state of birth of remaining non-migrant Mexican men) will not be influenced by the internal migration of men and women. Below, I estimate the specification in equation (3) above using (1) ordinary least squares and the relative supply of men in one's current state of residence, and (2) instrumental variables where the relative supply of men based on one's state of birth is used as an instrument for the relative supply of men in one's state of residence. Table 3 presents a series of regressions of the relative supply measure based on state of residence on the relative supply measure based on state of birth. In all three model specifications, the variable based on state of birth is a highly significant predictor of the relative supply measure based on state of residence.

To measure the relative supply of men to women of a specific age, I make use of the empirically-observed propensity of married men of specific age groups to marry women of specific age groups. To be specific, define $p_{c|i}$ as the conditional probability that a married man of age i is married to a women a of age c, where $\sum_c p_{c|i} = 1$. Let men_{ist} be the total population of men of age i in state s in year t. If the distribution of married men across the spousal age distribution is indicative of men's preferences, then the supply of men of age i to women of age c in a given state and year is given by $supply_{icst} = p_{c|i} * men_{ist}$. The total supply of men to women in a specific state, age, and year group is found by summing over i, or $\sup ply_{cst} = \sum_i \sup ply_{icst}$. Finally, dividing this total supply measure by the relevant population count for women provides a gauge of the relative supply of men $(rsupply_{cst} = supply_{cst} / women_{cst})$.

I estimate the conditional probabilities $p_{c|i}$ using data on all married men in the 1990 census who can be matched to their spouses. Figure 12 displays these empirical probability distribution functions for 25 and 35 year old men. While men are certainly more likely to marry women who are relatively close to them in age (although both distributions reveal a propensity to

marry younger women), there is a fair degree of pairing outside of narrow five year age bands. Hence, the relative supply measure should more precisely capture how the supply of men of a given age group is distributed across women of different ages. I calculate the relevant male and female populations at the state age group level for all census years included in the analysis and then tabulate relative supply according to the formula above.

Figure 13 presents a bivariate scatter plot of the relative supply measure against the sex ratio for women ages 26 to 30 year of age. As can be seen in the figure, the relative supply of men allowing men of all ages to contribute to supply based on observed marriage patterns is quite strongly correlated with the sex ratio. Comparable scatter plots for other age groups are qualitatively similar.

I restrict the analysis to three age groups of women; 16 to 19 year olds, 20 to 25 year olds, and 26 to 30 year olds. Figures 1 through 6 reveal that most first marriages, first birth, and human capital investments choices take place prior to thirty years of age. Thus, if the relative supply of men is impacting outcomes one would expect to see an impact for these three age groups. Relative supply is tabulated for each single year age group and then averaged within the broader age bands that form one the age dimension of variation in my data set.

Finally, all of the models presented below are weighted by the average number of observations used to compute the inter-census change in the dependent variable. I tabulate robust standard errors that are clustered by state and age groups.

5. Estimation Results

Before estimating more complex specifications, Table 4 displays the basic relationship between changes in each of the outcome variables and changes in the relative supply of men. To

construct the table, I first stratify the sample of between-census year changes into those observations where the change in the relative supply of men is above the median value and the set of observations where changes in the relative supply of men are below the median. The former group represents observations experiencing relatively favorable changes in marriage market conditions while the latter group experiences comparably unfavorable changes. The first two columns of the table present the average change in each outcome variable within each stratum, while the final column presents the difference in these sample averages.

Beginning with the proportion of women who have never married, the table reveals positive average changes for both strata, indicating that Mexican women are delaying the time until first marriage over the time period analyzed. The table also reveals relatively larger average increases in state-age-year cells experiencing below median changes in the relative supply of men, with the relative difference significant at the one percent level of confidence. In other words, women experiencing relatively unfavorable changes in marriage market conditions are increasingly more likely to have never been married. A similar statistically-significant pattern is observed for the change in the proportion of women who have never had a child.

While the incidence of women with children who have never married increases significantly for each of the strata (the average changes are positive and statistically significant for each), there is no relationship between this variable and the relative supply of men as characterized by the stratification in Table 4. Similarly, the table reveals no apparent effect on the likelihood of being enrolled in school.

I do, however, observe strong relationships between marriage market conditions, total years of educational attainment, and employment. Observations with below-median changes in the relative supply of men experience an average increase in years of schooling that exceeds the

average for observations with more favorable marriage market conditions by 1.5 years. In addition, we observe a larger increases in the proportion of women who are employed (with a statistically significant relative difference of approximately 2 percentage points) among observations with less favorable marriage market conditions.

Table 5 presents results from estimation of Equation (3) for each of the outcomes variables. Here, however, I abandon the dichotomous characterization of marriage market conditions and exploit the full variation in changes in the relative supply of men. For each outcome the model presents OLS results where the key explanatory variable is the relative supply of men based on state of residence as well as IV results where the relative supply of men based on state of birth is used as an instrument for the relative supply measure based on state of residence.[8] Within each set, I present estimates for three specifications: a model including year fixed effects, a model with year and age effects, and a model with year, age, and state fixed effects. In all regressions, the average age of women within each group is also included in the specification.

The empirical relationship between the proportion of women who have never been married and the relative supply of men is fairly robust across specifications. In both the OLS and IV models controlling for year-specific and age-specific fixed effects, the relative supply of males exerts a significant (at the one percent level) and negative impact. In the final specification allowing for state linear time trends, the coefficients are attenuated somewhat, yet are still statistically significant at the 10 percent level of confidence. For the proportion of women who have never had a child, relative supply exerts a negative effect which is statistically significant at the one percent level of confidence in all specifications.

[8] Note, the relevant first stage models are presented in Table 3.

In contrast to the differences in means, we do observe a statistically significant positive relationship between the relative supply of men and school enrolment, suggesting that young women are more likely to be enrolled in school when men are relatively abundant. This estimate is fairly consistent across model specifications and significant at either the one percent or five percent level of confidence in all models. Completed years of schooling is also negatively associated with changes in the relative supply of men, suggesting that women complete more schooling when men are relatively scarce. Finally, there is a strong robust negative effect of the relative supply of men on the proportion of women who are working. The coefficient estimate is significant in all specifications, and varies little between models.

The results in Table 5 pool women of three different age groups. In Table 6, I explore whether the relationship between the relative supply of men and the six outcome variables varies across age groups. To do so, I estimate the following slight variation of the empirical model,

$$\Delta Outcome_{cst} = \alpha_c + \psi_t + \delta_s + \beta_c \Delta r \sup ply_{cst} + \varepsilon_{cst}, \quad (4)$$

where the key difference relative to equation (3) is that the slope coefficient on relative supply is permitted to vary with age. The time effects and state effects are still constrained to being equal for all groups. Here I only present the results from estimation by OLS as the instrumental variables results are quite similar.

There is some notable heterogeneity in the estimated impact of relative male supply on the proportion of women who have never married and the proportion of women who have never had a child. The negative relationship between relative supply and the proportion never married holds for the youngest women and women between 20 and 25 years of age, although for the youngest women the marginal effect jus falls short of statistical significance (p-value=0.12). For

older women, there is actually a positive significant marginal impact. A similar pattern is observed for the proportion of women who have never had a child, although here the marginal negative effect of relative male supply is statistically significant at the five percent level for the youngest women.

Regarding the positive relationship between school enrolment and the relative supply of men, this appears to be driven by a particular large marginal effect for the oldest women in the sample (26 to 30 years of age), while the negative impact on years of schooling is driven by a large negative coefficient for women in their early twenties. For educational attainment, the marginal impact is significant for this group only. The estimated impacts of the relative supply of men on female employment rates are quite consistent across age groups. The observed marginal effects are quite close to one another and are all statistically significant at the 5 percent level of confidence.

Tables 4, 5, and 6 explore the relationship between the relative supply of men and average outcomes measured for all women regardless of marital status. However, several of the papers reviewed above find that the relative supply of men may also impact characteristics of marriages that actually form. For example, several papers find evidence consistent with women dropping their standards when men are relatively scarce. Table 7 presents comparisons of means for observations with above and below median changes in the relative supply of men for four outcomes meant to characterize several dimensions of the quality of the marriage from the perspective of the female. In particular, I explore the relationship between changes in relative male supply and four measures describing married women: (1) the median within-marriage age difference between husbands and wives, (2) the proportion of women married to a younger man,

(3) the median within-marriage education difference between husbands and wives, and (4) the proportion of women married to a less educated man.

With the exception of the median age differential, there are no significant differences in the average changes in these outcomes between observations with above median changes in the relative supply of men and observations with below median changes. For the median age difference, the husband-wife differential is declining for both groups, yet is declining by more for women in age-state-year cells experiencing below median changes in the relative supply of men. Table 8 presents the parallel multivariate results. Controlling for age, year, and state effects eliminates the statistically significant relationship between the median age difference and the relative supply of men. For the remainder of the outcomes, all of the coefficients are statistically insignificant with one exception. In the most detailed specification for the change in the proportion of women married to less educated men, the marginal effect of the relative supply of men becomes statistically significant and positive. In general however, there is little evidence of an impact of the relative supply of men on these outcomes. The corresponding age-specific results in Table 9 corroborate these findings.

While I find significant impacts of the relative supply of men on a number of outcomes, it is difficult to interpret the magnitude of these effects from the regression coefficients presented thus far. To put these estimates into context, Table 10 presents the results from the following thought experiment. Suppose we were to transplant a young woman between 20 and 25 years of age from the central state of Michoacán (where the relative supply of men to women of this age group in 2000 has the relatively low value of 0.89) to the southern state of Quintana Roo (where the relative supply of men to women of this age group in 2000 is the relatively high value of

1.11). By how much would each of the analysis outcomes change? Moreover, how large would these effects be relative to the base level of each outcome for all Mexican Women?

The first column of figures in Table 10 presents the coefficient from the most complete specification reported in Table 5 (those in the final column of figures). Table 10 reports either the OLS or IV coefficient with the smaller value for each outcome. The second column presents the difference in the relative supply of men between Quintana Roo and Michoacán. The third column presents the product of the figures in the first two columns, providing an estimate of the impact that the hypothetical move would have on each outcome. Finally, the final column characterizes the implied effect relative to the base level. For the proportion never married, never having had a child, employed, and the proportion enrolled, I use the average for all Mexican women between 20 and 25 years of age for 2000. For years of schooling, I use the overall average level of schooling for all women 14 to 50 years of age as the base.

The results suggest relatively modest effects of variation in the supply of men on the proportion of women who have never married and have never had a child. Moving from the state with one of the lowest relative supplies to the state with one of the highest would decrease the proportion never married by roughly 6 percent relative to the observe base level. The comparable figure for the proportion that have never had a child is 7 percent. The relative impact on school enrolment among this group is appreciably larger, with the move yielding a 20 percent increase in enrolment. In addition, the implied impact on employment is a reduction of 15 percent. Finally, the relative impact on years of schooling is a modest 6 percent.

6. Conclusion

The results of this study are several. First, I have documented quite large changes in the ratio of resident Mexican men to women since 1960 and the great deal of cross-state heterogeneity in these ratios. Sex ratios for prime age men and women are quite closely associated with the proportion of households in a state with a migrant abroad, with states with higher migration rates having relatively low sex ratios. Thus, it is certainly the case that emigration from Mexico has altered the internal demographic composition of the nation.

Second, changes in the relative supply of men have geographically concentrated impacts on several average socioeconomic outcomes for young Mexican women. In particular, states experiencing relatively large declines in the relative supply of men also experience relatively large increase in the proportion of young women who have never married, the proportion who have never had a child, female school enrolment rates, female educational attainment, and female employment rates. I find very little evidence that among those women marry less educated men or marry men who are younger in response to a relative scarcity of potential spouses.

The findings here raise a number of questions that are certainly in need of further research. For example, as women's behavioral and social outcomes are influence by the relative supply of men, it would be interesting to assess whether internal migration of men and women respond to variation in marriage-market conditions. In other words, do women move from states where men are scarce to states where men are relatively abundant? Do we observe the opposite internal migratory patterns for men? A further analysis of this question would certainly shed light on the process by which men and women seek out spouses and contribute to our understanding of the economics of household formation.

A further, perhaps more difficult question concerns how the changes in female roles induced by gender biased emigration is impacting women's position within Mexico. For example, does the increase in female labor force participation corresponding to greater occupational mobility for women? Has the resultant economic independence alter the living arrangements of young Mexican women (for example, are they more likely to reside away from their parents)?

More generally, greater attention should be paid to the impact of international migration on sending countries. The scale of north-south population movements is certainly sufficient to generate similar patterns in other large sending nations.

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Figure 1

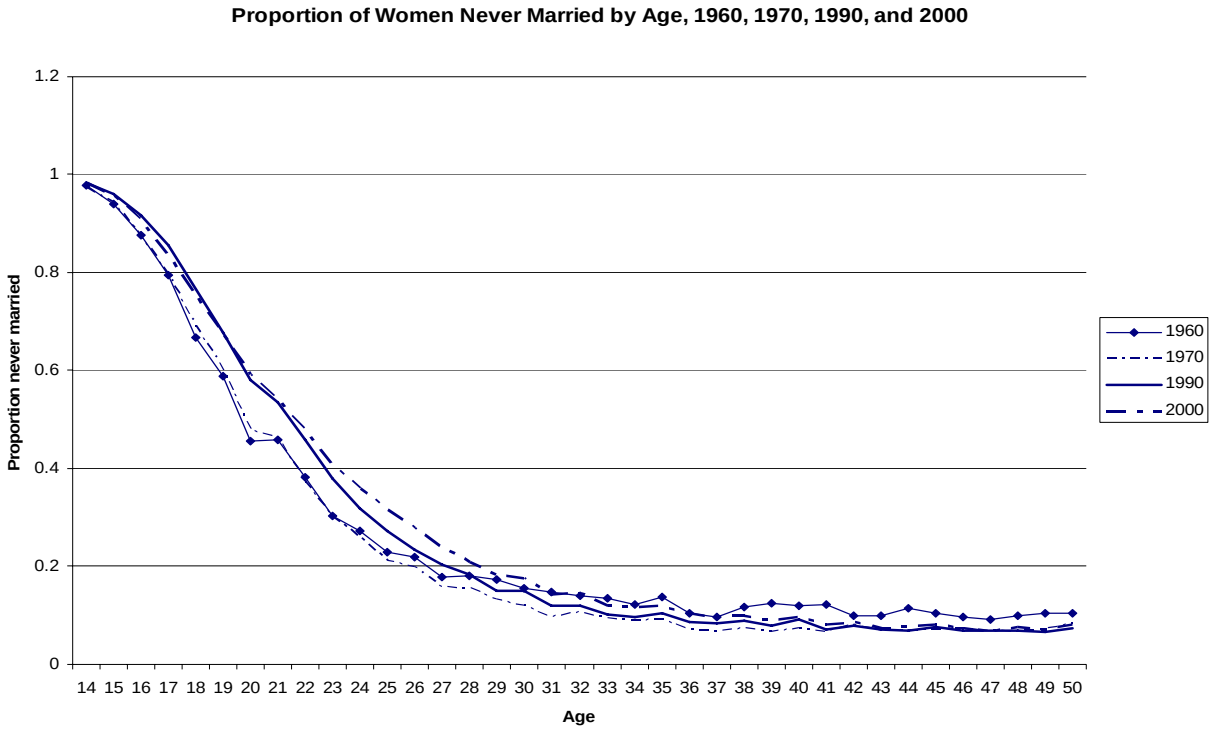

Figure 2

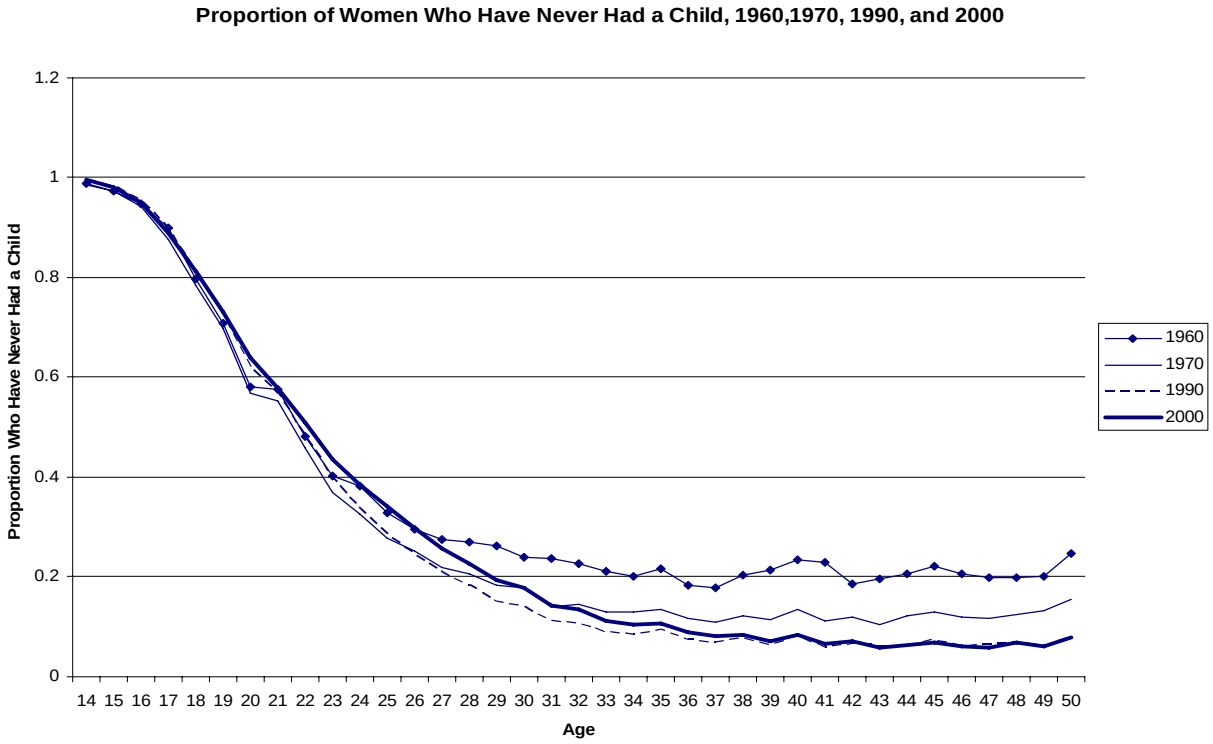

Figure 3

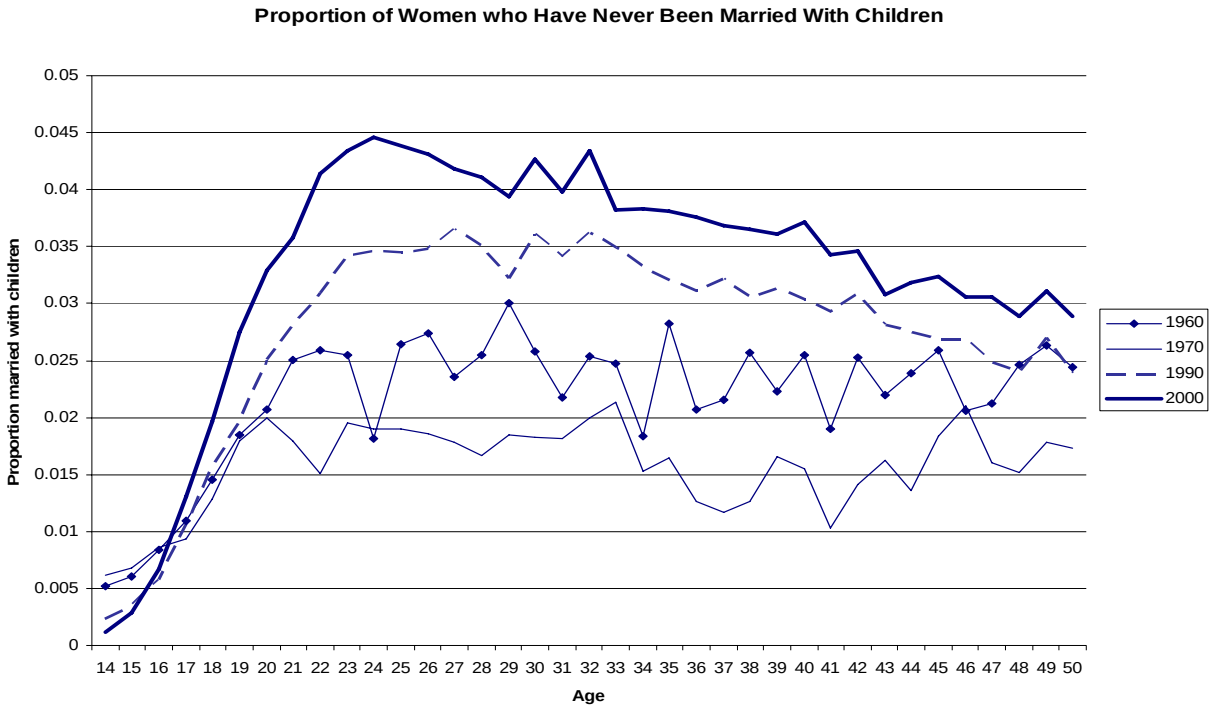

Figure 4

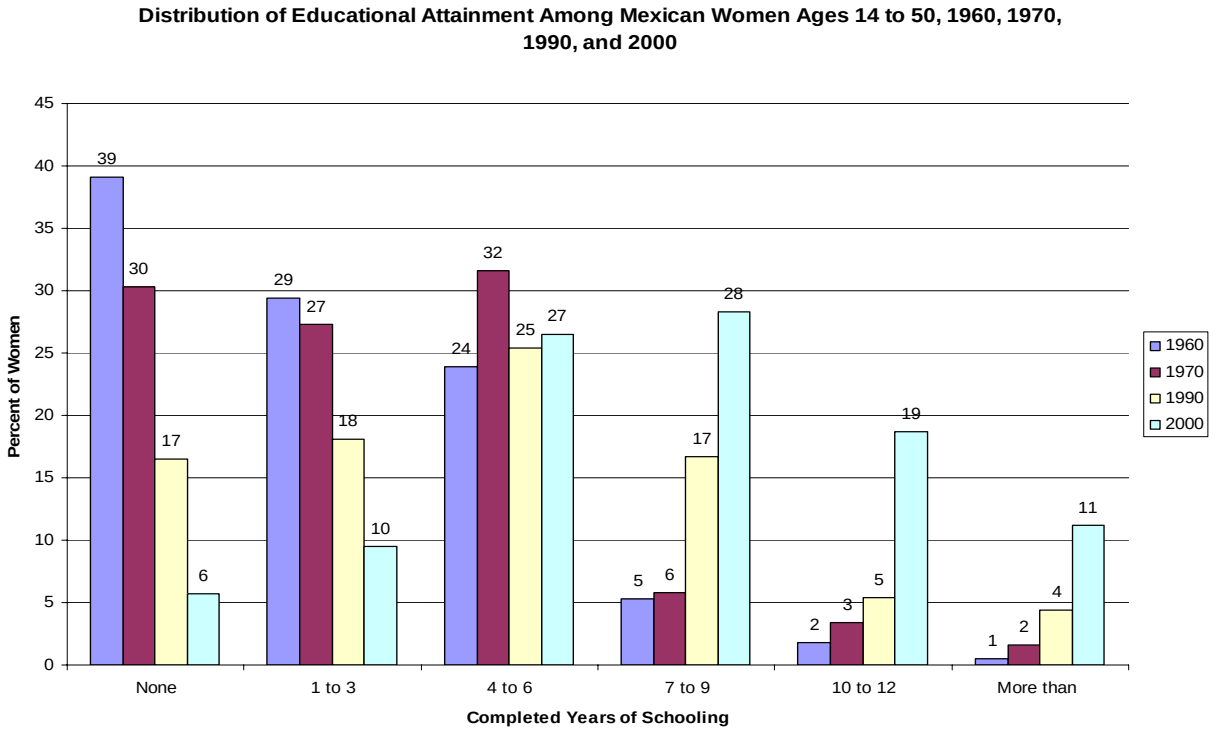

Figure 5

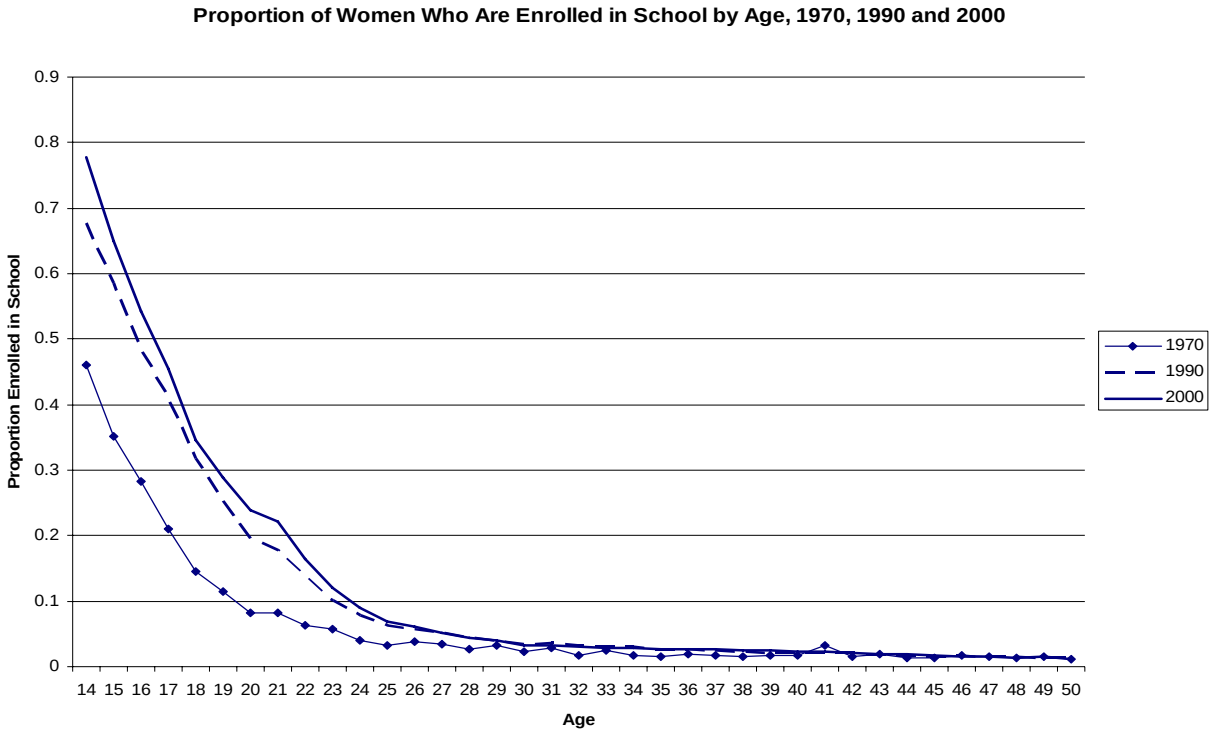

Figure 6

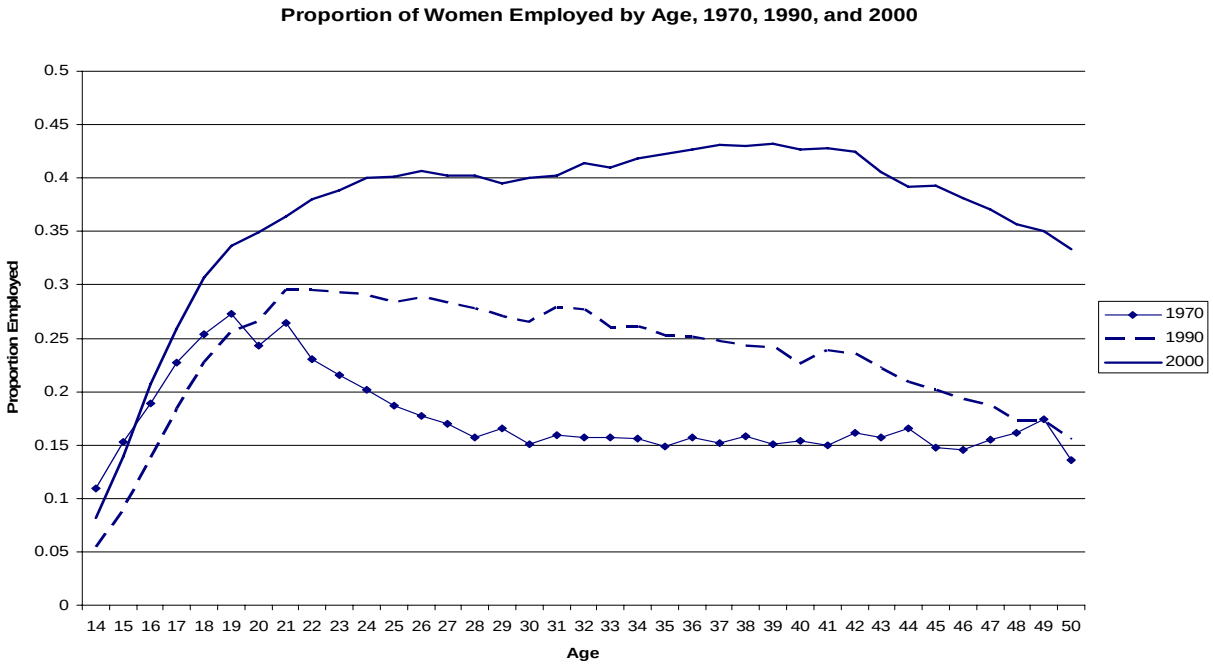

Figure 7

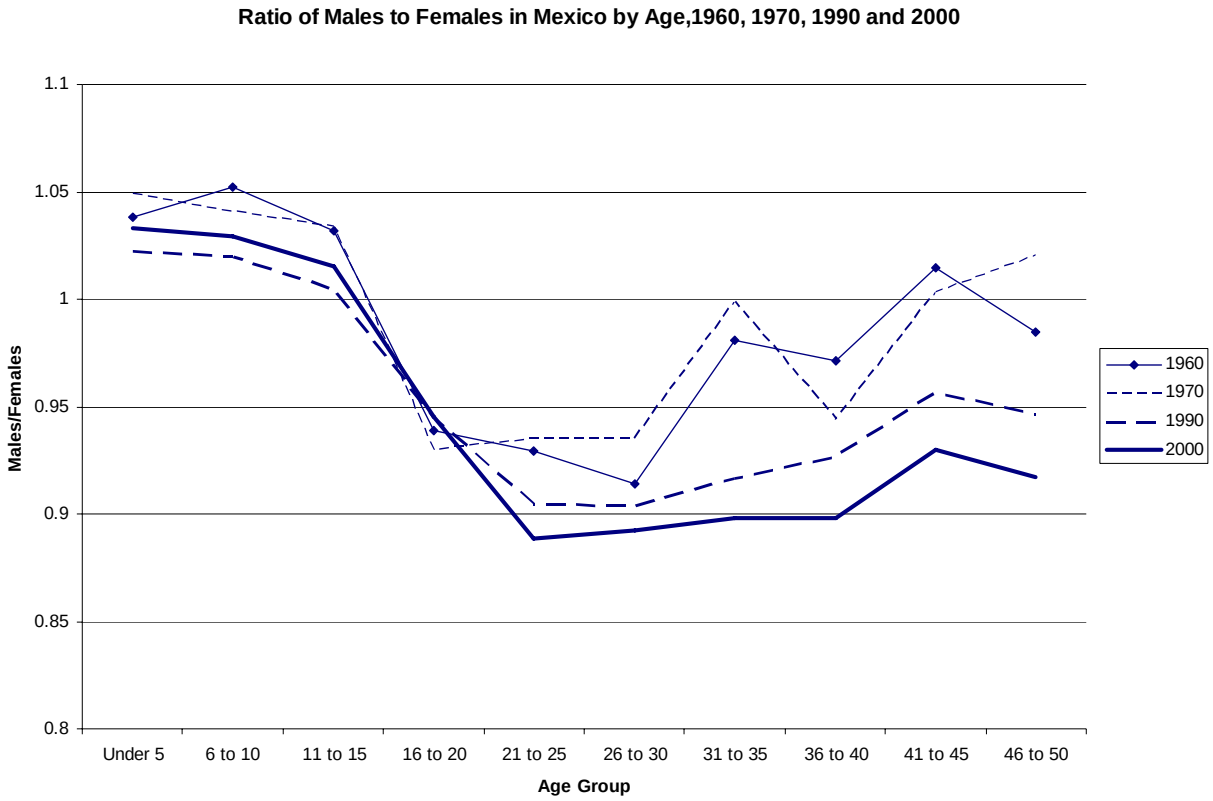

Figure 8

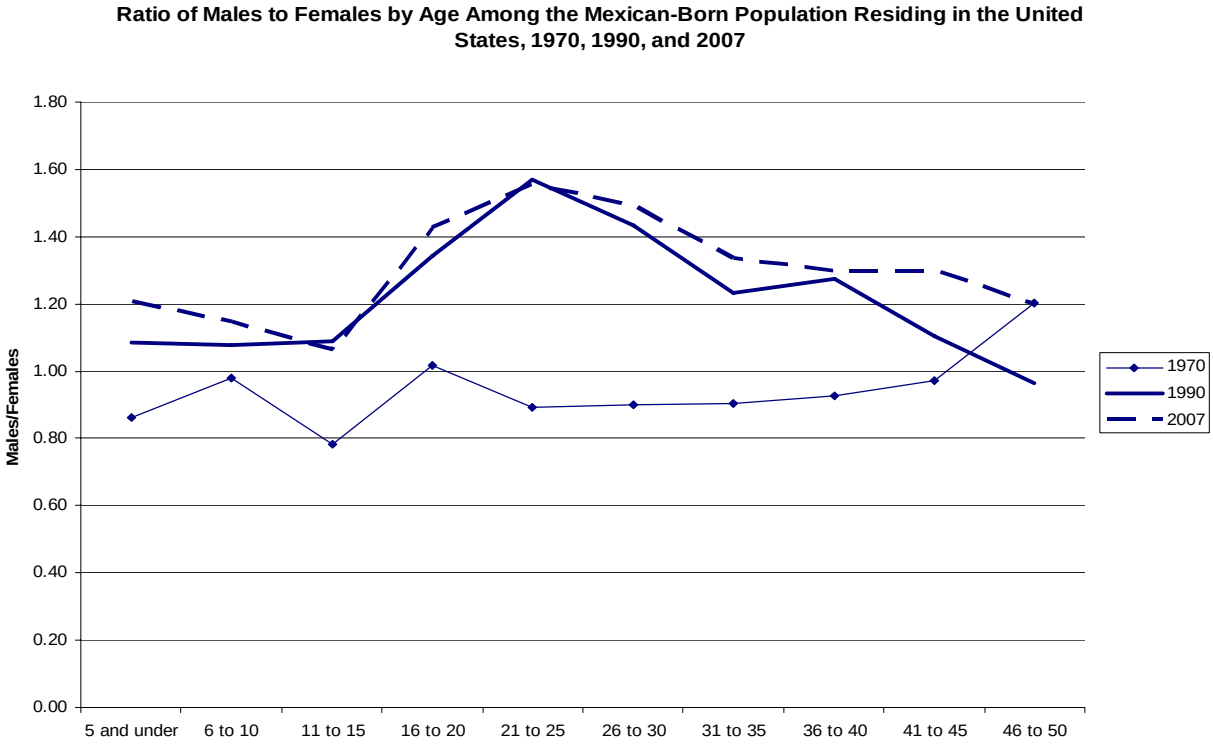

Figure 9

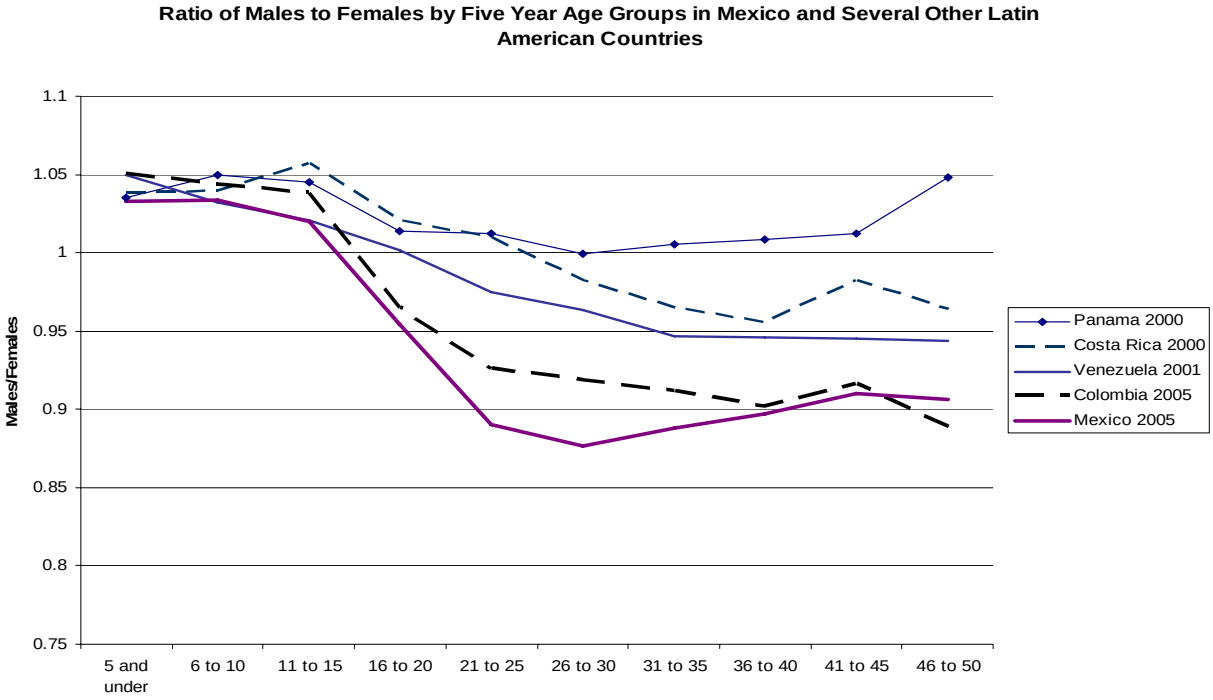

Figure 10: Scatter Plot of the 2000 Ratio of Males-to-Females By State Among those 20 to 25 Years of Age Against the 2000 Proportion of Households with a Migrant Residing Abroad

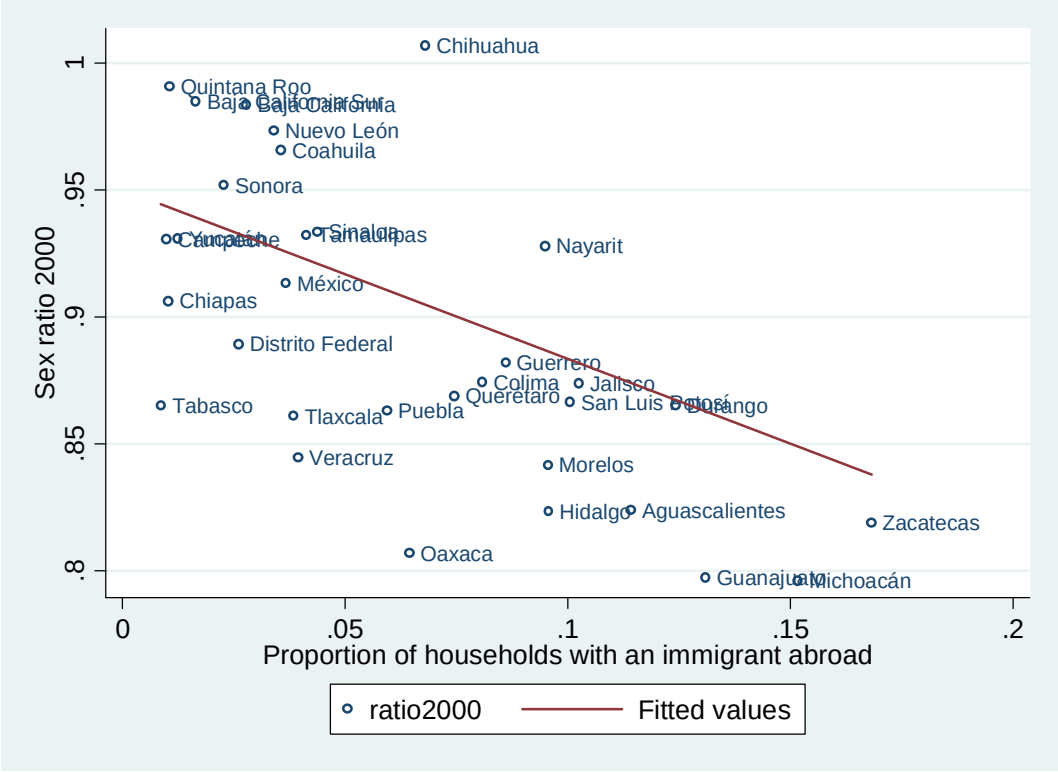

Figure 11: Scatter Plot of the 2000 Ratio of Males-to-Females By State Among those 31 to 35 Years of Age Against the 2000 Proportion of Households with a Migrant Residing Abroad

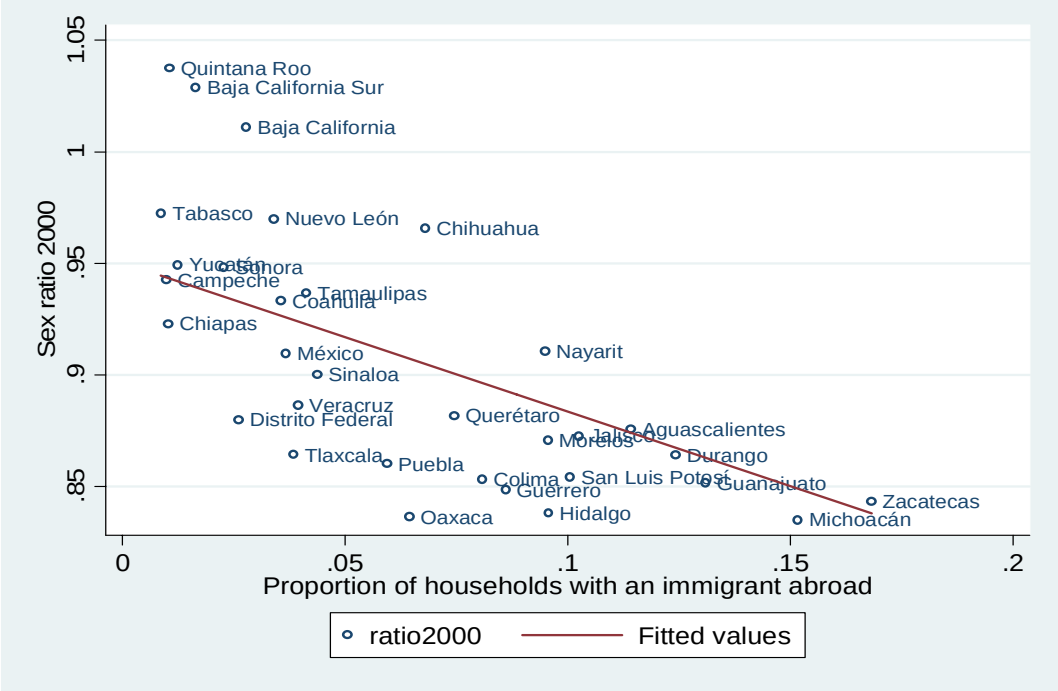

Figure 12: Distribution of Married Men Across Spouse's Ages in 1990

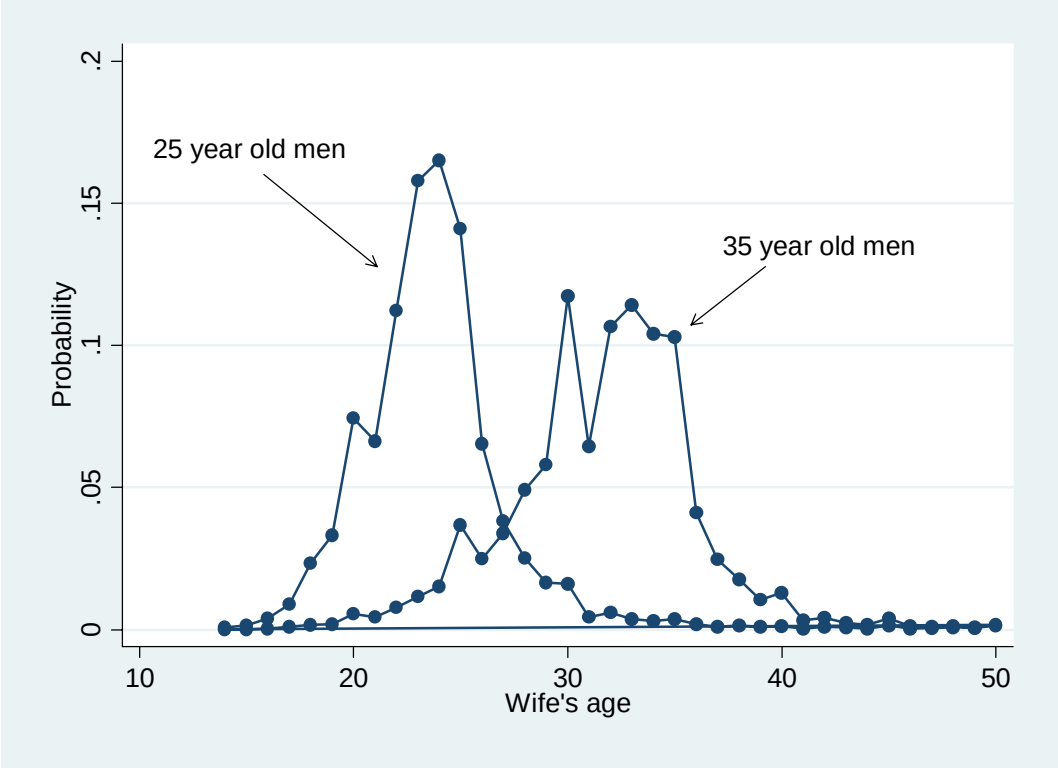

Figure 13: Scatter Plot of the Measure of the Relative Supply of Men Against the Sex Ratio of Males to Females for Women Ages 26 to 30

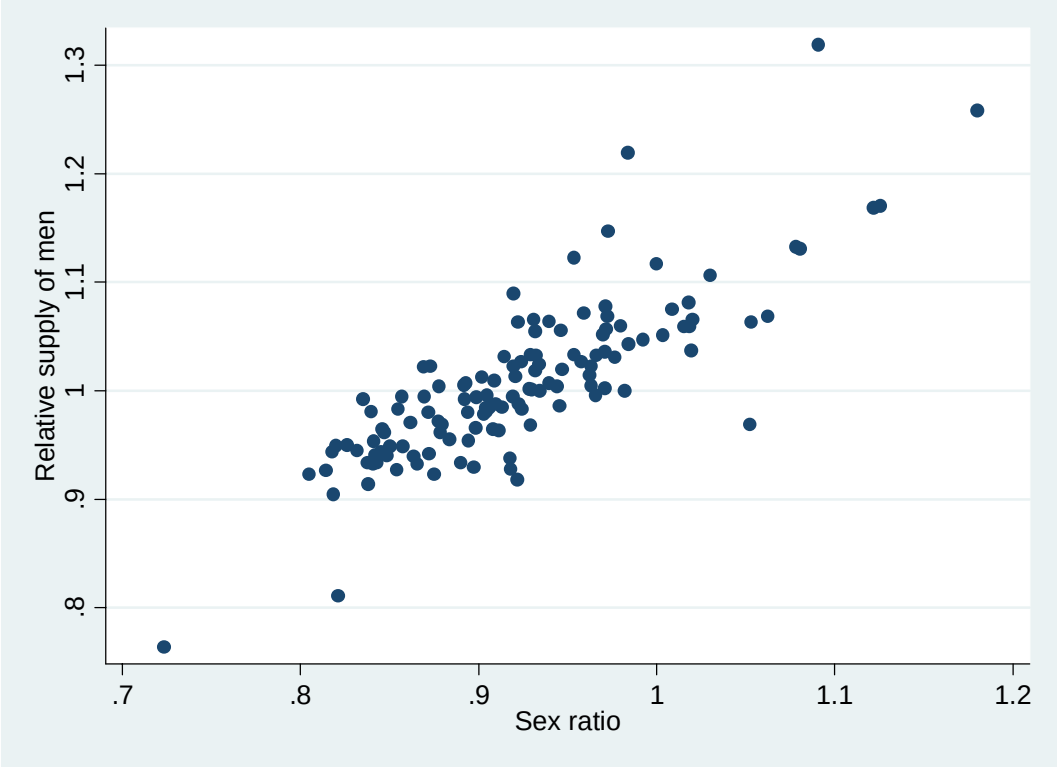

Table 1
Key Percentiles of the Distributions of Husband-Wife Differences in Educational Attainment (Measures as Completed Years of Schooling) and Mexican National Non-Migrants, 1970, 1990, and 2000

Panel A: Husband's Years of Schooling – Wife's Years of Schooling			
	1970	1990	2000
Percentile			
10th	-2	-3	-4
25th	0	-1	-1
50th	0	0	0
75th	2	3	3
90th	4	6	5
Mean Difference	0.58	0.82	0.52

Panel B: Husband's Age – Wife's Age			
	1970	1990	2000
Percentile			
10th	0	-1	-1
25th	1	1	0
50th	4	3	3
75th	8	6	6
90th	14	11	10
Mean Difference	5.47	4.28	3.57

Tabulated from the 1970, 1990, and 2000 Mexican Census files.

Table 2
Characteristics of the Relative Age and Education of Married Mexican Women Relative to Their Husbands, by Years and Age Group

	Women's Education Relative to that of Their Husbands			Women's Age Relative to that of Their Husbands		
	Proportion more educated than husband	Proportion with same education as husband	Proportion less educated than husband	Proportion older than husband	Proportion same age as husband	Proportion younger than husband
All Women 14 to 50						
1970	0.235	0.382	0.384	0.098	0.070	0.833
1990	0.262	0.309	0.429	0.118	0.098	0.784
2000	0.300	0.288	0.412	0.150	0.110	0.740
Women Ages 14 to 20						
1970	0.262	0.371	0.366	0.015	0.036	0.949
1990	0.309	0.287	0.404	0.024	0.064	0.912
2000	0.315	0.285	0.400	0.038	0.074	0.888
Women Ages 21 to 30						
1970	0.246	0.365	0.389	0.078	0.074	0.848
1990	0.282	0.290	0.428	0.103	0.104	0.793
2000	0.315	0.290	0.396	0.135	0.116	0.749
Women Ages 31 to 40						
1970	0.225	0.384	0.392	0.123	0.077	0.801
1990	0.247	0.308	0.445	0.145	0.101	0.753
2000	0.301	0.281	0.418	0.173	0.115	0.713
Women Ages 41 to 50						
1970	0.210	0.420	0.370	0.147	0.069	0.785
1990	0.241	0.347	0.412	0.151	0.092	0.758
2000	0.271	0.296	0.433	0.170	0.102	0.728

Tabulated from the 1970, 1990, and 2000 Mexican Census files.

Table 3
First-Stage Regressions of the Relative Supply of Males Based on State of Residence on the Relative Supply of Males Based on State of Birth

	Dependent Variable = Relative Supply of Males Based on State of Residence		
Relative Supply of Males Based on Sate of Birth	0.824	0.824	0.772
	(0.026)	(0.026)	(0.031)
Fixed Effect Specification			
Year Effects	Yes	Yes	Yes
Age Effects	No	Yes	Yes
State Effects	No	No	Yes

Standard errors are in parentheses. Standard errors are computed allowing for clustering in each included age-state cell. Observation in the data vary across three age groups (16 to 19, 20 to 25 , and 26 to 30), 32 Mexican states, and three inter-census changes (1960 to 1970, 1970 to 1990, and 1990 to 2000, giving a total of 288 observations. For the proportion employed and the proportion enrolled, comparisons do not include the 1960 to 1970 changes, yielding a total of 192 observations. Each model also controls for the average age within each cell. All models are weighted by the average of the number of observations used to compute the inter-census change.

Table 4
Comparison of Mean Changes in Outcomes Affecting all Women for States with Above and Below-Median Changes in the Relative Supply of Men

	Above-Median Change in Relative Supply of Men	Below-Median Change in Relative Supply of Men	Difference (Above-Median – Below-Median)
Δ Proportion Never Married	0.018 (0.003)	0.047 (0.003)	-0.029 (0.004)[a]
Δ Proportion with no children	0.014 (0.003)	0.030 (0.003)	-0.016 (0.004)[a]
Δ Proportion never married and with children	0.007 (0.001)	0.008 (0.001)	-0.001 (0.001)
Δ Proportion enrolled in school	0.045 (0.006)	0.048 (0.006)	-0.003 (0.008)
Δ Years of education attainment	0.949 (0.171)	2.463 (0.200)	-1.514 (0.263)[a]
Δ Proportion employed	0.076 (0.006)	0.095 (0.005)	-0.019 (0.008)[a]

Standard errors are in parentheses. Figures in the first two rows present average between-census changes in each of the outcomes in states with below and above-median changes in the relative supply of men. The cell means as well as the difference in means are weighted by the average of the number of observations in each census year used to calculate the change. The table pools all observable between-census changes for all states for the 1960 to 1970, 1970 to 1990, and 1990 to 2000 comparisons. For the proportion employed and the proportion enrolled, comparisons do not include the 1960 to 1970 changes. The relative supply measure accounts for the difference in the age distributions of married men and women as described in the text.
a. Statistically significant at the one percent level of confidence.
b. Statistically significant at the five percent level of confidence.
c. Statistically significant at the ten percent level of confidence.

Table 5
Regression Model Estimates of the Impact of Changes in the Relative Supply of Men on Changes in Outcomes Variables Measures for All Women

Dependent Variables	(1)	(2)	(3)
Δ Proportion Never Married			
OLS	-0.173 (0.048)[a]	-0.162 (0.045)[a]	-0.111 (0.058)[c]
IV	-0.170 (0.056)[a]	-0.157 (0.050)[a]	-0.123 (0.067)[c]
Δ Proportion with no children			
OLS	-0.195 (0.046)[a]	-0.185 (0.046)[a]	-0.150 (0.061)[a]
IV	-0.202 (0.048)[a]	-0.191 (0.046)[a]	-0.188 (0.065)[a]
Δ Proportion never married and with children			
OLS	0.008 (0.013)	0.013 (0.010)	0.009 (0.014)
IV	0.003 (0.015)	0.007 (0.011)	0.003 (0.016)
Δ Proportion enrolled in school			
OLS	0.227 (0.087)[a]	0.175 (0.056)[a]	0.174 (0.087)[b]
IV	0.229 (0.087)[a]	0.174 (0.049)[a]	0.144 (0.067)[b]
Δ Years of education attainment			
OLS	-2.708 (1.283)[b]	-2.665 (1.287)[b]	-1.976 (2.074)
IV	-3.472 (1.202)[a]	-3.439 (1.198)[a]	-2.824 (1.911)
Δ Proportion employed			
OLS	-0.254 (0.107)[a]	-0.209 (0.081)[a]	-0.258 (0.102)[b]
IV	-0.305 (0.113)[a]	-0.258 (0.085)[a]	-0.288 (0.102)[a]
Fixed Effect Specification			
Year Effects	Yes	Yes	Yes
Age Effects	No	Yes	Yes
State Effects	No	No	Yes

Standard errors are in parentheses. Standard errors are computed allowing for clustering in each included age-state cell. The figure in each cell is the coefficient on the between-census change on the relative supply of males. Observation in the data vary across three age groups (16 to 19, 20 to 25 , and 26 to 30), 32 Mexican states, and three inter-census changes (1960 to 1970, 1970 to 1990, and 1990 to 2000, giving a total of 288 observations. For the proportion employed and the proportion enrolled, comparisons do not include the 1960 to 1970 changes, yielding a total of 192 observations. Each regression also controls for the average age within each cell. All models are weighted by the average of the number of observations used to compute the inter-census change.

a. Statistically significant at the one percent level of confidence.
b. Statistically significant at the five percent level of confidence.
c. Statistically significant at the 10 percent level of confidence.

Table 6
Age-Specific Regression Model Estimates of the Effect of Changes in the Relative Supply of Men on Changes in Outcome Variables for All Women

Dependent Variable	16 to 19 years of age	20 to 25 year of age	26 to 30 years of age
Δ Proportion Never Married	-0.136 (0.088)	-0.224 (0.045)[a]	0.322 (0.087)[a]
Δ Proportion with no children	-0.178 (0.078)[b]	-0.263 (0.059)[a]	0.291 (0.094)[a]
Δ Proportion never married and with children	0.031 (0.016)	0.009 (0.015)	-0.056 (0.022)[b]
Δ Proportion enrolled in school	0.089 (0.130)	0.172 (0.084)[b]	0.439 (0.127)[a]
Δ Years of education attainment	1.824 (1.953)	-5.742 (2.940)[b]	-0.574 (2.636)
Δ Proportion employed	-0.271 (0.137)[b]	-0.250 (0.111)[b]	-0.248 (0.126)[b]

Standard errors are in parentheses. Standard errors are computed allowing for clustering in each included age-state cell. The regression models used to estimate the age-specific effects uses the inter-census outcome change as the dependent variable, while the explanatory variables includes a base term change in the relative supply of men, a set of age fixed effects, a complete set of interaction terms between the change in the relative supply of men and the age fixed effects, a set of year effects and a set of state effects. In addition, each model includes the average age in each cell. The coefficient in the table are the sum of the base coefficient on the change in the relative supply of men plus the corresponding interaction term between the relevant age fixed effect and the relative supply of men and should be interpreted as the impact of a change in the supply of men on the outcome for the indicated age groups of women. Standard errors for these sums are estimated using elements of the variance-covariance matrix for each models vector of parameter estimates. The figures in each row come from a separate model. Observation in the data vary across three age groups (16 to 19, 20 to 25 , 26 to 30) 32 Mexican states, and three inter-census changes (1960 to 1970, 1970 to 1990, and 1990 to 2000, giving a total of 288 observations. For the proportion employed and the proportion enrolled, comparisons do not include the 1960 to 1970 changes, yielding a total of 192 observations. All models are weighted by the average of the number of observations used to compute the inter-census change.

a. Statistically significant at the one percent level of confidence.
b. Statistically significant at the five percent level of confidence.
c. Statistically significant at the 10 percent level of confidence.

Table 7
Comparison of Mean Changes in Outcomes Describing the Spouses of Married Women for States with Above and Below-Median Changes in the Relative Supply of Men

	Above-Median Change in Relative Supply of Men	Below-Median Change in Relative Supply of Men	Difference (Above-Median – Below-Median)
Δ Median husband-wife age difference	-0.430 (0.063)	-0.723 (0.057)	0.292 (0.085)[a]
Δ Proportion married to younger men	0.023 (0.001)	0.025 (0.001)	0.001 (0.002)
Δ Median husband-wife education difference	-0.033 (0.018)	-0.035 (0.019)	0.002 (0.026)
Δ Proportion married to less educated men	0.038 (0.004)	0.030 (0.004)	0.008 (0.006)

Standard errors are in parentheses. Figures in the first two rows present average between-census changes in each of the outcomes in states with below and above-median changes in the relative supply of men. The cell means as well as the difference in means are weighted by the average of the number of observations in each census year used to calculate the change. The table pools all observable between-census changes for all states for the 1970 to 1990, and 1990 to 2000 comparisons. The relative supply measure accounts for the difference in the age distributions of married men and women as described in the text.

a. Statistically significant at the one percent level of confidence.

b. Statistically significant at the five percent level of confidence.

c. Statistically significant at the ten percent level of confidence.

Table 8
Regression Model Estimates of the Impact of Changes in the Relative Supply of Men on Changes in Outcomes Describing the Spouses of Married Women

Dependent Variables	(1)	(2)	(3)
Δ Median husband-wife age difference			
OLS	0.535 (0.862)	0.431 (0.896)	0.206 (1.376)
IV	0.967 (1.240)	0.868 (1.251)	0.707 (2.132)
Δ Proportion married to younger men			
OLS	-0.024 (0.017)	-0.014 (0.017)	0.006 (0.029)
IV	-0.028 (0.020)	-0.018 (0.019)	0.014 (0.038)
Δ Median husband-wife education difference			
OLS	-0.460 (0.418)	-0.478 (0.418)	-0.322 (0.495)
IV	-0.346 (0.358)	-0.362 (0.369)	0.042 (0.396)
Δ Proportion married to less educated men			
OLS	0.049 (0.084)	0.077 (0.079)	0.272 (0.114)[b]
IV	0.066 (0.088)	0.094 (0.084)	0.283 (0.129)[b]
Fixed Effect Specification			
Year Effects	Yes	Yes	Yes
Age Effects	No	Yes	Yes
State Effects	No	No	Yes

Standard errors are in parentheses. Standard errors are computed allowing for clustering in each included age-state cell. The figure in each cell is the coefficient on the between-census change on the relative supply of males. Observation in the data vary across three age groups (16 to 19, 20 to 25 , 26 to 30), 32 Mexican states, and three inter-census changes (1960 to 1970, 1970 to 1990, and 1990 to 2000, giving a total of 192 observations. Each regression also controls for the average age within each cell. All models are weighted by the average of the number of observations used to compute the inter-census change.

a. Statistically significant at the one percent level of confidence.
b. Statistically significant at the five percent level of confidence.
c. Statistically significant at the 10 percent level of confidence.

Table 9
Age-Specific Regression Model Estimates of the Effect of Changes in the Relative Supply of Men on Changes in Outcomes Describing the Spouses of Married Women

Dependent Variable	16 to 19 years of age	20 to 25 year of age	26 to 30 years of age
Δ Median husband-wife age difference	1.288 (2.082)	-0.161 (1.456)	0.319 (2.231)
Δ Proportion married to younger men	-0.011 (0.027)	0.017 (0.031)	-0.005 (0.049)
Δ Median husband-wife education difference	0.544 (0.975)	-0.627 (0.508)	0.209 (0.439)
Δ Proportion married to less educated men	0.069 (0.211)	0.221 (0.097)[b]	0.491 (0.158)[a]

Standard errors are in parentheses. Standard errors are computed allowing for clustering in each included age-state cell. The regression models used to estimate the age-specific effects uses the inter-census outcome change as the dependent variable, while the explanatory variables includes a base term change in the relative supply of men, a set of age fixed effects, a complete set of interaction terms between the change in the relative supply of men and the age fixed effects, a set of year effects and a set of state effects. In addition, each model includes the average age in each cell. The coefficient in the table are the sum of the base coefficient on the change in the relative supply of men plus the corresponding interaction term between the relevant age fixed effect and the relative supply of men and should be interpreted as the impact of a change in the supply of men on the outcome for the indicated age groups of women. Standard errors for these sums are estimated using elements of the variance-covariance matrix for each models vector of parameter estimates. The figures in each row come from a separate model. Observation in the data vary across three age groups (16 to 19, 20 to 25 , 26 to 30) 32 Mexican states, and two inter-census changes (1970 to 1990, and 1990 to 2000, giving a total of 192 observations. All models are weighted by the average of the number of observations used to compute the inter-census change.
a. Statistically significant at the one percent level of confidence.
b. Statistically significant at the five percent level of confidence.
c. Statistically significant at the 10 percent level of confidence.

Table 10
Implied Effect on Select Outcomes of Moving a 20 to 25 Year Old Woman form Michoacán (Where Men are Relatively Scarce) to Quintana Roo (Where Men are Abundant)

Outcome	Coefficient[a]	Difference in Relative Supply, Quintana Roo minus Michoacán	Implied Impact	Impact relative to base estimate
Proportion never married	-0.111	0.22	-0.024	-0.055
Proportion that have never had a child	-0.150	0.22	-0.033	-0.069
Proportion enrolled	0.144	0.22	0.032	0.211
Years of schooling	-1.976	0.22	-0.434	-0.054
Proportion employed	-0.258	0.22	-0.057	-0.149

a. Coefficients in this column are the coefficient estimates from the final column of Table 5. I use the smaller of either the IV or OLS coefficients from this specification

b. For the proportion never married, the proportion that have never had a child, the proportion enrolled, and the proportion employed, the figures in this column present the ratio of the effect size in the previous column to the average value for all Mexican women between 20 and 25 in 2000. For years of schooling, average education in 2000 for all women is used as the base value.