Migration and Schooling among Second-generation Mexican Immigrant Children (extended abstract)

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Introduction

The educational outcomes of Mexican immigrant children in the United States are among the poorest of all immigrant children, marked especially by high rates of leaving high school without graduating (Landale, Oropesa, and Llanes 1998; Hirschman 2001). Differences are seen already at pre-school ages, with lower enrollment rates among Mexican immigrant children than among either native-born or other immigrant groups (Hernandez 2004). The effects of the migration process itself on educational outcomes are found to be important for first-generation migrants. Hirschman, for example, finds that high school graduation is more common among children that arrived in the US at earlier ages. Second-generation migrants, however, are invariably analyzed under the assumption that, having being born in the US, their schooling takes place exclusively in the US. The main aim of the present study is to explore the cases for which this assumption is not true specifically for second-generation Mexican children. It describes both their US-Mexico migration patterns during childhood and their school enrollment in the US and Mexico associated with this childhood migration.

Children's place in the study of migration is typically viewed as a possible hindrance to parents' migration. When family migration including children does occur, it is often assumed that the children's moves are tied to the parent's motives for moving. While the rationale for such an adult-centric characterization of the determinants of children and family migration is strong, the Mexico-US migration system contains within it possibilities for the presence and characteristics of children to have a stronger determining role in the decision to migrate. Migration has also been found to have an important relationship to fertility in the US versus in Mexico among Mexican-born women (Lindstrom and Saucedo 2002), suggesting co-determination of migration and fertility.

The incentives for giving birth in the US, even if the child will be raised principally in Mexico, are strong. For the children themselves, US citizenship may be expected to increase their later labor-market opportunities since they are not hampered by the unauthorized residence or work status issues they might encounter were they born in Mexico. For the family, having one or more children born in the US builds the family's US legal migration capital, in an overall migration context in which kin networks have been emphasized (Massey et al 1998; Durand and Massey 2004a). There are also reasons for having a US-born child schooled in the US rather than in Mexico. Apart from differences in the schooling systems, continued residence in the US will build language and cultural capital that facilitates the child's later labor market outcomes. Other factors, however, such as the parents unauthorized migration status in the US, may result in second-generation immigrants' spending at least some of their childhood in Mexico. Very little is currently known empirically. The greater frequency of "settlement" migration among women than men is an indicator of continued residence in the US associated with family formation (Donato 1993; Donato and Patterson 2004). The present study, however, is the first to provide direct evidence using national level data.

In this extended abstract, tabulations using data from the US birth registration system and microdata from the US and Mexico censuses of 1990 and 2000 are first presented to provide

indications of the extent of migration both to Mexico and back to the US among second-generation Mexican children. Following that is a description of the migration-education transition probability estimation and life table construction planned for the full paper.

Data

The data files used are the US Natality Files (National Center for Health Statistics various years) and the 1990 and 2000 census microdata from the University of Minnesota's IPUMSi project (Sobek, Ruggles, McCaa, King, and Levison 2002). The US Natality Files, used also in Jonsson and Rendall (2004), include variables for mother's country of birth, age, education, parity, years since last birth, and current marital status. Those analyses revealed no apparent anomalies in the recording of Mexican women's country of birth and age. The quality of birth registration in Mexico, however, is known to be low (Campos 1998), and so no reverse-direction analyses of Mexican-born children of the type proposed here for US-born children of Mexican-born women are planned.

The IPUMSi microdata files include first an equal probability 10% sample for Mexico in 1990, implying a uniform weight of 10 for all individuals. The 2000 Mexico samples and 1990 and 2000 US samples, however, involve stratified cluster sample designs (10.6% sample for Mexico and 5% samples for the US), and thus the sample weights supplied by the respective census agencies need to be used. Hill and Wong's (2005) estimates of net migration between Mexico and the US between 1990 and 2000 alternately using the Mexican and US censuses revealed a basic compatibility of the two countries in terms of enumeration by age and gender, including both unauthorized and authorized Mexican-born residents of the US.

The key variables present in both the US's and Mexico's censuses are country of birth, country of residence five years ago, and questions providing current school attendance and level of schooling attained. The Census microdata include all household members, allowing for linkage of the child to the mother if present in the same household, or to other adults who may be caring for the child in the mother's absence. The use of census household member information has previously been used successfully in the identification and analyses of second-generation immigrants with the 1990 US Census PUMS (Jensen and Chitose 1994; Landale, Oropesa, and Llanes 1998).

Extent and timing of US-Mexico migration during 2nd-generation Mexican childhoods

Estimates of migration during childhood are presented in Table 1 from the US Natality Files 1990-99 and from the Mexican census of 2000 microdata from the IPUMSi data. These together give an indication of the potential importance of early childhood emigration from the US to Mexico. The number of US births to Mexican-born women over the decade was 2.8 million. The almost 200 thousand US-born children aged 1 to 10 in the Mexican census of 2000 is an approximate estimate only of the number of emigrants to Mexico among children born in the US to Mexican-born mothers. First, some of these child emigrants will have a mother born in either the US or another country. Second, some children with a Mexican-born mother will have emigrated to Mexico but subsequently returned to the US. In preliminary analyses not reported here, fewer than 1 out of 10 US-born children in Mexico were found to have a non-Mexican-born mother. Five-year transition probabilities, described below, will give some indication of the extent of multiple moves during childhood.

The observed pattern shows some regularity by age: a rising percentage in the pre-school ages up to 8.1 percent at age 3, followed by a falling percentage through the early school ages down to 6.1 percent at age 10. This pattern may relate to children's age and schooling in Mexico versus in the US as a determinant of parents' return migration to Mexico, or it may be a coincident effect of variables more related to the parents' own reasons for migration, including variables such as changes in border control. Comparisons between the 1990 and 2000 Census patterns will be helpful in addressing this question.

Table 1 Numbers of births in the US to Mexican-born women and numbers of 0 to 10 year old US-born Children in 2000 Mexico Census				
Year	US Births to Mexican-born women ('000)	Age in 2000	US-born children in Mexico 2000 ('000)	Ratio of US-born children aged x per 100 births in the US x years before
1990	206.8	10	12.7	6.1
1991	247.9	9	17.3	7.0
1992	265.9	8	18.2	6.8
1993	280.5	7	19.3	6.9
1994	288.3	6	20.5	7.1
1995	292.8	5	21.8	7.4
1996	295.1	4	22.2	7.6
1997	308.8	3	24.9	8.1
1998	307.5	2	22.1	7.2
1999	317.1	1	20.7	6.5
1990-99	2,810.8	1 to 10	199.8	7.1
Sources: US Natality Data Files, 2000 Mexican Census IPUMSi File				

Another observation from these data is that the implied rates of emigration to Mexico, while substantial, are relatively low. More than 90 percent of children born in the US to Mexican-born mothers are apparently still, or are again, in the US at any given age up to 10. The expected number in the US in 2000 at each age is approximately the number of US births in column 2 minus the number of Mexico-resident, US-born children of column 4, with adjustment for infant

and child mortality, for census under-enumeration, and for more exact alignment of births to age at census. A major advantage of having data on both sides of the border is that it allows for observation of members of the same birth cohort also in the US, and for checks that are more informative about the extent and sources of data problems such as under-enumeration than are data on one side of the border only.

Table 2 Numbers of US-born Children Resident in Mexico at ages 1 to 8 in 1990 and ages 11 to 18 in 2000			
US-born children with Mexican-born mothers, Mexico 1990 ('000)	Age in 1990, 2000	US-born children with Mexican-born mothers, Mexico 2000 ('000)	Ratio of US-born children aged x to x+10
8,893	1, 11	7,646	0.860
7,930	2, 12	6,062	0.764
7,142	3, 13	6,446	0.903
6,751	4, 14	6,361	0.942
7,467	5, 15	5,389	0.722
6,069	6, 16	4,393	0.724
6,964	7, 17	4,781	0.687
8,442	8, 18	4,950	0.586
Source: Mexican Census IPUMSi Files 1990 and 2000			
Note: estimates of Mexican-born mothers made from probable mother or other adult women in the Census household			

As shown by Hill and Wong (2005) for the Mexican-born population, net return migration to the US can be estimated indirectly both from two consecutive Mexican censuses, and from two consecutive US censuses. In Table 2, the 1990 and 2000 Mexican censuses are used to indicate of the level of net Mexico-US migration between the ages 1 to 8 and 11 to 18 years old. The results indicate a strong pattern of increasing return migration to the US in early adulthood. While as many as 86 percent of 1 year olds in 1990 survived to be recorded 10 years later at age 11 still or again in Mexico, only 59 percent of 8 year olds in 1990 survived to be recorded 10

years later at age 18 still or again in Mexico. An implied regular pattern of migration by age is again seen, with return migration to the US lowest between ages 3 and 4 to ages 13 and 14, where over 90 percent survived to be recorded 10 years later again in Mexico. Again this is consistent with a strategy of migration that would have US-born children schooled in Mexico, with return migration to the US not occurring until the labor-force ages of 15 and older.

These preliminary analyses suggest a pattern of overall strong residential attachment to the US in both childhood and adolescence among the US-born children of Mexican-born women. Compared to analyses of return migration of adult Mexicans (Massey and Zenteno 1999; Durand et al 2001), they indicate a much greater likelihood of remaining in the US among the children of Mexican migrants than among Mexican migrants themselves. These patterns imply that having a child or children born in the US is associated with substantially reduced return migration probabilities among the parents, assuming that returning Mexican-born parents do not instead leave their children with US-resident carers.

Rates of cross-sectional state prevalence such as in Table 1, however, typically understate "ever-in-state" prevalence. Thus the proportions of second-generation Mexican-American children who have spent some of their childhood and schooling years in Mexico may be considerably higher. This and the regular age patterns of emigration and return migration suggested by separate analyses of birth to early childhood (Table 1) and early childhood to adolescence (Table 2) suggest that life-table type models of birth to adolescence may be an appropriate tool to represent longitudinally the process of US-Mexico migration over the childhood life course.

Schooling entry and exit transition probabilities in the US and Mexico, joint with migration probabilities

The purpose of estimating schooling transition probabilities is to allow schooling outcomes to be associated with US-Mexico migration. To do so, joint migration and schooling transition probabilities are estimated. Formally, between pre-school age x and age $x+5$, the child has a probability of entering school and changing country $p_{ij,s}(x+5)$, where i is country of residence at age x and j is country of residence at age $x+5$, and s is a 0,1 indicator for in-school or not at age $x+5$. This probability is estimated from a numerator of children in the country-j census who were in country i five years before and who are either currently attending or not attending school in the census year, and a denominator aggregated over the two countries' censuses that includes the children living in country i both in the census year and five years before and the children living in country j in the census year and country i five years before. Thus eight transition probabilities are estimated for two origin countries at age x by two destination countries at age $x+5$ by two schooling statuses. For a given i,j pair, these are given by:

$$p_{ij,1}(x,x+5) = N_{ij,1}(t+5,x+5) / [N_{ij,1}(t+5,x+5) + N_{ij,0}(t+5,x+5)]$$

and

$$p_{ij,0}(x,x+5) = N_{ij,0}(t+5,x+5) / [N_{ij,1}(t+5,x+5) + N_{ij,0}(t+5,x+5)]$$

The four transition probabilities for each origin country i add to 1, reflecting the joint process of both migrating (or not) and entering school (or not).

Between ages $x+5$ and $x+10$ and between ages $x+10$ and $x+15$, the child has a probability of leaving school, assuming he/she was in school at age $x+5$. If not in school, he/she has a probability of entering school and changing country. Defining r as a 0,1 indicator for in-school or not five years before the census year and s again as a 0,1 indicator for in-school in the census year, then $p_{ij,rs}(a)$, $a=x+10, x+15$, represents the transition probability defining both international migration and leaving school. At all ages $x+10$ and at most ages $x+5$, leaving school will be the only possible schooling transition that needs to be estimated.

As shown by Feliciano (2005), comparable educational attainment measures can be derived between the US and Mexican census. In the US Census, schooling attainment consists of grade level attained. In the Mexican Census, a derived "years of schooling" variable (in single years) is available in addition to educational attainment in the IPUMSi files. Variables for current enrollment status are present in both countries in both 1990 and 2000. The school-leaving part of the transition probability is coded from a numerator of children in the country-j census who are in either currently attending ($s=1$) or not attending school ($s=0$) in the census year, and a denominator aggregated over the two countries' censuses. Schooling status five years before census is constructed from the variables of current schooling status, years of schooling, and level of educational attainment. In general, currently in school at age $x+5$ or $x+10$ will be sufficient to impute an in-school status five years before. Where the individual aged $x+10$ or $x+15$ at the census is not currently in school, the years of schooling and/or educational attainment and age at census will be sufficient to impute in-school status five years before.

A US-Mexico migration and schooling life table
Using life table methods (e.g., Schoen 1988), "childhoods" consisting of status at birth, at a pre-school age between 1 and 5 years old, and at either two or three ages five years apart can be constructed from the above transition probabilities. To incorporate mortality as well as migration, the transition probabilities will be adjusted for mortality (see above). Life tables will be estimated separately for boys and girls, thereby revealing gender-differentiated consequences of migration and schooling that may be of considerable substantive interest.

The migration-schooling life tables will be constructed in synthetic-cohort form using alternately the 1985-90 and the 1995-00 transition probabilities. School-leaving and migration dynamics may vary greatly from one age to the next, especially around the modal school-entry and school-leaving ages. Therefore the life-tables will be estimated by single-year age. Life tables beginning their post-birth outcomes at ages 0, 1, or 2 will have four time points, up to ages 15, 16, and 17, while life tables beginning their post-birth outcomes at ages 3 or 4 will have three time points, up to ages 13 or 14.

The synthetic cohort life table is simplest to construct, and measures derived from it have interpretations analogous to life expectancy and the total fertility rate, being lifetime or part-of-lifetime outcomes implied by the current period's event rates. The disadvantage of measures from a synthetic-cohort life table is that they do not have an interpretation applicable to any real cohort. To mitigate this problem, the transition probabilities for the 1985-89 birth cohort will be linked across the 1990 and 2000 censuses, similarly to in Table 2 above for country-of-residence numbers in 1990 and 2000. This will be done by using their observed 1985-1990 transition probabilities from birth to age x, and their observed 1995-2000 transition probabilities from age $x+5$ to $x+10$. This allows for return migration in the adolescent years to be estimated for a cohort for which pre-school-age emigration to Mexico has been observed.

Computationally, the use of a five-year interval with only three or four time points after birth allows for the probability of every path of migration and schooling to be calculated analytically,

while with a one-year interval, for example, microsimulation methods are needed to make such calculations (e.g., Moffitt and Rendall 1995). The life table can answer questions about how many US-born children will ever reside in Mexico for significant time periods ----- for example, it can be used to capture all such children who will reside in Mexico for five continuous years or more of their childhoods, and some who will reside shorter periods. The life table can also be used to estimate the associations between length of schooling and residence in Mexico.

The five-year migration interval following the birth-to-pre-school-age first interval, however, also has disadvantages for interpretation compared to the frequently-used one-year interval. The concept of a "transition probability" is distinguished in the multi-state demography literature from the concept of a "transition intensity" (e.g., Rogers 1995). The key difference between these concepts is that a transition probability does not imply that only one transition occurred in the time between the beginning and end of the transition interval. Its interpretation instead is as the probability of being in a different status (e.g., in a different country) at the end of the transition interval compared with at the beginning. A transition probability is, however, most usefully defined over an interval in which multiple transitions are relatively uncommon. While an assumption that multiple US-Mexico migration transitions over intervals up to five years long would clearly be wrong for labor migrants, who are predominantly men (Durand and Massey 2004), it is much more likely to be reasonable for the family migration of children and their mothers.

From a modeling perspective, repeat migration implies a second- or third-order state dependency (e.g., knowledge of place of residence both five and ten years before the census). The life table itself is built around a first-order state dependency, and so is appropriate to the use of the single Census question on place of residence five years ago. While repeat migration may in theory be derived from the life table, it is not recommended without testing of the "ergodicity" assumption (of no dependence of the current probability of moving on having previously moved). A second-order migration dependency is, however, built into the return migration probability from Mexico to the US, as being born in the US and resident in Mexico implies having already migrated at least once. This relationship adds considerably to the realism of the life table model.

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