PARAMETRIC ESTIMATION OF INFLATED TYPE MIGRATION MODEL

HIMANSHU PANDEY*

ASHIVANI KUMAR YADAV*

RAJENDRA TIWARI*

ABSTRACT

An attempt is made to estimate the parameter of inflated type migration model with help of the method of moments and maximum likelihood estimation techniques. Through estimated values of the parameter draw some conclusion regarding the migration problern the data collected from the different survey in the India.

Key Words:- Geeta Distribution, Risk of Migration, Household, Probability Model, Method of Moment, MLE, Migrants

* DEPARTMENT OF MATHEMATICS AND STATISTICS, D.D.U. GORAKHPUR UNIVERSITY, GORAKHPUR (U.P.) INDIA.

1-INTRODUCTION:-

Estimation theory is a branch of statistics and single processing that deals which estimating the values of parameter based on measured empirical data that has. a random component. The parameters describe an underlying physical setting in such a way that their value effects the distribution of the measured data. An estimator attempts to approximate the unknown parameters using the measurements for the future predictions. For any probabilistic model the parameter estimation is play very key role for the conclusion and interoperation of the results. Migration is a complex phenomenon involving a number of social economic cultural, political and behavioural factors. To studies in relation to nature and behaviour of these components have always been handled with great interest, because the development of a country, to a great extant depends upon them. Migration, especially in the process of the regional economic development urbanization and industrialization is an important cause and the effect of social and economic change. Recognition of this fact is evident is developed and under developed countries alike. Policy makes have becomes increasingly aware of the role of migration in balance economic growth and innumerable social, psychological, ecological and political ramifications of present and projected patterns of population ratifications of present and projected patterns of populations redistribution.

The main objective of this paper to estimate the problem of the inflated type migration model and draw the conclusion on basis of estimated value of the parameter involve in the model.

2. PROPOSED MODEL

Let X denote the random number of rural out-migration from a household. The inflated probability model for describing the variation in the number of the single male migrants from the rural areas has been obtained on the basis of the following assumptions.

(1) Suppose α the probability that a household exposed to the risk of migration at the survey point and (1-α) be the probability that a household is not exposed to the risk of migration.

(2) It is observed from the survey that the probability of k males migrating from a household is more than the probability of (K+1) males migrating from a household, K= 1,2,3,..........

.These the probability is a decreasing function of K. is assumed to follow geeta distribution [Consul (1990) with parameters θ and β.

From the assumptions (İ) and (İİ) with the help of Jahnsan and Kotz (1969), the inflated from the distribution becomes:

$$P = [x = 0] = 1\text{-}\alpha$$

$$P [X = K] = \alpha\frac{1}{\beta(K-1)}(K^{\beta K-1})\theta^{K}(1-\theta)^{\beta K-K} \qquad K=1,2,3,... \quad (2.1)$$

$$0 > \theta > 1; \quad 1 < \beta < \theta^{-1}$$

Where α be the risk of migration.

3. ESTIMATION:

Three parameter α, β and θ have involves in the probability model (2.1) . These three parameters are estimated from the observed distribution of out-migrants from households. The following two estimations techniques are used to estimate the parameters.

METHOD OF MOMENTS:

The parameter α, β and θ are estimated by equating zeroth and first cell theoretical frequencies of the respective cells and theoretical mean equal to observed mean as follows:

$$1\text{-}\alpha = \frac{f_0}{f} \qquad (3.1)$$

$$\alpha(1-\theta)^{\beta-1} = \frac{f_1}{f} \qquad (3.2)$$

$$\alpha(1\text{-}\theta)(1-\beta\theta)^{-1} = \overline{x} \qquad (3.3)$$

Where f_0 = Number of observed growth cell.

f_1 = Number observed first cell

f_2 = Total number of observation

$\overline{x}$ = Observed mean of the distribution

The expected frequencies of the corresponding cells or obtained after gating the estimated values of the parameters by using above expressions (3.1),(3.2),(3.3).

METHOD OF MAXIMUM LIKELIHOOD

Since α, β and θ can not be estimated simultaneously by the method, so the value of β has been taken from the method of moments.

Let X be a random variable from a sample of f observation with the probability function (2.1) where f_0 denote the number of observation in zeroth cell, f_1 denote the number of observation in first cell and f denote the total number of observation. Then the likelihood function for the given sample can be expressed as:

$$L\ (1-\alpha)^{f_0}[\alpha(1-\theta)^{\beta-1}]f_1[\alpha\{1-(1-\theta)^{\beta-1}\}]^{f-f_0-f_1} \qquad (3.4)$$

Expression For logarithm of likelihood function is

$$\text{Log } L = f_0 \log(1\text{-}\alpha) + f_1\log[\alpha(1-\theta)^{\beta-1}] + (f\text{-}f_0\text{-}f_1)\log[1\text{-}(1-\theta)^{\beta-1}\}]$$
(3.5)

Partialy differentiating (3.5) with respecet to α and θ respectively and equating to zero, we get the following equations

$$\frac{\partial}{\partial x}\log L = \frac{f_0}{(1-\alpha)} + \frac{f_1}{\alpha} + \frac{(f-f_0-f_1)}{\alpha}$$

$$= \frac{-f_0}{(1-\alpha)} + \frac{f-f_0}{\alpha}$$

$$= o \qquad (3.6)$$

And

$$\frac{\partial}{\partial\theta}\log L = \frac{-f_1(\beta-1)}{(1-\theta)} + \frac{(f-f_0-f_1)(\beta-1)(1-\theta)^{\beta-2}}{\{1-(1-\theta)^{\beta-1}\}} \qquad (3.7)$$

By solving the equation (3.6)and (3.7) we get the following estimate valuations.

$$\alpha = \frac{f-f_0}{f} \qquad (3.8)$$

$$\text{and } (1-\theta)^{\beta-1} = \frac{f_1}{f-f_o} \qquad (3.9)$$

APPLICATION:

The proposed model(2.1) has been applied to the date for single male out-migrants at house hold level taken from the survey :RDPG- a sample survey (1978)". Conducted by the centre of population studies Varanasi (India). The observed and expected frequencies of the household according to male migrants are given in table 1 to table 3. The estimated value of the risk of migrations under the proposed model (2.1) are 0.1111, 0.2319 and 0.1913 respectively for "Semi Urban",: Remote" and "Growth Centre (o.1913) and Semi Urban (0.1111). From the Table 3 to found the risk of migration α is greater in the middle class people (economic status) than Middle class people (caste wise).

From the above tables we also conclude that the value of χ^2 is in significant for the set of migration data at 5% level of significance. This shows that the proposed model describe satisfactorily well to the rural out-migration. Thus the present model may be taken as useful tool in calculating the various probabilities of migrants connected with process of migration from a household and also for prediction in a specified population.

TABLE -1

Observed and Expected Distribution of Household according to Male Migrants aged fifteen years and above in semi-urban type of villages, remote type of villages & Growth centre type of villages.

Number of out migrant	Type of Villages					
	Semi-urban type of villages		Remote type of village		Growth Centre type of Villages	
	Observed	Expected Method of Moment	Observed	Expected Method of Moment	Observed	Expected Method of Moment
0	1032	1032.01	871	871.0	972	972.06
1	95	96.8	176	175.80	154	164.1
2	19	19.2	59	59.20	47	38.7
3	10	19.8	18	16.45	18	14.3
4	2	} 6.19	6	4.50	9	} 12.84
5	2		4	} 7.50	1	
6	0		0		0	
7	1		0		0	
8	0		0		1	
Total	1161	1161	1134	1134	1202	1202

$\hat{\alpha}$=	0.1111	0.2319	0.1913
$\hat{\theta}$=	0.1598	0.0578	0.424
$\hat{\beta}$=	2.65	4.34	8.87
χ^2=	1.77	2.64	3.63
d.f.	1	1	1

TABLE -2

Observed and Expected Distribution of Household according to Male Migrants aged fifteen years and above in semi-urban type of villages, remote type of villages & Growth centre type of villages.

Number of out migrant	Type of Villages					
	Semi-urban type of villages		Remote type of village		Growth Centre type of Villages	
	Observed	Expected Method of Maximum Likelihood	Observed	Expected Method of Maximum Likelihood	Observed	Expected Method of Maximum Likelihood
0	1032	1032.01	871	871.00	972	972.6
1	95	94.99	176	176.00	154	153.95
2	19	19.53	59	58.10	47	40.32
3	10	7.24	18	17.87	18	16.51
4	2 }		6	5.40	9 }	
5	2 }		4 }		1 }	
6	0 }	7.23	0 }	5.43	0 }	19.16
7	1 }		0 }		0 }	
8	0 }		0 }		1 }	
Total	1161	1161	1134	1134	1202	1202

	Semi-urban	Remote	Growth Centre
$\hat{\alpha}=$	0.1111	0.2319	0.1913
$\hat{\theta}=$	0.1692	0.0589	0.497
$\hat{\beta}=$	-----	-----	----
$\chi^2=$	1.7544	2.631	4.7164
d.f.	2	2	2

TABLE -3

Observed and Expected Distribution of Household according to Male Migrants aged fifteen years and above in middle class people (cost wise & economic status).

Number of out-migrants	Type of Villages					
	Middle Class people (Cost wise)			Middle Class people (Economic status)		
	Observed	Expected: Method of Moment	Expected: Method of Maximum likelihood	Observed	Expected: Method of Moment	Expected: Method of Maximum likelihood
0	802	801.07	801.97	691	690.97	690.97
1	118	123.4	117.99	100	105.7	100.00
2	32	26.0	27.44	28	23.4	24.79
3	9	8.5	9.94	10	7.9	9.38
4	3			5		
5	2			0		
6	0	6.13	8.66	0	6.03	8.66
7	0			0		
8	0			0		
Total	**966**	**966**	**966**	**834**	**834**	**834**

$\hat{\alpha}$=	0.11698	0.1698	0.1715	0.1715
$\hat{\theta}$=	0.318	0.0367	0.154	0.0182
$\hat{\beta}$=	9.81	-----	20.48	----
χ^2=	1.86	2.395	1.94	2.1383
d.f.	1	2	1	2

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