The Interplay of Spatial Diffusion and Marital Assimilation of Mexicans in the United States, 1980-2011

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Abstract: Recent trends suggest a decline in the rate of intermarriage between Mexicans and non-Hispanic whites. In this paper, we argue that interpretations of this trend as a decline in preferences for intermarriage are misleading because of the lack of adequate data that captures both spatial and temporal variation in the level of intergroup contact. Using data from the Decennial Census (1980-2000) and the American Community Survey (2008-2011), we employ a novel methodological approach to disentangle the impact of spatial diffusion, ethnic replenishment, and shifts in preferences for homophily on Mexican ethnic intermarriage patterns across 543 Consistent Public Use Microdata Areas (c-PUMA). Once changes in the demographic composition of C-PUMAs are accounted for, individual-level models of marital choice using multilevel models for repeated cross-sectional data suggest no evidence of a change in the marital preferences of Mexicans over time. Trends in intermarriage rates are predominantly explained by compositional and structural changes.

Keywords: Mexicans, intermarriage, spatial diffusion, ethnic replenishment, comparative research

1 Introduction

Intermarriage is a central indicator of the extent to which social boundaries exist and persist between different groups (Hwang, Saenz and Aguirre 1997; Kalmijn 1998; Bean and Stevens 2003; Alba and Nee 2003; Rosenfeld 2008; Lichter, Carmalt and Qian 2011). According to assimilation theory, there is a higher likelihood that groups will accept each other as social equals when intimate relations cross racial or ethnic boundaries, become more frequent, and are sustained (Kalmijn 1998, Alba and Nee 2003). Until the 1990s, the rate of Mexican[3]/white intermarriage steadily increased suggesting progressive structural assimilation (Rosenfeld 2002). More recent studies, however, paint a less optimistic picture of the subsequent decades and report "unprecedented declines" in Mexican/white intermarriage during the 1990s (Qian and Lichter 2007:90; Lichter, Brown, Qian, and Carmalt 2007). Albeit at comparatively high levels, Mexican/White intermarriages rates have since stalled.

According to classic assimilation models, intermarriage is the ultimate endpoint of assimilation processes following from socioeconomic, spatial and linguistic assimilation (Gordon 1964, Alba and Nee 2003, Waters and Jiménez 2005). In the classic models, assimilation is understood as a process of "interpenetration and fusion in which persons and groups acquire the memories, sentiments and attitudes of other persons and groups and […] are incorporated with them in a common cultural life" (Park and Burgess 1890: qtd. in Alba

[3] This article will focus on Mexicans since they represent by far the largest origin group of all Hispanic migrants to the United States. Moreover, a focus on Mexicans is common in the literature as they also constitute one of the largest ethnic minorities in the United States.

and Nee 2003:19). At the time when early models of assimilation were being developed, this process was most evident in the case of European immigrants who progressively assimilated into American mainstream society with each passing generation. This view of "straight-line assimilation" has been critiqued in recent times for its inadequacy in accounting for the present patterns of immigration. Historically, the implementation of the Immigration Act of 1924 facilitated European assimilation by drastically reducing immigration from Europe, which effectively cut off the steady supply of co-ethnics. Scholars argued that this cut off gave European migrants and their decedents the opportunity "to acquire the memories, sentiments and attitudes" of the American mainstream and incorporate them into their daily lives (Alba and Nee 2003). Thus, over time ethnic boundaries blurred and/or shifted facilitating structural assimilation and acculturation.

Contrary to the European experience, the steady influx of Mexicans over the last four decades has continuously replenished the pool of co-ethnics. For example, according to a report by the Pew Hispanic Center the Mexican-born population rose from under two million in 1970 to over 12 million by 2011. In absolute terms, no origin country has had more individuals migrate to the United States than Mexico in this time (Passel, D'Vera, and Gonzale-Barrerra 2012). While this same report reveals that *net* migration fell to zero or less in 2012 as a result of high levels of return migration, Custom and Border Protections apprehension statistics--a proxy for flows of unauthorized migrants--reveal that Mexicans continue to make the largest share of the annual flow of unauthorized migrants (U.S. Custom and Border Protection 2013).

In order to explain recent declines in Mexican/white intermarriage rates, researchers have argued that a process of ethnic replenishment—where high immigration rates maintain a large foreign born stock with cultural and social ties to the origin country—acts as the primary mechanism that stalls intermarriage with non-Hispanic whites (Lichter et al. 2007, Lichter et al. 2011, Qian and Lichter 2011). This can happen either because it affects relative group size or because it shifts the preferences for intermarriage. In line with Blau's structural theory of group interaction (Blau et al 1982), high levels of immigration should reduce the likelihood of routine interethnic contact as it creates structural conditions that increase the likelihood of co-ethnic interaction (Blau 1977; Blau and Schwartz 1984). Beyond expanding structural opportunities, however, ethnic replenishment is argued to also have the potential to fundamentally affect the dynamics of cross-group interaction and mixing (Jiménez 2008, Lichter, Carmalt, and Qian 2011). According to Jimenz (2008), the continuous replenishment of co-ethnics through immigration has prevented the blurring or shifting of ethnic social boundaries by providing frequent contact with individuals with "authentic" Mexican culture traits and an intensification of awareness of intergroup differences vis-à-vis non-Hispanic whites. Similarly, Lichter, Carmalt and Qian (2011:258) argue that the "influx of Hispanic immigration may also have heightened ethnic identify and reinforced social or cultural boundaries" leading to a reduction in the rate of intermarriage with whites and a slowdown in the rate of marital incorporation.

The recent downward trend in Mexican marital assimilation is particularly puzzling in that it has taken place at the same time that a dramatic spatial diffusion of Mexican immigrant settlement across the country occurred (Durand, Massey and Charvet 2000, Singer 2004, Iceland and Nelson 2008, Massey 2008, Mouw and Sharma 2009, Card and

Lewis 2007). Urban and rural areas alike have seen substantial increases in their Mexican population leading to the formation of "new" Mexican communities outside the traditional settlement areas of the Borderlands and the Great Lakes Region (Singer 2004, Donato et al. 2007, Leach and Bean 2008, Riosmena and Massey 2012, Barcus and Simmons 2013). This spatial diffusion of Mexicans into areas with a smaller number of co-ethnics should have created structural opportunities that facilitate intermarriage.

As a result of the movement of Mexican immigrants towards new destination areas, the impact of ethnic replenishment on intermarriage rates is likely to vary considerably at the sub-national, local level. While arguments regarding changes in cultural retention and ethnic solidarity due to ethnic replenishment might be highly relevant in traditional Mexican settlement areas, its impact is less definite in the newly settled areas around the country, where, despite rapid growth rates, Mexicans still comprise a small percentage of the overall population. In effect, spatial diffusion and ethnic replenishment shape the likelihood of intermarriage in very opposing ways—spatial diffusion increases the structural opportunities for exogamy, while any shift in preferences due to ethnic replenishment should increase the rate of marital endogamy. Research relying on national-level data will ultimately be unable to disentangle those two processes as they potentially cancel each other out.

In this article, we propose a better-suited analytical framework to account for the separate effects of spatial diffusion and ethnic replenishment on intermarriage by exploiting the structural variation across geographic areas over time. If the martial preferences of Mexicans have indeed fundamentally shifted away from whites—as suggested by the ethnic replenishment argument—we should be able to identify these shifts by investigating

whether the magnitude of the effect of relative group size on intermarriage has declined over time. An increase in preferences for endogamy will decrease the magnitude of the effect of relative group size because individuals will actively seek co-ethnic marriage partners and so variation across areas in the frequency of routine interaction caused by relative group size alone will be less important. Disaggregating Mexican marital behavior to smaller geographic units therefore serves an essential analytical purpose: it provides access to variation in the structural conditions Mexicans experience across high-density areas in traditional settlement regions as well as the newly formed low-density areas in the new destinations, which allows us to better test the impact of spatial diffusion and ethnic replenishment on intermarriage. Overall, we aim to contribute to this discussion about fundamental changes in Mexican/white relations in two ways: we reexamine and disaggregate the trends in Mexican/white intermarriage while explicitly considering the process of spatial diffusion.

Using micro-level data from the 1980-2000 Decennial Censuses and the 2008-2011 American Community Surveys (ACS), we examine trends in intermarriage across 543 Consistent Public Use Microdata Areas (c-PUMAs). The benefit of this approach is that it allows us to exploit variation in demographic change over a comparatively large number of small-scale marriage markets. With the help of multilevel modeling strategies and longitudinal data at the c-PUMA level we investigate whether the impact of demographic change (ethnic replenishment) and spatial diffusion have changed fundamentally over the last 30 years.

2 Literature Review

Research on Hispanic[4] intermarriage in the last four decades documents important variation in trends. In general, Hispanics have the highest intermarriage rates of all ethnic minorities in the United States, followed by Asians and Blacks (Qian and Lichter 2007). Until the 1990s, intermarriage was on an upward trend for all racial groups. One of the few studies with an explicit focus on marital assimilation of Mexicans documents a decline of endogamy (within-group marriages, i.e., Mexican-Mexican unions) between 1970 and 1990 suggestive of progressive assimilation, leading the author to "consider whether Mexican Americans are becoming White" (Rosenfeld 2002:160). More recent studies paint a less optimistic picture of the subsequent decades reporting declines in Hispanic/white intermarriage during the 1990s with intermarriage rates declining from 27 to 20 percent (Qian and Lichter 2007; Lichter et al. 2007). This decline was largely driven by the marriage patterns of foreign-born Hispanics. The intermarriage rates of 2nd+ generation Hispanics still increased over the same study period pointing to sustained but somewhat

[4] The vast majority of studies describing and analyzing intermarriage trends focus on broad racial and ethnic categories where Mexicans are subsumed under the panethnic label "Hispanic" despite studies noting important variations in intermarriage across ethnic groups within panethnic categories (Okamoto 2007; Qian, Glick and Batson 2012). Hence, although people of Mexican descent account for more than 60 percent of all Hispanics, this literature review can only be indicative of broad trends in Mexican/white intermarriage due to the literature's strong focus on the marital behavior across panethnic groups.

slower assimilation trends (Qian and Lichter 2007). This pattern of 1st generation decline and 2nd+ generation increase in intermarriage appears to persist during the 2000s, however the overall intermarriage rates increased between 2000 and 2008 implying that the 2nd+ increases in intermarriage outweighed the 1st generation decline (Qian and Lichter 2011).

Borrowing heavily from Blau's structural theory of group interaction (Blau et al 1982), intermarriage, whether across groups (Kalmijn 1998; Gullickson 2006; Okamoto 2007; Fu 2010; Furtado and Theodoropoulos 2011), across geographic units (Hwang, Saenz and Aguirre 1997; Lichter et al. 2011) or both simultaneously (Lievens 1998; Kalmijn and van Tubergen 2010; Spörlein, Schlüter and van Tubergen 2014) is seen as a function of the structure of the local marriage market. This is because variation in the demographic characteristics of local context creates differential opportunities to meet suitable partners (Blau 1977; Blau and Schwartz 1984). Meeting and interacting with members of the majority population on daily basis increases the chances of forming intimate relationships.

Structural conditions, however, are not static and maybe especially influenced by processes of population redistribution. For example, industrial restructuring and deteriorating living conditions in traditional settlement areas ushered in a period of spatial diffusion of Mexicans across the United States during the 1990s (Waters and Jiménez 2005; Zúniga and Hernández-León 2005; Card and Lewis 2007; Massey 2008; Riosmena and Massey 2012). Before 1990, Mexicans overwhelmingly settled in a few traditional gateway states (Massey and Capoferro 2008; Lichter and Johnson 2009). The following period of spatial diffusion saw the establishment of Mexican communities in areas with previously very few Mexican immigrants including many rural areas (Kandel and Cromartie 2004; Singer 2004; Donato et al. 2007; Leach and Bean 2008). In some counties population

redistribution fueled population growth or offset population decline (Donato et al. 2007). The U.S. Midwest and South census regions with previously little migrant settlement, experienced large percentage growth, in extreme cases such as Georgia, Nevada or North Carolina amounting up to 600 percent (Singer 2004). Figure 1 presents a graphical depiction of the spatial diffusion of Mexicans across the United States. The 1980s panel shows the strong concentration of Mexicans in states close to the border. The situation is drastically different in 2010 documenting the North- and Eastward expansion of Mexican settlement and the substantial increase of Mexican population share in the traditional settlement areas.

[Figure 1 about here]

The recent changes in settlement patterns certainly affected the structural and demographic conditions Mexicans experience when looking for a suitable mate in the local marriage markets. On the most basic level, Mexicans in traditional settlement areas encounter an abundant pool of co-ethnics within an established ethnic infrastructure—and the stock of first generation immigrants has been maintained at high levels due to consistently high rates of immigration since 1990. On the hand, the recent diffusion of Mexicans to other parts of the U.S. means that an increasing proportion of Mexicans are now living in non-traditional settlement areas where they rarely account for more than 10 percent of the local population, a fact that—all else being equal—should increase the rate of intermarriage. Overall, since intermarriage rates have declined since 1990 despite the expansion of the Mexican population in new destination areas, some researchers have argued that this means there has been a fundamental shift in Mexican/white relations and a

reversal of the Hispanic structural assimilation process (Lichter et al. 2007, Lichter et al. 2011, Qian and Lichter 2011). According to this interpretation of the trends, ethnic replenishment leads to changing marital preferences of U.S.-born Mexicans promoting cultural and ethnic solidarity, which interrupts assimilation pathways.

As a test of the role of relative group size, Lichter et al. (2007) use aggregate data from 155 metropolitan areas for 1990 and 2000 to estimate how changes in structural factors and city-level characteristics affect the aggregate rate of intermarriage in metropolitan areas. Their findings suggest that any trend in intermarriage rates across metropolitan areas can be attributed to structural conditions and socioeconomic measures of assimilation. A problem with this aggregate approach, however, rests with the inability to include individual characteristics alongside macro-level structural variables. This makes it difficult to separate the effect of individual factors that affect marital choice—such as preferences and individual measures of social incorporation—from aggregate effects such as relative group size. In addition, Lichter et. al. (2007) estimate a constant effect of group size over time, while we argue that a key question posed by the ethnic replenishment perspective is whether the effect of group size on intermarriage rates has changed over time.

An alternative approach to examine intermarriage trends involves employing log-linear models with the assumption of a single, national-level marriage market (Qian and Lichter 2007; Lichter et al. 2011, Qian and Lichter 2011). The research strategy pursued by this approach entails purging the impact of recent demographic changes on marital behavior and interpreting residual time trends as evidence for preference shifts. Findings from these studies suggest, however, that time trends in intermarriage are accounted for by

demographic changes alone. In other words, no evidence for a preference shift was found. However, while employing log-linear models with a single, national-level marriage market accounts for changes in the marginal distributions (e.g., changes in the size of the Mexican population), it doesn't pick up changes in the local-level structural conditions resulting from the spatial diffusion of Mexicans since the 1990s. This is because spatial diffusion changes the marginal distributions of small-scale marriage markets, which are analyzed in highly aggregate fashion in the log-linear models. As a result, the national-level log-linear approach, although it uses individual level data, doesn't incorporate the kind of spatial and temporal variation across local marriage markets that would allow for a more realistic test of relative group size on intermarriage rates.

Taking both the aggregate and log-linear approaches together, we argue that the current literature on intermarriage trends and preference shifts among Hispanics have been limited by the use of methodology that does not account for the various concurrent processes that shape these trends. As described below, in this paper we use a multilevel logistic model for trends in intermarriage rates which allows for both individual and structural factors and enables us to more directly assess how intergroup relations between Mexicans and whites may have shifted. The benefit of this approach is that we will be able to pick up any fundamental changes in preferences towards endogamy or cultural homogamy by investigating whether the impact of structural conditions (i.e., relative group size) on intermarriage has shifted over time. In theory, the changed preferences should lead

to a decreased importance of ethnic communities in local marriage markets.[5] This could occur when Mexicans actively seeking out other Mexicans in the area in such a way that even relative small numbers of co-ethnics result in a decrease in the incidence of intermarriage. Put differently, a preference change should reduce the differences between low and high density areas as individuals in the former will tend to invest more in their search for co-ethnic mates, investments that individuals in high density areas are simply not required to do. Thus, we would expect to find that the impact of relative group size decreases over time study period. Investigations that effectively conceptualize the whole United States as a single marriage market will therefore not be able to uncover these patterns and draw unsubstantiated conclusions. Moreover, our approach using multilevel methodology will allow us to model individual determinants and structural conditions simultaneously.

[5] To test that an increase in preferences for endogamy results in a decline in the magnitude of relative group size on intermarriage rates (i.e., the negative coefficient on group size moves closer towards 0) we conducted a Monte Carlo experiment with simulated data under a wide range of conditions. The results confirm this expectation. Full results and computer code are available upon request.

3. Data and Methods

3.1. Data

Our analyses are based on the 1980, 1990 and 2000 Decennial Censuses as well as pooled data from the 2008 to 2012 American Community Surveys (Ruggles et al. 2010). Geographic information is based on 543 "consistent Public Use Microdata Areas" (c-PUMA). C-PUMAs represent the most detailed geographic areas without boundary changes over time. The sample is limited to 1st and 2nd+ generation Mexicans aged 20 to 30 years. This comparatively narrow age range is necessary to measure current rates and define local marriage market characteristics as adequately as possible. Due to homophily with respect to age it is unlikely that potential partners ten or more years older (or younger) than the respondent should be counted among the pool of potential mates. Including them when defining macro level characteristics potentially misrepresents the current marriage market conditions. Moreover, we exclude Mexicans who immigrated after the age of 17 in order to reduce the inflation of endogamy rates introduced by immigrants married abroad (Hwang and Saenz 1990). These restrictions leave us with 42,442 1st generation and 133,775 2nd+ generation Mexicans living in one of the 543 c-PUMAs across the United States.

3.2. Methods

In order to analyze Mexican marital behavior over time and place, we rely on multilevel logistic regression models for repeated cross-sectional data (Fairbrother 2014). Within each of our four measurement occasions (i.e., 1980, 1990, 2000, 2010) individuals are clustered in c-PUMAs. Extending standard multilevel models to appropriately deal with repeated cross-sectional data entails introducing an additional time level comprising of a cross-

classification of time and c-PUMA. The resulting nesting structure is captured in a three level model with a "c-PUMA-time" level situated between the c-PUMA and the individual level. Another crucial step involves group-mean centering (i.e., within-c-PUMA centering) macro level predictors with the group-mean serving as cross-sectional component and de-meaned values serving as longitudinal components. Group-mean centering removes the correlation between longitudinal and cross-sectional components thus allowing us to estimate their effects separately in one combined model (Fairbrother 2014). Equation 1 depicts our model formally where i denotes individuals, t time-points, j c-PUMAs and the dependent variable Y_{itj} represents a dichotomous variable with Mexican/white couples coded 1 and endogamous marriages coded 0:

$$(1)\ Y_{itj} = \beta_0 + \beta_1 x_{itj} + \beta_2 x_{tjM} + \beta_3 \bar{x}_j + \beta_4 time_{tj} + u_j + u_{tj} + e_{itj}$$

$\bar{x}_j$ represent the means of c-PUMA characteristics aimed at capturing cross-sectional differences while x_{tjM} represents the corresponding de-meaned c-PUMA characteristics. For example, $\bar{x}_j$ measures the average Mexican population size for each c-PUMA over the 30 years while x_{tjM} effectively represents a time-series of the development of the Mexican population within each c-PUMA. u_j, u_{tj} and e_{itj} denote the random effects related to c-PUMAs, c-PUMA-time and individuals respectively. In general terms, cross-sectional components aim to explain differences across c-PUMAs while longitudinal components deal with the development of intermarriage within c-PUMAs. The resulting components are orthogonal allowing an estimation of their coefficients separately in one combined model. This procedure is applied to all macro level predictors yielding a regression model in which Mexicans are nested in 2,073 c-PUMA-time units and 543 c-PUMAs. This baseline model

will be further adapted to fit what Fairbrother (2014) terms “societal growth curves” in order to get at the question of fundamental preference shifts among the Mexican population. "Societal growth curves" model the changing impact of time-invariant variables of the model. We therefore formulate interaction terms between the time indicator and the cross-sectional component of our group density measure (see below). Our expectation is that preference shifts should materialize in a negative effect of group density that decreases in magnitude over time. The substantive implication would be that differences between low and high density areas become smaller. Models are estimated using maximum likelihood estimation implemented in the lme4 package for R (Bates et al. 2013).

3.3. Measures

The dependent variable measures whether Mexican respondents married a White spouse (i.e., exogamy, Y=1) or a Mexican spouse (i.e, endogamy, Y=0). In the following, we will discuss each of the structural measures in turn. Note that all structural measures computed from Census and ACS data (i.e., occupational segregation, sex ratio, % speaking Spanish at home and relative group size) are based on respondents age 20 to 30. By doing so, we aim to include only the most relevant marriage market population under the assumption of homophily with respect to age (McPherson, Smith-Lovin and Cook 2001).

Independent variables:

% of PUMA living in metro area is measured using data on whether respondents lived in a metropolitan area. This variable aims to control differences between urban and rural

PUMAs expecting co-ethnic meeting opportunities and thus endogamy to be higher in urban settings.

Occupational segregation between Mexicans and Whites is measured using the index of dissimilarity D (Duncan and Duncan 1955). D is calculated using 1-digit ISCO categories and records the percentage of Mexicans that would have to change occupational categories to achieve an even distribution with Whites. Higher occupational segregation corresponds to more limited meeting opportunities between Mexicans and Whites hence we expect this measure to have a negative effect on intermarriage.

Sex ratio represents the proportion of male Mexicans to female Mexicans. Values above 1 indicate a higher supply of male Mexicans suggesting structural conditions in favor of (male) exogamy. Since this measure has different implications for male and female Mexicans, we add an interaction term with gender.

In order to measure origin culture retention among the 2nd+ generation Mexicans, we record the *% speaking Spanish at home*. The underlying reasoning being that the fewer 2nd+ generation Mexicans who speak Spanish, the more likely claims of "losing touch" with the origin culture are voiced by 1st generation members.

Differences in the extent to which Mexicans might encounter nativism are measured using *White's negative feelings towards Hispanics*. Data for this measure was gathered from the American National Election Study (ANES 2010). We took the five-year average in White's scores on the feeling thermometer prior to each time point. Higher scores on the thermometer indicate "warmer" feelings towards Hispanics. We therefore reversed the scores on this indicator to better correspond to our hypotheses. Note that due to data

availability issues, this measure was only available for states. Thus, c-PUMAs within a state have the same score.

Relative group size represents a central indicator for the potential availability of co-ethnic spouses. This variable records the percentage of a c-PUMAs population that is Mexican. In order to avoid placing functional restrictions on this measure, we include relative group size as splines. The splines are defined as the quartiles of the relative group size variable[6]. More specifically, the splines range from 0.1 to 3.8 percent, 3.8 to 8.3 percent, 8.3 to 12.6 percent and 12.6 to 31 percent.

We also include a number of individual level control variables to account for (1) essential micro level predictors of marital behavior and for (2) compositional differences across c-PUMAs: age (measured in years), a gender dummy (with males as the reference category), years of education and a dummy variable indicating respondent's ability to speak English (1="speaks only English" to "speaks English well", 0="does not speak English" and "speaks English but not well"). Moreover, a linear time term (with decades as the unit) is added with respondents in the 1980s scoring 0 and respondents in the 2010s scoring 3.

Descriptive statistics for the independent variables are presented in Table 1.

[Table 1 about here]

[6] We approached the question of spline definition in two ways. The first, as described above, took the whole sample to define the quartiles. This approach approximates population weighted splines. We also defined splines based only on the 543 c-PUMAs effectively assuming that each c-PUMAs has an equal weight. Both approaches reach very similar conclusions (see Appendix B for results based on the second approach).

4. Results

4.1. Descriptive results

Table 2 presents time trends in intermarriage rates. The overall ethnic intermarriage rates conform to the picture painted in the literature: There was an increase in Mexican/White intermarriage until the 1990s, a subsequent decline to pre-1990 levels in the 2000s and finally an increase in intermarriage to 41 percent in the 2010s. Thus, the overall ethnic intermarriage rates do not show a clear trend pattern but rather a pattern of ups and downs remaining on fairly stable levels. If we disaggregate the overall rate by generational status, we see a clear trend of generational divergence appearing: the ethnic intermarriage rates of 1st generation Mexicans decline from 13 percent in the 1980s to 9 percent in the 2010s, whereas the corresponding rates for 2nd+ generation Mexicans show a strong increase of 13 percentage points from 40 percent in the 1980s to 53 percent in the 2010s. According to these findings, 2nd+ generation Mexicans are firmly on the path towards marital assimilation with the U.S. White population.

[Table 2 about here]

Figure 2 further disaggregates these trends by traditional, re-emerging, or new destination areas based on the classification of states in Riosmena and Massey (2012)[7]. Irrespective of settlement area, the trends presented here seem to agree with the overall conclusions drawn from Table 1. We do however see important variation in the trend level across settlement areas. Ethnic intermarriage rates dropped markedly outside traditional destinations for first generation Mexican immigrants. In the 1980s, around 60 percent of 1st

[7] This classification of settlement areas is presented in Appendix A.

generation Mexicans intermarried in new destinations but this number dropped to a little more than 15 percent in the 2010s. The situations seems similar albeit less drastic in re-emerging settlement areas. However, the reader should also keep in mind that relatively few Mexican immigrants lived outside traditional destinations in the 1980s. Despite the shifts in intermarriage rates in new and re-merging destination areas, the relative size distribution of the population across the three settlement areas, prevents these trends from having a pronounced effect on the overall trend presented in Table 2. The majority of Mexican immigrants still live in traditional settlement areas, and according to Figure 2 the intermarriage rate among first generation immigrants in these areas shows little evidence of a pronounced decline over the 30 year study period, remaining fairly stable at around 10 percent.

[Figure 2 about here]

In Figure 2 we see that there is a large difference in the rate of intermarriage among 2^{nd}+ generation Mexicans across the three types of settlement areas, although the time trend is remarkably similar. As expected, intermarriage is least common in traditional settlement areas with around 40 percent marrying a White spouse. Also in line with our expectations, intermarriage is most frequent in new destinations, followed by re-emerging destinations. Relative to traditional settlement areas, the intermarriage rate is an astonishing 40 percentage points higher in new destinations. Surprisingly, the intermarriage rates in new destinations have declined slightly since the 1990s while corresponding rates in traditional destinations remained fairly stable.

4.2. Variance partition

Table 3 presents the results from our baseline models, which decompose the variance in intermarriage rates across the geographic areas. These models provide insights into the relative importance of the local marriage market (i.e., the c-PUMA) with respect to ethnic intermarriage. Not surprisingly most of the variation in intermarriage is associated with individual differences. Around 35 percent of the variation is attributable to differences across c-PUMAS (see Table 3: Var(c-PUMA)/[$\pi^2/3$+Var(c-PUMA)+Var(c-PUMA-time)]). An additional 2 percent of the variation relates to differences in the trajectory development of intermarriage within c-PUMAs (i.e., var[c-PUMA-time]).

[Table 3 about here]

When investigating the average pattern over time, Table 3 reinforces the impression of divergent interethnic marriage trends gained by studying the descriptive findings above. While the time coefficient is strongly negative for the 1st generation, it is substantially smaller, though still negative for 2nd+ generation Mexicans. Another important insight generated by Table 3 relates to the variation of the average time trend as signified by its random slope. While the effect of time is uniformly negative for 1st generation Mexicans, even taking into account the slope variation, we see that the confidence interval for the variation in the estimated time coefficient across c-PUMAs ranges from -.664 to .492 for 2nd+ generation Mexicans. Thus, there is no uniform intermarriage trend across c-PUMAs with 2nd+ generation Mexicans becoming more assimilated in some while becoming less assimilated in others. In other words, disaggregating intermarriage beyond the state level is essential in providing a representative picture of the state of Mexican assimilation patterns.

4.3. Multivariate results

The results for the full logistic multilevel models investigating interethnic marriages are presented in Table 4 for Mexican immigrants and in Table 5 for 2nd+ generation Mexicans. Note that in all models presented, macro level variables have been standardized to facilitate interpretation and provide some indication of their relevance. In general, the longitudinal components relate to intermarriage *within* c-PUMAs whereas the cross-sectional components relate to underlying differences in intermarriage *across* c-PUMAs. Since the aim of this article is to account for the development of intermarriage over time, we will focus the discussion on the longitudinal components of our models.

[Table 4 about here]

Before discussing findings regarding the main research question of this article, we will briefly summarize the results for the structural conditions. For both 1st and 2nd+ generation Mexicans our results suggest that increases in relative group size and the fraction of Mexicans speaking Spanish at home reduces the likelihood of marrying a White spouse. More specifically, a one standard deviation increase in relative group size (which corresponds to roughly a 1.5 percentage point increase in the Mexican population see Table 1) multiplied by the coefficient on the longitudinal component of group size (b=-.136 in Model 1 of Table 4) results in a predicted decrease in the odds of marrying a White spouse by 15 percent ($1-e^{-.136}$). Hence, spatial diffusion has a non-negligible impact on Mexican/White relations, an impact that would otherwise be missed in log-linear models.

While the relationship between intermarriage and group size changes is roughly the same across generations, the impact of changes in origin culture retention (i.e., the percentage of Mexicans speaking Spanish at home) differs across generations. A ten percentage point increase in our measure of origin culture retention (one standard deviation

increase) decreases the odds of marrying a White spouse by five percent for 1st generation Mexicans and by ten percent for 2nd+ generation Mexicans. Thus, it appears that the extent to which 2nd+ generation Mexicans retain their origin culture shapes marriage for both 1st and 2nd+ generation Mexicans. This suggests that ethnic and racial boundaries are more distinct when a larger percent of native-born Mexicans maintain the use of Spanish, which impacts ethnic marriage patterns. Finally, while changes in occupational segregation between Mexicans and Whites are not related to changes in martial behavior for 2nd+ generation Mexicans, it significantly reduces the odds of marrying a White spouse for Mexican immigrants. Increasing occupational segregation by one standard deviation decreases the odds of marrying a White spouse by five percent. These results are consistent with expectations. The distribution of groups in the labor force shapes opportunities for intergroup interaction. Thus, the segregation of Mexican immigrants into "brown-collar jobs" since the 1980s (Catanzarite 2000) facilitates their interaction with native-born coethnics but has played a role preventing interaction non-Hispanic whites on a daily basis. Changes in white's feelings towards Hispanics only seem to matter for the 2nd+ generation, where increasingly negative feelings towards Hispanics reduce the propensity for intermarriage.

[Table 5 about here]

We now turn to findings regarding the main research question of this article, namely whether there has been a fundamental shift in the martial preferences of Mexicans over time. As argued before, we should be able to identify these shifts by investigating whether the impact of living in high versus low-density areas on the odds of marrying a White spouse has decreased. First, we note that one of the key features of analysis in Tables 4 and

5 is that we model the effect of relative group size using a series of linear splines, which allows for a flexible estimation of the effect of group size on the rate of intermarriage. An important finding from the results is that the coefficients on the splines tend to get smaller as the relative group size increases; for first generation immigrants in Model 1 of Table 4, for example, the coefficient on changes in relative group size for the first spline (group size between 0.1 to 3.8 percent of the population) is -0.438, whereas the effect falls to -0.043 for the fourth spline (group sizes greater than 12.1 percent) . This curvilinear effect of relative group size is evident for both 1st and 2nd+ generation Mexicans. Hence, when the Mexicans population density has reached a certain level, the difference between "low" and "high" density c-PUMAs within the specific group size spline becomes less pronounced. Accurately fitting the nonlinear effect of relative group size on intermarriage rates with a spline function or higher order polynomial--as opposed to assuming a constant linear effect--is important because otherwise the large increase in the relative size of the Mexican population during the study period would induce a change in the estimated effect of group size even in the absence of a preference shift.

Model 3 in Tables 4 and 5 presents the results for our main research question which is whether the marital preferences of Mexicans have shifted over the study period net of individual and group level explanatory variables and the baseline effect of relative group size. The underlying idea is again that shifts in the marital preferences of Mexicans towards endogamy would reduce the importance of whether an individual lives in a low as opposed to high-density are because individuals will try to satisfy their endogamy preferences irrespective of the structural conditions. Evidence for these preference shifts would present itself in our model as significant changes of the cross-sectional group size components over

time. In other words, the difference between high and low density area should decline (or vanish) over the study period. When investigating the “societal growth curves” (i.e., the interaction effects labeled "Time*spline 1-4") our results suggest that no significant change in the impact of relative group size over time has occurred. Hence, we see a very stable pattern in the relevance of living in low versus high density areas over the study period. We therefore do not find evidence for “fundamental” preference shifts for either 1st or 2nd+ generation Mexicans.

5. Conclusion and discussion

In this article, we argue that conclusion about drivers of Mexican intermarriage trends might be misleading due to simultaneously occurring demographic processes and inadequate analytical models to disentangle them. Ethnic replenishment (i.e., the continuous inflow of Mexicans) has a very different impact on intermarriage than the enormous spatial diffusion of Mexicans across the United States since the 1990s (Singer 2004; Massey 2008; Lichter et al. 2008). Methodology that conceptualizes the United States as one big marriage market is unlikely to adequately model these differential processes and their impact on Mexican/White intermarriage (Lichter et al. 2011; Qian and Lichter 2011). We therefore proposed the use of multilevel models for repeated cross-sectional data in order to exploit the variation within and across comparatively small-scale marriage markets [i.e., c-PUMAs] (Fairbrother 2014). Modelling "societal growth curves" allows us to assess whether there really has been a "fundamental" change in the martial preferences of Mexicans as stated in the literature. Overall, this paper reveals a series of important findings.

First, our analysis provides a more nuanced picture of Mexican marriage assimilation in a national context of spatial diffusion. The overall ethnic intermarriage rates of pooled 1st and 2nd+ generation Mexicans have not followed a uniform trend across destination types over the last 30 years. Rather, a pattern of ups and downs is evident. Moreover, when we disaggregate by generational status an alternative trend is apparent. Mexican immigrants' ethnic intermarriage rates have declined slightly from 1980 to 2010 and 2nd+ generation Mexican ethnic intermarriage rates have increased more substantially in the same time frame. Thus, the slowdown in marital assimilation does not represent a

uniform process for Mexicans across the United States, especially when immigrant generation is taken into consideration. When we further examine patterns across destination type greater variation is apparent. For 1st generation Mexicans outside of traditional destinations, intermarriage rates decreased from 1980 to 1990 but increased between 1990 and 2010. For 2nd+ generation Mexicans, trends across destination type do not vary much from the national time trend. In line with our expectations, absolute ethnic intermarriage rates for 2nd+ generation Mexicans vary such that intermarriage is much more frequent in new destinations compared to re-emerging or traditional destinations. Overall, these findings allow us to conclude that 2nd+ generation Mexicans are firmly on the path towards marital assimilation with the U.S. White population, regardless of destination type.

Second, our multivariate analysis also offers important findings related to trend in Mexican/White intermarriage. In line with earlier findings in the literature, we find that an increase in relative group size, occupational segregation, and origin culture retention over times deters interethnic marriage in favor of endogamy (Hwang et al. 1997; Kalmijn and van Tubergen 2010; Spörlein et al 2014). With regard to the main research question of this article, we did not evidence for substantial shifts in marital preferences of Mexicans. None of the interactions between the time effect and the relative group size splines indicates a significant change in the impact of group density on marital behavior. In other words, we did not find evidence for the proposition that preference shifts lead a reduced importance of whether Mexicans live in low vs high density areas. It is still the case the endogamy is more likely in high density marriage markets as opposed to low density marriage markets.

Our analysis is of course not without its limitations. We cannot distinguish at a higher level than 2rd generation. This is important given the volume of research that

suggests third and higher generation Mexicans are at risk for stagnation or decline on other assimilation measures (Rumbaut 2005; Telles and Ortiz 2008). Furthermore, this current research on marital assimilation only considers one of the many dimensions of assimilation (Gordon 1967). Future researchers should consider quantitative tests how and if immigrant replenishment affects complementary structural and cultural measures including spatial mobility, friendship formation, or native language retention/abandonment. Alternatively, future scholars may apply similar methods used in this paper to examine assimilation measures for other immigrant groups or consider comparative research across multiple immigrant groups. Disaggregating and conducting similar analyzes at lower levels may also prove necessary to further our understanding of the effects of immigrant replenishment, spatial diffusion, and marital assimilation.

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Figures

Figure 1: The percentage share of Mexicans couples across c-PUMAs

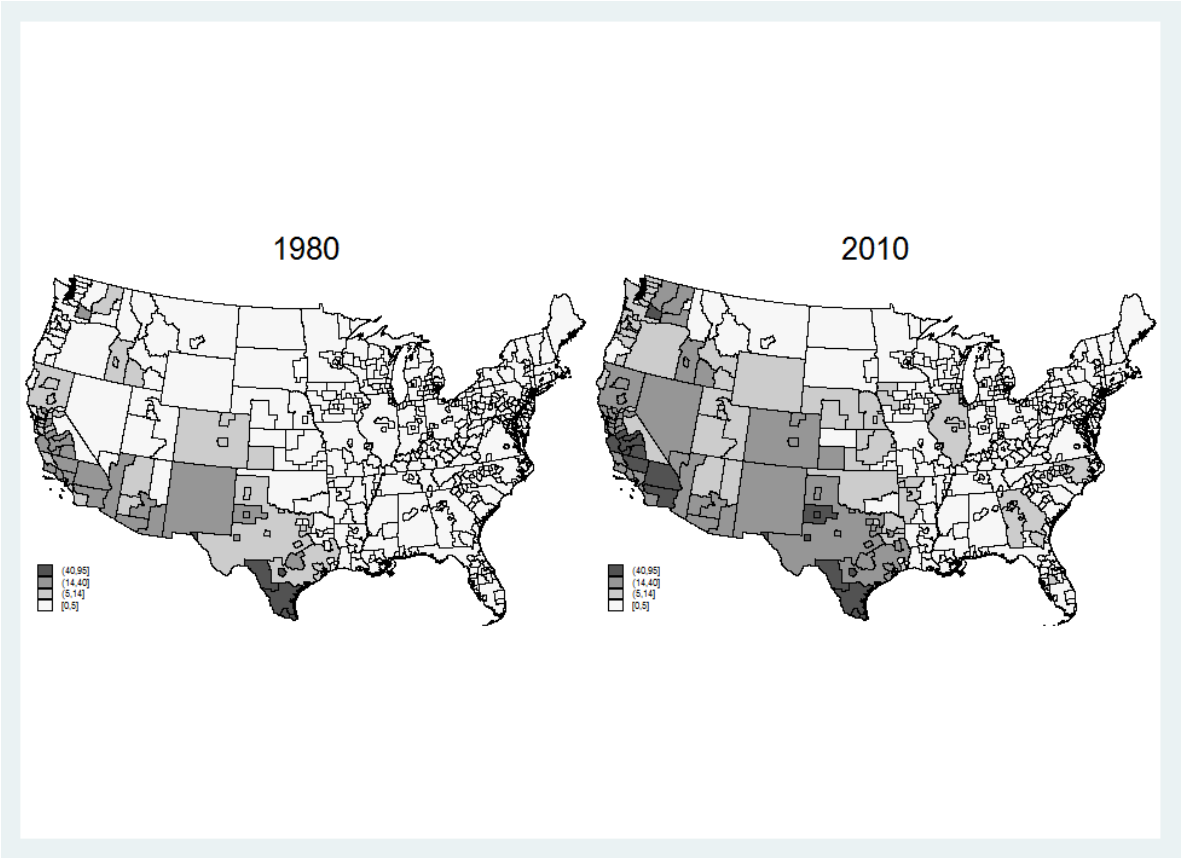
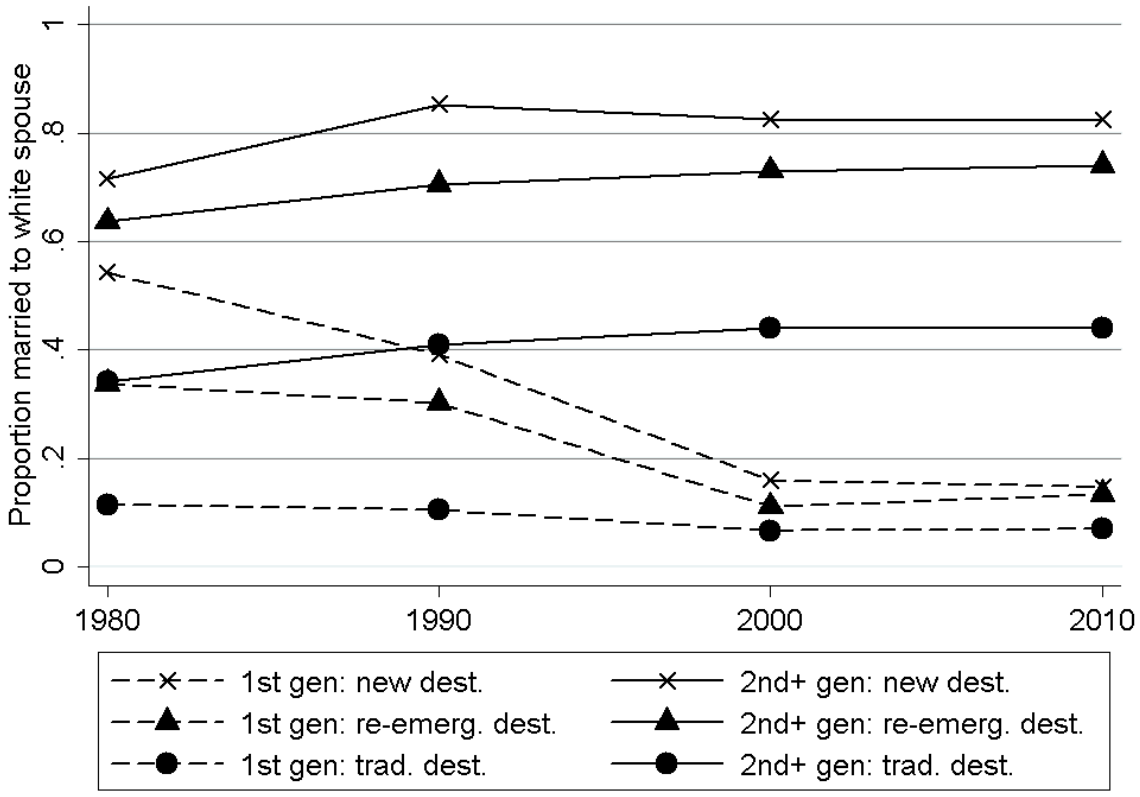


Figure 2: Mexican/White intermarriage rates across time, generational status and settlement area, 1980-2012.



Tables

Table 1: Descriptive statistics of independent variables

	Range	Mean	SD
Macro level variables			
% of c-PUMA living in metro area	.00-100.00	35.73	39.91
Occupational segregation	.04-.95	.33	.09
Sex ratio	.14-16.00	1.18	.35
% speaking Spanish at home	.00-100.00	61.30	18.62
White's negative feeling towards Hispanics (measured at state level)	-20.00--89.00	-61.95	6.04
Relative group size (in %)	.01-34.01	8.98	7.15
Micro level variables			
Female	0-1	.56	
Age	20-30	25.92	2.92
Years of education	0-17	11.78	2.56
Speaks English	0-1	.91	

Table 2: Mexican ethnic and generational intermarriage over time

Intermarriage rate	1980	1990	2000	2010
Overall	.38	.43	.38	.41
1st generation	.13	.13	.08	.09
2nd+ generation	.40	.48	.51	.53

Table 3: Variance Components and Random Time Slope

	1st generation	**2nd+ generation**
Var(c-PUMA)	1.795	1.715
Var(c-PUMA-time)	.094	.096
b_{time}	-.518**	-.086**
sd(b_{time})	.205	.295
95% CI b_{time}	[-.920;-.116]	[-.664; .492]

Note: individual level variance component fixed to $\pi^2/3$ in logistic multilevel models.

Table 4: Multilevel logistic regression 1st generation Mexican ethnic marital behavior, 1980-2012

	Married exogamously vs. married endogamously					
	Model 1		**Model 2**		**Model 3**	
	coef	**s.e.**	**coef**	**s.e.**	**coef**	**s.e.**
Intercept	.735	.110**	1.038	.162**	.423	.184**
% of c-PUMA living in metro area	-.282	.069**	-.239	.067**	-.174	.065**
Relative group size (cross-sectional) spline 1	-.438	.032**	-.488	.065**	-.367	.065**
Relative group size (cross-sectional) spline 2	-.083	.029**	-.160	.051**	-.129	.049**
Relative group size (cross-sectional) spline 3	-.088	.031**	-.085	.054	-.084	.049
Relative group size (cross-sectional) spline 4	-.043	.014**	-.042	.024	-.015	.024
Relative group size (longitudinal)	-.136	.035**	-.166	.036**	-.134	.036**
Time*spline 1			.009	.029	.001	.029
Time*spline 2			.069	.022**	.060	.021
Time*spline 3			-.010	.022	-.011	.021
Time*spline 4			-.003	.011	-.005	.011
Occupational segregation (cross-sectional)					-.149	.032**
Occupational segregation (longitudinal)					-.056	.024**
Sex ratio (cross-sectional)					.154	.029**
Sex ratio (longitudinal)					.034	.022
Sex ratio (cross-sectional) x gender					-.213	.036**
Sex ratio (longitudinal) x gender					-.046	.039
% speaking Spanish at home (cross-sectional)					-.225	.047**
% speaking Spanish at home (longitudinal)					-.051	.026*
White's negative feelings towards Hispanics (cross-sectional)					.013	.031
White's negative feelings towards Hispanics (longitudinal					-.060	.031
Sex	-.183	.039**	-.184	.039**	-.135	.040**
Age	.034	.007**	.033	.007**	.033	.007**
Years of education	.256	.009**	.256	.009**	.255	.009**
Speaks English	1.874	.092**	1.872	.093**	1.858	.093**
Time	-.408	.032**	-.550	.067**	-.458	.069**
Var(c-PUMA)	.000		.106		.068	
Var(c-PUMA-time)	.070		.038		.025	
sd(time)	.138		.000		.032	
Observations						
c-PUMA	510		510		510	
c-PUMA-time	1,542		1,542		1,542	
Individuals	96,406		96,406		96,406	

Note: Macro level variables standardized, micro level variables grand-mean centered. See data section for a definition of the splines. ** p<.01 (two-sided), * p<.05 (two-sided).

Table 5: Multilevel logistic regression of 2nd+ generation Mexican ethnic marital behavior, 1980-2012

	Married exogamously vs. married endogamously					
	Model 1		**Model 2**		**Model 3**	
	coef	**s.e.**	**coef**	**s.e.**	**coef**	**s.e.**
Intercept	2.231	.063**	2.228	.082**	1.510	.104**
% of c-PUMA living in metro area	-.359	.043**	-.358	.044**	-.272	.039**
Relative group size (cross-sectional) spline 1	-.448	.028**	-.428	.051**	-.255	.048**
Relative group size (cross-sectional) spline 2	-.128	.035**	-.192	.064**	-.159	.055**
Relative group size (cross-sectional) spline 3	-.083	.044**	-.077	.082	-.075	.070
Relative group size (cross-sectional) spline 4	-.123	.018**	-.093	.034**	-.053	.029
Relative group size (longitudinal)	-.107	.024**	-.118	.026**	-.098	.022**
Time*spline 1			-.009	.021	-.020	.019
Time*spline 2			.029	.025	.018	.021
Time*spline 3			-.003	.031	.005	.026
Time*spline 4			-.014	.013	-.016	.011
Occupational segregation (cross-sectional)					-.019	.021
Occupational segregation (longitudinal)					.003	.011
Sex ratio (cross-sectional)					.016	.017
Sex ratio (longitudinal)					.039	.013**
Sex ratio (cross-sectional) x gender					.007	.015
Sex ratio (longitudinal) x gender					.019	.015
% speaking Spanish at home (cross-sectional)					-.332	.034**
% speaking Spanish at home (longitudinal)					-.126	.013**
White's negative feelings towards Hispanics (cross-sectional)					-.006	.024
White's negative feelings towards Hispanics (longitudinal					-.032	.015**
Sex	-.023	-.013	-.023	.013	-.022	.013
Age	.016	.002**	.016	.002**	.016	.002**
Years of education	.290	.004**	.290	.004**	.290	.004**
Speaks English	1.156	.056**	1.156	.056**	1.142	.056**
Time	-.116	.021**	-.115	.035**	-.076	.033**
Var(c-PUMA)	.629		.620		.446	
Var(c-PUMA-time)	.055		.056		.034	
sd(time)	.285		.279		.235	
Observations						
c-PUMA	543		543		543	
c-PUMA-time	2,147		2,147		2,147	
Individuals	355,853		355,853		355,853	

Note: Macro level variables standardized, micro level variables grand-mean centered. See data section for a definition of the splines. ** p<.01 (two-sided), * p<.05 (two-sided).

Appendix A

Table 1: Classification of settlement areas based on Riosmena and Massey (2012)

Settlement areas	States
Traditional	Arizona, California, Illinois, Indiana, New Mexico, Michigan, Ohio, Texas and Wisconsin
Re-emerging	Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming
New	Alabama, Arkansas, Connecticut, Delaware, Washington D.C., Florida, Georgia, Kentucky, Louisiana, Maine, Massachusetts, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia and West Virginia

Appendix B

Table 1: Multilevel logistic regression of 1st and 2nd+ generation Mexican ethnic marital behavior, 1980-2012. Alternative specification of the group size splines.

	Married exogamously vs. married endogamously			
	1st generation		**2nd+ generation**	
	coef	**s.e.**	**coef**	**s.e.**
Intercept	1.388	1.058	1.991	.317**
% of c-PUMA living in metro area	-.190	.066**	-.266	.039**
Relative group size (cross-sectional) spline 1	-3.557	4.155	-2.585	1.255**
Relative group size (cross-sectional) spline 2	.632	1.497	.761	.595
Relative group size (cross-sectional) spline 3	-1.410	.314**	-.627	.167**
Relative group size (cross-sectional) spline 4	-.080	.012	-.109	.012**
Relative group size (longitudinal)	-.124	.034**	-.095	.021**
Time*spline 1	1.102	1.915	.300	.645
Time*spline 2	-.882	.649	-.599	.270**
Time*spline 3	.348	.137**	.018	.069
Time*spline 4	.006	.005	.000	.004
Occupational segregation (cross-sectional)	-.149	.034**	-.026	.022
Occupational segregation (longitudinal)	-.054	.024**	.004	.011
Sex ratio (cross-sectional)	.178	.029**	.024	.018
Sex ratio (longitudinal)	.036	.022	.040	.013**
Sex ratio (cross-sectional) x gender	-.216	.037**	.008	.015
Sex ratio (longitudinal) x gender	-.042	.040	.019	.016
% speaking Spanish at home (cross-sectional)	-.202	.051**	-.311	.036**
% speaking Spanish at home (longitudinal)	-.046	.026	-.129	.013**
White's negative feelings towards Hispanics (cross-sectional)	-.024	.033	-.022	.013
White's negative feelings towards Hispanics (longitudinal	-.057	.031	-.031	.015**
Sex	-.134	.040**	-.058	.071
Age	.032	.007**	.016	.002**
Years of education	.253	.009**	.290	.004**
Speaks English	1.854	.093**	1.142	.056**
Time	-.748	.498	-.035	.162
Var(c-PUMA)	.093		.468	
Var(c-PUMA-time)	.032		.032	
sd(time)	.000		.237	
Observations				
c-PUMA	510		543	
c-PUMA-time	1,542		2,147	
Individuals	96,406		355,853	

Note: Macro level variables standardized, micro level variables grand-mean centered. ** p<.01 (two-sided), * p<.05 (two-sided).