

A Study of Pattern of the Rural-Urban Migration

I. Introduction

MIGRATION (movement from one place to another) affects not only the size but also the composition of the population. It affects social, economic and demographic characteristics of the population in any specified territory. Migration has special significance for developing countries where it is associated with economic development in the context of a very rapid pace of population growth. In respect of India, where eighty percent of people still live in rural areas, Zachariah (1964) has rightly pointed out, 'it is generally assumed that the Indian population is comparatively immobile, but granting that the proportional movement is very insignificant, the absolute number involved in the internal movement has been large'. This highlights the importance of focusing attention on the nature of internal migration and its demographic impact.

A number of writers have proposed models for migration based on various sets of assumptions. In 1946 Zipf's formulated a simple mathematical model assuming that the number of migrants from one place to another is directly proportional to the product of the populations of origin and destination and is inversely proportional to the distance between them. In many studies the distance factor has been found to have a decreasing effect on the migration streams (Tarver and Leod, 1973; Levy

and Wadychi, 1973; Hangerstrand, 1957). Stouffer (1940) introduced the idea of 'intervening opportunities' and suggested that there might not exist a relationship between mobility and geographical distance, but the number of migrants would be directly proportional to the number of opportunities at the place of destination. Many attempts have been made to improve the explanatory power of Zipf's model. In this model, the migrants tend to be overestimated if the migratory distance is very small. TerHeide (1963) considered the inverse exponential of the square of the distance to avoid this limitation. Petersen-Greenwood (1969) considered the prior migration flow as an independent variable. Further, Tarver and Leod (1973) and others have showed that Zipf's model alongwith the variable 'previous migrants' is capable of predicting inter-state migration.

The objective of the present paper is to propose models for studying the nature of rural-urban migration. Models are based on the number of previous migrants to the place of destination and opportunities available, there. They also take into account the distance of the migratory places. The applicability and adequacy of the models are not claimed in respect of other study-areas and models. The independent variables we use are already used by others except for minor modifications in the definitions as required by the available data. However, to an extent, the explanatory power of Petersen-Greenwood hypothesis of prior migration, viz, the flow of migration in any period is a function of previous flow, is tested for the pattern of migration. Data used, has been collected in the Demographic Survey of Varanasi (Rural) 1969-70. Section II deals with models. The application of the models is presented in Section III where a short description of data is also given. The estimates of the parameters and discussion of the results are given in Section IV and conclusions are given at the end.

II. The Model

Models for describing the pattern of migration in a given period of time from a particular rural area to various places of destinations are derived in this section. Previous studies, point out that the number of migrants between two places is a decreasing function of the distance between them. It is an increasing function of the-number of opportunities and the number of previous migrants-at the place of destinations. Models

proposed previously and their improvements have a large number of independent variables and consequently large number of parameters. The estimation of these parameters requires many sets of observations and a large number of migratory places. It is, therefore, not possible to test the explanatory powers of these models with the help of a small number of migratory destinations from a particular place. Keeping these trends in view we present the following models.

Suppose that N persons migrate from a given rural area to n places in a given period of time. Let X_j be the number of previous migrants and O_j be the number of opportunities to the j -th place, $j=1, 2, \dots, n$. So the total number of opportunities at the disposal of migrant is $O = \sum_{j=1}^n O_j$. Let

$p_j = \frac{O_j}{O}$ and let $d_j = D_j / \sum_{j=1}^n D_j$ be the relative distance of the j -th place. Let

us assume that the migration from rural area follows one of the following patterns :

$$\text{I. } M_j = AX_j + BY_j$$

$$\text{II. } M_j = AX_j + B_e^{-Z_j}$$

$$\text{III. } M_j = X_j^A Y_j^B$$

where M_j is the number of migrants to the j -th place in the period under consideration; $Y_j = \frac{p_j}{d_j}$ and $Z_j = \frac{I}{Y_j}$; and A and B are the constants to be determined.

III. Application

Models are applied to data on the rural-urban migration collected in the Demographic Survey of Varanasi (Rural) 1969-70. For convenience a short description of the survey is given below :

The Demographic Survey of Varanasi (Rural) was conducted in the year 1969-70 by the staff of the Demographic Research Centre, Banaras Hindu

University. About 2200 households were selected following a two-stage stratified random sampling procedure from villages of Varanasi Tehsil. The data from the selected households were collected by personal interview method. The information on household structure, household facilities, migration, mortality and morbidity was obtained from each selected household in the sample. The migration record consisted of questions relating to present age, age at migration, year of migration, place of migration, occupation for each migrated person of the household. The information on migration could successfully be included by adopting a 'special definition' of a household.

In the survey, a household is defined as a group of persons who usually live together and take food from a common kitchen. It, however, included those who lived outside the village but claimed the household to be their own. Persons of this category work outside the village (mostly the rural areas of Varanasi) and often send remittances. Really speaking, such persons are the 'migrated persons' of the household. Because of this concept of household, only those migrants could be ascertained who were included in the household. Naturally, 'complete household migration' is not included. Fortunately, in Eastern U.P. such type of migration is rare and hence it does not pose any serious problem in the study. The details of the survey are given in Singh, Yadava and Bhaduri (1970).

It should, however, be noted that this study is concerned with the present status of migrants. Thus *return migration* has not been included. Data relating to each male and female migration was collected in the survey but because of a small number of female migrants, the present analysis deals with male migration only. Migrants, who are at the place of destination since birth and students migrated because of the presence of the member of household, are excluded from the present study.

Persons from the rural area of Varanasi Tehsil have migrated to many places. Though the number of migrants to places like Bombay and Calcutta is quite large, very few have migrated to other places. Consequently, to have significant number of observations for each place, the places have been considered in five groups only. These groups are :

- I. Varanasi
- II. U.P. (excluding Varanasi).

III. West Bengal

IV. Maharashtra

V. Others

The last group includes all those places for which the percentage of migrants is less than 5.

There were total of 7491 males in the sample at the time of survey (1969-70). Out of this 1068 males have migrated to different parts of the country. (Migrants since birth and student-dependent-migrants whose number is 147 are not included in this study). Thus the present analysis deals with 921 male migrants only. Most of the migrants visit their households from time to time and change their place of destination. The data, therefore, refer to the first migration date for the present place of the destination. The specific period, to which the models are applied, is from the year 1960 to 1969. Persons who have migrated before 1960, are treated as the previous migrants in the present study. Table 1 re-

TABLE 1—DISTRIBUTION OF MIGRANTS ACCORDING TO PLACE AND DATE OF MIGRATION

Date	Places						
	I	II	III	IV	V	N.A.	T
1960-69	150	106	109	147	72	2	586
1960	78	40	69	107	27	0	321
N.A.	5	1	3	1	1	3	14
T	233	147	181	255	100	5	921

presents the distribution of migrants according to the place of destination and the period of migration. Out of these 921 male migrants, 586 are in the current period, 1960-69, and 321 are the previous migrants. For 14 cases, information relating to date and place of migration is not available.

The measurement of opportunities at the place of destination is rather a very complex problem. Many authors have tried to measure this factor by taking into account the related variables such as per capita income, sex-ratio, percent employed, degree of urbanization, quality of dwelling etc. For convenience and due to inadequacy of data, we have taken the total urban population of those cities which have a population of 100,000 or more as opportunities at the place of destination, i.e., if U_j be the total population of all such cities in the j^{th} place then $O_j = U_j$ and accordingly

$$P_i = \frac{U_i}{\sum U_j}, S = \frac{U_i}{U_j}$$

Migrants have been distributed in various cities of a state and so the geographical distance is taken from the survey place to the respective capital of the states. M_i , the number of migrants in the current period 1960-69; X_j , the number of previous migrants; D_{ij} the geographical distance (in kilometre); U_j , the total urban population of above considered cities, and Y_j for different j are presented in Table 2.

TABLE 2—VALUES OF M_i , X_j , D_{ij} , U_j AND Y_j FOR DIFFERENT

Variable	Places				
	I	II	III	IV	V
M	150	106	109	147	72
X	78	40	69	107	27
$D(km.)$	18	255	700	1250	1100 ^a
U^c	4,19,864	4,66,980	4,82,886	7,25,092	2,09,37,456 ^b
Y	2.367	1.593	0.599	0.505	1.657

average distance of all the places which are included in this group. Total urban population of all the places included in this group. *c*: SOURCE: Data of the 1961 Census of India.

Estimation of Parameters and Discussion of Results

Models involve two parameters, A and B . The number of migrants is linearly related to X_j and Y_j in the model I. In the model II it is linearly related to X_j and exponentially to the inverse of Y_j and it is a product

function of X_i and Y_j in the model III. The following equations for the expected number of migrants to each place are obtained by least square method:

$$\text{I. } M_j = \hat{A} X_j + \hat{B} Y_j$$

$$\text{II. } M_j = \hat{A} X_j + \hat{B}_e^{-Z_j}, \text{ for } Z_j = \frac{1}{Y_j}; j = 1, 2, \dots, 5.$$

$$\text{III. } M_j = X_j^{\hat{A}} Y_j^{\hat{B}}$$

where A and B are estimates of A and B respectively. The standard errors of these estimated coefficients A and B are obtained from the vari-ance-covariance matrix. The contribution of the independent variables used in the model has been examined by the standard t test. The corresponding numerical values obtained from the available data are given in Table 3.

TABLE 3-ESTIMATES WITH THEIR STANDARD ERRORS OF THE PARAMETERS AND THE VALUES OF 't'-STATISTICS FOR DIFFERENT MODELS

<i>Model</i>	\hat{A}	\hat{B}	$\hat{\alpha}^2$	s.e. \hat{A}	s.e. \hat{B}	t for \hat{A} at 3 d.f.	t for \hat{B} at 3 d.f.
<i>I</i>	2	3	4	5	6	7	8
I	1.277	24.924	119.950	0.102	4.728	12.508	5.272
II	1.292	81.033	71.833	0.077	11.633	16.867	6.966
III ^d	1.149	0.408	0.017	0.011	0.216	110.452	1.889*

d: values corresponding to model III are obtained by using the logarithmic transformation. *; value is insignificant.

The column 7 of Table 3 indicates that the coefficients of X_i in these models are highly significant. Hence, the variable X_i seems to be the main determining factor of migration. The current and the previous migrants are significantly correlated, the value of the correlation coefficient being 0.887 ($t=3.33$, $d.f.=3$). The findings are consistent with the results of Levey and Wadycki (1973), Tarver Leod (1973) and Greenwood

(1973) who have showed that the previous migration is a very important variable to explain the migration streams. Thus the present findings confirm the hypothesis that the prior migration is the most important variable in the determination of current migration, especially, from a rural area. This may be due to the fact that the previous migrants work as motivators by supplying them food, shelter and other necessities in the initial stages.

The separate effects of distance and population (opportunities here) could not be explained in these models. However, the column 8 of Table 3 shows that influence of the second factor in each model is not very significant in accounting for the variability of rural-urban migration.

Conclusions

Three functions are utilized to examine the nature of migration from a rural area to urban places. The independent variables considered here are (i) previous migrants and (ii) distance of and opportunities at the migratory places. The first variable is highly related with the present migrants. Models proposed are very simple and may be useful in explaining the nature of migration from a particular rural area. They describe the data quite satisfactorily. Model II seems preferable because it is less affected by distance.

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References

1. Greenwood, Michael, J., An analysis of the determinants of geographic labour mobility in United States, *Review of Economics and Statistics*, 51, 189-194, 1969,
2. ___, The influence of family and friends on geographic labour mobility in less developed countries : the case of India, *Review of Regional Studies*, 1973, (forthcoming).

3. Hangerstrand, T., 'Migration and Area' in : David Hannerberg (ed.) Migration in Sweden ; A symposium Land Studies in Geography, Series B, 27-158, 1957.
4. Levy, M.B., and Wadycki, W. J., The influence of family and friends on Geographic Labour mobility, Review of Economics and Statistics, 55(2), 1973.
5. Petersen, William, Population, London, Macmillan Co., 1969,
6. Rao, G. D. Interstate migration in India., Sankhya series B, 35, 1973.
7. Singh, S.N., Yadava, R. C. and Bhaduri, T. A demographic survey of Varanasi (Rural) 1969-70, Prajna, Banaras Hindu University, 16(1), 176-89, 1970.
8. Stouffer, Samuel A., Intervening opportunities—A theory relating mobility and distance, American Sociological Review, 5, 845-867, 1940.
9. ____, Intervening opportunities and competing migrants, Journal of Regional Science, 2, 1-26, 1960.
10. Tarver, James D. and McLeod, R. Douglas, A test and modification of ZipF'S hypothesis for predicting inter-state migration, Demography 10, 259-275, 1973.
11. TerHeide, Migration models and their significance for population forecasts. Milbank Memorial Fund Quarterly, 41 (1), 56-76, 1963.
12. Zachariah, K.C., Historical Study of Internal Migration in the Indian Sub-Continent 1901-1931, Bombay, Asia Publishing House, 1964.
13. Zip F's, George $\frac{P_1 P_2}{D}$ K., The hypothesis. On the internal movement of persons, American Sociological Review, 11, 677-686, 1946.