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Relative Deprivation and International Migration

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This article provides theoretical reasoning and empirical evidence that international migration decisions are influenced by relative as well as absolute income considerations. Potential gains in absolute income through migration are likely to play an important role in households' migration decisions, but international migration by household members who hold promise for success as labor migrants can also be an effective strategy to improve a household's income position relative to others in the household's reference group. The findings reported in this article provide empirical support for the hypothesis that relative deprivation plays a significant role in Mexico-to-U.S. migration decisions. The findings also suggest that this migration is an effective mechanism for achieving income gains in households that send migrants to the U.S. and that households wisely choose as migrants those of their members who are most likely to provide net income gains.

Do intragroup comparisons affect perception, incentives, evaluation, and behavior? If relative magnitudes count, do they count enough to aid not only in understanding and in generating more accurate descriptions but also in facilitating prediction?

Suppose that there are two villages of households whose incomes are as follows: A_1 = (20, 30, 40, 50, 60) and A_2 = (20, 60, 65, 70, 75, 80). The configuration of these income distributions is such that an income of 60 places an A_1 household at the top of its village income distribution. By contrast, in A_2 this same absolute income places a household within one rank of the bottom of the income distribution.

Suppose that by reallocating some of its labor to international migration, the household earning an income of 60 in each village can expect to receive a 20 percent (12 unit) increase in absolute income. An expected income model of migration would predict that the two households have the same propensity to participate in international migration. Assume, however, that the nature of the reallocation is such that when a household member is assigned to a foreign labor market, the household together with that member continue to consider A_1 as the relevant reference distribution. (We shall discuss this assumption momentarily.) If household utility is a function not only of absolute income but also of income position vis-à-vis other households in the village, then intuition could lead us to expect that the household in A_2 will have a stronger motivation to participate in migration than the one in A_1. That is, a given absolute income gain that confers a significant income position gain is worth more than the same absolute income gain that is not associated with an income position gain.

Suppose that through migration of a family member, the total income of the family rises. Suppose also, however, that the migrant's income, which is fully pooled with the income of the rest of the family staying behind, is earned in an economy in which incomes

are exceedingly higher than those prevailing in the home village. If the migrant were to engage in income comparisons with members of the absorbing economy in a manner similar to that characterizing comparisons made by his family in the origin economy, and if the deprivation thereby experienced by the migrant is taken into consideration by the family, the family's income gain could be eroded by the migrant's enhanced deprivation.

Presumably families are aware of the risk that through a reference-group substitution process they may fail to decrease the level of their relative deprivation (a concept formally defined in the next section) or to improve their level of relative satisfaction. Whereas migration within a country (particularly a culturally and socially homogenous country) can generate alienation and increased relative deprivation through a smooth reference-group substitution, international migration to an entirely different cultural and social milieu can carry with it built-in protection against such a substitution process and ensure that the original reference group continues to be the relevant reference group. By locating themselves in a host community distinct from their own, migrants are less likely to orient themselves to the host community than if they were to locate themselves in a "neighboring" host community. For a comparison to occur with the host community, some "minimal similarity" between the migrant and that community must be perceived. This becomes more likely when direct social interaction or sustained social relations persist. In some cases, the host community may consciously be selected to ensure estrangement, detachment, and social distance. Migrants may wish to guard against becoming oriented to the host community for fear that the secondary, negative effects of a changing reference group might outweigh the primary, positive effect of improving their position vis-à-vis the original reference group.[1] International migration thus can enable households to exploit cultural and social discontinuity across international frontiers, capture this discontinuity, and transform international dissimilarities into a source of advantage.

Relative Deprivation: The "Cornerstone Equation" and the Migration Hypothesis

The theory of relative deprivation is concerned with the feelings raised by intragroup inequalities. The original conceptualization of the theory appears in the famous three-volume research monograph *The American Soldier: Adjustment During Army Life* (Stouffer et al., 1949). The theory has been applied to several fields to model social behavior (see Crosby, 1979, for an excellent review). As pointed out by Merton and Kitt (1950), however, the concept of relative deprivation is not formally defined in *The American Soldier*. Therefore it is not surprising that Crosby counted four versions of the theory and that in general there is no agreement on what is the exact meaning of the term "relative deprivation." In this article we follow the approach developed in Yitzhaki (1979, 1982), Stark (1984a,b), and Stark and Yitzhaki (1988), which may be viewed as the economist's interpretation and quantification of the work of Runciman (1966). Runciman defined four conditions for an individual to feel relatively deprived: "We can roughly say that [a person] is relatively deprived of X when (i) he does not have X, (ii) he sees some other person or persons (possibly including himself at some previous or future time) as having X (whether or not that is or will be in fact the case), (iii) he wants X, and (iv) he sees it as feasible that he should have X" (Runciman, 1966:10).

The relativity of the concept comes from conditions (ii) and (iv). The feeling of deprivation is defined by conditions (i) and (iii). Replacing condition (i) with condition (i′)—"the person has X," where X represents a bundle of commodities x—enables us to interpret condition (i′) as representing the utility or disutility derived from x while condition (iii) eliminates disutility and thereby ensures utility. An individual's utility is a function of the commodities he or she has, whereas deprivation is the loss in foregone utility due to not

having commodities. Obviously, having x also means not having more than x or being deprived of having more than x. Formally, if $u(x)$ is an index of the satisfaction from having x, then $-u(x)$ can serve as an index of the deprivation from having no more than x. Maximizing $u(x)$ subject to an income constraint yields the same result as minimizing deprivation, $-u(x)$, subject to the same constraint. Hence we can argue that the deprivation concept and the utility concept are two sides of the same coin: whereas utility is defined on "having," deprivation is defined on "not having."

There are two major differences, however, between a relative deprivation approach and the utility, or the welfare function, approach. One, related to the relativity of the concept, emerges from the existence of reference groups in the society. As already pointed out, how reference groups are formed and dissolved is a complicated issue that we hope to explore in the future. For the rest of this article, we assume that the village of origin is the relevant reference group.

The other major difference between the relative deprivation approach and the welfare function approach relates to the marginal utility of income. Under the utility approach, the marginal utility of income is a function of income alone and hence does not depend on the income of others. Under the relative deprivation approach, each unit of income can be viewed as Runciman's X, and the feeling of deprivation that arises from not having the unit is an increasing function of the number of individuals in the reference group who have it.[2] Note, however, that envy and altruism are not postulated; what counts is how individuals evaluate what they have (satisfaction) and what they do not have (deprivation).

Assume a continuous income distribution. Then each income unit (Runciman's X) is represented by an income range, $[y, y + \Delta y]$, where $\Delta y \to 0$. Let $F(y)$ be the cumulative distribution of income. Then $1 - F(y)$ is the percentage of individuals whose income is higher than y. Hence $1 - F(y)$ is the percentage of individuals who have the commodities represented by the income range $[y, y + \Delta y]$, and the feeling of deprivation is an increasing function of the percentage of individuals who have income larger than y, that is, $1 - F(y)$.

Let $h[1 - F(y)]$ be the deprivation from not having $[y, y + \Delta y]$, where $h(0) = 0$ and $h' > 0$. An individual whose income is y is deprived of all units of income above y. Thus we can write[3]

$$RD(y) = \int_y^\infty h[1 - F(z)]\, dz. \tag{1}$$

To simplify the discussion, we shall assume for now a simple form of $h[1 - F(y)] = 1 - F(y)$. The more general form $h(\cdot)$ is addressed elsewhere (see Stark and Yitzhaki, 1988).[4]

This function is particularly useful because it lends itself to the following conversion: The deprivation of an individual is the percentage of persons richer than the individual times their mean excess income; that is,

$$RD(y) = [1 - F(y)]E(z - y \mid z > y), \tag{2}$$

where z is the income of the richer persons. (A proof appears in Appendix A.)

Equation (2) implies that for a given mean excess income of persons richer than the individual, the individual's deprivation is an increasing function of the percentage of such persons; and for a given percentage of persons richer than the individual, the individual's deprivation is higher the larger is their mean excess income.

The entire analysis carries through if "an individual" and "persons" are replaced by "a village household" and "village households," respectively. It helps to write equation (2) as

$$RD^i = AD(Y_i)P(Y_i), \tag{3}$$

where Y_i is the income of household i, $AD(Y_i)$ is the mean excess income of households richer than household i, and $P(Y_i)$ is the proportion of households in the village richer than household i. The households are ranked by income from lowest to highest with $i = 1, \ldots, n$ such that 1 is the poorest household and n is the richest. Clearly, ceteris paribus, a decline in the proportion of households richer than i will reduce the relative deprivation of household i.

The relative deprivation hypothesis of international migration is that, controlling for households' expected income gains from migration, the decision by households to send migrants to foreign labor markets is influenced by their initial perceived relative deprivation within the reference group. Specifically, given a household's initial absolute income and its expected net income from migration, more relatively deprived households are more likely to send migrants to foreign labor markets than are less relatively deprived households.

Empirical work is necessary to disentangle the influences of expected income gains and initial relative deprivation on international migration. By including instruments for these two variables in a single migration decision model, it is possible empirically to isolate the influence of relative deprivation on migration decisions, provided that not all migration decision units are drawn from the same reference group. This ensures that a specific income is not associated with the same income positions and hence, in principle, can trigger different relative deprivation-based responses. The relative deprivation model would predict that once we control for expected income gains, households' initial relative deprivation will be directly related to their propensity to send migrants.

Evidence From Mexico

Data

Data from a recent survey of rural Mexican households are used to explore empirically the roles of absolute income and relative deprivation in explaining Mexico-to-U.S. migration. The sample consists of 61 randomly selected households in two villages in the Pátzcuaro region of the state of Michoacán, Mexico, which were surveyed during the winter of 1983. The sample is distributed almost equally between the two villages (30 and 31 households, respectively). From these households we obtained data on 423 adults 13 years old or older.[5] Data were collected on a set of characteristics of both individuals and their households that were deemed likely to influence the returns to households from Mexico-to-U.S. migration versus work in Mexico by household members. Data were also gathered on the allocation of each individual's labor to migration and nonmigration activities and on each individual's income contribution to the household during 1982. The latter include, for non–Mexico-to-U.S. migrants, contributions of income from household-farm production (farming, handicrafts, fishing, livestock, commerce, etc.), village wage work, rental income, and internal labor migration.[6] Income contributions in the form of remittances from household members who migrated either within Mexico or to the U.S. are all net of reverse (household-to-migrant) flows and of direct migration costs. In the remainder of this article, "migrants" will refer to international migrants, defined as individuals who were observed working in the U.S. at any time during 1982. The shortest term of international migration in our sample is approximately three weeks. Persons classified as "nonmigrants" include those who remained in the village throughout the year and those who were observed as internal labor migrants.

Selected household and individual characteristics for the Mexico-to-U.S. migrant and nonmigrant subsamples are summarized in Table 1. Definite patterns distinguish the two labor groups. Families of non–Mexico-to-U.S. migrants, on average, have 8 adult members ($\geq$13 years old) compared with 9.1 for Mexico-to-U.S. migrant families. Nonmigrant house-

Table 1. Selected Average 1982 Household and Individual Characteristics for Mexico-to-U.S. Migrants and Nonmigrants

Characteristic	Nonmigrants and internal migrants	Mexico-to-U.S. migrants
Household		
Adult family size (13 years or older)	7.98	9.11
Landholdings (hectares)	5.14	7.14
% with family contacts at internal migrant destinations	0.73	0.57
% with family contacts at U.S. destinations	0.49	0.89
Wealth (in 1,000s)	2.19	3.47
Individual		
Sex (male = 1.0)	0.44	0.63
Age	32.30	28.70
Years of completed schooling	4.50	4.06
Years of internal migration experience	1.32	0.79
Years of U.S. migration experience	0.76	4.91
Sample size	353	70

Note: Family contact can be a sibling, a parent, or the sibling of a parent. Wealth is the total U.S. dollar value of land, animals, and machinery.

holds have less land and fewer physical assets overall than do migrant households. They are likely to have internal migration networks or family contacts at internal migrant destinations (primarily Mexico City), but they are far less likely than Mexico-to-U.S. migrant households to have U.S. migration networks. Fewer than half of nonmigrants are male (44 percent). On average, nonmigrants are somewhat older than migrants (32 years compared with 29 years), have slightly more schooling (4.50 years compared with 4.06 years), have little past Mexico-to-U.S. migration experience (0.8 years compared with 4.9 years), but have more internal migration experience (1.3 years compared with 0.8 years).

One in six individuals in the sample was observed as a Mexico-to-U.S. labor migrant during 1982. In no case, however, did an entire household leave the village. Thus the households covered by the sample remained as stable and meaningful entities in their respective villages while individual household members participated in Mexico-to-U.S. migration, typically remitting part of their earnings to the household.

Estimation

A multivariate probit was used to estimate the probability that household members' labor time was allocated to Mexico-to-U.S. migration work during 1982, versus the alternative of engaging exclusively in labor activities in Mexico. The observations in the data set are the allocations of individual household members' labor time to Mexico-to-U.S. migration and nonmigration work.[7] The dependent variable takes on the value of 1 if person j was observed as a Mexico-to-U.S. migrant at any time during 1982 and 0 otherwise.

Contributions to household income by person j as a worker in Mexico are denoted R_0^j. Remittances, net of migration costs, by household members who succeed in entering

and finding work (usually illegally) in the U.S. are denoted R_1^j. The probability that person j will succeed in entering and finding employment in the U.S. is denoted p^j. Expected remittances by household members who leave the village to work as Mexico-to-U.S. migrants are therefore $p^j R_1$. The expected net income gain to the household from sending person j to the U.S., ΔY, is $p^j R_1^j - R_0^j$.

Migrant remittances are a function of migrant earnings as well as of migrants' propensity to share these earnings with the village household. A comprehensive theory of remittances should thus refer both to the determinants of migrant earnings and to what factors shape migrants' incentives to remit earnings to the household. Although we recognize the complexity of migrants' motives to remit, a detailed theory of remittance behavior is beyond the scope of this article. (The interested reader may refer to recent work developing and testing alternative theories of migrant remittance behavior—Lucas and Stark, 1985; Stark and Lucas, 1988.)

In our empirical analysis, we make the simplifying assumption that migrant remittances are positively related to migrant earnings. It should be stressed, however, that to the extent that variables affecting migrant earnings also influence remittance propensities, estimated coefficients on these variables in the remittance equation capture the variables' net effect on earnings and remittance propensities. Let X_1^j denote a vector of human capital and migration capital variables and other characteristics of person j that "explain" his or her earnings as a Mexico-to-U.S. migrant worker and the propensity to share these earnings with the village household, such that $R_1^j = R_1(X_1^j)$. Analogously, for contributions by household members who do not migrate to the U.S., let $R_0^j = R_0(X_0^j)$. Finally, let migration success probability p^j be a function of variables Z^j. The complete migration model to be estimated consists of three equations: two equations for the expected returns to households from Mexico-to-U.S. migration and from nonmigration work by person j,

$$\ln R_0^j = \alpha_0 + X_0^j \alpha_1 + \upsilon_0^j \tag{4}$$

and

$$\ln R_1^j = \beta_0 + X_1^j \beta_1 + Z^j \beta_2 + \upsilon_1^j , \tag{5}$$

and a probit criterion equation for Mexico-to-U.S. migration,

$$I^{*j} = \delta_0 + \delta_1 (\ln R_1^j - \ln R_0^j) + Z^j \delta_2 + RD^j \delta_3 - \xi^j. \tag{6}$$

Household member j is observed as an undocumented Mexico-to-U.S. migrant if $I^{*j} > 0$ and as a worker in Mexico otherwise. Equation (6) corresponds to the decision rule that states that person j will be observed as a Mexico-to-U.S. migrant if the consequent expected change in absolute income given relative deprivation results in a positive utility gain for person j's household.[8]

The explanatory variables X_1 and X_0 include the list of human capital variables typically found in studies of the earnings of different labor force groups (e.g., Lee, 1978; Mincer, 1974). These include age, sex, years of completed schooling, and work experience. This list is expanded and modified, however, to take account of earnings in migrant labor markets and to focus on migrant remittances. The explanatory variables include separate measures of prior experience as a migrant worker in the U.S. and in Mexico. To the extent that remittances are an increasing function of earnings, all other things being equal, we would expect the relationship of these variables to remittances to be similar to the effects commonly found in studies of earnings. For example, migration work experience probably is positively related to remittances—unless time away from the village reduces household members'

motivation to remit, and this effect dominates the positive effect of migrants' experience on earnings (Chiswick, 1978).

The effects of the explanatory variables on earnings generally will not be the same in all labor markets. For example, schooling is likely to have a positive effect on earnings and hence on income contributions in Mexico, particularly for internal migrants (Taylor, 1986). Its effect on Mexico-to-U.S. migrant remittances depends on the transferability of skills acquired through schooling across the border and the recognition and valuation of these skills by employers in the U.S. In general, returns to schooling are expected to be small in the labor-intensive, low-skill labor markets in which opportunities for undocumented immigrants are concentrated. A similar argument would hold for the effect of past work experience in Mexico on Mexico-to-U.S. migrant remittances. On the other hand, if skills acquired in the U.S. are transferable to Mexico, then U.S. work experience may yield a positive return for workers in Mexico.

Both the X_0 and X_1 variables include individuals' status in the household as either a household head or nonhead. This, along with other variables, may influence individuals' propensity to share part of their earnings with their household of origin in Mexico. All else being equal, one would expect heads of households to have a stronger motivation to remit than other household members. Because of the important administrative role frequently played by household heads on the family farm, however, the opportunity cost of migration for these individuals may be large. Moreover, holders of *ejidos* (reform-sector lands) are required to work their lands themselves or risk having them reallocated to other villagers.

Mexico-to-U.S. migration success probabilities, p^j, are not observed in the data. Two variables that are likely to have a major influence on these probabilities, however, are observed: household migration capital, or contacts with family members in the U.S., and individuals' U.S. migration experience. These are included in the vector Z^j. Migration networks and experience can substantially improve the probability of successfully entering and finding work in the U.S. and avoiding apprehension by immigration authorities. Moreover, they can reduce and help finance migration costs. These variables may also influence migrants' earnings and their propensity to remit if they are successful in crossing the border and finding work in the U.S. The latter effects can be isolated in a structural probit that controls for the effect of expected remittances on migration decisions.

An instrument for household income from sources besides person j, $\hat{Y}^{-j}$, is also included to control for the effect of initial household absolute income on the motives for migration, interactions among household income decisions, and the household's ability and willingness to finance the initially relatively large costs of participating in illegal Mexico-to-U.S. migration in the absence of well-developed credit markets in rural Mexico. Migration costs include the cost of hiring *coyotes* (smugglers) to assist with the illegal border crossing. These averaged US$350 per migrant in 1982 for the households in the sample, representing a large investment in relation to average village incomes. The household income instrument is also included in the two income-contribution equations to control for the possibility that propensities to contribute to village household income are responsive to household need. Derivation of this household income instrument is described in Appendix B. A summary of variables included in the empirical analysis appears in Table 2.

Instrumental variable techniques were used to obtain estimates of the expected net income gains to households from sending migrants to the U.S. and of the relative deprivation associated with nonmigration. These estimates correct for possible sample selectivity bias. As stated earlier, the household sample was drawn from two different villages. Thus two similar absolute incomes do not necessarily imply similar levels of relative deprivation, and absolute income and relative deprivation can be treated as independent variables.[9] The relative deprivation variable is the basis for empirically testing the relative deprivation hypothesis. Our presentation of the empirical findings will proceed in two parts: first, the

Table 2. Definition of Variables

Variable	Definition
Decision, I^{*j}	Mexico-to-U.S. migrant in 1982: 0 if household member j remained in Mexico throughout 1982; 1 if household member j was observed as an undocumented.
Income	
$\hat{Y}^{-j}$	Instrument for total household income from sources besides person j (100s of U.S. dollars).
$R_1(R_0)$	Return to household income in 1982 from Mexico-to-U.S. migration (work in Mexico) by person j.
ΔY^j	Selectivity-corrected estimate of net income gain to the household from migration by person j to the U.S.
RD^j	Estimated household relative deprivation in the absence of migration by household member j.
Household	
SIZE	Household size.
LAND	Household landholdings (hectares).
ADULTS	Adult household size.
ADLAND	ADULTS/LAND.
PK	Total value of household's major physical assets (land, animals, and machinery), in 1,000s.
MEXNET	1 if a close relative (sibling, parent, sibling of parent) of person j was residing outside the village in Mexico at the start of 1982. 0 otherwise.
USNET	1 if a close relative of person j was residing in the U.S. at the start of 1982. 0 otherwise.
Individual	
AGE	Age.
SEX	1 if male. 0 if female.
ED	Highest level of schooling completed.
SEXAGE	SEX · AGE
HEAD	1 if the person is a head of the village household. 0 otherwise.
MEXEX	Years of experience as an internal migrant prior to 1982.
USEX	Years of experience as a Mexico-to-U.S. migrant prior to 1982.

expected net income gains to households from sending migrants to the United States and, second, the effect of expected income gains and relative deprivation on Mexico-to-U.S. migration decisions.

Expected Net Gains to Households From Mexico-to-U.S. Migration

Estimates of expected net income gains to households in this sample from illegally sending migrants to the U.S. can be found in Taylor (1987). Our empirical work expands on this study by using the same estimation techniques together with instruments for other incomes in the respective village household income distributions to construct measures of households' relative deprivation in the absence of Mexico-to-U.S. migration (i.e., households' initial relative deprivation). Because the present analysis makes use of estimates of the expected income gains from Mexico-to-U.S. migration and work in Mexico, we begin by summarizing the findings of the companion study.

The estimated coefficients of the Mexico-to-U.S. migrant remittances equation are presented in the left side of Table 3. The equation includes an inverse-Mills ratio term to correct for possible sample selectivity bias. This correction is necessary because remittances

Table 3. Estimates of Household Income Contribution Equations Adjusted for Selectivity Bias

Variable	Coefficient	Standard error	Variable	Coefficient	Standard error
Mexico–U.S. Migrant Remittances (ln R_1)			Income Contributions by Workers in Mexico (ln R_0)		
CONSTANT	8.614	3.828**	ADLAND	−0.048	0.081
ED	−0.086	0.125	ED	0.200	0.043**
AGE	−0.246	0.237	AGE	0.080	0.021**
AGE²	0.001	0.004	AGE²	−0.001	0.0003**
SEXAGE	0.055	0.022**	SEXAGE	0.050	0.008**
USEX	0.190	0.101**	USEX	0.117	0.057**
MEXEX	−0.033	0.113	MEXEX	−0.019	0.037
HEAD	2.801	2.633	HEAD	2.456	0.428**
USNET	−1.967	1.279*	MEXNET	−0.280	0.287
$\hat{Y}^{-j}$	0.042	0.031*	$\hat{Y}^{-j}$	−0.033	0.013**
$\hat{\lambda}_{US}$	0.729	0.698	$\hat{\lambda}_{MX}$	1.243	0.613**
Log-likelihood = −118.34			Log-likelihood = −792.32		
χ^2 (df) = 26.748 (10)			χ^2 (df) = 179.84 (10)		
$\hat{\sigma}_1^2 = 4.12$			$\hat{\sigma}_2^2 = 5.52$		
Observations = 59			Observations = 353		

* Significant at below the 0.10 level.
** Significant at below the 0.05 level.

are observed only for persons who migrate to the U.S. and these persons are a self-selected sample of the village population. If villagers who are observed as Mexico-to-U.S. migrants are persons who are in the most favorable positions to contribute to their households' income by working in the U.S., then their remittances will tend to overstate the true expected returns to Mexico-to-U.S. migration.

The findings in the left side of Table 3 do not provide evidence of a positive truncation effect for Mexico-to-U.S. migration (viz., the insignificance of the selectivity parameter, $\hat{\lambda}_{US}$).[10] They also show insignificant returns to schooling in the U.S. labor markets in which opportunities for Mexico-to-U.S. migrants are concentrated and low returns to past work experience in urban Mexico for migrants in the U.S. There is, however, a significant positive relationship between remittances and U.S. work experience.

The findings for contributions by nonmigrants (Table 3, right side) reveal a different pattern. There is evidence that villagers who are in the best position to generate income for their households by working in Mexico are positively selected *not* to migrate to the U.S. The returns to schooling are high in Mexican labor markets, and past U.S. migration experience also appears to have a favorable impact on income contributions by workers in Mexico—perhaps because skills acquired in the U.S. yield a positive return in Mexico.

Estimated coefficients from the two income-contribution equations were used together with the explanatory variables X_1 and X_0 to estimate log contributions to household income for each person in the sample as a Mexico-to-U.S. migrant and as a worker in Mexico. The difference between these log contributions is the estimated net gain to the household from international migration by person j.

The level of household relative deprivation associated with nonmigration by person j, RD^j, was estimated on the basis of expected contributions by person j as a nonmigrant, the instrument for household income from sources besides person j ($\hat{Y}^{-j}$), and instruments for incomes of all other households in person j's village. (The derivation of the latter is given in Appendix C.) These estimates provide all of the information needed to construct our

measure of relative deprivation for the household in the absence of migration by person j using equation (3). Note that because our sample was drawn from two distinct village income distributions, the condition that the same absolute household incomes do not imply the same levels of relative deprivation is fully satisfied.

On average, estimated remittances by villagers who migrate to the U.S., net of migration costs, are 2.9 times higher than expected contributions to household income by these same individuals as nonmigrants. Mexico-to-U.S. migration therefore appears to be an effective mechanism for achieving income gains for the households that send migrants to the U.S.

Relative Deprivation and Migration Decisions

To test the relative deprivation hypothesis, predicted relative deprivation in the absence of migration was included, along with predicted absolute income gain, as an explanatory variable in the migration decision function. Although our theory predicts that relative deprivation will have an unambiguous positive effect on migration propensities, we recognize that in a real-world sense, at incomes very near or below subsistence level, relative income considerations may not matter as much as concern for mere survival. In addition, in the absence of smoothly functioning credit markets—a condition characteristic of village economies in less developed countries—regardless of their perceived level of relative deprivation, households at very low income levels may be unable to afford to pursue migration, especially if migration is costly and the initial risks associated with it are high. These considerations may erode the measured positive impact of relative deprivation on migration at the lowest income levels. To capture these potential nonlinearities, a quadratic initial relative deprivation term is also included in the migration decision model.

Structural probit estimates of the model are summarized in Table 4. These estimates support the relative deprivation hypothesis. Controlling for expected absolute income changes, the greater the household's initial relative deprivation, the higher the probability that house-

Table 4. The Mexico-to-U.S. Migration Equation Estimates (structural form estimates)

Variable	Coefficient	Standard error
CONSTANT	−11.990	3.086**
ΔY	0.490	0.286**
RD	0.373	0.183**
RD^2	−0.027	0.012**
$\hat{Y}^{-I}$	0.227	1.042
$(\hat{Y}^{-I})^2$	−0.061	0.179
SIZE	0.197	0.082**
MEXNET	0.126	0.348
USNET	2.918	0.840**
AGE	0.315	0.107**
AGE^2	−0.004	0.001**
SEXAGE	0.011	0.011
HEAD	−3.518	0.949**
MEXEX	−0.256	0.093**
$MEXEX^2$	0.010	0.005**
USEX	0.658	0.122**
$USEX^2$	−0.036	0.009**

Note: Log-likelihood = −60.059. χ^2 (df) = 109.46 (16).
** Significant at below the 0.05 level.

hold members' labor time will be allocated to Mexico-to-U.S. migration. The exception occurs at the very bottom of the village income distributions, as evidenced by the significant negative coefficient on the relative-deprivation-squared term.[11]

Inclusion of the relative deprivation variable does not alter Taylor's (1987) finding that expected absolute income gains have a significant positive effect on Mexico-to-U.S. migration probabilities. These findings are consistent with comparative advantage in international migration: Mexico-to-U.S. migrants are persons who can provide their households with the largest net income gains by working in the U.S. When the households' expected income in the absence of migration is translated into the associated relative deprivation, however, the latter has an independent effect on migration that is not predicted by expected income models of migration behavior.

The remaining coefficient estimates in the table suggest the robustness of our findings with respect to the definition of income variables. Controlling for relative deprivation and the absolute income gains from migration, initial absolute income does not significantly affect migration decisions. Migration networks and experience (USNET and USEX), which are likely to affect positively migrants' probability of success in the U.S., have a strong positive effect on migration probabilities. Given the high cost in U.S. dollars of entering the U.S., assistance from family contacts in the U.S. is the principal means for financing illegal Mexico-to-U.S. migration. This may explain the insignificance of the effect of initial absolute income ($\hat{Y}^{-i}$) on Mexico-to-U.S. migration. Family contacts in the U.S. also encourage migration by reducing the psychic costs of working illegally in this country. Past migration experience to destinations in Mexico (MEXEX), by contrast, has a significant negative effect on Mexico-to-U.S. migration. Migrants are most likely to come from households with large numbers of adult family members (ADULTS), they are more likely to be male than female, and they are unlikely to be household heads. There is a significant inverted-U-shaped relationship between age and Mexico-to-U.S. migration. This is consistent with a life cycle pattern of migration (Cornelius, 1978). It is impossible, however, to separate life cycle effects from cohort effects in these data. The negative coefficient on age-squared reflects a tendency for older cohorts of migrants to resettle in Mexico, but it is not possible to ascertain on the basis of these data whether the migrants currently working in the U.S. will follow the resettlement pattern of their predecessors.

Conclusions

The findings in this article provide empirical support for the theory that relative deprivation plays a significant role in Mexico-to-U.S. migration decisions. Mexico-to-U.S. migration is an effective mechanism for achieving income gains by households that send migrants to the U.S. In addition, controlling for absolute income gains, the probability that households participate in Mexico-to-U.S. migration is directly related to households' initial relative deprivation. Finally, our results indicate that households wisely choose as migrants to the U.S. those of their members who are most likely to provide the household with net income gains.

Notes

[1] The Amba of East Africa worked for Europeans for a much lower wage than for employers from another tribe and were "quite willing to explain this state of affairs. They say that a European is on a much higher social plane, and therefore comparisons are out of the question. Europeans are so wealthy that an increase in their wealth makes no difference in the . . . standing" of the Amba relative to Europeans (quoted in Hyman and Singer, 1968).

"Migration to the industrial community and the work performed there is purely instrumental: a means to gather income, income that can be taken back to [the migrant's] home community and used to fulfill or enhance his or her role within *that* social structure. From the perspective of the migrant, the work is essentially asocial: It is purely a means to an end" (Piore, 1979:54).

[2] Runciman used the example of promotions: "The more people a man sees promoted when he is not promoted himself, the more people he may compare himself with in a situation where the comparison will make him feel relatively deprived" (1966:19).

[3] For a detailed and explicit derivation of this equation from Runciman's axioms, see Yitzhaki (1982).

[4] The reader might question our definition of $RD(y)$, pointing out that, intuitively, $1 - F(y)$ might do just as well. Unfortunately, such is not the case. If, for example, the income of an individual who is richer than our reference individual increases, $F(y)$ remains unchanged and so does $1 - F(y)$. Yet a proper measure of relative deprivation should be sensitive to there now being more income units of which the reference individual is deprived. $RD(y)$ as defined in equation (1) exhibits such sensitivity.

[5] All interviews were conducted with at least one household head. In no case in this sample were both the male and female heads of the household absent at the time of the survey, and in the majority of the cases (58 out of 61), the male head of household was the primary respondent. The survey was timed to coincide with the season of lowest migrant labor demand in the U.S. Data on household members who were outside the village at the time of the survey were provided by the remaining household members. This approach could be used because the focus of the survey was on the household and its returns from different labor allocations. Data were not needed on the earnings of household members who migrated or on other details concerning the absent migrants' work away from home.

[6] Income contributions from household-farm work are imputed on the basis of the number of days worked on the household-farm valued at the prevailing agricultural wage in the village (this wage was substantially below the minimum agricultural wage in Mexico). Contributions by the owner (or de facto owner, in the case of *ejidos*, or reform sector lands) of the household-farm also include farm profits. These are calculated as the difference between the gross value of farm output, evaluated at the average farm-gate sales price in the case of subsistence farming, and all direct costs plus invisible costs. Direct costs include the cost of all material inputs, hired physical capital inputs (mechanical services, animal services, land), and hired labor inputs. Invisible costs include the cost of imputed wages of unpaid family labor. Contributions also include rental income (land rents and payments received for capital services) and income from livestock (the net additions to animal stocks as well as sales of animals and animal products) received by owners of these capital goods from other households. Income contributions by household members working in handicrafts, wood gathering, fishing, and other household-farm activities were calculated in a manner analogous to contributions from farm work.

[7] Even though the use of a household decision framework obviously overlooks any autonomy of individuals in their labor allocations, we are convinced that to treat each migration decision as independent from a household decision problem would entail far more severe limiting assumptions than does simplifying the analysis to a household decision problem. As the empirical results presented later in this section demonstrate, socioeconomic characteristics of households play a significant role alongside characteristics of individual household members in explaining migration behavior. In addition, economic ties between migrants and their households in the village tend to be very strong here as in other samples of rural households in less developed countries (e.g., see Johnson and Whitelaw, 1974; Lucas and Stark, 1985; Oberai and Singh, 1980; Stark, 1978). One illustration of the economic ties between migrant and household is given by remittances: In the present sample, migrant remittances account for an average 36.5 percent of total household income.

[8] The random error terms v_0, v_1, and ξ are assumed to be independently normally distributed with zero means and variances σ_1^2, σ_2^2, and σ_ξ^2, respectively.

[9] The correlation between absolute income and relative deprivation for the sample is -0.41.

[10] The selectivity parameter, or inverse-Mills ratio term, is derived (following Heckman, 1979) from a reduced-form probit in which the migration decision variable, I^*, is regressed on the explanatory variables Z, X_0, and X_1 from equations (3)–(6). See Taylor (1987).

[11] The quadratic term dominates the linear term in the 14 percent most relatively deprived cases in the sample.

Appendix A: Proof of Equation (2)

Using integration by parts, where $v(z) = 1 - F(z)$, $v'(z) = -f(z)$, $u(z) = z$, $u'(z) = 1$, and the property $\lim_{y\to\infty}[1 - F(y)] = 0$, we obtain

$$RD(y) = \int_y^\infty [1 - F(z)]\,dz = -[1 - F(y)]\,y + \int_y^\infty zf(z)\,dz.$$

Using the conditional density function $f^*(z \mid z > y) = (1/[1 - F(y)])f(z)$, we insert $f(z)$ into the last integral to obtain equation (2).

Appendix B: Derivation of the Instrument for Household Income From Sources Besides Person j, $\hat{Y}^{-j}$

The instrument for total household income from sources besides person j, $\hat{Y}^{-j}$, was constructed by regressing observed 1982 income from sources besides person j on household holdings of income-producing assets at the start of the year and then using the estimated equation to predict household income from other sources for each person in the sample. The assets include the value of households' primary physical assets (land, animals, and machinery, PK) in thousands, human capital assets (the number of adults in the household, NADS, and the number of household members with post-primary schooling, TED), and household migration capital, represented by whether or not the household had a family contact in the U.S. (USNET = 1) or at an internal migrant destination (MEXNET = 1) at the start of 1982. The estimated income equation is

$$\begin{aligned}\hat{Y}^{-j} = {} & 1376.8 + 0.29\text{PK} + 821.92\text{TED} - 96.275\text{NADS} \\ & \quad (4.94) \quad (5.59) \quad (8.87) \quad (-1.98) \\ & + 558.08\text{USNET} - 397.96\text{MEXNET} \\ & \quad (2.81) \quad (-1.85)\end{aligned}$$

$$R^2 = 0.28$$

Numbers in parentheses are t statistics.

Appendix C: Estimation of Household Income Instruments

Estimation of initial relative deprivation requires an estimate of the predicted 1982 income distribution of each of the two villages. For each household n in the sample, an estimate of total household income, $\hat{Y}$, was obtained from a regression of observed 1982 total household income on household holdings of income-producing assets at the start of the year. The assets include the value of households' primary physical capital assets (land and draught animals) in thousands (PK), human capital assets (the number of adults in the household, NADS, and the number of household members with post-primary schooling, TED), and migration capital, reflected by the number of household members who participated in internal migration (MEXMIG) and in Mexico-to-U.S. migration (USMIG) in the year prior to 1982. The estimated income equation is

$$\begin{aligned}\ln \hat{Y} = {} & 7.17 + 0.13\text{PK} + 0.26\text{TED} - 0.07\text{NADS} \\ & \quad (27.2) \quad (2.19) \quad (2.53) \quad (-1.19) \\ & + 0.59\text{USMIG} - 0.08\text{MEXMIG} \\ & \quad (2.26) \quad (-0.32)\end{aligned}$$

$$R^2 = 0.32$$

$$N = 61.0$$

Numbers in parentheses are t statistics.

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