K. Krishnakumari

Population Heterogeneity and Internal Migration

FROM the available literature, it appears that demographers have not so far evolved any comprehensive theory of human migration that fits well with the demographic processes. Most theoretical formulations on migration represent attempts at generalising empirical results. Ravenstein was the first to provide a theoretical basis to human migration (Bogue, 1969). His theories can be described as uniformities observed in empirical situations and cannot be considered as laws in the strict sense. After Ravensteiu, there was no attempt at formulating theories for a long interval of over 50 years. Zipf in 1946, and Stewart in 1942 attempted to draw upon physical settings to explain the movement of individuals. Their theories are labelled as gravitational (Kammeyer, 1972) as they treat human beings and their movements like objects and their motion on physical space. Inspired by Ravenstein's ideas, Stouffer came out with his theory of intervening opportunities in 1940. 'Intervening opportunities' being a relative concept it was later replaced by 'Intervening obstacles' by Stouffer himself.

There are also other studies similar to that of Stouffer which place heavy emphasis on the personal and psychological factors (Beshers, 1967). The unpredictable vagaries of human behaviour can keep any empirical generalisation far from reality. Attempts at generalisations based on the investigator's assessment of what the motivating factors are, have been the major snag in establishing a universal law of migration- If migration is to be explained as a demographic process on an aggregate basis, the generating forces are to be searched for, not in terms of personal motives, but in terms of physical, demographic, social, economic, political and cultural factors at the societal level. From this

poin to view, Lee's is perhaps the first major attempt, after Ravenstein's to bring the various aspects of migration into a coherent set of rules especially when it relates volume of migration to characteristics of migrants.

Of the several laws stated by Lee, the one relating volume of migration to heterogeneity of people is the most important. About this relationship, Lee states, "volume of migration varies with the diversity of people". While stating this law, Lee had clearly in mind the composition of the population, particularly of the ethnic composition, although he mentions educational and income differences as well.

This law considers the volume of migration as the dependent variable and the diversity of the composition of population as the independent factor. The latter can be viewed only in a collective context of the prevailing conditions in a spciety. However, the law is vague as to whether the diversity is a cause or a consequence of migration. In support, Lee (1966) holds that ethnic diversity has resulted because of large number of groups moving in to take up specialised work. But later on he also suggests that specialisation is the result of the diversity of population composition, which is occasioned by the requirement of Specialised persons. In fact, the relationship between diversity and migration is mutual. Migration increases diversity which, in turn, is a favourable condition for further migration. The law is general in the sense that it has relevance to spatial and temporal dimensions. The present paper is concerned with the testing of the validity of Lee's law in the Indian situation.

The, characteristics of a population are several and it is not possible to study the heterogeneity with respect to all the social, ethnical and cultural variables. In the present context, heterogeneity relates to three variables—occupation, education and religion. As per Lee's theory, we should expect a positive association between heterogeneity of population composition and volume of internal migration. But this rule, cannot be generalised for all situations. Socio-economic factors cannot be considered to have the same influence as ethnic factors on migration. To be more specific, ethnic factors could have a segregating tendency and hence will be a deterrent to in-migration.

Consider the case of an economic factor, say occupational heterogeneity, which is an index of the diversity of economic activity of a population and/or the potential for occupational opportunities in the community. Opportunities for employment enhance the volume of migration to an area. So it is possible to expect a positive association between occupational heterogeneity and volume of migration. But this need not always be true of other factors. For example, the educational level of a community can be said to provide individuals with equipment to secure an occupation. It may, therefore, be taken to describe

Varying opportunities available in the society, the level of equipment of the population for furtherance of prospects. So, it may for a given area generate[1] migration within and from outside the area. Hence, the greater the educational diversity greater would be the extent of migration in the community. But if educational progress precedes economic growth, the tendency would be to increase out-migration from such areas. If, on the other hand, the progress in education, is slow, may have only a negligible influence on migration. It is» therefore, possible that the relationship between educational heterogeneity and migration is curvilinear.

Religion, however, exercises a peculiar influence on people. Several studies (Toney, 1973) have shown that migrants choose as their place of destination, areas dominated by people of their own ethnicity. Such migration tends to generate certain residential patterns. Migrants are welcome if they belong to the same faith and are resisted if they do not. But in some situations, due to socio-economic affluence religion may not exert its hold over people, in such cases religious resistance may not be of significance. In the" former case, we would expect a negative correlation and in the latter, a positive correlation between volume of migration and religious heterogeneity. Combining the two, we will get a curvilinear relationship.

2. Data and Methods

The data for this study were taken from the Census of India, 1961. Information on total population, the number of migrants and the distribution of population by the different characteristics viz,, occupation, education and religion arc available in the census tables for 1961,

Diversity. Lieberson's diversity index is used for calculating heterogeneity in a population. If P_1 *(i = 1, 2* ... n) represents the proportion of persons in each subgroup such that *Pi* = 1.00, then Lieberson's index of diversity is D — 1 — *Pi* where p,? is the chance of picking up persons of the same characteristics if successive selections are made. The theoretical minimum for the index is zero, indicating perfect homogeneity and the maximum of 1 indicates that every individual of the community possesses a different characteristic.

Migration. Volume of migration at a place is considered under several conditions. Migrants in a population can be studied with respect to the place of origin or irrespective of it. The volume of migrants can be considered in terms of absolute numbers or in relation to the total population or the population "ex-

posed to the risk" of migration. Here, attempt is made to define volume of migration in the light of all these aspects.

The first index is defined as

$$\text{Index} \qquad A = \frac{M}{P} \times 100$$

where, M = Total number of Migrants in the population, and P = Population of the area. Here, migrant component of a given population is considered i.e., proportion of movers to the total population. 'M' has two components—those who have moved within the territory and those who have moved in from outside. Denoting them as M_w and M_i respectively we can define two indices for within region movement and in-migration.

$$\text{Index } A_1 \text{ (within region movement)} = \frac{M_w}{P} \times 100$$

where M_w = Migrants within the area, and P = Population of the area. Thus index A_1 measures the volume of migration generated and retained within the territorial unit.

$$\text{Index } A_2 \text{ (in-migration)} = \frac{M_i}{P} \times 100$$

where M_i = Migrants into the area, and P = Population of the area. Index A_2 measures the extent to which migrants have been attracted to an area, considering the area as a place of destination.

3. Heterogeneity

Heterogeneity scores of (he population composition with respect to occupation, education and religion and the different indices of migration for each State of India are shown in Table 1,

It can be observed from the table that the occupational heterogeneity scores range from 0.530 to 0.697 which is a very narrow band. This presents a picture of identical distribution in the States. It is a serious handicap for the study that the lower half and the upper quarter of the possible range are without a single state. The distribution of educational heterogeneity score also show the same pattern. The values clearly exhibit the lack of difference among the states and

TABLE 1—HETEROGENEITY SCORES AND THE VALUES OF THE VARIOUS MIGRATION INDICES FOR THE STATES **OF** INDIA, 1961

States	*Heterogeneity Scores*			*Migration Indices*		
	Occupation	*Edn.*	*Religion*	*A*	A_1	*At*
Andhra Pradesh	0.697	0,358	0.211	30.23	23.16	7.07
Assam	0.595	0.430	0.499	22.20	20-69	1.31
Bihar	0.596	0,314	0.267	28.48	25.22	3.26
Gujarat	0.597	0.470	0.201	29.88	25.95	3.93
Jammu and Kashmir	0,565	0.203	0.452	18.49	16.59	1.90
Kerala	0.537	0.601	0.553	23.42	19.00	4.42
Madhya Pradesh	C.653	0.297	0.116	31.84	25.33	6.51
Madras	0.652	0.477	0.186	26.64	18.33	S.31
Maharashtra	0.663	0.469	0.310	34.51	29.91	4.60
Mysore	0,633	0.404	0.228	27.61	26.23	1.38
Orissa	0.611	0.352	0.048	29.11	28.20	0.91
Punjab	0.534	0.402	0.481	28.27	25.69	2.58
Rajasthan	0.601	0.265	0.185	25.35	23.51	1.84
Uttar Pradesh	0.563	0.306	0.262	28.01	23.56	4-45
West Bengal	0-530	0.461	3.339	23.67	22-05	1.62

the uniformly limited progress achieved by the Indian States towards educational improvement. Most of the States are homogeneous as far as religious composition is concerned. As in the case of occupational heterogeneity the score values do not vary all along the possible range of 0 to 1. Apart from this it can be observed *that* the upper half of the range is without a single state. The only redeeming feature is that the distribution of the 15 states according to religious, heterogeneity scores do not present a clustering at the maximum or minimuin value observed. The states are distributed evenly over the range with more values near the mean,

4, Migration

The The migration indices A,A_1 and A_2 reflect the migrant component of the states.-Values of-Index *A* show that only a little more than the fourth of the 86,

population of the States are migrants. The highest value of 34.51 and the lowest of 18.49 show that the overall variation in the migrant component of the population is low and extreme differences between states do not exist. Values of Index A_1 show that a major part of the migrant component consists of intra-state movers. In the case of A_1 too, the variation is very limited. But states vary widely in the proportion of migrants residing in the States who have come from other states (Index A_2). Although on an average the proportion of in-migrants is very low in all cases.

5. Heterogeneity and Migration

The correlation between the values of the migrant component of the population of the states (Index *A)* and the heterogeneity scores with respect to occupation, education, and religion were found to be 0.595, 0.105 and-0.580 respectively. Of these the occupational and religious heterogeneity were found to be statistically correlated to volume of migration. The direction of the relationship migration has with religious heterogeneity is negative. These results do not establish definitely the hypothesis stated earlier.

The data were further analysed to study curvilinearity. It was fouud that in no case was the second degree curve a better representation. But a close study of the data showed the possibilities of curvilinear relationship. The small sample size and the narrow range within which the heterogeneity scores were clustered appeared to mask the curvilinear relationship. Hence the data were truncated at stages and the regression analysis was repeated to investigate the curvilinear relationship. The results are given in the following Table 2.

It can be observed from the above table that in the case of occupation positive regression was obtained throughout indicating a definite linear positive relationship between occupational heterogeneity and migrant component.

The regression analysis of educational heterogeneity shows the possibilities Of an inverted 'U' shaped curve. It can be seen that at lower values of educational heterogeneity the direction of the slope is positive and at higher values it is negative.

In the case of religion the results of the Table 2 show that the relationship is 'U' shaped with negative slope at low values and positive slope at higher values. The regression analysis truncating the data at various stages substantiate the hypothesis stated earlier. The small sample size has however been a handicap in establishing statistical significance at various stages.

Indices AI and A_z. The-migrant component *A* can be taken.as a sum,of two

TABLE 2—REGRESSION EQUATIONS RELATING MIGRATION INDEX *A, (Y)* AND THE THREE HETEROGENEITY (X) FOR VALUES ABOVE THE TRUNCATED POINTS

For Heterogeneity above	*Sample size*	*correlation*	*Regression equation*
For occupation			
0.65	4	+ 0.065	$Y = 22.944 + 11.6419 x$
0.60	7	+ 0.566*	$Y = 6.6950 + 55.8228 x$
0.55	12	+ 0.616*	$Y = + 11.7475 + 63.721 x$
0.50	15	+ 0.595*	$Y = +1.1407 + 47.053 x$
For education			
0.45	5	- 0.479	$Y = 46.3309 - 37.739 x$
0.40	8	- 0.207	$Y = 33.1910 - 13.283 x$
0.30	12	– 0.132	$Y = 33.0678 - 12.845 x$
0.20	15	+ 0.105	$Y = 25.6191 + 4.033 x$
For religion			
.4	4	+ 0.274	$Y = 10.197 + 25.990 x$
.3	6	- 0.524	$Y = 38.594 ~ 30.755 x$
.25	8	- 0.562	$Y = 35.511 -24.356 x$
.2	11	- 0.627	$y = 34.368 -21.898 x$
.15	13	– 0.521	$Y = 31.890 - 16.247 x$
.00	15	- 0.575*	$Y = 31.724 - 15.713 x$

'Significant at 5% level.

parts namely Index A_1 which measures the movement within the state and A_s which measures the movement from outside into the state. It is of interest to know whether the relationship observed in the case of A holds true for A_1 and A_1 also.

The correlation coefficients obtained in each case are shown in Table 3, AH values, excepting the correlation between occupational heterogeneity, with A^* are found to be statistically not significant. There is also no change in the

TABLE 3-CORRELATTON COEFFICIENTS BETWEEN MIGRATION INDICES A_1 AND A_2 AND THE THREE HETEROGENEITY SCORES

Migration Indices	*Characteristics*		
	Occupation	*Education*	*Religion*
$A1$	0.312	- 0.005	- 0.485
A_3	0.550*	0.195	- 0.234

*Significant at 5% level.

direction of the relationship except between education and A_1- Evidently the information available is not sufficient to establish the theory with respect to the migration factor A_I and A_2.

Hence further investigation was carried out to study curvilinear relationships and it was found that in no case was the relationship significant except between occupational heterogeneity and Index A_2.

The regression equations in the case of occupational heterogeneity generally showed that (see Table 4) it is positively correlated with both A_1 and A_z—in the

TABLE 4—REGRESSION EQUATIONS RELATING MIGRATION INDICES A_1 AND A_2 (Y), AND OCCUPATIONAL HETEROGENEITY FOR VALUES ABOVE THE TRUNCATED POINTS

For Heterogeneity above	*Sample size*	*Correlation*	*Regression Equation*
For Index A_1			
0.65	4	0.058	$y = 13.9672 + 15.320\ x$
0.60	7	-00.16	$Y = 26.1464 - 1.846\ x$
0.55	12	0.284	$Y = 7.4438 + 26.569\ x$
0.50	15	0.312	$Y = 9.8843 + 22.723\ x$
For Index A_2			
0.65	4	- 0.044	$Y = 9.093 - 3.7050\ x$
0.60	7	0.788*	$Y = - 43.5446 + 74.3390\ x$
0.55	12	0.622*	$y = - 19.2404 + 37.2310\ x$
0.50	15	0.550*	$Y = - 11.0399 + 24.3550\ x$

'Significant at 5% level,

latter case the correlation was statistically significant. This result clearly establishes that occupational heterogeneity and migration are directly related, with greater occupational heterogeneity the likelyhood of more persons moving into an area getting enhanced. This, to some extent, establishes the theory putforth earlier that migration enhances heterogeneity, which in turn tends to attract more migrants. In the case of educational heterogeneity, although the regression equations were not significant, the truncated data analysis with A_1 and A_2 indicate certain interesting results (see Table 5).

TABLE 5—REGRESSION EQUATIONS RELATING MIGRATION INDICES A_1 AND A_2 (Y), TO EDUCATIONAL HETEROGENEITY (X) FOR VALUES ABOVE THE TRUNCATED POINTS

For Heterogeneity above	*Sample size*	*Correlation*	*Regression equation*
For Index A_1			
0.45	5	− 0.486	$Y =$ 42.8933 − 40.043x
0.40	8	− 0.458	$Y =$ 37.1876 − 29.527x
0.30	12	− 0.407	$Y =$ 31.2834 − 17.331x
0.20	15	− 0.005	$Y =$ 23.6608 − 0.257x
For Index A_2			
0.45	5	0.057	$Y =$ 3.4346 + 2.303x
0.40	8	0.440	$Y =$ − 3.9961 + 16.245x
0.30	12	0.162	$Y =$ 1.7845 + 4.486x
0.20	15	0.195	$Y =$ 3.3823 + 0.612x

The negative regression coefficients obtained in the case of A_1 (see Table) shows that greater educational heterogeneity actually hampers migration within the states, while the positive relationship with A_2 can be interpreted as educational heterogeneity of an area promoting migration into it from outside.

The results of the analysis for religious heterogeneity are also similar to those obtained in the case of education (see Table 6) although the regression coefficients are not significant in both A_1 and A_2. So it would be inferred that the relationship between migration and religious heterogeneity is different from what Lee has putforth as a general proposition. Extreme religious uniformity as well as extreme religious diversity are both conducive towards attracting migrants.

TABLE 6—REGRESSION EQUATIONS RELATING MIGRATION INDICES A_1 AND A_2 (Y), TO RELIGIOUS HETEROGENEITY (X), FOR VALUES ABOVE THE TRUNCATED POINTS

Heterogeneity above	*Sample size*	*Correlation*	*Regression equations*
For Index A_1			
0.40	4	0.018	$Y = 19.643 + 1.710x$
0.30	6	− 0.596	$Y = 35.552 - 30.498x$
0.25	8	− 0.567	$Y = 31.100 - 20.896x$
0.20	11	− 0.582	$Y = 29.360 - 17.069x$
0.15	13	− 0.461	$Y = 26.334 - 10.172x$
0.00	15	− 0.485	$Y = 27.064 - 12.112x$
For Index A_2			
0.40	4	0.800	$Y = 9.446 + 24.280x$
0.30	6	− 0.042	$Y = 3.042 - 0.616x$
0.25	8	− 0.298	$Y = 4.411 - 3.460x$
0.20	11	− 0.350	$Y = 5.007 - 4.829x$
0.15	13	− 0.366	$Y = 5.555 - 6.075x$
0.00	15	− 0.234	$Y = 4.661 - 3.601x$

6. Heterogeneity (combined effect)

Index A. In this section the combined effect of the three variables on migration is investigated. The correlation (see Table 7) shows that the maximum correlation is to be found between religious and occupational heterogeneity (i.e.

TABLE 7—PARTIAL CORRELATION AND SIMPLE CORRELATION COEFFICIENTS AMONG THE THREE HETEROGENEITY VARIABLES TWO AT A TIME

$r_{ER \cdot O^*} = 0.324$	$r_{ER} = 0.325$
$r_{OR \cdot E} = 0.607$	$r_{OR} = -0.607$
$r_{OE \cdot R} = 0.114$	$r_{OE} = -0.114$

*E—Education R—Religion O—Occupation

—0.607) and the minimum is between educational and occupational heteroge"-neity (-0.114). ,

The latter result is surprising as ordinarily one would expect a positive high correlation between occupational and educational heterogeneity. It is very likely that the variations in religious heterogeneity is obscuring the relationship between occupational and educational heterogeneity. Earlier it was found that migration is greater in those States where religious homogeneity was greater. The partial correlation (see Table 7) coefficient between occupation and education; after eliminating the effect of religion, shows a positive correlation as could.be expected. So religious composition appears to be a strong factor that is closely related to occupational and educational composition of the states. The positive correlation shows that greater educational heterogeneity will result in greater diversification of occupations within a state.

The multiple correlation was found to be 0.709. The multiple regression equation relating migration to the three heterogeneity scores was obtained as

$$Y = 9.47 - 12.50x_1 + 11.63x_2 + 27.94x_3,$$

where y is migration Index *A* and X_1, X_2 and X_3 are the three heterogeneity variables.

The partial regression coefficients also show that only religious heterogeneity has a negative influence on migration. The maximum percentage of variation in migration (34.5%) was explained by occupational heterogeneity and the variation becomes higher when the joint influence of religious and occupational heterogeneity on migration was considered. Hence it can be said that the religious as well as the occupational heterogeneity has been of greater importance in deciding the migrant component in Indian States during 1951-61 than educational heterogeneity.

. *Index A_1 and A_z.* The multiple correlations of the three heterogeneity scores for A_1 and A_z were found to be 0.511 and 0.614 respectively which were not significant and explained only 26.1% and 37% of the variation.

In the case of A_1 the multiple regression again suggests the negative influence of religion on migration. The maximum weight from the religious heterogeneity has a depressing effect on internal movement within the states. The results clearly show that internal movement within the states have been low when religious heterogeneity is high.

With respect to A_2 the multiple regression equation

$$Y = 15.34 + 0.90x_1 + 4.47x_2 + 27.55x_3,$$

shows that all the three variables have a positive influence on migration. As in the case of *A*, here also the maximum influence is exerted by occupational heterogeneity which explained 30.2% of variation of migration. The explained variation became greater when the joint influence of educational and occupational heterogeneity on migration was measured (32.0%). Thus religious heterogeneity could only be placed as the third variable. So, A_2 also shows that occupational and educational heterogeneity had greater influence than religion in shaping the flow of migrants from outside the states.

7. Conclusions

In the attempt at connecting societal level factors to migration, Lee has succeeded in giving a general theory. According to him there is a direct relationship between migration and composition of population viewed in terms of its heterogeneity. This study has shown that the theory can be accepted only with certain modifications when different characteristics are considered. It is shown here that while occupation has a linear relationship to migration, education has a relationship that is an inverted 'U' shaped and religion has a 'U' shaped relationship. Of the three factors studied here, occupation had turned out to be the most important factor in explaining the variation in migrant component of a population. In short, in spite of the limitations of the data, the study lends some support to Lee's theory.

Acknowledgements

This article is part of her Ph. D. thesis submitted to the University of Kerala and carried out under the guidance of Dr. R. Ramakumar, Professor and Head of the Department of Demography. The author acknowledges with gratitude his helpful and critical comments in preparing this paper.

References

1. **Beshers, J. M.,** 1967, *Population Process in Social System,* The Free Press, New York.
2. Bogue, D. L., 1969, *Migration Internal and International. Principle of Demography,* John Wiley and Sons, Inc., New York.
3. Kammeyer, K. C, 1972, *An Introduction to Population,* Inter Text Book, London.
4. Lee, Everett, S., 1966, A theory of migration, *Demography,* 3, 47-57.
5. Lieberson, S., 1969, Measure of population diversity, *American Sociological Review,* **34,** 850-862.
6. Stewart, J. Q-, 1942, A measure of the influx of population at a distance, *Sociometry,* V.
7. Stouffer, S. A., 1940, Intervening opportunities—A theory relating mobility and distance. *American Sociological Review,* 845-867.

8. Stouffer, S) A, 1960, Intervening opportunities and competing migrants, *Journal) Regional Science*, 2,1-26.
9. Toney.lM. B., 1973, Religious perference and migration, *International Migration Review*, 7,281-288.
10. Zipf, G. K., 1946, The $P_1 P_2 /D$ Hypothesis. The case of Railway. *Journal of Psychology* XXII, 3-8.
11. ___, 1946, The P_1P_2/D.Hypothesis: On the intercity movement of persons, *Sociological Review*, X I 677-685.