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Determinants of Emigration
from Mexico, Central America,
and the Caribbean

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Relative Deprivation and Migration: Theory, Evidence, and Policy Implications

Oded Stark and J. Edward Taylor

I. INTRODUCTION

With few exceptions, economic studies of labor migration in developing countries (LDCs) focus on the potential contributions that migration may make to the *absolute* income of the relevant migration unit (i.e., the individual, the family or the household). By contrast, Stark hypothesizes that rural-to-urban migration might be undertaken primarily to improve an individual's or a household's comparative income position with respect to that of other individuals or households in the relevant reference group (for example, the village).¹

A recent study by Stark and Taylor found empirical evidence that households' initial relative deprivation in their village reference group plays a significant role in migration from Mexico to the United States.² Controlling for initial absolute income and the expected income gains from migration, these authors showed that households' propensity to participate in international migration is directly related to the households' initial relative deprivation.

The present paper expands this earlier work by addressing the role of absolute income versus relative deprivation incentives for internal and international migration in LDC households, taking into account continuities across some labor markets and discontinuities across others. The rationale for the analysis is threefold. First, there are fairly strong reasons to expect that the role of relative deprivation will differ between international migration and migration within a country. Second, sharp discontinuities in the returns to human capital between home- and host-country labor markets may affect the ability of households who differ in their human capital endowments to achieve gains in their income position through international migration. Third, a relative deprivation approach to migration has important implications for development policy. For example, the effects of rural development policies on rural-to-urban migration, as predicted by an expected income model, may be precisely opposite those predicted by a relative deprivation model.

Section II of the paper outlines the absolute income and relative deprivation models of migration and presents an illustration of their divergent policy implications. It also considers the likely case in which the decision to migrate and the choice of migrant destination are influenced by both absolute income and relative deprivation objectives. In this case, income remittances from household members who migrate have a dual impact on the household's well-being: first, by contributing to its absolute income; second, by improving its income position relative to that of other village households. An attempt is made to identify distinct empirical im-

plications of these two motives for migrating. In Section III, a migration decision model is estimated and used to explore absolute and relative income motives for internal and international migration in a sample of rural Mexican households, as well as the extent to which the degree of discontinuity in labor markets shapes the choice of migrant destination.

II. ABSOLUTE AND RELATIVE INCOME HYPOTHESES OF MIGRATION

Empirical economic studies of migration are based on the general assumption that individuals migrate to maximize expected utility, EU , which is typically defined on income Y at the end of the relevant time period:

$$EU = EU'(Y), \quad (1)$$

where $U'(Y) > 0$. Let Y_1 denote income associated with migration, net of any implied moving costs, and let Y_0 denote income in the absence of migration. The absolute income hypothesis then states simply that a person will migrate if $EU(Y_1) > EU(Y_0)$. That is, an individual's labor is allocated to the labor market associated with the highest level of expected utility. A clearer picture of the economic determinants of migration can be gained when expected utility is replaced by its Taylor-series approximation around expected income EY :

$$EU(Y) = U(EY) + 0.5U''(EY)s^2, \quad (2)$$

where s^2 is the variance of income Y and $U''(EY)$ is the second derivative of utility evaluated at expected income EY .³ If decision-makers are risk-neutral—that is, if $U''(EY)$ is zero—equation (2) reduces to the expected income hypothesis⁴, which states that labor will be allocated to the destination that maximizes expected income. By contrast, if the migration decision-maker is risk-averse—that is, $U''(EY) < 0$ —then migration decisions are influenced by both the mean and variability of income associated with alternative locations, as well as by the decision-maker's aversion to risk. In the case of risk aversion, the absolute income model predicts that an individual will migrate if the corresponding expected income gain outweighs any increase in income risk that may be associated with migration.⁵ Several studies provide empirical support for an absolute income motive for migration, with regard to both expected income and risk.⁶

A Relative Deprivation Hypothesis

In earlier papers by Stark and Stark and Taylor,⁷ it was hypothesized that household members undertake migration not necessarily to increase the household's absolute income, but rather to improve the household's position (in terms of relative deprivation) with respect to a specific reference group. The case studied in those papers is of individuals who engage in migration to improve their households' income positions relative to that of all other households in the village.

Consider two villages of households whose incomes are as follows: $A_1 = (20, 30, 40, 50, 60)$ and $A_2 = (20, 37, 38, 39, 40, 41, 42, 43, 60)$. These two income distributions share the same average income (40), and both cover the same income range (20, 60). However, whereas the five household incomes in A_1 are uniformly distributed over this range, seven of the nine incomes in A_2 are concentrated around the mean.

Suppose that by reallocating some of its labor to migration, the household earning the average income in each village can enjoy a 20 percent (8-unit) increase in absolute income. For the household in A_2 , this absolute income gain translates into a relative income gain of three ranks, enabling that household to move to within one rank of the top of its village income distribution. By contrast, the same absolute income gain leaves the A_1 household's rank unchanged. Assume that the nature of the reallocation is such that when a household member is assigned to a different sector, the household together with that member continue to consider A_1 as the relevant reference distribution. If household utility is a function not only of absolute income but also of ranking in relation to other households in the village, then one would intuitively expect that the average household in A_2 will have a stronger motivation to participate in migration than the average household in A_1 . That is, a given absolute income gain associated with an improvement in rank is worth more than an identical income gain without an improvement in rank.

Consider now the poorest households in A_1 and in A_2 . Suppose that each of these households can reap a 60 percent (12-unit) gain from migration by one of its members. This gain will not cause a rank change for the household in A_2 , but the household in A_1 could escape from the very bottom of its village's income distribution through migration. A given absolute income gain is likely to be considered more valuable in the latter situation than in the former.

The two examples above have in common a correlation between rank within an income distribution and absolute income. One can, however, easily consider rank gains that are not associated with income gains, or rank losses that are not associated with income losses. Consider two village household income distributions given by $B_1 = (30, 35, 40, 45, 50)$ and

$B_2 = (30, 32, 34, 47, 62)$. For the household with income equal to 35, relocation from B_1 to B_2 would result in a rank gain that is not associated with an absolute income change. Intuition alone, however, may not provide clear-cut guidance whether to expect this move to take place. Even though the change implies a higher rank in a new reference group having the same average income (after 35 is added to B_2 , the average income in B_2 is 40), in a cardinal sense the new position may be perceived as inferior (if judged, for example, by the distance from the highest-income household: $62 - 35 > 50 - 35$). An ambiguity arises in this case, since the simple rank measure is not sufficiently sensitive to all rank-related information. Hence there is a need to adopt a more complete measure of income ranking and relative deprivation. We shall therefore draw here on an axiomatic foundation for an index of relative deprivation.⁸

Let RD^i denote household i 's relative deprivation. Assume a continuous income distribution. Each income unit can then be represented by an income range $[x, x + \Delta x]$, where $\Delta x \rightarrow 0$. Let $F(x)$ be the cumulative distribution of income in a village. Then $1 - F(x)$ is the percentage of households whose income is higher than x . Hence $1 - F(x)$ represents the percentage of households that have incomes sufficient to obtain the commodities represented by the income range $[x, x + \Delta x]$. By hypothesis, the feeling of deprivation is an increasing function of the percentage of households with income larger than x . Let $g[1 - F(x)]$ be the deprivation from not having $[x, x + \Delta x]$, where $g(0) = 0$ and $g' > 0$. A household with income x is deprived of all units of income above x . Thus, one can write the relative deprivation of household i , whose income is y_i , as:

$$RD^i = \int_{y_i}^{y^h} g[1 - F(x)] dx, \quad (3)$$

where y^h denotes the highest village income. To simplify the discussion, we shall assume a simple form of $g[1 - F(x)] = 1 - F(x)$. Subject to some algebraic manipulations the expression on the right-hand side of equation (3) can be decomposed into the product of the mean excess income of households richer than the household with income y_i and the proportion of households in the village who are richer than the household with income y_i .⁹ This interpretation nicely captures the point that, leaving all rankings intact, any increase in the income of a household richer than household i will increase the relative deprivation of household i , whereas any rank gain by household i (resulting in a decline of the proportion of households richer than i) will reduce the relative deprivation of household i . Given this interpretation, in the example above of household income distributions B_1 and B_2 , the ambiguity associated with the relocation of the household whose income is 35 is not only better understood but is also resolved because the two effects are duly weighted (resulting, in the

particular case of the example, in an increase of relative deprivation from 6.0 to 6.5).

The relative deprivation hypothesis is that migration will be observed if $EU(RD_1) > EU(RD_0)$, where RD_1 is the relative deprivation associated with migration and RD_0 is relative deprivation in the absence of migration. Thus, individuals or households below the upper end of the income distribution may decide to engage in migration on the assumption that they will thereby succeed in improving their position in the village by securing an income higher than their initial income.

To illustrate some of the new policy implications of the relative deprivation approach to migration, we consider an extreme example. In a country consisting of a village and a town, the income of every village household is 100; in the town, it is 200. As the result of a certain development policy, the income of half of the village households rises to 150. What are the likely migration implications? In a world motivated solely by income differentials, the incentives for village-to-town migration will have declined unequivocally: the propensity to migrate of those earning 150 has declined whereas that of those earning 100 remains as before. In a world motivated solely by relative deprivation, the prediction is exactly the opposite. If the village is the relevant reference group for village households, before the change no household had any inducement to migrate, since the relative deprivation of each and every household was nil. After the change, however, half of the village households—those which now experience relative deprivation (at the level of 25 units of income)—will have an incentive to migrate, whereas the incentive to migrate of the others (whose income is 150) will remain at zero.

When a household's utility is a function of both absolute income and relative deprivation arising from intra-group income comparisons, the effect of a policy change on the propensity to migrate from the village cannot be presigned because there are conflicting effects: the lower inducement to migrate of the households whose absolute incomes rise has to be weighed against the new inducement to migrate on the part of households whose relative incomes fall. The received theory, however, will admit only the former inducement and is completely blind to the latter. The relative deprivation theory of migration and the received absolute income differentials theory of migration generate conflicting predictions.

Suppose a development agency is not indifferent to the migration implications of its policies and wishes to induce less migration, more migration, or keep migration at its existing level. If the relative deprivation theory of migration obtains, a new policy instrument is identified, and the policy mix will thereby change. For example, in an effort to stem rural-to-urban migration, equalization of the rural income distribution could be combined with, reinforced by, or substituted for the narrowing of town-village income differentials.

An Integrated Approach

In real life it is likely that migration decisions are influenced by both absolute and relative income considerations. In this case, utility is of the form

$$U = U(Y, RD) \quad (4)$$

where $\partial U / \partial Y > 0$ and $\partial U / \partial RD < 0$. The net utility gain from migration is given by the differential

$$\Delta_1 = U(Y_1, RD_1) - U(Y_0, RD_0). \quad (5)$$

This can be expressed as a function of Y_0 , RD_0 , and the net household income gain from migration, (which we shall denote W), by replacing $RD(Y_1)$ with its Taylor-series approximation around Y_0 :

$$\begin{aligned} \Delta_1 &= U[Y_0 + W, RD(Y_0) + RD'(Y_0)W] \\ &\quad - U[Y_0, RD(Y_0)] = \Theta(Y_0, RD_0, W), \end{aligned} \quad (6)$$

where $RD'(Y_0)$ is the change in relative deprivation brought about by a small change in income Y_0 .

Any variable that enhances the net returns from migration W can increase the household's incentive to participate in migration in two ways: first, by increasing absolute income $Y_1 = Y_0 + W$; second, by decreasing relative deprivation, since by construction $RD'(Y_0) < 0$. On the basis of this consideration, the effect of a household's income and relative deprivation levels in the absence of migration on its propensity to participate in migration is generally predictable. At low levels of income, incentives to engage in potentially income-enhancing migration may be strong. On the absolute income side, low village incomes presumably imply large income disparities between migration work and village work and, hence, large potential net gains from migration. Low village incomes are also associated with high degrees of relative deprivation as defined in equation (3); and hence the incentive to reduce relative deprivation through migration may also be large for low-income households. Thus, both the absolute and relative income hypotheses would predict a greater desire to engage in migration among households or individuals at the lower end of the village income spectrum.

However, in the absence of smoothly functioning credit markets that give explicit preference to the poor—a condition characteristic of village economies in LDCs—households or individuals at very low levels of absolute income may be unable to migrate if migration is costly and the ini-

tial risks associated with it are high.¹⁰ In addition, at incomes very near or below subsistence, relative income considerations are not likely to matter as much as concerns for mere survival. Thus, one would expect a small increase in income (and a small decrease in relative deprivation) to have a positive effect on migration from households at the very bottom of the village income distribution—owing, first, to a loosening of capital constraints on migration and, second, to the increasing importance of relative deprivation considerations in these households' labor allocations. At higher income levels, by contrast, both the relative and absolute income hypotheses predict that increases in income will reduce the likelihood that households or individuals will engage in migration. It is therefore impossible on purely theoretical grounds to separate the effect of absolute income incentives from the effect of relative income incentives for migration, since, when credit markets are highly imperfect and biased, absolute and relative income effects of changes in village incomes tend to move in tandem.

Reference-Group Substitution, Labor Market Discontinuities and Destination Choice

In a relative deprivation model of migration, there is a risk that, through a reference-group substitution of the host community for the village community, households may fail to decrease their relative deprivation—even if their relative incomes in terms of the village income distribution improve. In a recent study it has been argued that international migration, to an entirely different social and cultural milieu, can carry with it built-in protection against such reference-group substitution and ensure that the original reference group continues to be the relevant one for the migrant and his or her household.¹¹ 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 with the host community to occur, 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 be intentionally 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 in relation to the original reference group. 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. This consideration applies in particular to repetitive or tempo-

rary migration rather than to permanent, once-and-for-all migration; in the recent study cited, migration was by and large of the former type.¹² In contrast with international migration, migration within a country is more likely to generate alienation and increased relative deprivation through a smooth reference-group substitution, particularly when the country is socially and culturally homogeneous. These considerations suggest that the role of relative deprivation in internal migration may be quite different from the role of relative deprivation in international migration, owing to social and cultural discontinuities across international borders.

Discontinuities in labor markets across international frontiers may, however, temper the role of relative deprivation in migration decisions. Paramount among these are sharp differences in the returns to human capital. Education, skills and work experience in the home country may enhance the returns to internal migration. But it is less clear to which degree these human capital assets are internationally transferable. When international migration takes the form of illegal entry into the host country, as is frequently the case with migration from rural Mexico to the United States, the returns to human capital in host-country labor markets may be minimal.¹³

Empirical work is thus needed to further pursue an analysis of explanations for internal and international migration motivated by absolute versus relative income considerations. By including both absolute income and relative deprivation variables in a single household model of internal and international migration decisions, it is possible to isolate empirically the differential influence of relative deprivation on these two types of migration, provided that not all migration decision units are drawn from the same reference group. Estimated absolute household income—if a household member does not migrate—can be used to control for the effect of both the motivations to migrate and the capital constraints associated with absolute income in the migration equation. Controlling for households' initial absolute income and for human capital, the integrated model would predict that households' initial relative deprivation will have a positive influence on their propensity to send migrants to destinations where the potential returns from migration are large enough to alter significantly the relative income positions in the village. We would expect this relative deprivation effect to be tempered, however, in the case of internal migration (where a reference-group substitution is more likely).

III. EVIDENCE FROM MEXICO

Data

In this section, data from a recent survey of rural Mexican households

are used to explore empirically the roles of absolute income and relative deprivation in explaining migration both to Mexican destinations and to the United States, as well as to estimate the impact of migration on village households rankings. The sample consists of 61 randomly selected households surveyed in the Pátzcuaro region of the state of Michoacán, Mexico, during the winter of 1983. From these households we obtained data on 423 adults who were 13 years of age or older. Data were collected for a set of characteristics—of both the individuals themselves and their households—that are likely to influence the returns to households from migration versus nonmigration work by household members. Data were also collected 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 nonmigrants, contributions of income from household farm production (farming, handicrafts, fishing, livestock, commerce and the like), village wage work and rental income.¹⁴ Income contributions in the form of remittances from household members who migrated, either within Mexico or to the United States, are all net of reverse (household-to-migrant) flows and of direct migration costs. A "migrant" is defined as an individual who left the village at any time during 1982 for the purpose of working. The shortest term of migration in the sample was approximately three weeks. Nonmigrants include individuals who remained in the village throughout the year, as well as a small group of secondary and postsecondary students who studied outside the village but did not participate in migrant labor activities. (The empirical results are not significantly altered if students are excluded entirely from the sample.)

Selected characteristics of the households of nonmigrants, internal migrants and Mexico-to-U.S. migrants, together with individual characteristics of the migrant and nonmigrant subsamples, are summarized in Table 1. (In no case in the sample was a person both an internal and a Mexico-to-U.S. migrant in 1982.) Distinct patterns characterize the households of the three labor groups. Families of nonmigrants, on average, are relatively small, with 7.8 adult members (13 years or older) compared with 8.5 and 9.1, respectively, for internal migrant and Mexico-to-U.S. migrant families. Nonmigrant households 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, but are far less likely to have networks for U.S. migration. Fewer than half of nonmigrants are male (43 percent). On average, nonmigrants are somewhat older than migrants (33 years, compared with 28 to 29 years for the two migrant groups), have little schooling (3.9 years), and have little past internal (0.32 years) and Mexico-to-U.S. migration experience (0.76 years).

Internal migrants are distinguished from the other two labor groups by

TABLE 1
SELECTED 1982 HOUSEHOLD AND INDIVIDUAL CHARACTERISTICS

	Nonmigrants	Internal Migrants	Mexico-to-U.S. Migrants
<i>Household Characteristics</i>			
Adult family size (13 years or older)	7.84	8.47	9.11
Landholdings (in hectares)	4.75	6.48	7.14
Percentage with family contacts (sibling, parent, sibling of parent) with internal migrant destinations	0.71	0.80	0.57
Percentage with family contacts (sibling, parent, sibling of parent) at U.S. destinations	0.50	0.44	0.89
Wealth (total 1982 U.S. dollar value of land, animals, and machinery, in thousands)	2.11	2.47	3.47
<i>Individual Characteristics</i>			
Sex (male = 1.0)	0.43	0.49	0.63
Age	33.40	28.48	28.70
Years of schooling completed	3.93	6.50	4.06
Years of internal migration experience	0.32	4.75	0.79
Years of U.S. migration experience	0.76	0.74	4.91
Sample size	273	80	70

their high schooling levels (6.5 years) and their past internal migration experience (4.8 years). Eighty percent of all internal migrants come from households with family contacts at internal migrant destinations. Mexico-to-U.S. migrants are predominantly male (63 percent) and uneducated (4.1 years) but have considerable past U.S. migration experience (4.9 years). Their households are above average in terms of adult family size (9.1), landholdings (7.1 hectares), physical capital wealth (\$3500 total in 1982 dollars), and the probability of having family contacts in the United States (0.89).

More than one-third of all individuals in the sample were labor migrants 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 labor migration, typically remitting part of their earnings to the household. Each observation in the sample represents a separate allocation of household labor time.¹⁵

Estimation

A procedure for testing the relative deprivation hypothesis presented earlier in this paper requires, as indicated by equation (6), estimation of the effect on households' internal and Mexico-to-U.S. migration decisions of initial absolute income, initial relative deprivation, and factors expected to influence the net returns to households from undertaking migration.

A multinomial logit procedure was used to estimate the probabilities that an individual participated in internal migration or Mexico-to-U.S. migration work during 1982, versus the alternative of engaging exclusively in activities other than labor migration.

Let X^j be a vector of characteristics of person j and his or her household that are likely to influence the returns to the household from migration, net of migration costs, such that the returns from migration to labor market d —that is W_d^j —can be represented as $W_d^j = f_d(X^j)$. The vector of characteristics X^j includes the household member's sex, age, education, status as household head or not and migration work experience. These variables can influence household members' earnings as migrants in different labor markets as well as migrants' motivations to remit part of these earnings to the household. The vector X^j also includes household migration networks, or contacts with relatives at prospective migrant destinations, which can reduce the costs and risks associated with labor migration, (especially those of illegal Mexico-to-U.S. migration); household wealth, which can affect the household's willingness to participate in risky migration activities and its ability to secure financing for these activities; household labor available to assume the household farm duties of those who migrate; and household landholdings, which are an indication of the demand for labor on the household farm. Let Z^j denote a $1 \times k$ vector whose components, z_k^j , are the explanatory variables Y_0^j , RD_0^j , and X^j (where Y_0^j is the household's estimated income if household member j does not migrate and RD_0^j is the household's level of relative deprivation associated with this absolute income). The logit equations are given by

$$P^j(d^*) = \exp(Z^j \beta_{d^*}) / \sum_{d=1}^D \exp(Z^j \beta_d) \quad (7)$$

for labor allocations $d^* = 1$ (nonmigration), $d^* = 2$ (internal migration), and $d^* = 3$ (Mexico-to-U.S. migration), where $P^j(d^*)$ denotes the probability that household member j 's labor is allocated to activity d^* . The symbol β_d is a $K \times 1$ vector whose components, $b_{d,k}$, are the coefficients on characteristic k that correspond to labor activity d .

Instrumental-variable techniques were used to obtain estimates of household income in the absence of migration by household member j

and of the level of relative deprivation associated with different income levels. These techniques are described in the Appendix. The household sample was drawn from two 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.¹⁶ These absolute income and relative deprivation variables, together with a quadratic transformation of each, are the basis for testing the relative and absolute income hypotheses empirically. Definitions of the variables used in the logit analysis appear in Table 2.

Strong dissimilarities between labor markets imply substantial differences in the returns to human capital for migrant workers. Although migration to a foreign labor market tends to minimize the added relative deprivation to which the household is exposed, there is evidence that returns to human capital are low in the labor-intensive, low-skill sectors in

TABLE 2
DEFINITION OF VARIABLES, TIME PERIOD 1982

Decision variable

- d = 1 if the individual did not participate in labor migration;
 2 if the individual was an internal migrant;
 3 if the individual migrated to the United States

Income variables

- Y = instrument for total household income without migration by household member j, in thousands (see Appendix)
 YSQ = Y squared
 RD = instrument for relative deprivation associated with Y, in thousands (see Appendix)
 RDSQ = RD squared

Household characteristics

- SIZE = household size
 LAND = household landholdings (in hectares)
 ADULTS = number of adult household members in the village
 WEALTH = total value of household's major physical assets (land, animals, and machinery), in thousands
 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 (sibling, parent, sibling of parent) of person j was residing in the United States at the start of 1982;
 0 otherwise

Individual characteristics

- SEX = 1 if male;
 0 if female
 AGE = age
 AGESQ = age squared
 ED = highest level of schooling completed
 HEAD = 1 if the individual is a household head;
 0 otherwise
 MEXEX = years experience as an internal migrant
 USEX = years experience as a Mexico-to-U.S. migrant
-

which opportunities for undocumented immigrants in the United States are concentrated.¹⁷ In addition, skills acquired through work experience in Mexico may not be readily transferable to the United States. Thus, in choosing between international and internal migration, households may be confronted with a tradeoff between the risk of increased relative deprivation (through a smooth reference-group substitution) yet high returns to human capital in the case of internal migration, and a low return to human capital yet low risk of increased relative deprivation in the case of migration to the United States. Should one therefore expect households to sort themselves out such that those with high relative deprivation and low skills will engage in international migration, whereas those with lower relative deprivation and high skills will resort to internal migration?

In light of the postulated tradeoff, it is not clear a priori how differences in relative deprivation, on the one hand, and human capital of household members, on the other, will jointly influence the allocation of household labor between internal and international migration when investment in human capital is taken as exogenous.

Logit Findings

The estimated coefficients in the decision model corresponding to each of the two migration labor categories are reported in Table 3. Standard errors appear in parentheses below each estimated coefficient. The coefficient on variable *k* for category *d* corresponds to the effect of variable *k* on the probability that a person migrated to place *d* versus the probability that he or she did not participate in any form of labor migration.

Absolute income (*Y* in the table) does not play a significant role in explaining internal migration from the households surveyed. By contrast, the coefficient on absolute income for Mexico-to-U.S. migration is positive and significant at below the 0.10 level. The coefficient on absolute income square (*YSQ*) for Mexico-to-U.S. migration is negative, indicating that absolute income motives for migrating to the United States diminish at higher income levels. This term is also significant at below the 0.10 level. The contrasting effect of absolute income on internal and Mexico-to-U.S. migration is not surprising. Where capital constraints play an important role in household decisions, changes in absolute income are likely to have a significant effect on migration to the United States, which generally entails a high sunk cost for transportation as well as for the border crossing. Internal migration, by contrast, requires a relatively small fixed cost. To the extent that consideration of initial migration risks has an effect on migration decisions, moreover, higher incomes may be necessary before households are willing to engage in relatively risky international migration, which for the present sample usually involves illegal entry into the

TABLE 3
LOGIT RESULTS

Variable	Estimated coefficient	
	Internal migration	Mexico-to-U.S. migration
INTERCEPT	-10.309** (2.81)	-16.491** (3.77)
SIZE	0.089 (0.13)	0.063 (0.16)
LAND	0.017 (0.06)	-0.067 (0.06)
ADULTS	0.130 (0.19)	0.422** (0.23)
Y	0.440 (1.36)	2.501* (1.90)
YSQ	-0.074 (0.21)	-0.400* (0.30)
RD	0.109 (0.21)	0.571** (0.28)
RDSQ	0.004 (0.01)	-0.039** (0.02)
WEALTH	0.027 (0.24)	0.185 (0.22)
MEXNET	0.374 (0.52)	-0.021 (0.55)
USNET	-0.315 (0.56)	1.993** (0.79)
SEX	0.186 (0.36)	0.602* (0.43)
AGE	0.348** (0.11)	0.552** (0.14)
AGESQ	-0.006** (0.002)	-0.009** (0.002)
ED	0.266** (0.06)	-0.129* (0.09)
HEAD	0.067 (0.82)	-3.129** (1.09)
MEXEX	0.467** (0.08)	0.144* (0.11)
USEX	0.141* (0.10)	0.487** (0.09)

Note: Log-likelihood = -194.22; * indicates significance at below the 0.10 level; ** indicates significance at below the 0.05 level; standard errors appear in parentheses.

United States.

Of particular interest is the result that, like absolute income, relative deprivation (RD in Table 3) has a significant impact on migration to U.S. destinations but is *not* significant in explaining internal migration. With everything else held constant, relatively deprived households are more likely to participate in Mexico-to-U.S. migration than are less relatively deprived households. The coefficient on RD of 0.57 for Mexico-to-U.S. mi-

gration is significant at below the 0.05 level, indicating an important role for relative income motives in Mexico-to-U.S. migration.

The influence of relative deprivation is not the same at all points in the village income spectrum. Relative income motives for Mexico-to-U.S. migration are lower in the most relatively deprived households. The negative coefficient on the square of relative deprivation (RDSQ) is significant at the 0.05 level for Mexico-to-U.S. migration. This result supports the hypothesis, put forth in Section II, that subsistence concerns tend to dampen relative income considerations in the poorest village households. It also indicates the presence of diminishing marginal disutility of relative deprivation.¹⁸

The remaining variables in the decision model are included for their hypothesized influence on the returns to migration versus nonmigration activities and on the motivation of household members to contribute all or part of their earnings to their respective households. We would expect migrating household members to be those whose attributes are most likely to be associated with high differentials in returns to the household from migration versus non-migration activities. In addition, certain household characteristics are likely to have an important effect both on the probability of migration and on the choice of migrant destination.

The logit analysis reveals striking differences between migrants and nonmigrants as well as between the two groups of migrants. On average, migrants tend to be male, 20 to 30 years of age, not heads of households, and to possess past migration experience. However, two of these variables affect the migrant categories in very different ways. Although males are significantly more likely than females to participate in Mexico-to-U.S. migration, sex plays an insignificant role in explaining internal migration. Household heads, by contrast, are very unlikely to engage in international migration but are no less likely to be internal migrants than those who are not heads of households. The latter result no doubt reflects differences in opportunity costs between internal and international migration for household heads. For heads of households, administrative responsibilities on the family farm and other obligations in the village generally preclude migration to the United States, which typically entails a large commitment of both time and capital. Household members' schooling (ED) has a significant positive effect on the probability of internal migration but is negatively related to Mexico-to-U.S. migration. Not surprisingly, better-educated villagers are much more likely to migrate to destinations in Mexico, where returns to schooling are likely to be high, than to low-skill, undocumented immigrant labor markets in the United States.

Two other variables in Table 3 stand out as significant influences on migration decisions. Mexico-to-U.S. migrants tend to originate from households with other adult members in the village (ADULTS in the table) who

can assume the household farm duties of those who migrate. In addition, households with kinship networks in place in the United States (USNET) are significantly more likely to send additional members to the United States. The particularly large and significant coefficient on USNET for the Mexico-to-U.S. migration category reflects the important role kinship contacts play in international migration—where risks are highest, labor market information is most costly and scarce, and the penalty for failure (that is, lost time and capital) is most severe. Internal migration networks (MEXNET), by contrast, do not significantly affect internal migration. This reflects the relative ease with which individuals in this sample can migrate and remigrate internally (that is, take corrective action in case of a failure).

IV. CONCLUSIONS

The findings reported in this paper provide evidence that controlling for absolute income, relatively deprived households are more likely to engage in Mexico-to-U.S. migration than are households more favorably situated in their village's income distribution. Relative deprivation is not, however, significant in explaining internal migration. This may be because social and cultural discontinuities between villages and the destinations of internal migration are small and because reference-group substitutions that increase relative deprivation are likely to occur. It may also be due to the fact that, on average, international migration is a more effective strategy for achieving relative income gains than is internal migration. The results support the relative deprivation hypothesis of migration when migration is likely reduce households' relative deprivation within the relevant reference group.

Choice of migrant destination is also influenced by the differential returns to human capital in internal and foreign labor markets. Our statistical results suggest that, independent of relative deprivation, households wisely pair their members with the labor markets in which the returns to their human capital are likely to be greatest.

This analysis leads to several new policy implications. Contrary to the assumption that all types of migration can be attributed to the same explanatory variables, our results suggest that (at least in the context studied) a specific type of migration constitutes a response to a specific configuration of variables. Thus, a distribution-neutral development policy that shifts a village income distribution to the right would reduce the incentive to engage in internal migration but may have little impact on international migration. Conversely, a distribution-biased policy leading to a more equal income distribution (for example, provision of stronger support for the poorest households) could tip the migration balance from interna-

tional migration to internal migration.

The possibility that different variables may be the cause of different types of migration could lead to the paradoxical result that interference, say, to stem migration will result in its rise: raising the incomes of highly, relatively deprived households in a poor village may reduce their incentive to engage in rural-to-urban migration but may also unleash their hitherto constrained propensity to engage in international migration.

Finally, and in connection with the foregoing, *if* the disutility from relative deprivation and the migration response to it are an increasing function of own (absolute) income, a "relative deprivation paradox of migration" may operate: economic development that does not redress intravillage income inequalities will be associated with *more* international migration.

APPENDIX

Estimation of equation (7) in the text requires measures of predicted household income in the absence of migration by the household member (Y_0^j) and of the level of relative deprivation associated with this predicted income (RD_0^j). This Appendix outlines the method used to obtain first, an instrument for household income in the absence of migration by person j (\hat{Y}_0^j) and, second, an instrument for relative deprivation associated with this income (\hat{RD}_0^j).

Household Income without Migration by Person j .

A household's predicted income in the absence of migration by household member j (\hat{Y}_0^j) is the sum of predicted income from other sources (\hat{Y}^{-j}) and the expected contribution by the household member as a nonmigrant (\hat{W}_0^j). Estimates of household income (from sources other than person j) were obtained by regressing observed 1982 income from sources other than person j on household assets at the start of 1982. The estimated equation is

$$\begin{aligned}\hat{Y}^{-j} = & 1376.8 + 0.29A + 821.92TED - 96.29NADS \\ & (4.94) \quad (5.59) \quad (8.87) \quad (-1.98) \\ & + 558.08USNET - 397.96MEXNET \\ & (2.81) \quad (-1.85)\end{aligned}\tag{A.1}$$

$$R^2 = 0.28$$

$$N = 423$$

Numbers in parentheses are t-statistics; variables are as defined for equations (A.2) and (A.3) below.

Household member j 's predicted contribution to household income as a nonmigrant was estimated by regressing observed 1982 contributions by nonmigrants on a set of personal and household variables likely to influence earnings in the village as well as nonmigrants' willingness to share these earnings with the household. Contributions by nonmigrants were observed only for individuals who did not migrate during the year. An inverse Mills ratio was included in the equation for contributions by nonmigrants to adjust for potential sample-selection bias.¹⁹ It was obtained from a reduced-form probit for nonmigration by using the explanatory variables in equation (A.1) and the household and individual characteristics variables in Table 1. The estimated equation for contributions by nonmigrants is

$$\begin{aligned}\hat{W}_0^j = & -0.63 + 1.87\text{SEX} + 0.11\text{AGE} - 0.001\text{AGESQ} + 2.08\text{HEAD} \\ & (0.90) \quad (6.29) \quad (2.29) \quad (-2.39) \quad (3.86) \\ & + 0.21\text{MEXEX} + 0.22\text{USEX} - 1.30\text{LAMBDA} \\ & (1.87) \quad (3.47) \quad (-2.19) \quad (A.2)\end{aligned}$$

$R^2 = 0.44$
 $N = 273$

where numbers in parentheses are t-statistics and LAMBDA is the selectivity variable. The variables as they appear in equation (A.2) with the exception of LAMBDA, are defined in Table 2. The instrument for household income in the absence of migration is given by $\hat{Y}_0^j = \hat{Y}^{-j} + \hat{W}_0^j$.

Relative Deprivation without Migration by Person j.

Estimation of a household's relative deprivation in the absence of migration by person j (RD_0^j) is complicated by the fact that relative deprivation is a function not only of person j's household's income, but also of the incomes of all other households in person j's village (equation (3)). We constructed an instrument for RD_0^j by first estimating the income (\hat{Y}) of each household in the village sample and then using this estimated income distribution to estimate the level of a household's relative deprivation associated with nonmigration by person j.

Estimates of total household income (\hat{Y}) were obtained by regressing observed 1982 total household income on household holdings of income-producing assets at the start of the year and then using the estimated equation to predict 1982 income for each household represented in the sample. The assets include the value of households' primary physical capital assets (land and draft animals) in thousands, denoted A; human capital assets (the number of adults in the household NADS, and the number of household members with postprimary 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 years prior to 1982. The estimated income equation is

$$\begin{aligned}\text{LN}(\hat{Y}) = & 7.17 + 0.13A + 0.26\text{TED} - 0.07\text{NADS} \\ & (27.2) \quad (2.19) \quad (2.53) \quad (-1.19) \\ & + 0.59\text{USMIG} - 0.08\text{MEXMIG} \\ & (2.26) \quad (-0.32) \quad (A.3)\end{aligned}$$

$$R^2 = 0.32$$

$$N = 61$$

Numbers in parentheses are t-statistics.

Using the discrete form of equation (3), one can easily calculate households' predicted relative deprivation, without migration by person j , from \hat{Y}_0^j and the predicted total incomes (\hat{Y} s) of all other households in the corresponding village:

$$\hat{RD}_0^j = \sum_{\hat{Y}_0^j}^{\hat{Y}^h} [1 - F(x)] \Delta x \quad (\text{A.4})$$

where \hat{Y}^h is the highest predicted total household income in the village and, for a given income x_i , $\Delta x_i = x_{i+1} - x_i$.

NOTES

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7. Stark, "Rural-to-Urban Migration in LDCs," 1984; Stark and Taylor, "Relative Deprivation," 1989.

8. O. Stark and S. Yitzhaki, "Labor Migration as a Response to Relative Deprivation," *Journal of Population Economics* 1, no. 1 (1988): 57-70; Stark and Taylor, "Relative Deprivation," 1989.

9. For these procedures and an analysis of the more general form $g(\cdot)$, see Stark and Yitzhaki, "Labor Migration".

10. Borrowing against future earnings expected to arise from present investment

in human capital is difficult even in developed countries although the difficulty is eased somewhat by the availability of physical (nonhuman capital) assets that act as a collateral. Such perfection of credit markets, limited as it is, does not typically apply to the poor in LDCs.

11. Stark and Taylor, "Relative Deprivation," 1989.

12. We note that there need not be a corresponding relation between absence of remittances and reference-group substitution. For example, seasonal migrants who return home repeatedly may not need recourse to remittances to have their households of origin partake in the income earned at the destination of migration. Conversely, migrants who do remit may do so even though their village of origin does not constitute (part of) their reference group, as is the case when remittance flows are part of mutually beneficial, risk-sharing, implicit contractual arrangements. See O. Stark and R.E.B. Lucas, "Migration, Remittances and The Family," *Economic Development and Cultural Change* 36, no. 3 (1988): 465-481.

13. J.E. Taylor, "Undocumented Mexico-U.S. Migration and the Returns to Households in Rural Mexico," *American Journal of Agricultural Economics* 69 (1987): 626-638.

14. Income contributions from household farm work were 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 were 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 farming work.

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.

15. While the use of a household decision framework obviously overlooks any autonomy of individuals in their labor allocations, we believe 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, socio-economic characteristics of households play a significant role in addition to 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 LDCs. An illustration of 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, every household that participated in labor migration received remittances and nearly 90 percent of all migrants remitted.

16. The correlation between absolute income and relative deprivation for the sample is -0.41 .

17. Taylor, "Undocumented Mexico-to-U.S. Migration," 1987; and Stark and Taylor, "Relative Deprivation," 1989.

18. The quadratic term dominates the linear term in the 14 percent most relatively deprived cases in the sample.

19. J. Heckman, "Sample Selection Bias as a Specification Error," *Econometrica* 47, no. 1 (1979): 153-162; W.H. Green, "Sample Selection Bias as a Specification Error: Comment," *Econometrica* 49, no. 3 (1981): 795-798.