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AN EMPIRICAL MODEL OF INDIVIDUAL AND  
HOUSEHOLD MIGRATION CHOICE:  
PHILIPPINES, 1965-1973

by

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Abstract

(Most migration studies have used aggregate data to test hypotheses concerning individual migration behavior. This paper attempts to understand migration behavior more directly by analyzing data on individuals and households. The decision to migrate or stay is viewed as influenced by individual or household attributes and certain external factors that impinge on the individual or household. Additionally, income-earning capacity and employment or occupation are assumed to be sequentially determined with migration. The migration decision model is specified in logit form and estimated, using the maximum likelihood method, with data from the 1973 National Demographic Survey (NDS). In general, personal and household characteristics are found to be more significant in the decision to migrate than external factors which have been stressed by previous studies. Kinship ties at destination seem to be the decisive factor in the choice to migrate. Occupation at destination appears to interact more strongly with migration than income. With respect to policy, such factors as education, employment, and kinship stand out as potential vehicles for migration policy.)

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I. INTRODUCTION

(A common theme of migration research has revolved around the question of why people move or what factors affect the choice to migrate or stay.) This question is generally couched in the framework of individual utility maximization by economists, or examined in the context of the individual's mobility through the social structure by sociologists. Due primarily to lack of data, however, most studies have used aggregate data to test hypotheses concerning individual migration behavior. Migration streams are frequently analyzed by means of the gravity model, which hypothesizes that the volume or rate of migration is directly related to the size of the population at origin and destination and inversely related to distance and intervening or alter-

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native opportunities (Stouffer, 1940; Isard, 1960; Levy and Wadycki, 1974). Usually, the gravity model is modified by the incorporation of other variables that reflect conditions at origin and destination such as income levels and employment rates, and of control variables such as sex, age, education, and race (Lee, 1966; Sahota, 1968; Schultz, 1971; Schwartz, 1973). The analysis of migration behavior is also often handled indirectly by comparing the characteristics of migrants with those of non-migrants in general, or non-migrants at origin and destination (Goldstein, 1973; Carvajal and Geithman, 1974; Speare, 1974). Common to the two general approaches is the attempt to infer about the behavior or characteristics of the "average individual or household" from data on aggregate populations and areas.<sup>1</sup>

This paper aims to understand migration behavior more directly by analyzing data on individuals and households with the aid of the logit model. Logit analysis

has seen increasing application in recent years due in part

<sup>1</sup>For more criticism on the use of aggregate data to learn about individual migration behavior, see also DaVanzo (1976).

to migrate or stay can, therefore, be seen as influenced by the individual's attributes and the said external factors. More specifically, the functional relationship may be expressed as

$$MIG_{it} = f(A_{it}, E_i, \epsilon_i) \quad (1)$$

where  $MIG_{it}$  denotes the choice of person  $i$  or household  $i$  to migrate or not at time  $t$ ,  $A_{it}$  is a vector of personal or household characteristics at decision time (or around that time),  $E_i$  represents external factors, more or less constant during the decision interval, that impinge on the individual, and  $\epsilon_i$  is the error term. A distance factor is not included in the  $E_i$  vector because the points of origin and destination are not specified. Moreover, as Schwartz (1973) has shown, the distance effect is really an information effect captured by the education variable which is included in the  $A_{it}$  vector, as will be seen below. Furthermore, we assume, on the basis of the findings of other studies (Nelson, 1959; Lansing and Mueller, 1967; Fabricant, 1970), that distance and the psychic costs inherent in it are offset or mitigated by the presence of kins at destinations, i.e., the kinship effect which is also included in our model.

The above conceptualization of the migration decision process may be enhanced if we include in the model other variables, such as income-earning capacity, employment or occupation, and marriage, which may be considered as jointly or sequentially determined with migration. We may assume, for instance, that an individual  $i$  decides to migrate at time  $t$  because, possessing certain attributes (young age, high education, job experience, etc.), he or she believes that at the other place he can land a good job and earn a high income, or be able to find a desirable marriage partner. However, his or her capability of getting a certain job and income or getting married would probably also depend on his <sup>her</sup> status as a migrant at time  $t + n$ , his <sup>her</sup> other characteristics and previous background, as well as the type of destination he <sup>she</sup> has chosen. An enhanced migration model may then be formulated as

$$MIG_{it} = f(A_{it}, E_i, N_{it+n}, \epsilon_i) \quad (2)$$

and

$$N_{it+n} = f(A_{it}, E_i, MIG_{it}, \epsilon_i) \quad (3)$$

where  $N_{it+n}$  represents a vector of other endogenous variables referring to the migrant's (or non-migrant's)

potential statuses at the place of destination (or the non-migrant's at terminus quo).

The model is improved not just because arguments are added in equation (1) but because equation (2) can estimate the determinants of migration while equation (3) can provide insights into its consequences.<sup>4</sup>

### III. SPECIFICATION OF MODEL AND DATA

The individual's decision to migrate or not,  $MIG_i$ , is specified as a binary choice: migrate = 1, not migrate = 0. (The qualitative nature of the dependent variable renders the linear probability model by way of ordinary least squares regression inappropriate for estimating equations (1) to (3).) This is because of the problem of heteroscedasticity; that is, the variance of the error term  $\epsilon_i$  is not constant for all observations. Observations for which  $MIG_i$  is close to 0 or close to 1 have small variances, but those with  $MIG_i$  close to 0.5 have large variances (Theil, 1971: 628-629; Pindyck and

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<sup>4</sup> Greenwood (1975a), in his extensive survey of migration research, points out that the focus has been largely on the determinants of migration and very little has been done on its consequences. The present paper may be considered as an effort at more balanced analysis.

Rubinfeld, 1976: 239-243). This is a violation of a fundamental assumption of the linear model which results in inefficient, though not necessarily unbiased or inconsistent, parameter estimates. Moreover, since the  $MIG_i$ 's are not normally distributed, the usual tests of significance, including the  $R^2$ , are technically invalid (Cox, 1970:17). The probit and logit models using maximum likelihood procedure are more suitable alternatives for our purpose. We choose the logit model because it is quite similar to the probit model and yet is computationally more tractable (Ashton, 1972:11). The logit model for migration can be specified as

$$P(MIG_i) = \frac{1}{1 + e^{-\sum \beta_i X_i}} \quad (4)$$

where  $P(MIG_i)$  is the probability that an individual will choose to migrate, and  $X_i$  stands for the explanatory variables, i.e., those variables found on the right-hand side of equations (1) to (3). Equation (4) is the cumulative logistic probability function which, after omitting intermediate steps, can be transformed to

$$\log \left[ \frac{P(MIG_i)}{1 - P(MIG_i)} \right] = \sum \beta_i X_i \quad (5)$$

This shows that the dependent variable in the regression equation is simply the logarithm of the odds that the decision to migrate will be made. A similar specification as equation (5) can be made for the other endogenous variables ( $N_{it+n}$ ) in equation (3).

The data on which our migration model is to be tested are from the 1973 National Demographic Survey (NDS). The NDS was conducted in May 1973 by the University of the Philippines Population Institute (UPPI) in collaboration with the National Census and Statistics Offices (NCSO). It involved a nation-wide representative sample of 8,434 households containing 28,482 persons 15 years old and over. For the present study, we focus on persons in their prime years of active (working and decision-making) life, ages 15-49 in 1973, who changed residence or not between 1965 and 1973, and for whom there is sufficient information for our model. Preliminary analyses warranted the use of three separate data sets (sub-samples) differentiated by sex. These are all persons, household heads, and persons never married as of 1965.

From preliminary analyses we were also able to determine the more relevant variables for inclusion in one

or the other regression models. The explanatory (exogenous) variables include: age; education; occupation in 1965; marital status in 1965; household size; prospective income; kinship ties; locale of residence in 1965; and size of municipality of residence in 1973.<sup>5</sup> The first five variables are personal or household attributes, corresponding to  $A_i$  in equations (1) to (3), at about the time the decision to move or stay is made; the last four are external or situational factors corresponding to  $E_i$  in said equations of the theoretical model.

A word needs to be said about each of the variables. AGE is set at roughly the mid-point of the 1965-1973 interval, that is, the mean time the mobility-stability choice is made; it ranges 11-45 in single years. Education (EDUC) is a continuous variable ranging from 1 to 12 household members, but we can assume that the level of education did not change measurably in such a short time. Income (INCOME) refers to cash income for 1973, the year prior to the survey; it ranges from 0 for those with no income (presumably unemployed), then 1 for incomes

<sup>5</sup> From the correlation matrices there is no evidence of the multicollinearity problem. Marital status in 1965 is highly correlated with age, 0.82 for all males and 0.76 for all females, but marital status is dropped in a subsequent run. The correlation coefficients between occupation and age, and occupation and income are both about 0.53; all other correlations are much lower.

(around four years from the mean time of decision-making);<sup>6</sup> EDUC ranges 0-16 in single years of academic or vocational schooling. Occupation in 1965 (OOC65) is clearly an ex ante attribute; this goes from 0 for those without occupations (presumably unemployed), then 1.0 for farm and mine laborers and on up to 13 for upper professionals, i.e., classified according to a combination of education, income, and prestige criteria (see Bacol, 1971 and the Appendix for specific categories and codes). Marital status in 1965 (MAR65) is coded 1 for single, 2 for divorced or separated, and 3 for married, i.e., ordered from least attached to most attached. Household size (HHSIZE) information also refers to the time of the survey, again an apparent shortcoming, but we can assume that a household moves or stays as a unit and that the size should not vary much in a short time; HHSIZE ranges from 1 to 22 household members. Prospective income (EXINC) refers to cash income for 1972, the year prior to the survey; it ranges from 0 for those without income (presumably unemployed), then 1 for incomes less than ₦1,000, and on up to 7 for incomes greater than ₦1,000. It is conceivable, however, for a person to absorb in a short time certain kinds of vocational and on-the-job training which may be readily available especially in a big city.

₱10,000,<sup>7</sup> Kinship ties (KINS) is a dummy variable for presence (= 1) or absence (= 0) of relatives at destination. Locale of residence in 1965 (RES65) is also a dummy variable: agricultural = 0, non-agricultural = 1. Finally, size of municipality (MUNI73) refers to residence in 1973; it ranges from 1 for municipalities with less than 8,000 population to 7 for those with 50,000 or more.<sup>8</sup>

As specified, the independent variables to be used in estimating equation (1) do not seem to cause a simultaneous-equations bias in that migration (or staying) itself may have an effect on them (Greenwood, 1975b). A possibility exists for the expected income (EXINC) variable which may, in fact, be a consequence of migration. This leads us to equations (2) and (3) where income and occupation (employment) after migration are specified as endogenous variables, so that their bivariate interaction effects with migration

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<sup>7</sup> In 1972 the exchange rate was approximately US\$1.00 = ₱6.90.

<sup>8</sup> A municipality is the smallest administrative (statistical) sub-division short of the población or barrio. As a unit of destination in migration analysis, it is a substantial improvement over the province and region, which were used in previous studies of Philippine migration (Zosa, 1973; Smith, 1974; de los Santos, 1976).

can be isolated.<sup>9</sup> On account of the limitations of the computer program, income in 1972 (INC72) and occupation in 1973 (OCC73) have to be coded as dichotomous. INC72 is set to 0 for low income (less than ₱3,000 or nothing) and set to 1 for high income (₱3,000 or over). OCC73 is set to 0 for blue-collar occupations (unemployed, farm workers, . . . , to machinists, etc.) and set to 1 for white-collar work (sales workers, . . . , to upper professionals; see Appendix for specific codes).

Equations (1) to (3), specified in logit form, are estimated by the maximum likelihood method using a computer program developed by Nerlove and Press (1973: 38-130). The results are displayed and discussed in the next section.

#### IV. RESULTS OF LOGIT ANALYSIS

We present first the empirical results of the model which treats exogenous variables that influence the choice to migrate (equation 1). Then, we show the results

<sup>9</sup> As mentioned in the theoretical model, another endogenous variable of interest (in the Philippine context) would be marital status after migration. Although originally planned for inclusion, it was not feasible because of the way questions on marital status in 1973 and 1965 were asked in the survey.

of the other model that, in addition, deals with the reciprocal effects of migration, income, and occupation (equations 2 and 3). For both models the order of presentation is as follows: all persons, household heads, and persons single at the time the decision is made.

A. Determinants of Decision to Migrate

(Table 1 presents regression estimates for the personal attributes and external factors that are hypothesized to affect the individual decision to migrate.)

As expected, age at time of decision has an inhibitive effect on moving, but more so for females than for males.

Education (EDUC) has a strong positive influence on the decision to move--stronger for men than for women. As postulated earlier, the education effect includes an information effect which reduces the distance effect, and hence renders a separate distance variable unnecessary (Schwartz, 1973). Previous occupation (OCC65) has also a strong positive effect on migration, especially for males. Together with education, this reflects the greater need for preparation on the part of men than on the part of women if some returns from migration are to be expected, especially in big cities (MUNI73) with com-

petitive labor markets. Related to this is expected income at destination (EXINC) which seems to matter more for males than for females. Of course, some of the females may be non-working housewives of the male migrants.

Similar to the age effect is the effect of marital status (MAR65) which, although relatively insignificant, is nonetheless more restrictive of female than of male geographic mobility. The interpretation of the negative household size (HHSIZE) effect with respect to individuals is ambiguous. One way of looking at it is that the probability of an individual moving out of a large, perhaps closely-knit, household is low. This interpretation seems to run counter to the common supposition that a large household exerts a strong pressure to move out. Since household-size information, as noted earlier, refers to the time of the survey, it may be that individuals are not attracted to move into large households and those who migrate prefer to live in relatively small households. Given that migrants tend to be young, single, and with high educational and occupational backgrounds, their bias against large households in favor of smaller ones appears tenable.

Table 1

Factors Affecting Individual Choice to Migrate:  
Philippines, 1965-1973

| Variable               | Regression 1         |                      | Regression 2         |                      |
|------------------------|----------------------|----------------------|----------------------|----------------------|
|                        | Males                | Females              | Males                | Females              |
| AGE                    | -0.007<br>(1.213)    | -0.012<br>(2.524)**  | -0.010<br>(2.288)**  | -0.017<br>(4.799)**  |
| EDUC                   | 0.040<br>(4.642)**   | 0.015<br>(1.865)*    | 0.042<br>(4.881)**   | 0.017<br>(2.179)*    |
| OCC65                  | 0.053<br>(4.242)**   | 0.010<br>(0.828)     | 0.050<br>(4.297)**   | 0.007<br>(0.623)     |
| MAR65                  | -0.032<br>(0.699)    | -0.049<br>(1.411)    |                      |                      |
| HHSIZE                 | -0.048<br>(4.159)**  | -0.029<br>(2.780)**  | -0.048<br>(4.176)**  | -0.028<br>(2.738)**  |
| EXINC                  | 0.040<br>(1.263)     | 0.035<br>(0.829)     | 0.040<br>(1.263)     | 0.033<br>(0.786)     |
| KINS                   | 0.839<br>(9.926)**   | 1.052<br>(16.482)**  | 0.840<br>(9.947)**   | 1.047<br>(16.451)**  |
| RES65                  | -0.221<br>(2.974)**  | -0.187<br>(2.822)**  | -0.218<br>(2.932)**  | -0.186<br>(2.802)**  |
| MUNI73                 | 0.074<br>(2.954)**   | 0.085<br>(3.793)**   | 0.075<br>(2.972)**   | 0.086<br>(3.848)**   |
| Constant               | -1.330<br>(6.461)    | -1.070<br>(5.829)    | -1.306<br>(6.428)    | -1.043<br>(5.718)    |
| -2 log $\lambda$       | 204.226 <sup>#</sup> | 351.434 <sup>#</sup> | 203.736 <sup>#</sup> | 349.444 <sup>#</sup> |
| No. of<br>Observations | 2085                 | 2291                 | 2085                 | 2291                 |

Note: Figures in parentheses are asymptotic t-ratios

\*\* Significant at 1 percent level.

\* Significant at 5 percent level.

<sup>#</sup> Like F-test for OLS, -2 log likelihood ratio test the null hypothesis that all multiplicative coefficients vanish simultaneously; the value is asymptotically distributed as  $\chi^2$  with 9 and 8 degrees of freedom (respectively for regressions 1 and 2) and is significant at 0.1 percent or better.

The previous residence variable (RES65) demonstrates quite clearly that, regardless of sex, persons in agricultural areas are highly prone to move. Their destinations are likely to be large towns or cities (MUNI73) which are apt to possess a variety of opportunities for employment, education, marriage, entertainment, etc.

The most decisive factor for the decision to migrate appears to be the presence of kins at destination (KINS). Kinship facilitates a person's migration in a number of important ways. Relatives at destination can provide needed information and financial assistance for travel to those who are contemplating to move. They can ease the psychic costs or pains of moving away from relatives and friends at place of origin. And kins can make the adjustment process of the individual of destination more surmountable than otherwise. Moreover, migration from one place to another may simply represent the subsequent move of an individual family member to join other members of the family who had moved earlier ("chain migration"). It is important to note from above, however, that the migrant's propensity for a relatively small household implies that he or she does not necessarily live with non-immediate family members.

The importance of the kinship factor has been recognized by other studies, but it has been largely documented by aggregate data. For instance, Greenwood (1969 and 1970) has tested this factor for the U.S. by introducing a "migrant stock variable" (the number of persons born in  $i$  and living in  $j$  at the beginning of the migration interval) into his model. He finds that "indeed the past migration of relatives and friends is an important determinant of the distribution of present migrants, and

that when account is taken of past migration, the true (current) direct effects of distance are not nearly so great as they would otherwise seem" (Greenwood, 1975a:406).<sup>10</sup> However, inasmuch as such "migrant stock variable" can at best only indirectly reflect kinship ties, it does not come out as crucial to migration choice as the kinship factor does in the present study. A descriptive study on individual migration between certain towns in Cebu province (Central Visayas) and a valley in Davao Province (Southern

Mindanao) has previously stressed the importance of the kinship effect. (Simkins and Wernstedt, 1971).

<sup>10</sup> A similar attempt has been done for the Philippines using interregional migration data (de los Santos, 1976).

Regression 2 in Table 1 deletes MAR65, which does not appear significant in regression 1 and which is highly correlated with age, as mentioned earlier. The effect is to raise the significance of age for both males and females, with virtually no disturbance on the other coefficients. The test of significance for the regression equations is given by  $-2 \log \lambda$  (minus 2 log likelihood ratio) which indicates that all four equations are significant at the 0.1 percent level or better.<sup>11</sup>

Table 2 presents the results of household migration behavior analysis with the household head as the decision-maker. Age appears to be more constraining for male household heads than for all males, as was seen previously; for female heads the negative effect of age seems equally strong as for all females. Education is significant for both types of heads, and, as would be expected, more significant for the female head than for any female. The level of prior

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<sup>11</sup> The likelihood ratio,  $\lambda$ , is the ratio of the value of the likelihood function maximized under whatever constraints are embodied in the hypothesis being tested to the value maximized under no constraints except those implicit in the model. The test is done by maximizing the likelihood function with the coefficients set to zero and comparing the result with that of the function which has the estimated coefficients (unconstrained);  $-2$  times the difference is distributed asymptotically as Chi square with as many degrees of freedom as coefficients set to zero. See Nerlove and Press (1973:44-45), or Mood and Graybill (1963) for an extensive discussion of the likelihood ratio test.

occupation does not seem important for male heads who are not necessarily attracted to large cities (MUNI73) as are the regular male migrants. This implies that the positive education effect is not so much a preparation for the competitive urban centers as an information effect for opportunities outside those centers. Female heads are less prone to migrate the higher the occupations they are engaged in; but those who decide to move tend to go to urban centers where they are more likely to find some work and income (EXINC) than elsewhere.

The effect of household size is clearer with respect to household heads if we can assume that the household stays as a unit at origin and destination. On this basis, it appears that [large households have a lower propensity to move than small ones.] This understandably has something to do with the greater difficulty of uprooting a large household. But, household size is apparently less retardative on the movement of female-headed households because of the relative lack of female employment in agricultural areas (RES65), and, consequently, the greater need on the part of these women to move to large cities (MUNI73). With respect to male heads, RES65 indicates that they are not highly mobile out of the agricultural sector.

Table 2

Factors Affecting Household Choice to Migrate:  
Philippines, 1965-1973

| Variable         | Male Heads          | Female Heads         |
|------------------|---------------------|----------------------|
| AGE              | -0.032<br>(3.707)** | -0.019<br>(2.563)**  |
| EDUC             | 0.057<br>(3.758)**  | 0.032<br>(2.296)**   |
| OCC65            | 0.025<br>(1.341)    | -0.029<br>(1.520)    |
| HRSIZE           | -0.036<br>(1.680)   | -0.016<br>(0.826)    |
| EXING            | 0.073<br>(1.514)    | 0.117<br>(2.091)*    |
| KINS             | 0.815<br>(4.162)**  | 0.925<br>(7.036)**   |
| RES65            | -0.135<br>(0.969)   | -0.187<br>(1.502)    |
| MUNI73           | -0.011<br>(0.286)   | 0.124<br>(2.344)**   |
| Constant         | 0.291<br>(0.825)    | -1.264<br>(2.942)    |
| -2 log $\lambda$ | 70.932 <sup>#</sup> | 105.832 <sup>#</sup> |
| Observations     | 583                 | 560                  |

Note: Figures in parentheses are asymptotic t-ratios.

\*\* Significant at 1 percent level.

\* Significant at 5 percent level.

<sup>#</sup> Significant at 0.1 percent or better (8 degrees of freedom).

The positive influence of kinship on household migration stands out once again. It may be noted, however, that it appears less effective than for individual migrants because, as may be expected, the adjustment process for the household at destination is less difficult than for the individual.

Table 3 displays the results for persons who are single at the time the choice to move or stay is made. Interestingly, age has no effect for single men and only slightly negative for single women. Education remains significant for both, and occupation is significant only for the single men, not for women, as was the case for all males and females. A similar comment can be made concerning potential income (EXINC) which is more an incentive for male than for female migration. Single men and women also exhibit an aversion toward moving into large households, although kins at destination are very influential in the decision to move.

Surprisingly, single males do not show the tendency to move from the agricultural scene (RES65) to the cities (MUNI73). This may reflect the demand for their work in agriculture. On the other hand, single females show a