Immigration and the Family

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This article studies the role of the family in determining the skill composition and labor market experiences of immigrants in the United States. Our theoretical framework, based on the assumption that family migration decisions maximize household income, shows that the family attenuates the selection characterizing the skills of the immigrant population. The empirical analysis uses the 1970 and 1980 Public Use Samples of the U.S. census and reveals that an immigrant's skills and labor market performance are greatly influenced by the composition of the household at the time of migration and by his placement in the immigration chain.

I. Introduction

Immigrants are usually part of a "chain": most have relatives already residing in the United States, and many will have relatives joining them. About 70% of the persons who immigrated legally between 1981 and 1987 had entry visas sponsored by relatives already residing in the United States.[1] In addition, immigrants are often accompanied by relatives when they enter the country.

The internal migration literature recognizes the important role played by the family in migration decisions (DaVanzo, 1976; Sandell, 1977; Mincer,

We are grateful to Donald Deere, Larry Katz, Andrew Lo, Douglas Massey, and Stephen Trejo for many insightful comments and to Bernt Bratsberg for skillful research assistance. The research was funded by grants from the Alfred P. Sloan Foundation and the National Science Foundation (grant SES-8809281).

[1] U. S. Immigration and Naturalization Service (1988), table 4.

[*Journal of Labor Economics*, 1991, vol. 9, no. 2]

0734-306X/91/0902-0005$01.50

1978). These studies suggest that viewing the family as the decision-making unit explains important empirical regularities in internal migration flows. The assumption that the family's migration behavior maximizes household income leads to the possibility that some members of the family move (or stay) even though it is not optimal (in the absence of the family unit) to do so. These tied movers or stayers agree to the family migration decision because of wealth transfers made within the family (Becker 1974, 1981).

By contrast, the literature analyzing the labor market characteristics of immigrants in the United States ignores the family's role in the immigration experience (Chiswick 1978; Borjas 1985, 1987; Abowd and Freeman 1991). These studies view immigrants as single persons, unrelated to any persons in the host country prior to migration, whose decisions to immigrate, assimilate, or to become a return migrant are based on their own individual gains and who disregard the welfare of the dependents and relatives remaining in the source country.[2]

The internal migration literature indicates that even in the absence of statutory restrictions, the family plays an integral part in the migration decision. United States immigration policy magnifies the family's role. Table 1 lists the key features of the policy in effect since the 1965 amendments to the Immigration and Nationality Act.[3] There are 270,000 visas distributed annually (with the restriction that no source country receive more than 20,000 visas). Under current law, 80% of these numerically limited visas are allocated to persons who have close relatives in the United States. The law also allows for the unrestricted entry (above and beyond the 270,000 numerically limited visas) of anyone who is an immediate relative (a spouse, minor child, or parent) of an adult U.S. citizen.[4]

This article presents a theoretical and empirical analysis of the role of the family and of chain immigration in determining the skill composition and labor market experiences of immigrants in the United States. Our

[2] In contrast, the sociological literature stresses the role of family and social networks in immigration. See, e.g., Massey (1986) and Massey and Espana (1987).

[3] The various provisions of immigration policy summarized in table 1 were not all part of the original 1965 amendments but, instead, became law as various revisions to the amendments were enacted during the 1970s. For a history of U.S. immigration policy, see Borjas (1990, chap. 2).

[4] The fact that immigrants in the United States can sponsor the entry of their relatives, who, in turn, can sponsor the entry of their relatives, creates the potential for a geometric growth in the number of persons who qualify for admission. In theory, the immigration multiplier, the number of immigrants who will be admitted in the future as the result of one current admission, can be quite large. Jasso and Rosenzweig (1986) estimate the multiplier and find that, because of the naturalization requirements for sponsorship and because not all persons who qualify for a visa actually migrate to the United States, the immigration multiplier is under unity.

Table 1
U.S. Immigration Policy (as of 1988)

A. Numerically limited Visas (270,000 Annually)

Preference	Provision	Percentage of Visas	No. of Immigrants Admitted in 1981–87 (in 1,000s)
First	Unmarried adult children of U.S. citizens and their children	20	58.4
Second	Spouses and unmarried children of permanent resident aliens	26	791.4
Third	Members of the professions of exceptional ability and their children	10	175.7
Fourth	Married children of U.S. citizens and their spouses and children	10	131.0
Fifth	Siblings of adult (over 21) U.S. citizens and their spouses and children	24	515.8
Sixth	Workers in occupations in short supply in the U.S. and their spouses and children	10	183.3
Other			68.0

B. Immigrants Exempt from Numerical Limitation

Preference	Provision	No. of Immigrants Admitted in 1981–87 (in 1,000s)
1.	Immediate relatives of U.S. citizens spouses, minor children, and parents of adult U.S. citizens	1,328.3
2.	Refugees; special immigrants such as members of the clergy and former employees of the U.S. government abroad and babies born abroad to legal permanent resident aliens.	815.7
Total admitted (pt. A and pt. B)		4,067.6

SOURCE.—U.S. Immigration and Naturalization Service (1988).

behavioral assumption is that households maximize family income and that migration decisions are guided by the comparison of family incomes across the various alternatives relative to the costs of migration. We show that extending Roy's (1951) model to study family migration decisions provides a full categorization of the types of families likely to migrate and of the types of individuals likely to characterize each link in the chain.

Our empirical study uses the Public Use Samples of the 1970 and 1980 U.S. censuses. We exploit the hierarchical structure of the data to construct "family migration histories." The data reveal systematic differences in the

skills and labor market performance of immigrants according to the household composition of the individual at the time of migration and in terms of his placement in the immigration chain.

II. Theory

Consider a family with two members, i and j. Earnings (y) for individual k ($k = i, j$) in the source country are given by

$$y_{0k} = \mu_0 + v_{0k}, \tag{1}$$

while earnings in the country of destination (for concreteness, the United States) are given by

$$y_{1k} = \mu_1 + v_{1k}. \tag{2}$$

The parameter μ_0 is the population mean of the income distribution in the source country. The random variables v_{0k} and v_{1k} represent person-specific deviations from mean incomes due to differences in skills across individuals.[5] Finally, the parameter μ_1 is the mean income that immigrants would receive in the United States *if all* persons in the source country migrated here.[6] Because average skills are likely to differ across national origin groups, the parameter μ_1 need not be the same as the average income of U.S. natives, nor need it be the same for all national origin groups.

To simplify the analysis, we assume that the random variables v_{0k} and v_{1k} are perfectly correlated across countries.[7] The population income distributions can then be written as

$$y_{0k} = \mu_0 + \eta v_k; \tag{1'}$$

$$y_{1k} = \mu_1 + v_k. \tag{2'}$$

In this framework, the U.S. price for the skills embodied in v_k is the numeraire, and η is the relative price of skills in the source country. The assumption of perfect correlation in earnings across countries is equivalent

[5] The variables v_{0k} and v_{1k} are random in the sense that the skills of a randomly selected person have a nondegenerate distribution over the population. However, these skills are known to economic agents, so that there is no uncertainty associated with the immigration decision.

[6] Equations (1) and (2) decompose earnings into a country-specific "standard of living," μ, and an individual-specific skill component, v. The unconditional means μ_0 and μ_1 are then independent of the subscript k.

[7] We ignore the possibility of a "refugee sorting" of the immigrant population (Borjas 1987). In this sorting, the returns to ability may be negatively correlated across countries, and immigrants are highly skilled (in terms of the U.S. income distribution).

to assuming that earnings differences across individuals are attributable to a single factor. The parameter η is the relative factor loading of skills in the source country. The parameter η also gives the ratio of the standard deviation in earnings between the source and host countries. If $\eta > 1$, the source country has a more unequal income distribution than the United States, while the opposite is true if $\eta < 1$. Finally, the correlation in earnings among family members is given by $\text{corr}(v_i, v_j) = \rho$, where $-1 < \rho < 1$.

We assume that the random variable v is normally distributed with mean zero and variance σ^2. Although this is a restrictive assumption, it leads to a mathematically tractable model of family immigration behavior. Moreover, our results will often apply to different families of distributions, and we will note the generalizations we have explored below.

Although much of the literature influenced by Roy's framework focuses on the sorting in unobserved skills, the model also has implications for the sorting in observed skills. The random variable v may represent a vector of all the characteristics that are valued by the labor market, and on which individuals sort themselves across countries (including education, age, sex, and unobserved ability). We assume that the relative price of each characteristic in the source country is η (so that the vector of skill characteristics can be viewed as a composite commodity). The model can be generalized to allow for differential prices of skills, but to focus ideas, we concentrate on the simpler one-factor model throughout.

Our maintained behavioral assumption is that migration decisions are motivated by the maximization of family income (Becker 1974; Mincer 1978). This assumption is justified if the potential exists for income transfers within the family. These side payments, in effect, create an opportunity cost for family members pursuing selfish goals. Each family member has property rights to their individual migration decision that can be sold to other family members. The Coase theorem then implies that migration decisions are mutually agreed to by all family members.

Even though all persons agree to the migration decision made by the family, it may not be optimal for the family to move as a unit, hence the family incurs separation or dissolution costs. The key insights of the model are easiest to understand in the case where these costs are prohibitive, so that families migrate as a unit or not at all.[8]

Consider initially the migration decision of a one-person family. Person i migrates when

$$I_i = (1 - \eta)v_i - (\mu_0 - \mu_t) - M = (1 - \eta)v_i - \Delta\mu > 0, \qquad (3)$$

[8] It is not difficult to model the possibility that family disagreements over the immigration decision lead to the dissolution of the household, with some family members moving to the United States while others remain in the country of origin. This generalization does not alter the main implications of the analysis.

where M is the level of migration costs, initially assumed constant across individuals, and $\Delta\mu = (\mu_0 - \mu_1) + M$.

The conditional expectation of v_i for single migrants is given by

$$E(v_i \mid I_i > 0) = \alpha\sigma\lambda(\alpha z), \tag{4}$$

where $\alpha = 1$ if $\eta < 1$, and $\alpha = -1$ if $\eta > 1$; $\lambda(x) = \phi(x)/[1 - \Phi(x)]$; $z = \Delta\mu/(1 - \eta)\sigma$; ϕ is the standard normal density function; and Φ is the standard normal distribution function.

The immigrant flow is positively selected (i.e., immigrant skills are above average) when income inequality is greater in the United States than in the country of origin ($\eta < 1$) and is negatively selected (immigrant skills are below average) when $\eta > 1$. The optimal sorting of skills across countries thus depends on international differences in the rewards to skills. Highly skilled individuals choose to reside in a country with a high rental price for their skills (hence a highly dispersed income distribution), while less skilled individuals will not find it worthwhile to migrate to such a country.

Define I_j to be the index function corresponding to the migration decision of person j (analogous to i's index function in [3]). A two-person family migrates as a unit when

$$I_i + I_j = (1 - \eta)(v_i + v_j) - 2\Delta\mu > 0, \tag{5}$$

and the conditional expectation of v_i is

$$E(v_i \mid I_i + I_j > 0) = \alpha\sqrt{(1 + \rho)/2}\,\sigma\lambda[\alpha\sqrt{2/(1 + \rho)}z]. \tag{6}$$

The type of selection characterizing the immigrant population does not depend on the migrant's household composition. Both single persons and persons migrating in a family unit are positively selected when $\eta < 1$ and are negatively selected when $\eta > 1$. Figure 1 illustrates this result using the simplifying assumption that $\Delta\mu = 0$. If there is positive selection, single persons migrate if $v_i > 0$ (areas A, B, C), while, if there is negative selection, single persons migrate if $v_i < 0$ (areas D, E, F). The conditional means of the random term in the earnings functions, therefore, are, respectively, positive and negative. Similarly, if there is positive selection, families migrate whenever $v_i + v_j > 0$ (A, B, F), while, if there is negative selection, families migrate if $v_i + v_j < 0$ (C, D, E).

Figure 1 also shows that, in multiperson families, some persons are tied movers and other persons are tied stayers (Mincer 1978). If there is positive selection, for instance, tied movers (represented by v_i in F) migrate even though it is not profitable to do so in the absence of the family unit. Given positive selection, tied movers are necessarily the family members with

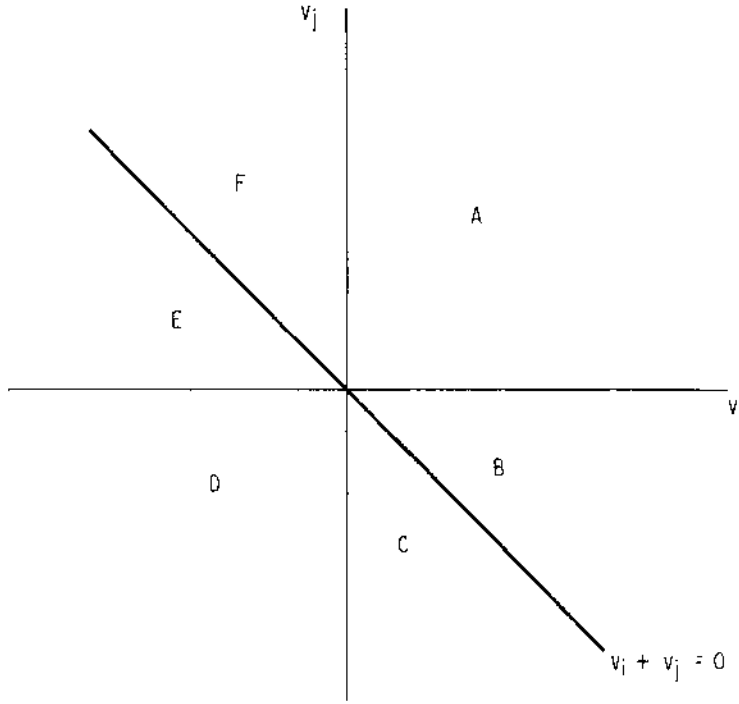

FIG. 1.—Single and family migration decisions

the lowest earnings in a migrating family. Similarly, tied stayers (v_i in C) do not migrate even though they would gain by doing so. Given positive selection, tied stayers are always the highest earnings person in a nonmigrating family.

These inferences, however, are reversed if there is negative selection. Tied movers are now represented by v_i in area C, while tied stayers are denoted by v_i in area F. Tied movers have higher earnings, on average, than their relatives, and tied stayers have lower earnings. The empirical content of the concepts of tied stayers and movers depends on the type of selection that generates the immigrant flow.

Finally, equations (4) and (6) show that the earnings of the typical single immigrant differ from the earnings of the typical family immigrant. In fact, given the normality assumption, we can show that the "intensity" with which persons are selected is much stronger among single persons than among family migrants. That is,[9]

[9] To prove eqq. (7) and (8) we use the mathematical property that $\beta\lambda(x) > \lambda(\beta x)$ for $\beta > 1$ and finite x. This property trivially applies for $x \leq 0$. For $x > 0$, the fact that $\lambda'(x) < 1$ (Johnson and Kotz 1970, p. 83) implies

$$E(v_i \mid I_i > 0) > E(v_i \mid I_i + I_j > 0) > 0 \quad \text{if } \eta < 1; \tag{7}$$

$$E(v_i \mid I_i > 0) < E(v_i \mid I_i + I_j > 0) < 0 \quad \text{if } \eta > 1. \tag{8}$$

Single immigrants have higher earnings than family immigrants if there is positive selection and have lower earnings than family immigrants if there is negative selection. Single persons who move are the ones who find it most profitable to migrate, that is, the ones with the most positive v's if there is positive selection or the most negative v's if there is negative selection. Family immigrants include a number of tied movers. These tied movers "dilute" the extent of selection observed among single immigrants.[10]

Although our model emphasizes intercountry variation in the returns to skills as an explanation of the different skill sorting that occurs for family and single immigrants, an alternative approach stresses differences in migration costs between the two groups. Suppose that the costs of moving the family are less than $2M$, either because of actual economies of scale or because immigration policy encourages the migration of families. Family migration is then more likely, further attenuating the selection associated with family immigrants. Note, however, that migration cost differentials alone cannot explain whether family immigrants are more skilled or less skilled, on average, than single immigrants. The nature of the selection depends on the relative returns to skills across countries and not on the structure of mobility costs.

As noted earlier, U.S. immigration policy encourages chain immigration. Suppose that the family can choose the identity of the first link in the chain. This implies that the family chooses whoever has the most to gain from migration to be the first link. If $\eta < 1$, the person with the most to

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$$\lambda(x) + x(\beta - 1) > \lambda(\beta x).$$

Consider the identity

$$\beta\lambda(x) \equiv \lambda(x) + \lambda(x)(\beta - 1).$$

Using $\lambda(x) > x$ and combining equations yields

$$\beta\lambda(x) > \lambda(\beta x).$$

Equations (7) and (8) follow by setting $\beta = \sqrt{2/(1+\rho)}$ and $x = \alpha z$.

[10] As shown in n. 9 above, this implication follows from a mathematical property of the normal density. Equations (7) and (8), however, are implied by any density that is elliptical and log concave. An important feature of elliptical densities is that the sum of identically distributed random variables has the same distribution as that of each term in the sum. Log concavity implies that $dE[Z \mid Z > x]/dx < 1$. For details, see Heckman and Honore (1990), and Ingersoll (1987).

gain will be the person with the highest earnings, but if $\eta > 1$, the person with the most to gain is the person with the lowest earnings.

It may seem counterintuitive that a family trying to maximize total income allocates the visa to the least productive family member when $\eta > 1$. However, this is precisely the way in which household income is maximized. If this person stays in the source country, he is the one who is most heavily subsidized (through internal transfers).

Because visas are not tradeable, the assumption that the family can choose the identity of the first link in the chain does not portray the essence of U.S. immigration policy. An alternative model of chain immigration assumes that the first link in the chain is determined exogenously (to the family). For instance, the first immigrant is the one who satisfies the arbitrary restrictions in the law. Without loss of generality, suppose that household member i is exogenously chosen to receive the first visa allocated to that household and that member j will spend a fraction δ of his (remaining) working life in the source country and a fraction $1 - \delta$ in the United States. The family jointly decides to migrate to the United States when[11]

$$I_i + I_j(\delta) = (1 - \eta)[v_i + (1 - \delta)v_j] - \Delta\mu^* > 0, \tag{9}$$

where $I_j(\delta)$ is the index function of person j if his immigration was delayed by a fraction δ of his working life, and $\Delta\mu^* = \Delta\mu + (1 - \delta)(\mu_o - \mu_t) + M$. The conditional expectations of v_i and v_j are

$$E[v_i \mid I_i + I_j(\delta) > 0)] = (\alpha/r)[1 + \rho(1 - \delta)]\sigma\lambda[\alpha z^*/r] \tag{10}$$

and

$$E[v_j \mid I_i + I_j(\delta) > 0] = (\alpha/r)[(1 - \delta) + \rho]\sigma\lambda[\alpha z^*/r], \tag{11}$$

where $r = [1 + (1 - \delta)^2 + 2\rho(1 - \delta)]^{1/2}$, and $z^* = \Delta\mu^*/(1 - \eta)\sigma$.

Inspection of equations (10) and (11) indicates that the first link in the chain is more intensely selected than the second link in the chain; that is, the first migrant has higher (lower) earnings than the second migrant if $\eta < 1$ ($\eta > 1$). It is worth noting that, although this result is most apparent when the distribution of skills is assumed to be normal, it generalizes to any symmetric distribution.

Therefore, the trend in the skill composition of the various links in the immigration chain is identical to that obtained in the simpler case where

[11] Equation (9) implicitly assumes that families use a zero discount rate in calculating lifetime family incomes. The generalization of the model to allow for discounting of future earnings does not alter the key results of the model but complicates the notation.

the family chooses who the first link in the immigration chain will be. Intuitively, families whose "nomination" for the first link coincides with the exogenous choice imposed by the government will still migrate as a family. However, if the family's nomination differs from the choice imposed by the government, the family's incentives to migrate decline. Hence the immigrant pool is more likely to be composed of families whose unconstrained internal decision is consistent with the government mandate.[12]

An alternative approach to modeling chain immigration emphasizes migration cost differentials within the family. Immigration policy gives preference to visa applicants with family members already residing in the United States. Further, information about U.S. labor market opportunities is less costly to obtain for later links in the chain (Massey 1986). The lower migration costs faced by later links in the chain do not imply that the intensity of selection is attenuated for these family members. The family income-maximization hypothesis implies that the family shares migration costs as well as incomes. The fact that individual migration costs are a function of a person's position in the immigration chain is irrelevant for the family's objective function. Differential migration costs are "amortized" within the family, hence the intensity of selection and the skill composition of various links in the immigration chain is unaffected by these cost differentials.

III. Data

We use the micro data available in the 2/100 1970 and the 5/100 1980 U.S. censuses to test the implications of the model.[13] Census data do not provide direct measures of the types of visas that immigrants used to enter the United States. Instead, we exploit the hierarchical structure of the data to determine how the timing of the immigration of a given individual is related to the timing of the immigration of his relatives.

We first extracted from the census data all records from every household that contained at least one immigrant. To construct a detailed family immigration history, we developed an algorithm that relates the migration

[12] Equations (10) and (11) also imply that not all the links in the chain need be characterized by the same selection. For example, if $\eta < 1$, eq. (10) shows that the first link in the chain must be positively selected, while eq. (11) shows that the second link in the chain may be negatively selected if ρ is sufficiently negative. This insight has interesting implications. The process of earnings determination for the first link in the chain follows the usual properties of Roy-type models: there is a negative relationship between U.S. earnings of immigrants and the level of income inequality in the source country (Borjas 1987). The existence of chain immigration implies that the earnings of subsequent links in the chain may not share this property.

[13] The 2/100 1970 census is obtained by pooling the 1/100 standard metropolitan statistical area and state files (5% questionnaire). The 5/100 1980 census data are drawn from the A file.

data of each immigrant in the household to the migration data of every other related immigrant in the household. The algorithm searches over all persons in the household record, determines the individual's relationship to other household members, whether the relatives are immigrants, and whether the relatives migrated at the same time or at different times.[14]

These immigration histories have two limitations. The first is that the census only reports the year of immigration within 5-year intervals (e.g., 1970–74). It is, therefore, impossible to determine exactly if some individuals in the family migrated at the same time. To the extent that the arrival of successive links in the migration chain is less than 5 years apart, our family immigration histories underestimate the extent to which chain migration occurs. We do not know the extent of the bias. Nevertheless, our family immigration histories reveal substantial chain immigration. Presumably, this is because many of the provisions in immigration law require that the sponsor be a U.S. citizen. It takes a minimum of 5 years for aliens to become naturalized, hence the immigration of the next link in the chain is delayed for several years.

A more serious limitation of the data is that we can only make inferences about family migration decisions for immigrants residing in the same household at the time of the census. It is likely that many immigrant families migrated together, but over time, new family relationships were formed, old ones were dissolved, and the original family unit became dispersed over the United States. Similarly, new immigrants may reside with their sponsors only until they establish their own households. Our constructed migration histories, therefore, underestimate the role played by the family in the immigration decision.

One way of mitigating this problem is to focus on recent immigrant cohorts. Recent immigrants are much less likely to have moved out of the sponsor's household or to have separated from the individuals who formed the original migrant unit. Thus we restrict our study to the two most recent immigrant cohorts identifiable in each of the two censuses: the 1960–64 and 1965–70 cohorts in the 1970 census, and the 1970–74 and 1975–80 cohorts in the 1980 census.

Because little is known about the importance of family ties in the immigration process, we begin by summarizing the data. Table 2 reports the frequency with which immigrants arriving in the United States reside with relatives who migrated prior to them, with relatives who migrated contemporaneously, and with relatives who migrated subsequently. The first column of the table shows that the fraction of immigrants who live in a household where at least one relative migrated prior to them was 14% in 1960–64, 17.8% in 1965–70, 22.2% in 1970–74, and 26.5% in 1975–80.

[14] The algorithm uses the variables describing family and subfamily relationships, country of birth, and year of arrival in the United States.

Table 2
Family Ties in Immigration

Cohort	Immigrants Residing with Relatives Who Migrated (%)			Immigrants Who Do Not Reside With Immigrant Relatives (%)
	Prior to Immigrant	With Immigrant	After Immigrant	
1960–64	14.0	61.2	13.5	25.2
1965–70	17.8	69.1	. . .	23.6
1970–74	22.2	58.7	22.7	23.5
1975–80	26.5	65.9	. . .	24.4

NOTE.—Data for the cohorts that migrated in the 1960s are drawn from the 1970 census; data for the cohorts that migrated in the 1970s are drawn from the 1980 census.

Table 2 also reports that 13.5% of the immigrants who moved in the early 1960s sponsored the entry of a relative and that the sponsorship rate increased to 22.7% for immigrants who arrived in the early 1970s. In sum, both the 1970 and 1980 census data indicate that only about 25% of the immigrants reside in households with no other related immigrants.

Table 3 documents the extent to which the incidence of chain immigration differs across national origin groups. For some countries, chain immigration is quite prevalent, while for other countries it is much less frequent. For instance, 40% of all Mexicans who migrated in the 1975–80 period had a relative in the United States prior to their migration, while only 9.2% of Canadians who immigrated in the same period joined relatives in the United States. Similarly, 31.4% of the Mexicans who migrated in

Table 3
Family Ties in Immigration, by Cohort and Country of Origin (1980 Census)

Country of Origin	Immigrants Residing with Relatives Who Migrated (%)					Immigrants Who Do Not Reside with Immigrant Relatives (%)	
	Prior to Immigrant		With Immigrant		After Immigrant		
	1970–74 Cohort	1975–80 Cohort	1970–74 Cohort	1975–80 Cohort	1970–74 Cohort	1970–74 Cohort	1975–80 Cohort
Canada	11.0	9.2	47.1	56.8	5.8	43.5	38.0
Germany	11.8	12.1	33.3	43.5	4.4	56.1	48.2
Ireland	16.0	18.6	33.1	42.5	4.7	49.4	43.1
Italy	20.2	29.9	70.1	60.3	7.9	13.2	21.6
Korea	8.6	18.8	62.9	71.9	23.6	23.6	20.7
Mexico	28.3	40.0	64.3	67.8	31.4	17.0	20.8
Phillipines	27.6	43.6	64.9	67.6	33.1	16.7	19.0
United Kingdom	10.9	8.8	51.3	62.7	5.4	40.6	33.0

1970–74 sponsored the entry of a relative in 1975–80, but only 5.8% of Canadian immigrants did so.

It is also useful to document the extent of chain immigration by marital status at the time of migration. Unfortunately, census data do not allow the unique identification of marital status at the time of migration for some individuals. Although the year of first marriage is reported exactly for every married person in the census, the year of immigration is reported only in 5-year intervals. Therefore, it is impossible to determine if the marriage occurred prior to or after immigration for individuals who married during the 5-year period in which the move took place. Because the census reports only the date of first marriage, we henceforth restrict the analysis to persons who have always been single or who married once and are not divorced, widowed, or legally separated.

We classify immigrants into four marital status categories: (1) those who were single at the time of migration and remained single until census week (i.e., they were single at the beginning and end of the 5-year immigration interval and were single in census week); (2) those who were married at the time of migration (i.e., they were married at the beginning and end of the 5-year interval); (3) those whose marital status at the time of migration cannot be determined (i.e., they were single at the beginning of the 5-year interval but married by the end of the 5-year interval); and (4) those who were single at the time of migration but were married by census week (i.e., they were single at the beginning and at the end of the 5-year interval, but were married by census week).

Table 4 uses this classification to document the extent to which chain immigration occurs in each of the marital status groups. The data show that 13.5% of "single" immigrants who migrated in the early 1960s had a relative in the United States prior to their arrival and that 22.2% of single immigrants who moved to the United States in the late 1970s joined a relative.

The statistics for "married" immigrants are surprising because they indicate that chain immigration occurs both for close relatives (spouse or child) and for other relatives (all other relationships). For instance, 9.9% of persons who migrated in the early 1960s and who were married at the time of migration had their spouse and/or child residing in the United States prior to their arrival. By the late 1970s, nearly 18% of persons married at the time of migration had a spouse (or child) already residing in the United States. In addition, 7.5% of married immigrants in the early 1960s reunited with their spouse (or child) in the late 1960s, and 15.2% of married immigrants in the early 1970s reunited with their spouse (or child) in the late 1970s.

The last two panels of table 4 describe the incidence of chain immigration for individuals who either married during the 5-year immigration interval or who married shortly afterwards. We do not know if the spouses of

Table 4
Family Ties in Immigration by Marital Status at Time of Migration (Persons Aged 18+)

	Immigrants Residing with Relatives Who Migrated (%)					
	Prior to Immigrant		With Immigrant		After Immigrant	
Marital Status/ Cohort	Spouse or Child	Other	Spouse or Child	Other	Spouse or Child	Other
Migrated single and is single at time of census:						
1960–64	...	13.5	...	48.7	...	12.4
1965–70	...	15.9	...	38.0	...	...
1970–74	...	20.3	...	45.7	...	16.7
1975–80	...	22.2	...	41.9	...	...
Migrated married:						
1960–64	9.9	3.3	72.3	9.3	7.5	7.4
1965–70	12.8	7.5	75.4	15.4	...	...
1970–74	16.0	5.2	64.5	8.7	15.2	9.6
1975–80	17.8	10.1	67.3	17.7	...	...
Marital status cannot be determined:						
1960–64	15.8	1.9	38.8	4.0	8.2	6.8
1965–70	15.1	4.6	48.5	11.0	...	...
1970–74	18.8	4.1	39.8	6.6	12.4	12.0
1975–80	18.3	9.0	43.2	17.9	...	...
Migrated single and is married at time of census:						
1960–64	9.8	2.9	25.0	7.0	21.6	6.5
1970–74	13.8	5.4	30.4	10.9	24.9	12.1

NOTE.—Data for the cohorts that migrated in the 1960s are drawn from the 1970 census; data for the cohorts that migrated in the 1970s are drawn from the 1980 census.

these immigrants participated in the migration decision. In the statistics summarized in tables 2 and 3, we assumed that all immigrants in the household were part of the family unit in the source country. Alternatively, we could have calculated the chain migration propensities by assuming that the spouse was not part of the family unit and that the immigrant met the spouse after the move. Although this assumption leads to somewhat lower rates of chain immigration, the resulting propensities remain sizable.

IV. Empirical Results

We restrict our analysis to immigrant men aged 18–64, who worked in the year prior to the census, and who were not self-employed or in the armed forces. The analysis is further confined to the 1960–64 cohort in the 1970 census, and the 1970–74 cohort in the 1980 census. We focus on these cohorts, rather than on the cohorts that arrived in the 5-year period

prior to the census, because the kinds of data available in the family immigration histories are more complete for these earlier cohorts.[15]

As noted above, selection occurs on the basis of both observed and unobserved skill characteristics. To determine the types of selection that take place in various dimensions of skill, we focus on three variables: education, the log wage, and the standardized log wage (the wage adjusted for differences in demographic characteristics). Because average skills (in the source country's population) need not be the same across national origin groups, we also present the results after controlling for country-of-origin fixed effects.

We begin by testing the theoretical implication that persons who migrate on their own have higher gains from migration than persons who migrate as part of a family. Given negative (positive) selection, this would imply that married immigrants should have more (fewer) skills and higher (lower) earnings than single immigrants.

Consider the four marital status categories defined above: (1) the sample of persons who migrated single and remained single until census week; (2) the sample of persons who migrated married; (3) the sample of persons who were single at the beginning of the 5-year migration period but were married at the end of the interval; and (4) the sample of persons who migrated single but married by census week. Table 5 presents the average differential in education and in the unstandardized and standardized log wage across these various groups.

It is important to stress that this descriptive empirical analysis does not depend on normality or any distributional assumptions in the underlying earnings distribution. Rather than estimate a reduced-form limited dependent variable model and correct for sample selectivity, our approach is nonparametric and is consequently less sensitive to potential misspecifications of the underlying density of skills. We focus on the implication of the theory that, *if* there is sample selection, the conditional means of skills or earnings across the various groups should follow a specific pattern.[16]

The first row in table 5 indicates that, although men who are known to be married at the time of migration have less education than men who are known to be single (and remained single), the wage of married immigrants is 20%–30% higher than the wage of single immigrants. Thus the evidence regarding which type of selection characterizes the data is mixed.

[15] Even though the data for the earlier cohorts are more complete than for the most recent cohorts, the former also suffer from the truncation problem because relatives may have migrated after the census date.

[16] The most direct test of our theory would be to compare the skills and earnings of immigrants (by household composition) to the skills and earnings of persons who decided not to migrate and remained in the source country. Unfortunately, these types of data are not generally available.

Table 5
Predicted Differentials in Education and Wages by Marital Status at Time of Migration

	Education		log Wage Rate			
Comparison	(1)	(2)	(1)	(2)	(3)	(4)
Married/single	−.3702	−.6923	.3266	.2144	.3020	.2010
	(−6.58)	(−14.71)	(49.93)	(22.23)	(46.61)	(30.54)
Married/single, then got married	.2543	−1.0209	.2320	.1124	.1141	.0500
	(1.89)	(−38.43)	(12.70)	(5.95)	(6.49)	(2.69)
Unknown marital status/single, then got married	1.2201	.1564	.2085	.0995	.1332	.0762
	(40.32)	(1.52)	(11.49)	(5.63)	(7.54)	(4.34)
Controls for demographic characteristics	No	No	No	Yes	No	Yes
Controls for country of birth	No	Yes	No	No	Yes	Yes

NOTE.—t-ratios are in parentheses. Predicted differentials are calculated from regressions estimated separately in each of the marital status groups and evaluated at the mean of the socioeconomic characteristics of the married sample. Vector of demographic characteristics includes age; age squared; a dummy variable indicating if married, spouse present; a dummy variable indicating if health limits work; and a dummy variable indicating metropolitan residence. Vector of demographic regressions includes education in the log wage regression. All regressions include a dummy variable indicating if the observation was drawn from the 1980 census. Sample sizes of observations: single: $N = 8,518$; married: $N = 11,260$; single, then got married: $N = 7,598$; unknown marital status: $N = 8,509$.

Moreover, the fact that earnings are higher for married than for single immigrants does not imply that single men have the greatest gains to migration and that there is negative selection. There are many other reasons why married men have higher earnings than single men, such as the gains to specialization in the market sector (Kenny 1983; Korenman 1988). To obtain the component of the married/single earnings differential due to selection in the migration decision, therefore, it is important to net out the portion of the married/single earnings differential due to specialization.

The construction of our data suggests a simple way of netting out the marriage wage effect. In the second row of table 5, we compare immigrants who were married at the time of migration to immigrants who were single at the time of migration but who married soon afterwards. Both these samples consist of married persons (as of the time of the census), hence the estimated skill and wage differentials control for the gains to specialization in the labor market.[17] In the third row of the table, we compare the earnings of persons whose marital status at the time of migration cannot be determined (but some of whom are married) to the earnings of persons

[17] It is interesting to note that this correction for netting out the gains to specialization associated with marriage reduces the wage differential between married and single men by between 10%–20%. This is roughly the same magnitude as the marriage effect on earnings in the U.S. economy (Kenny 1983).

who migrated as single but then got married. This comparison is likely to provide a better measure of the wage differential due to selection in the migration decision because the length of marriage (as of the time of the census) differs only by an average of 5 years between the two groups. The data in table 5 suggest that married immigrants earn more than single immigrants; in the third row, it is also evident that married immigrants have slightly more education than single immigrants.[18] In view of our theoretical framework, the evidence suggests that, on aggregate, the data are dominated by negative selection.

There is also substantial dispersion in the married/single education and wage differentials across national origin groups. Table 6 summarizes these differentials for a selected number of countries. For instance, married immigrants have 3 years more schooling than single immigrants if they originate in Germany, but −3.8 fewer years if they originate in Italy. Similarly, the married/single log wage differential is .5 for Mexican immigrants, but only .2 for Korean immigrants.

The Roy model implies that married immigrants are likely to be more skilled than single immigrants if they originate in countries with relatively high levels of income inequality but are likely to be less skilled than single immigrants if they originate in countries with relatively low levels of income inequality (holding constant the mean income in the source country). Borjas (1987) constructed a measure of income inequality for 41 source countries and the United States based on household income statistics reported by the World Bank. These 41 countries had the largest immigration flows to the United States in 1951–80 and are responsible for over 90% of the immigrant flow during this period. We would prefer data on returns to skills (such as the rate of return to schooling) in different source countries in order to test the implications of the model. It is worth noting, however, that the income inequality measure, defined as the ratio of income accruing to the top 10% of the households to the income accruing to the bottom 20% of the households, is highly correlated with the rate of return to schooling in the source country. In particular, for the 15 countries in com-

[18] It has been found that the effect of marriage on earnings depends on how long the person has been married (Korenman 1988). The wage comparisons reported in the third row of table 5 only roughly control for this duration effect. Because the two groups are defined in terms of how long the marriage has lasted (less than 5 years and between 5 and 10 years), it is not appropriate to control for the length-of-marriage effect by using marriage duration as a standardizing variable in the regressions. Instead, we have analyzed how native wages change over the marriage cycle. The log wage of natives who have been married fewer than 5 years is .218 units higher than the log wage of single natives (after adjusting for the same socioeconomic characteristics held constant in table 5), while the log wage of natives who have been married between 5 to 10 years is .245 units higher than that of single natives. The marriage-duration effect, therefore, accounts for only a 3% difference in the wage of the two groups under analysis.

Table 6
Married/Single Differentials by Country of Origin

	Married/Single			Married/Single Then Got Married			Unknown Marital Status/Single, Then Got Married		
	Education	log Wage		Education	log Wage		Education	log Wage	
Country of Origin	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Canada	−.515	.632	.479	1.370	.490	.378	1.528	.252	.175*
Germany	.275	.682	.536	1.060	.565	.488	.811	.296	.256
Ireland	−1.623	.739	.692	1.176	.221	.161*	.992	.093	.059*
Italy	−3.765	.330	.348	−2.593	.117	.181	−.384	.129	.106
Korea	.431	.399	.235	−1.175	.173	.186	−.212	.219	.229
Mexico	−2.170	.232	.479	−1.598	.054	.085	−.203	.106	.077
Phillipines	.473	.414	.297	.851	.224	.172	1.502	.186	.137
United Kingdom	−.378	.595	.474	.145	.370	.347	.768	.164*	.143*
Controls for demographic characteristics	No	No	Yes	No	No	Yes	No	No	Yes

* Not significantly different from zero at the 5% level. List of demographic controls is given in table 5 notes.

mon between our sample and the Psacharopoulos (1973) study of rates of return to education, the correlation between the income inequality measure and the private rate of return to higher education is .75.

We estimated the alternative measures of the skill and earnings differentials for each country in our 41-country sample. We then attempted to determine if a small set of source-country characteristics (a dummy variable indicating if the source country has more income inequality than the United States, and the log per capita gross national product [GNP] in the source country in 1980) "explains" the intercountry variation in the married/single earnings and skill differentials.

Table 7 presents the "second-stage" regressions. We find that source-country characteristics have a major effect on the married/single differentials. Most important, the married/single wage differentials (after netting out the gains to specialization) are significantly larger for immigrants originating in source countries with more income inequality than the United States. The wage data, therefore, are consistent with the theoretical implication that the family attenuates selection regardless of the type of selection that generates the immigrant pool. However, the impact of the income inequality variable on the difference in educational attainment between single and married immigrants, though positive, is not significant.[19]

The descriptive statistics presented in the previous section indicated that chain migration is an empirically important phenomenon in the immigration of families. We now investigate the effect of chain immigration on the skill composition of the immigrant flow. Our model implies that the first link of the immigration chain is more intensely selected than subsequent links. For instance, if immigrants are negatively selected, the first link should have lower earnings and skills than subsequent links.

One practical problem is that many chains of extended families may dissolve over time if some family members are particularly successful (or unsuccessful) in the United States. This implies that the presence of chain immigrants in the household is endogenous and correlated with the distribution of income within the household. To avoid this problem, we restrict our sample to men who were married at the time of migration and focus our analysis on husband/wife migration chains. This is done for two reasons. First, there is no uncertainty in this sample about whether the spouse

[19] The regression also includes the mean level of GNP per capita in the source country. The theoretical model leads to some predictions about this variable because variations in mean per-capita GNP are likely to be related to variations in μ_0. The interpretation of this coefficient, however, may be clouded by the fact that high-income countries are also the ones that most resemble the United States, and the GNP variable may be capturing the ease with which skills are transmitted across countries. We also reestimated the regressions in table 7 using a continuous measure of income inequality instead of the dummy variable we report. None of the qualitative results are affected by this alternative specification.

Table 7
Determinants of Married/Single Differentials across Countries of Origin

	Married/Single			Married/Single Then Got Married			Unknown Marital Status/Single, Then Got Married		
	Education	log Wage		Education	log Wage		Education	log Wage	
Variable	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	−4.3912	−.5123	−.4060	−5.4336	−1.3125	−1.1659	−2.2449	−.7123	−.6761
	(−2.29)	(−1.88)	(−1.75)	(−2.86)	(−4.37)	(−4.47)	(−1.79)	(−2.72)	(−2.82)
Source country has more inequality than United States	1.0658	.0331	−.0019	.6513	.1967	.1817	.2803	.1520	.0907
	(2.34)	(.51)	(−.03)	(1.45)	(2.77)	(2.94)	(.94)	(2.45)	(3.29)
log (per capita GNP in source country)	.3853	.1110	.0888	.6189	.1774	.1571	.3423	.0988	.1524
	(1.76)	(3.56)	(3.36)	(2.84)	(5.15)	(5.25)	(2.25)	(3.29)	(3.29)
R^2	.132	.293	.302	.179	.418	.427	.789	.236	.245
Controls for demographic characteristics	No	No	Yes	No	No	Yes	No	No	Yes

NOTE.—t-ratios are in parentheses. Regresions are estimated using generalized least squares to account for the heteroscedasticity introduced by the sampling error in the dependent variable. List of demographic controls is in table 5 note; $N = 41$.

Table 8
Impact of Chain Immigration in Education and Wages

Group	Fraction in Sample	Education		log Wage Rate			
		(1)	(2)	(1)	(2)	(3)	(4)
Husband migrated prior to wife (*a*)	.078	1.1381	.4099	.1598	.1049	.1258	.1065
		(4.24)	(1.96)	(4.57)	(3.21)	(3.79)	(3.31)
Husband migrated after wife (*b*)	.072	1.8052	1.6164	.2458	.1622	.2233	.1557
		(6.60)	(7.52)	(6.91)	(4.86)	(6.54)	(4.69)
Both migrated together	.718	2.8061	1.2814	.3500	.2185	.2406	.1849
		(13.50)	(7.78)	(12.95)	(8.57)	(9.21)	(7.29)
Husband married native	.067	2.6404	2.0298	.3388	.2225	.2387	.1636
		(9.47)	(9.31)	(9.35)	(6.51)	(6.90)	(4.85)
F-statistic for test of equality of (*a*) and (*b*)		6.56	34.61	6.46	3.27	8.94	2.44
Controls for demographic characteristics		No	No	No	Yes	No	Yes
Controls for country of birth		No	Yes	No	No	Yes	Yes
R^2		.022	.416	.124	.234	.222	.272

NOTE.—*t*-ratios are in parentheses. All regressions include a constant term and a dummy variable indicating if the observation was drawn from the 1980 census. The omitted marital status variable indicates if the individual is married, spouse absent. List of demographic controls is in table 5 note. Critical value of *F*-statistic for the test of equality of (*a*) and (*b*) is 3.00 at the .05 level of significance; $N = 11{,}260$.

participated in the migration decision. Second, the implications of the income maximization model are most likely to apply to households where the various members are most closely related.[20]

Table 8 reports regressions of education and (log) wage rates on a set of variables describing the household composition of the married immigrant at the time of migration. There are five different marital status classifications possible: (1) the husband migrated before the wife; (2) the husband migrated after the wife; (3) both spouses migrated together; (4) the husband was married to a woman born in the United States; and (5) the wife is not present in the household as of the time of the census. The regression coefficients presented in table 8 report the differences in mean education and wages across these various groups relative to the base group of married, spouse-absent men (under alternative sets of demographic and country-of-birth controls).

One key result is common to all the specifications presented in table 8: husbands who migrate prior to their wives are less skilled than husbands

[20] We replicated the analysis on the sample that includes the chains of more extended relatives and obtained qualitatively similar results.

who migrate after their wives. For instance, if country-of-birth dummies are introduced in the regression to net out the sizable differences in mean education and mean earnings across national origin groups, husbands who migrate prior to their wives have about 1.2 fewer years of schooling, and 10% lower wage rates, than husbands who migrate after their wives, and both of these differences are statistically significant. Therefore, the data suggest that the person with the most to gain from immigration is the worker with the lowest level of skills, an outcome consistent with the existence of negative selection.

The theoretical model implies that the skill differences between the first and second links in the chain will vary across source countries because of international differences in the returns to skills. In particular, the first link in the chain has higher (lower) earnings or skills than the second link if there is positive (negative) selection. The wage or skill differential between the first and second links in the chain, therefore, is a negative function of the extent of income inequality in the source country.

To test this implication, we focus on the sample of men who were married at the time of migration and who migrated as part of a chain (either they migrated prior to their wives or they migrated after their wives). Because of the relatively small sample size (1,435 observations), we estimated education and wage regressions where the dummy variable indicating if the husband is the first link in the chain is interacted with the country-specific variables (as opposed to the two-step procedure used in table 7).

Table 9 presents the results. The key finding is that immigrant chains originating in countries with higher levels of income inequality than the United States are more likely to be characterized by the first link in the chain being less skilled than the second link in the chain. For instance, in the regressions that simply include a dummy variable indicating if the source country has more or less inequality than the United States, the education or wage differential between husbands who migrate prior to their wives and husbands who migrate after their wives is positive (though insignificant in two of the three specifications) for source countries with a less dispersed income distribution than the United States. By contrast, if the country has more income inequality than the United States, husbands who migrate prior to their wives have lower wages and less schooling than husbands who migrate after their wives.[21]

Given the rather surprising empirical results, it is worth exploring what other factors could explain these findings. For instance, the evidence that early links in the chain are less successful, on average, than later links may

[21] Taylor (1987) presents evidence consistent with these results. He finds that household members migrating to the United States from a rural village in Mexico tend to be the least skilled members of the household.

Table 9
Determinants of Differences in Skills of Chain Immigrants across Countries of Origin

	Education		log Wage Rate			
Variable	(1)	(2)	(1)	(2)	(3)	(4)
Husband migrated first	1.2919	28.7754	.0879	.6980	.0719	−.3616
	(3.08)	(15.77)	(1.49)	(2.53)	(1.24)	(−1.25)
Interaction between husband migrated first and source country has more inequality than United States	−2.7247	−4.9042	−.2382	−.2866	−.1615	−.1201
	(−6.39)	(−11.69)	(−3.98)	(−4.52)	(−2.73)	(−1.84)
Interaction between husband migrated first and log (per capita GNP) in source country	...	−3.3990	...	−.0755	...	.0531
		(−15.42)		(−2.26)		(1.52)
Controls for demographic characteristics	No	No	No	No	Yes	Yes
R^2	.039	.176	.108	.111	.179	.180

NOTE.—*t*-ratios are in parentheses. Regressions are estimated in the subsample of married men who either migrated before or after their spouse. All regressions include a constant term and a dummy variable indicating if the observation was drawn from the 1980 census. List of demographic controls is given in table 5 note; $N = 1,435$.

be partly due to the transmission of information about labor market opportunities across family members. This hypothesis, however, does not explain why early links in the chain have less education than later links. Furthermore, the evidence in table 9 shows that the trends across links vary systematically across source countries, depending on the relative prices of skills. Hence it is unlikely that the transmission of information across family members is solely responsible for our empirical findings.

We have also ignored the "demand" side of the immigration market. In particular, we have not discussed the procedures immigration officials use to allocate visas among the many applicants from each source country. For instance, suppose that immigration officials consider earnings potential (relative to household size) in their visa allocation process. If ability to support a family is an important consideration, it is likely that officials would require family immigrants to be more skilled than single immigrants. This alternative hypothesis is consistent with our finding that, on average, married immigrant men earn relatively more than single immigrant men. It is unclear, however, why earnings potential seems to matter more in some countries than in others. For the demand side of the immigration market to explain the evidence reported in table 7, visa allocation procedures

would have to place greater importance on a married applicant's ability to support a family whenever the applicant is from a source country with more income inequality than the United States.

V. Summary

This article analyzes the role played by the family in the immigration decision. The study begins a new line of research in a literature that generally ignores the fact that family ties not only affect the gains from migration but also determine who among the many applicants will receive one of the scarce visas. The key behavioral assumption is that families maximize joint income so that the immigration decision is based on a comparison of total family income across potential countries of residence.

Among the implications of our theoretical analysis are the following:

1. Persons migrating on their own are more "intensely" selected than persons migrating as part of a family unit. This implies that, if there is positive selection, single immigrants will have higher earnings than married immigrants but that, if there is negative selection, single immigrants will have lower earnings than married immigrants.

2. The fact that immigration policy encourages the process of chain immigration changes the skill composition of the immigrant pool over time. In particular, the first link in the immigration chain is more likely to be the person who has the most to gain from immigration to the United States. If there is negative (positive) selection, the first link in the chain will have lower (higher) earnings than subsequent links in the chain.

Our empirical study used the Public Use Samples of the 1970 and 1980 U.S. censuses. These data allow the construction of family histories that characterize the composition of the household at the time of migration and the incidence of chain immigration in the family. The descriptive analysis of these data revealed that the family plays a pervasive role in the immigration decision.

The study of the skills and earnings of immigrant men indicated that the family ties influencing the immigration decision have a major effect on the immigrant wage structure. Many of the empirical results are consistent with the economic model of family migration if, on average, immigrants are negatively selected. For instance, the empirical analysis revealed that the skills and earnings of married immigrants are higher than those of single immigrants and that the skills and earnings of early links in the chain are lower than those of subsequent links.

Although our theoretical framework and empirical analysis lead to a number of new insights and results, this study is only a first attempt at incorporating the family into the economics of immigration. There are many theoretical and empirical issues that we have not addressed and that remain unresolved. A logical next step, for example, is to analyze jointly

the determinants of earnings for the various members of the immigrant family and the determination of family income in immigrant households. Our understanding of the assimilation process can also be greatly increased by modeling the transmission of information across the various links in the immigration chain.

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