Multidisciplinary

Rural-urban migration and social mobility in Bangladesh: an empirical study using stochastic process

Samira Salam[1*], Md. Abul Kalam Azad[2] and Rehena Parveen[3]

[1] Department of Basic Science, Primeasia University, Banani, Dhaka, Bangladesh

[2] Government BL College, Khulna, Bangladesh

[3] Department of Statistics, Bangabadhu Sheikh Mujibur Rahman Science and Technology University, Gopalgonj, Bangladesh

Correspondence Author: Samira Salam

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Abstract

This paper aims to measure social mobility in terms of income and occupation by using stochastic process due to rural-urban migration. The data for this analysis were retrospective data gathered using three-stage cluster sampling in Rajshahi City corporation in Bangladesh. The Markov Chain Model detected substantial shifts in the distribution of the lowest income class of migrants < BDT 5000, and migrants had a clear tendency to shift to the higher and especially to the highest income category > BDT 30,000. So, it is evident that rural-urban migration's social mobility is remarkable in terms of income. After 13 years of migration, social mobility entered the equilibrium of their desired status in terms of income. The average stay period is the longest in the highest income group, and comparatively longer in the higher income groups than in the lower income groups, suggesting that rural-urban social mobility is remarkable in terms of income due to rural-urban migration. The Bartholomew and Prais indices suggest that there is high degree of income mobility in rural-urban migration. Because of rural-urban migration, occupational social mobility is also surprising. After 9 years of migration, occupational social mobility reached equilibrium with their own agreements. Occupational status as service has a high tendency to adapt to that status and occupational status as labor has the lowest tendency to adapt to that status. Service is the longest stay period in the same occupation status, and the lowest stay period in the same occupation status is labor The Bartholomew and Prais indices show that there is a high degree of occupation mobility in rural-urban migration.

Keywords: rural-urban migration, stochastic process, occupational social mobility, economic social mobility, equilibrium, Bangladesh

1. Introduction

Migration is characterized as people's geographical move across a given boundary to create a new permanent or semi-permanent residence. Migrants usually move from less developed places of origin to more developed destination locations with the expectation of a better socioeconomic status. (Akhter and Bauer, 2014; Biswas *et al*., 2019; Ma *et al*., 2019; Nahar, 2020) [1, 5, 23, 30]. Interspatial rural-urban migration is an important indicator of regional economic, employment, living standards, health and educational inequalities (Hakim and Boz, 2019; Istiaque and Mahmud, 2011; Wang and Fu, 2019; Young, 2013) [18, 21, 43, 45]. This inequality can be explained by the large productivity and wage gaps between rural and urban workers (Gollin *et al*., 2014; Young, 2013) [15, 45]. In an economically developing country this kind of inequality is a common feature. This disparity stems from the disproportionate concentration of properties, resources, economic activities, purchasing power and various services opportunities in urban areas, as well as the continued abandonment and degradation of rural socioeconomic environments (Akhter and Bauer, 2014; Ma *et al*., 2019) [1, 23]. In developing countries, migration of rural people out of agriculture to find better socioeconomic status and then take advantage of employment opportunities in urban areas has thus become a natural process (Biswas *et al*., 2019; Galeano and Gerber, 2023; Rashid, 2013; Young, 2013;) [5, 14, 34, 45]. As a result, microeconomic migration models considered migration as a human capital investment (Sjaastad, 1962; Todaro and Maruszko, 1987) [38. 40]. Migration's economic gain aspect is the anticipated wage difference, and its non-market advantages are greater access to health, education, and residential facilities. Therefore, rural people migrate to urban areas to pursue perceived or actual opportunities in urban centers created to boost their socioeconomic status as a consequence of rural-urban wealth inequality (Madu, 2006; Young, 2013) [25, 45].

Social mobility describes the transition or passage opportunities between various social classes, and the benefits and drawbacks associated with include employment opportunities, job security, prospects for advancement etc. Social mobility concerns the changes in social status from one time period or generation to another. It is vital for three key reasons: (i) equality of opportunity is an aspiration across the political spectrum; (ii) economic performance depends on making the best use of everyone's talents; and (iii) social mobility and integration can be more likely to be achieved where people feel they can enhance the quality of life they and their children enjoy through their ability to work. Measures of social mobility due to migration investigate the relationship of socioeconomic status between the places of origin and the places of destination. These measurements have recently been recognized as a challenging problem. Research show that the well-being rates associated with income distributions at certain regional points are highly dependent on the populations' interspatial migration (Chakravarty *et al*., 1985; Chakravarty *et*

al., 2017; Coletti and Pasini, 2023; Dardanoni, 1993; Fields, 2010; Markandya, 1984; Maasoumi and Zandvakilli, 1986) [8-11, 13, 24, 27]. Interspatial migration is one type of investment that can impact social status, by expanding networks, by gaining education or training, and by promoting the search for a better work and living environment. From an economic perspective, social mobility can be characterized with key question: how easily can individuals move up the occupation ladder to access jobs in accordance with their potential? This research aimed at examining mobility of interspatial internal migrants, using a Markov method, between different income states and different occupation states. Urban areas seem to be the land of opportunity where everyone can improve their socio-economic status irrespective of their skills and abilities. However, this description may not always be merited. This study aimed at evaluating the nature of social mobility due to rural-urban migration in terms of income and occupation.

The social mobility can be measured using two main methods. The first approach is to estimate income elasticity and the second method is based on the building of Markov Model, where mobility is measured in terms of the probability of migrants having better or worse post-migration socio-economic conditions compared to pre-migration conditions. Since estimates of social mobility for rural-urban migration from the first approach may pose difficulties in their interpretation, we adopt the second approach to social mobility analysis due to interspatial migration. As with many other natural and social science processes, we believe that social mobility can be completely expressed by Markov matrices, whose elements are transition probabilities (Brtholomew, 1973) [3]. Measurement of socio-economic mobility using transition matrices between states has been widely discussed in literatures (Atkinson *et al*., 1992; Bartholomew, 1973; Bibby, 1975; Dardanoni, 1995; Gottschalk and Spolaore, 2002; Markandya, 1982, 1984; Shorrocks, 1978; Tsui, 2009) [1-4, 16, 26, 27, 37, 41]. A transition matrix is a square matrix which describes the individual probabilities of moving within a dynamic system from one state to another. Given the lack of consensus on the definition of mobility, mobility measures have increasingly been applied to empirical data to explain the dynamics of the mobility of socioeconomic status. Thus, the aim of this study is to measure rural-urban migrants' social mobility using transition probability matrices.

2. Methods and methodology

2.1 Methods of data collection

The present study was carried out using retrospective data on income and occupation at the time of pre-migration and one year of post-migration relating to the same individuals. The study was conducted at Rajshahi city corporation. Rajshahi city corporation, located on the north bank of the Padma River, near the Bangladesh-India border, a major urban, commercial and educational center of Bangladesh. The target population for the study were the migrants who moved to the city from the rural places of Bangladesh in the hope of a better life. With a three-stage cluster sampling technique, at the first stage, one city corporation out of 12 was randomly selected. Rajshahi city corporation, selected at the first stage, has 37 administrative units called “Ward” (smallest administrative urban geographic unit comprising of mahallas and having ward council institution), of which three administrative units in the second stage were randomly selected. Each Ward is again divided into smallest administrative unit called “Mohalla” (lowest urban geographic unit having identifiable boundaries). At the third stage, one Mohalla from each selected “Ward” was selected randomly. With face-to-face interviews, and a structured questionnaire all the migrants’ households of the selected Wards were surveyed to gather data on socioeconomic status just before migration and immediate after one year of migration. In total, 480 migrants’ households were identified by using snowball sampling technique. The data were analyzed by using IBM SPSS Statistics 23 software.

2.2 Methodology for measuring of social mobility of migrants using stochastic process

2.2.1 Markov chain

By its very nature, social mobility mainly concerns the time path of the distribution of social status among identified individuals in a given society. Therefore, much of the literature on measurement of social mobility uses stochastic process in modeling the generation of these time paths. These studies are typically performed either in intragenerational contexts through longitudinal or retrospective data for the same person, or in intergenerational contexts where the emphasis is more on the relationship between the parents' income and their offspring. This study is based on intragenerational contexts through retrospective data for the same person.

Human societies are often stratified into groups based on issues such as income, education, social status or place of residence. Members of these communities pass in what sometimes seems to be a haphazard fashion from one class to the next. An individual has some degree of choice in a free society over changing his job or starting a new job. By its very nature, social mobility is primarily concerned with the time path of the income distribution among identified individuals in a given society. In these situations, the inherent uncertainty of individual activities means that the future behavior of the mobility phenomenon cannot be predicted with certainty but only in terms of probability. The most popular method to cope with such problems is the Markov chain model of mobility where the transitions across individuals are independent. The essential primitive of this model is the transition (mobility) matrix of the chain, $P = [p_{ij}] \epsilon R^{k \times k}$ where p_{ij} stands for the probability of moving to social state j from social state i within a unit interval of time. Of course, $\sum_{j=1}^{k} p_{ij} = 1$ and k is the number of social states. A Markov chain is a random process represented by a physical system, which occupies one of a finite number of states at any given time (t=1,2,3 .....). The transition probability matrix P contains independent lines which sum up to one. A remarkable characteristic of Markov chains is that they are lack of memory—the next state of the system depends only on the current state, not any prior states.

2.2.2 Stationery and equilibrium distributions

Let $\pi^{(0)}$ be the row vector of probabilities of the k initial states at time 0, indicating the probability of an individual to belong to a particular state i at the starting point of the Markov process. The probability to belong any of the states at time 1 is described by the Markov process of order 1 as being given by $\pi^{(1)}$. By the definition of transition probability matrix, the relation between $\pi^{(0)}$ and $\pi^{(1)}$ is given by

$$\pi^{(1)} = \pi^{(0)}P$$

The Stationary assumption for a Markov process says that P is time invariant and thus the distribution of π at time t:

$$\pi^{(t)} = \pi^{(0)}P^t$$

The stationary distribution $\pi^* = (\pi_!^*, \dots\dots\dots, \pi_k^*)^*$ is a row vector of non-negative elements which sum up to 1 such that

$$\pi^* = \pi^* P$$

Thus, once a Markov chain has reached a distribution π^* such that $\pi^* = \pi^* P$, it will stay there. If $\pi^* = \pi^* P$, we say that the distribution π^* is an equilibrium distribution.

If the Markov chain is irreducible (it is possible to get to any state from any state) and aperiodic (an individual returns to state i can occur at irregular times), then there is a unique stationary distribution π^*, that is

$$\lim_{t\to\infty} P^t = \begin{pmatrix} \pi_1^* & \dots\dots\dots & \pi_k^* \\ \cdot\cdot & \dots\dots\dots & \cdot\cdot \\ \pi_1^* & \dots\dots\dots & \pi_k^* \end{pmatrix}$$

2.2.3 Average time spent in a social class

There is perfect immobility if a family always stays in the same class. This would correspond to P = I. The more mobile is a family, the shorter the period it would stay in the same class.

The average time is given by

$$1 + p_{ii} + p_{ii}^2 + \cdots = \frac{1}{1 - p_{ii}},$$

with standard deviation:

$$\frac{\sqrt{p_{ii}}}{1 - p_{ii}}$$

In a perfectly mobile society, the probability of entering a social class should be independent of the origin. The matrix P representing perfect mobility has all the elements in each column equal (each row in the notations of Prais).

2.2.4 Mobility indices

Bartholomew (1973; 1982) defined the mobility index as:

$$D_1(P) = \frac{k - k\sum_{j=1}^{k} \pi_i^* p_{ii}}{k - 1}$$

$$D_2(P) = \frac{1}{k-1} \sum_{i=1}^{k} \pi_i^* \sum_{j=1}^{k} p_{ij} |i - j|$$

A mobility index was later given the name of the Prais, certainly by Shorrocks (1978) and is expressed as:

$$M_p = \frac{k - tr(P)}{k - 1}$$

This M_p can be rewritten as:

$$M_p = \sum_i \frac{1 - p_{ii}}{k} - 1$$

3. Results and discussions

3.1 Background profiles of the selected individuals

The descriptive statistics provide some detail about the migrants' reasons for migration and living and working conditions, both at the place of origin and at the place of destination. Demographic characteristics, socioeconomic status, and personality traits make some people more likely to migrate than others (Nauman *et al*., 2015; Guest, 2003) [3, 17]. Table 1 reflects the migrants' descriptive statistics. Approximately 7 percent of migrants were under 30 years of age, about 31.5 percent were 40~49 years of age group, and about 16.3 percent were 60 years of age and older at the time of survey. The respondents' mean age was 45.2 years, with standard deviation (s.d.) 12.2 years. About 32.2 percent of migrants had less than 10 years of schooling, about 33.3 percent were Masters (17 + years of schooling), and about 20.2 percent were Bachelor's. The average school years for the migrants is 12 school years with s.d. 5.7 years of education showing a substantial proportion of migrants had higher education. In rural areas, there are no or few options for suitable employment for higher educated people. Agriculture and small business are the most common employment available in rural areas. Higher educated people are not interested in taking up farming or small business as their profession. Equivalent job opportunities in Bangladesh vary between rural and urban areas. Discrepancies in total productivity factor are responsible for differences across countries in equal work opportunities and per capita income. (Caselli, 2005; Hall and Jones, 1999) [7, 19]. Studies have found that misallocation of production factors within an economy across regions can cause these differences in overall productivity (Hsieh and Klenow, 2009; Restuccia and Rogerson, 2008) [20, 35]. An uneconomical distribution of workers across regions is the most significant cause of misallocation (Bryan and Morten, 2015; McMillan and Rodrik, 2011; Restuccia *et al*., 2008; Vollrath, 2009;) [6, 35, 42]. Thus, people with higher education and skills have a greater tendency to move to urban areas to look for perceived or actual desirable job opportunities. Fortunately, moving rural people out of agriculture to find employment in urban areas is a major ingredient in the development process, particularly in developing market economies (Niva *et al*., 2019; Young, 2013) [32, 45]. This is illustrated by the broad productivity and wage differences identified among rural and urban workers (Gollin *et al*., 2014; Young, 2013) [15, 45]. With regard to the type of occupation, about 52.9 percent of migrants were in service, about 22.9 percent were in business, about 11 percent were day laborers and the remaining 13 percent were in unclassified employment. The study results indicate that according to their expectations a significant proportion of migrants could be involved in the development process. About 96.5 percent of the migrants were married and about 91.7 percent were male. One measure of a migrant's general living conditions is the home or dwelling status of the migrant. Most migrants lived in rented dwellings (about 52.2 percent), dwelled in their own apartments (about 26.9 percent), and about 20.9 percent inhabited in slums.

Table 1: Background profile of the respondents

Characteristics	Percent
Age (in years)	
< 30	7.1
30-39	24.6
40~49	31.5
50~59	20.6
60+	16.3
Mean ±SD	45.2± 12.2
Education (in schooling years)	
<10	32.2
10-12	14.2
13-16	20.2
17+	33.3
Mean ±SD	12.0 ± 5.7
Present occupation	
Service	52.9
Business	22.9
Day labor	11.1
Others	13.1
Income	
< BDT 5,000	41.0
BDT 5,000~15,000	38.1
BDT 15001~30,000	16.7
>BDT 30,000	4.2
Mean±SD BDT 19925± BDT 7533	
Marital Status	
Married	96.5
Others	3.5
Sex	
Male	91.7
Female	8.3
Residence type in the place of destination	
Slum	20.9
Rented house	52.2
Own house	26.9

3.2 Migration characteristics

Table 2 lists the main features of the migration process. The causes or reasons why individuals migrated, which for some are closely linked to the economic situations of their place of origin that influence their daily lives. The causes manifest themselves in the concerns of the migrants about generating income for daily life at the place of origin and in their hopes for a better life at the place of destination. The dominant factors (about 66.6 percent of cases) of migration are obviously pull factors. Because of the large differences in employment opportunities and incomes between rural and urban workers, urban centers are the best places for people who want to fulfill their life expectancy. Low adaptive capacity across the place of origin usually forces people to move to the destination. On the other hand, factors such as perceived or actual prospects for suitable employment, children's educational facilities, better health care facilities drive migrants into urban areas to settle. According to the study findings, about 62.7 per cent of migrants settled in the Rajshahi city permanently because they could realize their aspirations. Approximately 39.4 percent of migrants migrated from the surrounding areas (a distance of less than 50 km), approximately 21.7 percent came from a distance of 50~99 km and the distance from the place of origin and Rajshahi City was more than 200 km of 17.3 percent of migrants. The mean distance between place of origin and destination was 119 km. Approximately 28 percent of respondents migrated to Rajshahi City less than five years ago, about 20.4 percent migrated 5 ~ 9 years ago and 23.8 percent migrated back 20 years or more. The average length of migrated life was 14 years at the place of destination.

Table 2: Characteristics of migration process

Characteristics of migration	Percent
Causes of migration	
Pull factors	66.6
Push factors	33.4
Nature of migration	
Permanent	62.7
Temporary	37.3
Distance (in km) from place of origin	
< 50	39.4
50~99	21.7
100~149	13.8
150~199	7.9
200+	17.3
Mean ±SD	119 ± 121
Duration of living in current place (in years)	
<5	28.1
5~9	20.4
10~14	15.0
15~19	12.7
20+	23.8
Mean ±SD	14.0 ± 10.5

3.3 Social mobility of migrants using stochastic process

The significance of mobility is largely determined by how a transition matrix is created. Groups are created for occupational mobility by aggregating individuals by profession or skill into accepted categories of occupations. The data in this case are by default discrete, and the boundaries between classes are easily drawn. However, income groups are created for income mobility by grouping individual incomes measured on a continuous scale. There are no natural boundaries for these groups; thus, researchers can track and characterize income mobilities within an income system in very different ways.

3.4 Approach to constructing an income and an occupation transition probability matrix

3.4.1 Construction of income transition probability matrix

The concept and measurement of income mobility focuses on two quite distinct attributes of an income-generating regime. It is concerned with how incomes are distributed over a given period of time by individuals and another is how the incomes of individuals change over time. Economists have long understood that depending on the size of income distribution alone is not enough to define a society's well-being. It is generally accepted that income mobility often needs to be weighted when determining a society's well-being. Because of varying degrees of internal mobility, two societies with equal sized income distributions may vary considerably in context

and the society with more mobility enjoys greater in welfare (Kuznets, 1966) [22]. Therefore, an evaluation of income mobility is very critical in determining a society's social welfare.

In order to quantify income mobility, we divide the population into four income classes: < BDT 5000 = 1, BDT5,000~15,000 = 2, BDT15001~30,000 = 3, > BDT30,000 = 4 with the probability row vector of the 4 initial income distribution states at the time 0 $\pi^{(0)} = (0.731, 0.179, 0.079, 0.010)$. The boundaries of income class were defined on the basis of an absolute definition, and the boundaries between classes of income were set exogenously. The resulting transition matrix is referred to as a size transition matrix. Markov processes model the transition between mutually exclusive classes or states. A number of studies, including Solow (1951) [39], McCall (1971) [28] and Schluter (1998) [36], adopt this approach and construct size transition matrices. The benefit of this form of transition matrix is that it reflects income movement between different income levels; thus, both the exchange of positions of individuals and economic growth (the increasing availability of positions at high income levels) are incorporated into mobility. One can draw welfare implications of mobility directly from comparisons of transition matrices of this type. Every income class here is treated as a state. Table 3 describes the estimated transition probability matrices (a) and (b), in which each row of each matrix adds up to unity. The matrix 4(a) describes the extent of the mobility before and after migration from one income class to another income class. The transition probability matrix revealed that if a migrant was in income class < BDT 50000 (state 1) before migration stays in the same income class after one year of migration with probability 0.20, migrants belonged to income class BDT 5000 to BDT 15,000 before migration stays in the same income class with probability 0.49, migrants whose income class was BDT 15001 to BDT 30,000 remains in the same income class after migration with probability 0.61. Therefore, after migration, the likelihood of staying in the same income class is lowest in the lowest income class and highest in the highest income class. Migrants belonging to the highest income class (> BDT 30,000) with a likelihood of 0.80 would stay in the same income class. Migrants in the lowest income class (< BDT 5,000) move to the next income class with a probability of 0.32, change their income status as a middle class with a possibility of 0.33, and surprisingly move to the highest income class with a probability of 0.14. The transition probability matrix showed that if a migrant is in BDT 5000 to BDT 15000 income class, then there is a chance of 0.40 moving to the next higher income class after migration and moving to the highest income class with probability of 0.08. Results indicate that the distribution of migrants' incomes has undergone major changes, especially among migrants whose income limits before migration were < BDT 5,000. It is also obvious that the likelihood for the higher income class to remain in the same income state is higher.

3.4.1 Construction of occupation transition probability matrix

People are social animals who care about their 'prestige' or the 'respect' that they are accorded by individuals with whom they interact. Although conventional economics concentrated on monetary incentives, sociologists emphasized social status and other social rewards as important reasons for human behavior. The term "social status' was first introduced by Max Weber as 'an effective claim to social esteem in terms of negative or positive privilege' (Weber, 1922, p.305) [44]. The choice of occupation is influenced by the social status associated with different occupations. When status is not directly observed, by changing their occupations, individuals try to signal it.

To assess migrants' occupational mobility, we have categorized migrants' occupation as Service=1, Business=2, Labor=3, Unclassified jobs=4, to construct the transition probability matrix. The occupation transition probability matrix showed that if the migrant's occupation was service prior to migration (State=1), then there is a likelihood of 0.70 that the migrant will remain the same occupational state-service, a likelihood of 0.11 that he will move to business and a likelihood of 0.17 that he will engage in unclassified employment (Table 3(b)). The transition probability matrix showed that if the occupation of migrants was business before migration, then there is a likelihood 0.71 that migrants will stay the same occupational class as business, a likelihood of 0.18 that they will change occupation from business to service. More interesting is that if a migrant was engaged in unclassified jobs before migration (no work, small business, rickshaw puller, etc.) then there is a small likelihood of 0.12 staying in the same occupational status-unclassified jobs, a likelihood of 0.47 being moved to employment as a service, and a likelihood of 0.24 being involved in business after migration.

Table 3: The estimated transition probability matrix for different income states of migrants

$$P = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{pmatrix} 0.21 & 0.32 & 0.33 & 0.14 \\ 0.03 & 0.49 & 0.40 & 0.08 \\ 0.03 & 0.05 & 0.61 & 0.31 \\ 0.00 & 0.00 & 0.20 & 0.80 \end{pmatrix} \end{array}$$

(a) Income

$$P = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{pmatrix} 0.71 & 0.11 & 0.01 & 0.17 \\ 0.18 & 0.71 & 0.03 & 0.08 \\ 0.18 & 0.18 & 0.58 & 0.06 \\ 0.48 & 0.25 & 0.16 & 0.11 \end{pmatrix} \end{array}$$

(b) Occupation

Table 4(a) represents the stationary income distribution or equilibrium distribution. Table 4(a) shows that P^t converges to a fixed matrix with all rows identical as $t \to 13$. The Markov chain thus enters a distribution of equilibrium that doesn't depend on the starting conditions. It shows that after 13 years the income distribution has reached a stable state: it does not change from t = 13, 14, 15, 16,17. The chain has reached equilibrium of its own accord. The equilibrium distribution is then given by any row of the converged P^t.

Table 4(b) depicts stationary occupation distribution or equilibrium distribution. From the table it is shown that P^t converges to a fixed matrix with all rows that are similar to that of as $t \to 9$. Thus, the Markov chain enters an equilibrium distribution which does not depend on the starting conditions. It indicates that the occupation distribution has attained a stable state after 9 years. By its own accord, the chain has reached equilibrium. Then, every row of the converged P^t gives the equilibrium distribution.

Table 4: Long-term behavior of income distribution of migrants

$$P = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{pmatrix} 0.21 & 0.32 & 0.33 & 0.14 \\ 0.03 & 0.49 & 0.40 & 0.08 \\ 0.03 & 0.05 & 0.61 & 0.31 \\ 0.00 & 0.00 & 0.20 & 0.80 \end{pmatrix} \end{array}$$

(a) Income

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(b) Occupation

Table 5 represents the actual and equilibrium income and occupation distribution of migrants. Approximately 73 percent of migrants whose income category was < BDT5000 just after one year of migration has the chance to adjust in the same income class after 13 years with chance of 0.015. The conclusion as a natural consequence of the last column of Table 6 is that the migrant's monthly income group of >BDT 30.000 has a great tendency to adjust this group. Next adjusted monthly income group is BDT 15001~30000. The results of the study show that the social mobility of rural-urban migration is remarkable in terms of income and that migrants are able to settle after 13 years of migration in the desired higher income category.

Table 5 also explains the actual and equilibrium distributions of the migrants' occupation. The inevitable result of Table 6's last column is that migrants with occupation status as a service have a strong propensity to adjust that status. The next adjusted status for the occupation is business. The lowest adjusted rank for occupation is labor. From the results it is clear that after 9 years of migration migrants will settle in their chosen occupation.

Table 5: Actual and equilibrium distributions of income class of migrants

	Actual distribution π^0	**Equilibrium distribution π^***
Income class		
<BDT 5,000	0.731	0.015
BDT 5,000~15,000	0.179	0.045
BDT 15001~30,000	0.079	0.358
>BDT 30,000	0.010	0.582
Occupation class		
Service	0.32	0.462
Business	0.08	0.332
Labor	0.14	0.082
Others	0.46	0.124

Figures 1(a)~1(d) and Figures 2(a)~2(d) represents the long-term behaviors of the migrants' income and occupation distributions. It is evident from the graphs that the initial behavior of income and occupation distributions differed significantly for the different starting states. But for all income and occupation distributions of all the starting states, the long-term behavior (large t) is the same, suggesting that social mobility in terms of income and occupation is unstable at the initial stage of migration due to not being able to achieve the desired social status, but after often they can achieve the desired income and occupation status states.

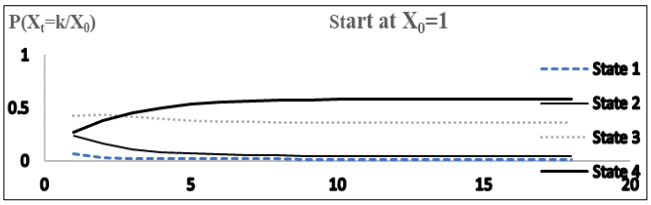

Fig 1(a): Probability of getting from income state 1 to state k in t steps, as t changes: $(P^t)1$, k for k = 1,2,3,4.

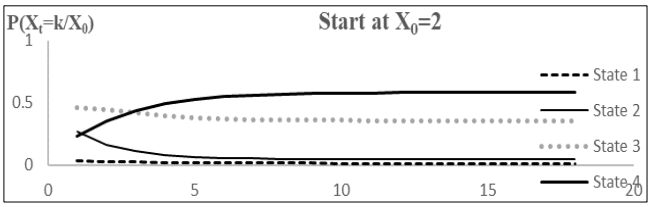

Fig 1(b): Probability of getting from income state 2 to state k in t steps, as t changes: $(P^t)2$, k for k = 1,2,3,4.

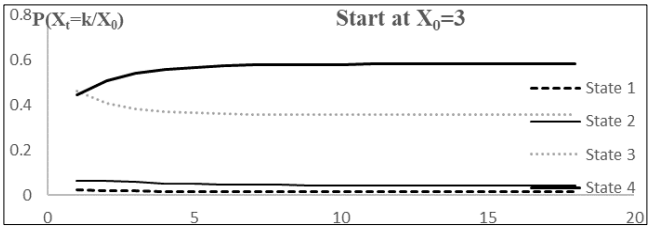

Fig 1(c): Probability of getting from income state 3 to state k in t steps, as t changes: $(P^t)3$, k for k = 1,2,3,4.

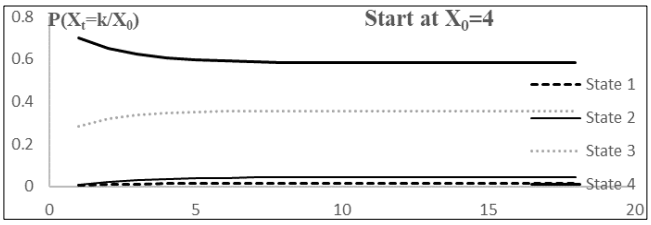

Fig 1(d): Probability of getting from income state 4 to state k in t steps, as t changes: $(P^t)4$, k for k = 1,2,3,4.

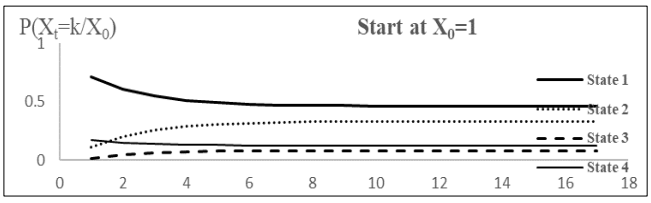

Fig 2(a): Probability of getting from occupation state 1 to state k in t steps, as t changes: $(P^t)1$, k for k = 1,2,3,4.

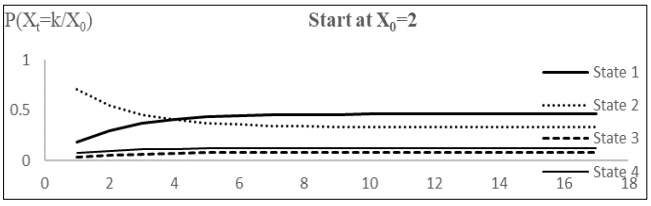

Fig 2(b): Probability of getting from occupation state 2 to state k in t steps, as t changes: $(P^t)2$, k for k = 1,2,3,4.

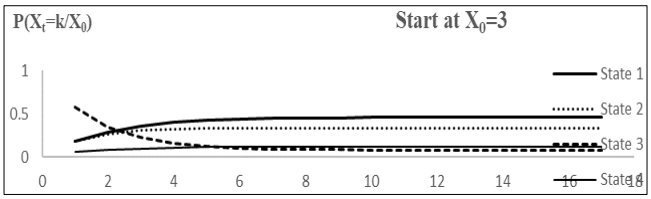

Fig 2(c): Probability of getting from occupation state 3 to state k in t steps, as t changes: $(P^t)3$, k for k = 1,2,3,4.

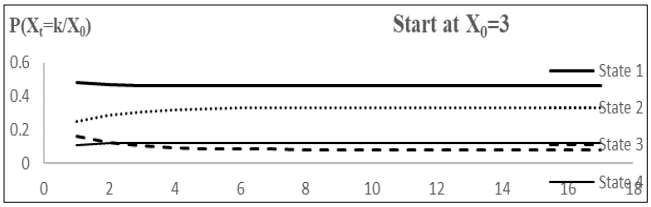

Fig 2(d): Probability of getting from occupation state 4 to state k in t steps, as t changes: $(P^t)4$, k for k = 1,2,3,4.

The average number of years stayed by a migrant in every income and occupation class is summarized in Table 6. The likelihood of entering a social class in a perfectly mobile society should be independent of the origin. If a family always stays in the same class, there is perfect immobility, and this corresponds to P = I. The more mobile a family is, the shorter the time it will spend in the same class. The matrix P representing perfect mobility has all elements equal in each column (each row in Prais notations). But naturally there are different elements in each column of P shown in Table 3. Thus, we determined distribution of the equilibrium (Table 5). A transition matrix that has all its rows (columns in the notations of Prais) equal to the distribution of equilibrium π^* characterizes the perfectly mobile society that can be contrasted with it. Column (1) of Table 6 shows the average time spent by a migrant in a given income class and occupation status, and column (2) shows the corresponding values in a perfect mobility situation. The corresponding values are quite different. For the income class, the longest time spent in the highest income group is 5.0 years, which is 109 percent longer than that of the equivalent perfect mobility situation and lowest time spent in the lowest income group is 1.27 years, which is 25 percent longer than that of the equivalent perfect mobility situation. It is evident from column (5) that all migrants observed will remain in a particular income state for 25 to 109 percent of the time relative to perfect mobility. It is apparent that as the income class goes up, there is a progressive increase in average stay in the income class and migrants in the highest income class had an average stay 139 percent longer in relation to perfect mobility.

The longest 3.35 years spent for occupational status is in business, which is 64 percent longer than that of the comparable perfect mobility situation. The next longer period of 3.33 years spent is in service, which is 79 percent longer than the equivalent perfect situation for mobility. The lowest 1.14 years spent is in unclassified jobs, which is equal to the perfect mobility condition.

Table 6: Expected stay in each income class of migrants

Social status	$E(\pi_i) = \frac{1}{(1-p_{ii})}$	$E(\pi_i^*) = \frac{1}{(1-\pi_i^*)}$	$Ratio = \frac{E(\pi_i)}{E(\pi_i^*)}$	S.D.	% of excess immobility
	(1)	(2)	(3)	(4)	(5)
Income class (in BDT)					
<5,000	1.27	1.02	1.25	0.58	25%
5,000~15,000	1.96	1.05	1.87	1.37	87%
15001~30,000	2.56	1.56	1.64	2.00	64%
>30,000	5.00	2.39	2.09	4.47	109%
Occupation status					
Service	3.33	1.86	1.79	2.91	79%
Business	3.35	1.50	1.19	2.91	19%
Labor	2.33	1.09	2.13	1.81	113%
Others	1.14	1.14	1.00	0.37	0%

Determinants of different indices are presented in Table 7. The Bartholomew and Prais indices indicate that rural-urban migration society has a high level of income mobility, which is a measure of economic and social mobility of migrants. The Bartholomew Co-efficient of mobility (D=0.50) indicates that society in rural-urban migration had a good degree of mobility for occupation which is an indicator of the economic and social mobility of migrants.

Table 7: Determinants of different indices for income

Indices	Value	
Indices	Income	Occupation
Prais (M_p)	0.63	0.63
Bartholomew $D_1(P)$	0.39	0.50
Bartholomew $D_2(P)$	0.11	0.24

4. Conclusion

Migrants usually move to more established destination locations from less developed places of origin with hopes of changing their social status in terms of a better life. Everyone wants an opportunity to do better in life, and a society's resilience may be checked by the lack of social mobility. People might feel stuck in their low-income status and worry about the lack of opportunities for their children to advance. This has an impact on social stability, economics and politics as well. Much potential talent is wasted or remains underdeveloped if people are unable to advance in their profession or enhance their lifestyle. Social mobility describes the transition or passage opportunities between various social classes, and the benefits and drawbacks associated with include employment opportunities, job security, prospects for advancement etc. Measures of social mobility due to migration investigate the relationship of socioeconomic status between the places of origin and the places of destination.

The transition probability matrix shows that migrants appear to change their income level upwards and strive to remain in the higher income level. The probability of remaining in the highest income class is highest, and in the higher income class, the probability is higher. Therefore, migrants have a propensity to achieve their goal of a better life after migration. Naturally,

the greatest likelihood of settling in service and business as their profession in the case of occupation is observed. The equilibrium distribution of income and occupation indicates that migrants had the greatest propensity to adapt after 13 years of migration in the highest income category and after 9 years, migrants might settle in their chosen occupation. The average number of years of stay in each income class shows that for the highest income class, the average number of years of stay is the longest, and the average stay in the higher income class is longer than in the lower income class, suggesting that migrants seek to settle in the higher income class. In the case of occupation, the longest average time spent in business is followed by service, which is 64 percent and 79 percent longer than the equivalent ideal mobility scenario, respectively. The indices of Prais and Batholomew suggest that rural-urban migration society has a strong level of mobility for both income and occupation, which is an indicator of migrants' income and occupational mobility. To understand the relationship between social mobility and quality of life, a more systematic focus on the whole life course, taking into account all changes that potentially influence such a transition, must be developed.

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