Determinants of Rural-to-Urban Labour Movements in Mexico: Household Perspective

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Abstract: The purpose of this paper is to test specific hypotheses about the determinants of temporary rural-to-urban migration (circulation) by male heads of households for the purpose of engaging in wage employment. Data from a sample of 145 rural households located in the central Mexican highlands are used to estimate the model. The circulation equation is formulated as a polychotomous, ordered-response model and is estimated using logistic regression. The results of the model suggest that males' level of education and previous circulation experience have a positive and significant impact on the probability of circulation. By comparison, land has a negative effect, and economic status has a *U*-shaped effect. Age and the number of adults in the household are found to have a statistically weak association with the dependent variable.

Introduction

In recent years, Mexico, like many other developing countries, has experienced considerable rural-to-urban migration. This process became common in the mid-1960s when the 25-year period of prosperity enjoyed by the Mexican agricultural sector came to an end, forcing small-scale farmers to seek seasonal employment in urban areas and/or temporary migration to the USA (Unikel, Chiapetto, and Lazcano, 1973; and Arizpe, 1981).

The economic literature focusing on rural-to-urban migration over the last two decades is heavily influenced by Todaro's (1969) model, which postulates that migration takes place because individuals choose to reside in areas where they can maximize the present value of a discounted net income stream. Tests of the Todaro model have relied almost exclusively on aggregate census data (e.g., state or county) collected in the migrant's destination area. Most of this work has assumed that migration is a one-time or permanent decision (DaVanzo, 1981). Examples of this type of analysis for Mexico are Garrison (1982), Greenwood (1978), and King (1978). In contrast, this paper focuses on the determinants of temporary rural-to-urban migration in Mexico based on household-level data collected at the workers' places of origin.

Migration decisions have been discussed recently in the context of poor household survival strategies (Wood, 1981 and 1982; and Roberts, 1982). According to this view, the behaviour of a household can be seen "as a series of 'sustenance' strategies by which the household actively strives to achieve a fit between its consumption necessities, the labor power at its disposal (both of which are determined by the number, age, sex, and skills of its members), and the alternatives for generating monetary and nonmonetary income" (Wood, 1981, p. 339). Migration is regarded as "an important aspect of the adaptive strategy that the household pursues in response to changing structural constraints" (Wood, 1981, p. 340).

More recently, a growing body of evidence points to the significance of *circulation* (i.e., temporary migration) as an integral component of a household's survival strategy in poor rural areas of many developing countries (e.g., Chapman and Prothero, 1983; Nelson, 1976; and Standing, 1985). Circulation as a component of a complex survival strategy may have significant positive as well as negative effects on household welfare (Nattrass, May, and Peters, 1987).

In the case of Mexico, the growing significance of labour circulation has been attributed to the slowdown in the agricultural sector combined with the *ejido* system. The agricultural recession has pushed small farmers to find income sources outside agriculture, while the *ejido* system has kept them tied to the soil in order to avoid losing their claims to *ejido* lands (Alba and Potter, 1986; and Sanderson, 1986). Some research, primarily descriptive in nature, has analyzed the circulation phenomenon in Mexico (e.g., Arizpe, 1981; DeWalt, 1979; Feindt and Browning, 1972; Roberts, 1982; and Wiest, 1973). This paper goes beyond the existing descriptive literature by formulating a single-equation model to test

specific hypotheses concerning the determinants of the decision to circulate by the male household head. Data from a sample of Mexican rural households located in the central highlands are used to estimate the model.

Data

The data used in the analysis are part of a much larger data set collected during the Mexico Collaborative Research and Support Programme on Nutrition and Function, a project conducted jointly, from 1982 to 1987, by researchers from the Instituto Nacional de la Nutrición Salvador Zubirán, División de Nutrición de Comunidad, in Mexico City, and the Department of Nutritional Sciences at the University of Connecticut. The study site included six communities located in the Solis Valley, approximately 75 miles northwest of Mexico City.

A complete survey of the communities was first undertaken to identify potential households for the study. To qualify, the household had to include both a male and a female head. If this was the case, then the couple had to have an infant younger than 8 months, and/or a child 18-30 months of age, and/or a child 7-8 years of age, and/or the woman had to be pregnant. All eligible households identified in the complete survey were invited to become collaborators in the project. Of those eligible, 290 (or 80 percent of those eligible) agreed to participate, which represents about 50 percent of all households located in the site. Of these 290 households, 145 were used to estimate the circulation equation. The latter sample is comprised of households for which extensive socioeconomic data are available. A detailed discussion of the data and sample selection criteria are found in Allen, Pelto, and Chávez (1987).

Model Specification

The broad conceptual framework of this paper, which is common to much of the economic work dealing with migration (or circulation), is that individuals move from one location to another in the expectation that this decision will yield financial rewards (DaVanzo, 1981). An individual's circulation decision is hypothesized to be determined by personal attributes and household characteristics (Bilsborrow, McDevitt, Kossoudji, and Fuller, 1987; and Findley, 1987). For the purposes of this study, circulation is defined as any temporary movement by the male household head away from the community—usually to Mexico City for 5-15 days at a time—in order to engage in wage employment.

In general terms, the circulation model is expressed as:

$$CI_h = f(AGE_h, EDUC_h, CASA_h, LAND_h, ADULT_h, CIEXP_h, COMMUN_h).$$

CI_h is the circulation index of the male head in the hth household. This index is a discrete variable set at 0 if the individual did not circulate or at 1, 2, 3, or 4 if he circulated in 1, 2, 3, or 4 quarters during 1984. *AGE* is the age of the male in years. *EDUC* is a binary variable equal to 1 if the male can read and write or 0 otherwise. *CASA* is a continuous index that combines the size and quality of dwellings, including the house and farm buildings, and is assumed to reflect the household's economic status. *LAND* measures the number of hectares controlled by the household and includes privately-owned as well as *ejido* lands. The reliability of the *LAND* variable is difficult to gauge given the intricate land-use arrangements encountered among the farmers in the sample. *ADULT* is the number of people 15 years and older who are members of the household; i.e. who live under the same roof. *COMMUN* is a set of binary variables representing the various communities where the households are located. *CIEXP* is a binary variable equal to 1 if the target male had circulated in more than two quarters between 1978 and 1983 and 0 otherwise.

Table 1 presents descriptive statistics for the variables included in the analysis. Out of the 145 males in the sample, 71 are circulators. Of these 71 individuals, 6 reported circulation in one quarter, 12 in two quarters, 8 in three quarters, and the remaining 45 in four quarters (not shown in Table 1). The data in Table 1 indicate that, on average, circulators are younger, better educated, have a lower *CASA* index, less land, more adults in the household, and considerably more circulation experience than noncirculators.

Table 1—Descriptive Statistics of Variables Used in the Analysis

	All Males		Circulators		Noncirculators	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
CI	1.61	1.80	3.30	1.03	0.00	0.00
AGE	37.31	8.14	36.96	7.54	37.65	8.71
EDUC	0.85	0.36	0.90	0.30	0.79	0.40
CASA	24.06	17.60	21.87	15.34	26.17	19.41
LAND	1.38	1.56	1.15	1.43	1.60	1.65
ADULT	3.39	1.68	3.48	1.76	3.31	1.60
CIEXP	0.46	0.50	0.73	0.45	0.20	0.40
Sample size	145		71		74	

The relationship between the probability of circulation and *AGE* is hypothesized to have an inverted *U*-shape (*ceteris paribus*). The rationale for this hypothesis is that income requirements first increase as the family gets larger and the male household head becomes older and then decline as the children get older and start contributing to the household. *EDUC* is hypothesized to have a positive effect on circulation, which is consistent with the notion that better-educated individuals have more and better information about labour markets outside their communities (DaVanzo, 1981; and Sahota, 1968). Also, rural people with higher levels of education are likely to be driven to urban areas to find jobs commensurate with their educational achievements (Carvajal and Geithman, 1974). *CASA*, as a proxy of economic status, is expected to have a *U*-shaped relationship with circulation. This is based on the view that individuals in poor households are forced to circulate in order to survive, while individuals in relatively affluent households circulate to advance the family's economic status (Findley, 1987). *LAND* is hypothesized to have a negative effect on the probability of circulation because the labour absorption capacity and the ability to generate income within the household are directly related to the amount of land available. *ADULT* is expected to be positively related to the probability of circulation because, as the number of adults increases, the day-to-day labour requirements of the household are more easily met (Wiest, 1973). Finally, *CIEXP* is hypothesized to have a positive effect on the dependent variable because circulation experience increases the probability of finding work and also reduces the cost of circulation.

Table 2—Logistic Regression Estimates of Determinants of Rural-to-Urban Circulation for a Sample of Mexican Males

Variable	Regression Coefficient	Asymptotic Standard Error
ALPHA1	-8.6016**	3.5965
ALPHA2	-8.8828**	3.6039
ALPHA3	-9.4721***	3.6145
ALPHA4	-9.8781***	3.6195
AGE	0.1927	0.1687
AGE^2	-0.0022	0.0021
EDUC	1.0367*	0.6360
1/CASA	41.8901***	12.1354
1/CASA^2	-144.0836***	45.5450
1/LAND	0.0015***	0.0005
ADULT	0.1282	0.1372
CIEXP	2.5632***	0.4535
COMM1	1.1015	0.7208
COMM2	0.3041	0.7016
COMM3	-0.1043	0.6664
COMM5	0.2061	0.6377
COMM6	0.2179	0.7972

Notes: Number of observations = 145; log-likelihood = 271; model χ^2 = 78.270***; and pseudo-R^2 = 0.225.
*** = parameter significant at 0.01 level.
** = parameter significant at 0.05 level.
* = parameter significant at 0.10 level.

Results

Given the nature of the dependent variable, the circulation equation is formulated as a polychotomous, ordered-response model and is estimated using logistic regression (Maddala, 1983). The model yields four intercepts

(*ALPHA1, ..., ALPHA4*) and four probabilities (*P1, ..., P4*). *P1*, *P2*, *P3*, and *P4* are defined as the probability that the male household head circulates in one or more quarters, in two or more quarters, in three or more quarters, or in four quarters, respectively.

As shown in Table 2, the pseudo-R^2 statistic indicates that the model explains about 23 percent of the dependent variable's variation, and the model χ^2 provides strong evidence against the hypothesis that all slope parameters are equal to zero. The results reveal that the parameters for *EDUC*, *CASA*, *LAND*, and *CIEXP* are highly significant and that their signs are consistent with the hypotheses. The coefficients for *AGE* and *ADULT* also have the expected sign but are not significantly different from zero at the 10-percent level. In addition, the results suggest that no systematic relationship exists between the male's community of origin, captured by the *COMMUN* binary variables, and his decision to circulate.

Table 3 shows the change in the probability of circulation with respect to each explanatory variable in the model, holding all continuous variables at their mean value and setting *EDUC* and *CIEXP* at 1 and all *COMMUN* variables at 0. The change in probabilities for the continuous variables is given by the partial derivative of the probability of circulating in 1, 2, 3, or 4 quarters (*P1*, *P2*, *P3*, and *P4*) with respect to the variable in question. By comparison, the change in probability associated with *EDUC* and *CIEXP* is computed by calculating the difference in predicted probabilities when these variables are set first at 1 and then at 0.[2]

Table 3–Marginal Effects of the Explanatory Variables Included in the Rural-to-Urban Circulation Model

Variable	*P1*	*P2*	*P3*	*P4*
AGE	0.00435	0.00488	0.00552	0.00543
EDUC	0.24022	0.25116	0.24479	0.21941
CASA	-0.11593	-0.12991	-0.14683	-0.14468
LAND	-0.00016	-0.00018	-0.00020	-0.00020
ADULT	0.02520	0.02131	0.01336	0.00877
CIEXP	0.55791	0.53587	0.45179	0.37620

The change in probabilities presented in Table 3 shows that the probability of circulating in 1, 2, 3, or 4 quarters increases with previous circulation experience as well as with education. Also, a decline of roughly 11-15 percent in the probability of circulation occurs as *CASA* increases by one unit. By contrast, a one-unit variation in *AGE*, *LAND*, or *ADULT* has a small impact on the probability of circulation.

Concluding Remarks

The results of this paper confirm the notion that individual as well as household characteristics are important determinants in the male household head's decision to circulate for the purpose of engaging in wage employment. Of special significance to policy makers is the fact that the better-educated males from households where land pressure is relatively high tend to rely more heavily on off-farm income. Both of these variables are to some extent subject to policy manipulation and hence can be used to affect circulation.

An important agricultural policy issue that requires further study is the relationship between farm productivity and circulation. Some have suggested that temporary migrants are likely to be exposed to new ideas, which can have a beneficial impact on farm productivity (DeWalt, 1979), and that the earnings realized through wage employment can facilitate the adoption of new techniques (Katz and Stark, 1986). In contrast, Elkan (1982) has argued that circulation by the household decision maker could retard the adoption of technical innovations or otherwise adversely affect productivity, having a detrimental impact on farm profitability. Further study is needed to test these important but competing hypotheses.

Notes

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[2]Given the nonlinear nature of the equations involved, the computed changes in probability will vary significantly across individual observations.

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DISCUSSION OPENING—*Mohamadreza Arsalanbod* (Urmia University)

While most studies show that migration is selective with respect to the number of adults in the household and especially selective with respect to the age, the insignificant effect of age in this study could be due to the kind of data used. The data comes from six communities located only 75 miles from Mexico City.

For most migrants, both efficiency in production and consumption are the reasons for migration, and the importance of each of these factors depends on the individual case and the personal characteristics and circumstances facing migrants. In this paper, consumption efficiency related factors are totally neglected. In the literature on migration, some elements related to consumption efficiency have been used in explanations of migration, but these factors have not been treated explicitly, either theoretically or empirically. Removing this shortcoming would probably increase the explanatory power of migration models, especially those of permanent migration. The *U*-shaped relationship between economic status and migration found in some studies of migration, including Bravo-Ureta *et al.*'s paper, could, at least to some extent, be due to consumption efficiency behaviour of migrants.

In Bravo-Ureta *et al.*'s paper, the number of hectares of land controlled by the household, including privately owned as well as *ejido* lands, is entered in the model. Using the land-to-labour ratio instead would be more appropriate.

Research on migration has been mostly concerned with identification of differentials between personal and locational characteristics and the extent to which these differentials influence migration, including temporary migration. Bravo-Ureta *et al.*'s paper is one example that confirms that individual as well as household characteristics are important determinants in the decision to circulate.

The impact of migrants on places of origin and destination (origin in particular) are matters of much concern and speculation. Bravo-Ureta *et al.* mention one of these important issues; i.e., the relationship between farm productivity and circulation.

While entering the consumption-efficiency-related variables, both personal and locational, is likely to increase the explanatory power of migration models, the more important area of

research on migration would be identification and measurement of impacts of the factors that condition the whole process of migration, factors that are powerful and to a large extent subject to policy manipulation and hence can be used to affect migration and in turn affect the occupational and geographical distributions of population. Factors related to the socioeconomic system of each country include pattern of economic development, government role in the economy, and personal distribution of nonlabour resources and income.

GENERAL DISCUSSION—*Chinkook Lee* (Economic Research Service, US Department of Agriculture)

One participant asked if intertemporal welfare functions could be used in the analysis. For example, labour migration to the USA over time may be an important factor to be considered.

In reply, Bravo-Ureta said that "factors affected by labour migration to the USA are important in analyzing labour movements between urban and rural regions. However, this study is a static analysis and not an intertemporal study. By using a reduced form, intertemporal considerations could probably be included in an empirical study.

Participants in the discussion included S. Larrea and A. Ortega Marquez.