

Application of the First Order Difference Equation in Applied Mathematics.

Tarun Kumar Dey

Assistant Professor, Department of Mathematics, Sambhu Nath College, Labpur, Birbhum, West Bengal, India. Email: deytarunkumar2020@gmail.com

Abstract:

The migration from rural to urban is a common phenomenon. This led to shift of a paradigm from agricultural sector to manufacture and service sector. In the course of time the rural- urban is increasing day by day. At the time there is also a reverse migration i.e. people are migrating from urban to rural. This both way migration will continue until there is a rural- urban divide. The present paper concentrates much on to minimize the rural – urban gap. The dynamic stability will establish in a hypothetical condition when there will be no rural – urban gap i.e. our ultimate goal.

Keywords: stability, rural, urban, migration, dynamic

1. Introduction:

According to Government of India's Statistical Census 2011 India has out 6, 40,867 villages and 7,935 towns/urban centres. Moreover, out of total population 1210.2 million, rural population accounts for 833.1 million (i.e. 68.84%) and urban population 377.1 million (i.e. 31.16 %). According to 2011 Census, India's population increases 181 million people from 1.03 billion in 2001 to 1.21 billion in 2011(Visaria L. 2011). The decadal growth rate of population is 17.6% compared to 21.2% during 1991-2001 suggesting a slowdown of growth. The sex ratio of population has began to improve from 927 in 1991to 933 in 2001to 940 in 2011. The overall literacy rate is in 2001 is 745 with 82.1% male and 65.55 female literacy rate. The child sex ratio has fallen from 945 in 2001 to 927 in 2001 to 914in 2011. At the end of October 2011, the world population crossed over 700 crores, China 135 crores and India 124 crores. Though India possesses only 2.4% of world geographical area it covers 17.71 % of total world population. It is expected that India will become the most populous country in the world by 2030 overtaking China. India's population size is expected to stabilize at 1.8 billion at 2041.The state Uttar Pradesh is the most populous state in India with 199.6 million people covering 16.5% of country's population.

M. K. Gandhi rightly told that the best, quickest and most effective way is to build up from the bottom. Every village has to become a self-sufficient republic. This does not require brave resolutions. It requires brave, corporate, intelligent work. In the course of Indian economic history the rural- urban divide is not a new phenomenon. Generally the rural people live in villages and getting lower wages where as urban people live in towns and getting higher wages. The standard of living in rural areas are poor than in urban areas. The rural economy is based on agriculture and the urban economy is based on industry. The urban centres have better opportunities for the rural people to cater the needs of the rural poor i.e. better market

facilities, banking and credits, higher educational institutions, health services, transport and communications etc. These are the main causes of migration from rural to urban. Our dynamic objective is to minimize the rural – urban gap. This will finally reduce the incidence of poverty, hunger and malnutrition and raise the income of rural poor in particular.

The simplest way to minimize the gap is to migrate from rural to urban due to a higher wage – gap. This type of migration will continue till the gap exists. But this type of one way migration is not the present situation. This was an old age practice. Now migration from both ways occurs due to various reasons. There are various forms of these types of interlinkage. Rural economy is primarily based on agriculture. One interesting fact is that in agriculture the farmers produce the farm products but they have no rights to settle the price for these products. Price is determined by the traders and the wholesalers. There is no proper marketing channel to sell their perishable products. To purchase the inputs and to sell their products they solely depend upon the urban traders. The rural and urban development is highly correlated and they cannot be separated from each other. If we want to develop one sector there creates an economic imbalance. Thus we should have to take a holistic approach for the simultaneous development of both the sectors.

The migration from rural to urban is an important part of urbanization in the course of economic development. This led to shift of a paradigm from agricultural sector to manufacture and service sector. In India about 20.50 million people (i.e. 30% of national urban growth) are migrated from rural to urban. The rural-urban interlinkage is both a cause and effect of economic development. There are various types of interlinkage. The three main types of interlinkage: through production, consumption and labour market. These both ways interlinkage are the main causes of social and environmental interdependences for balanced growth approach. This interlinkage plays an important role in the generation of income, employment and prosperity. By means of liberalization of trade and production has changed and not only in a regional but also in a global level.

2. Deurbanization:

It is the quite opposite of urbanization. Due to rapid change of technological progress the reverse migration i.e. from urban to rural is also possible. Due to rural internet and other modern amenities at home the rural people can work from home with a lower wage rate. Rural outsourcing is a classic example of Deurbanization. Rural source is using a source from rural to urban and they do not needed to move their entire family to a whole new setting and also reduce unnecessary expenses. Most of the workers in rural settings get paid less but have an option of either working from home or an office. The common people live in rural areas have found it more beneficial because of cleaner air, peace and quiet and lots of space. By using online facilities they can easily work at home.

The main objective of the government and the policy makers is to reduce the rural-urban wage gap. Along with the industrialization, urbanization and modernization of the economy is booming rapidly. A large

section of rural population is driven from agriculture to urban industrial sectors. But there is no hard and fast rule for the division of labour into rural and urban area. Rapid urbanization is inevitable though not desirable in some sort of cases. Through rapid industrialization market enlarge at global level and also create environmental pollution through urban waste.

3.The Dynamic Model:

Here for the sake of simplicity we consider two-commodity model. We suppose that the demand for labour in the urban sector from rural sector depends upon the current wage rate. But the supply of labour migrated depends upon the previous period wage rate i.e. one period lag in supply side. The rural labour makes decision for migration has one period gestation lag. Thus the simple Cobweb-type model can be written as follows:

$$\begin{aligned} U_{D_t} &= a + \alpha W_t ; \alpha < 0 \\ R_{S_t} &= b + \beta W_{t-1} ; \beta > 0 \end{aligned}$$

For the sake of simplicity we assume that both the demand and supply functions are linear.

Now in equilibrium condition, the demand for labour in urban sector equals the supply of labour from rural sector. Thus in equilibrium,

$$\begin{aligned} U_{D_t} &= R_{S_t} \\ \text{i.e. } a + \alpha W_t &= b + \beta W_{t-1} \dots\dots\dots(i) \end{aligned}$$

Let \bar{W} be the long-run stable equilibrium wage rate.

Then $a + \alpha \bar{W} = b + \beta \bar{W} ; W_t = \bar{W} \forall t$

By simple algebraic manipulation we get,

$$\bar{W} = \frac{b-a}{\alpha-\beta} \dots\dots\dots(ii)$$

Subtracting (ii) from (i) one gets,

$$\alpha(W_t - \bar{W}) = \beta(W_{t-1} - \bar{W})$$

$$\text{Or, } \alpha w_t = \beta w_{t-1}$$

$$w_t = \frac{\beta}{\alpha} w_{t-1} \dots\dots\dots(iii)$$

--which is a first-order difference equation.

The complementary function of this equation is:

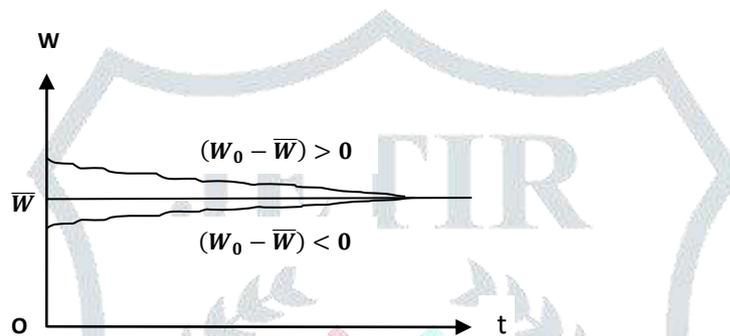
$$w_t = w_0 \left(\frac{\beta}{\alpha} \right)^t$$

$$W_t - \bar{W} = (W_0 - \bar{W}) \left(\frac{\beta}{\alpha}\right)^t$$

$$W_t = \bar{W} + (W_0 - \bar{W}) \left(\frac{\beta}{\alpha}\right)^t$$

4. Implications:

- (i) Now for stationary equilibrium, $\bar{W} = \frac{b-a}{\alpha-\beta}$ -which is the equilibrium of the model. But since it is constant over time, it represents the stationary equilibrium.
- (ii) The term $(W_0 - \bar{W})$ represents the scale effect. If $(W_0 - \bar{W}) > 0$ implies the time-path will blow up.
- (iii) If $(W_0 - \bar{W}) < 0$ implies the time-path starts from below the equilibrium price.



The above figure shows the long-run stable path equilibrium of the dynamic stability model.

- (iv) Now we analyze the most crucial factor $\left(\frac{\beta}{\alpha}\right)^t$. By assumptions $\beta > 0$ and $\alpha < 0$ implies $\left(\frac{\beta}{\alpha}\right) = -sign$.

If $\left(\frac{\beta}{\alpha}\right) > 1$ implies there will be explosive oscillations.

If $\left(\frac{\beta}{\alpha}\right) = 1$ implies there will be regular oscillations.

If $\left(\frac{\beta}{\alpha}\right) < 1$ implies there will be damped oscillations.

5. Conclusion:

Thus for dynamic stability $\left(\frac{\beta}{\alpha}\right) < 1$, is possible when the demand curve for migrated labour is steeper than the supply curve. This is the equilibrium condition for long-run stability. Thus by means of simultaneous urbanization and deurbanization the long-run stable equilibrium will attain.

The development indicator D is directly proportional to the product moment formula of two way migrations i.e.; $D \propto U_1 \cdot U_2$ & $D = kU_1 \cdot U_2$; Where k is a constant parameter. The value of k depends upon the educational status, health, environmental factors, technological upgradation, modern amenities, political factors etc. As a society develops the poverty gap and in-equality automatically reduce. This is simply because of due to migration the incomes of the labour community as a whole increase. As a result more people belong to the higher income group the in-equality is also reduced. By means of such development the society moves to a fully modernized and urbanized state which is our ultimate goal.

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