Application of Cobweb Model in Rural-Urban Migration

[1]Dr Ramsundar Bairagya, [2]Tarun Kumar Dey

[1]Assistant Professor, Department of Economics, [2]Assistant Professor, Department of Mathematics

Sambhu Nath College, Labpur, Birbhum, West Bengal, India.

Abstract

A dual economy is the existence two different sectors using different techniques of production process. Dual economy is the common features of under-developed country like India. A capitalist based manufacturing sector that uses capital-intensive techniques of production with higher productivity and hence offer higher wage rate. On the contrary, agricultural sector uses labour-intensive techniques of production with lower productivity and hence offer lower wage rate. The dynamic stability will establish in a hypothetical condition when there will be no rural – urban gap i.e. in the ultimate stage of development and the country will reach in fully industrialist. This paper tries to apply the Cobweb model to minimize this wage-gap.

Keywords: development, dynamic, dual, migration, stability, wage rate.

Introduction

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. Thus the main causes of migration from rural to urban are lack of service, lack of safety, high crime, crop failure, drought, flood and poverty.

The migration from rural to urban is an important part of urbanization in the course of social development. This led to shift of a paradigm from agricultural sector to manufacture and service sector to get higher wage rate. In the course of Indian economic history the rural- urban divide is not a new phenomenon. But in course of 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.

A dual economy is the existence two different sectors using different techniques of production process. Dual economy is the common features of developed country like India. A capitalist based manufacturing sector that uses capital-intensive techniques of production with higher productivity and hence offer higher wage rate. On the contrary agricultural sector uses labour-intensive techniques of production with lower productivity and hence offer lower wage rate. The industrial sector located in the so called urban area and

the agricultural sector located in the villages. This is the main cause of wage-gap and transition of labour from one sector to another. The rural-urban wage gap may be of regional, state, national and international level. 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. Thus there is an adverse terms of trade for agriculture occur.

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.

Malthus Theory

Rapid growth of population over the world is the main cause of unemployment. According to Malthus (1798) population increase at G.P. rate (e.g. 2,4,6,8,10,……..) while the supply of food increase at A.P. rate (e.g. 2,4,8,16,32,……) i.e. population grow at a higher rate than he food supply and create food scarcity. This shortage of food gives rise to famines, epidemics, food riots etc. Due to these calamities a part of population is eliminated and a natural balance between population and food supply is established only in the short-run because again population begins to grow at a faster rate than food supply and the economy again moves to food crisis. In this way food crisis arises in an economy at a regular interval. Malthusian theory is based on the agrarian economy. Even if the Malthusian theory has been discarded, the shadow of Malthus is still haunting us.

Lewis Model

The first theoretical analysis of rural – urban migration was done by Lewis (1954) to explain the transition of a rural stagnating economy to a growing modern industrial economy. Here growth not only simply means the accumulation of capital but also interact with rural and urban sector. Lewis assumed that in the agricultural sector there were surplus labour and their marginal productivities tend to zero. These surplus labours are absorbed into industrial sector through capital accumulation. This finally migrated labour from low density rural sector to high density urban sector. This migration will continue till the manufacturing

sector completely absorbed the disguised unemployed persons. Ranis and Fei (1961) introduce the possibility of technical progress in the agricultural sector and assume that the agricultural sector can also absorb capital investments.

Harris-Todaro Model

The Todaro (1969) and Harris-Todaro (1970) models also consider the role of internal migration in a dual economy where unban sector draws labour force from rural sector. Though in the Lewis model, internal migration removed disguised unemployment from rural areas and a transition from rural to urban economy. But in the Todarian model explain the existence of unemployment in urban areas and its link with internal migration. The Todaro paradox remains unsolved.

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.

One simple way is to minimize the rural-urban wage gap is as follows. Suppose we have two distinct types of production functions. One in agriculture sector uses labour-intensive and another in manufacturing sector uses capital-intensive. Now in this dual economic situation we have to draw a third function which is the linear combinations of these two inputs. Then if we maximize the joint function the required result would be the one way of the main solution.

The Dynamic 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:

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

For the sake of simplicity we assume that both the demand and supply functions are linear one. Now in equilibrium condition, the demand for labour in urban sector equals the supply of labour from rural sector. Thus in equilibrium,

$$U_{D_t} = R_{S_t}$$

i.e. $\quad a + \alpha W_t = b + \beta W_{t-1} \quad \ldots\ldots\ldots(i)$

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

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

By simple algebraic manipulation we get,

$$\overline{W} = \frac{b-a}{\alpha-\beta} \quad \ldots\ldots\ldots\ldots (ii)$$

Subtracting (ii) from (i) one gets,

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

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

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

-which is a first-order difference equation.

The complementary function of this equation is:

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

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

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

Results

(i)   Now for stationary equilibrium, $\overline{W} = \frac{b-a}{\alpha-\beta}$ -which is the equilibrium of the model. But since it is constant over time, it represents the stationary equilibrium.

(ii)   The term $(W_0 - \overline{W})$ represents the scale effect. If $(W_0 - \overline{W}) > 0$ implies the time-path will blow up.

(iii)   If $(W_0 - \overline{W}) < 0$ implies the time-path starts from below the equilibrium price.
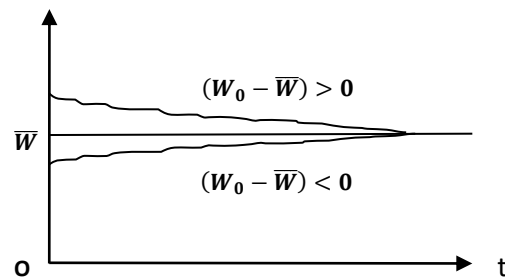
The above figure shows the long-run stable path equilibrium of the dynamic stability model.

(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.

The development indicator D is directly proportional to the product moment formula of two way migrations i.e.; $D \propto U_1 . U_2$ or $D = k U_1 . U_2$; 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.

Conclusion

Thus, for dynamic stability in the long-run (i.e. $\left(\frac{\beta}{\alpha}\right) < 1$), is possible only 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. It may be suggested that there are huge scope for further empirical research in this field.

References

[1] Alpha C. Chiang 3rd Ed. Fundamental Methods of Mathematical Economics, McGraw-Hill, Singapore, 1984

[2] Basu K. 1984. The Less development Economy: A Critique of Contemporary Theory. Delhi, Oxford Press

[3] Bhowmik A. and Sarkar A. 2015. Rural-Urban Dichotomy. Kurukshetra, Ministry of Rural Development. Vol.63 No. 4

[4] Daniel A. Rosenblum. 2013. Rural-Urban Migration and Agricultural Transformation in India: Observing the Impact on Childhood Migration from Bihar to New Delhi. Student Pulse, Vol. 5 No. 10

[5] E.T. Dowling. 1986. International Edition, Theory and Problems of Mathematics for Economists, Schaum's Outline Series, McGraw-Hill, Singapore

[6] Dhanai R. and Negi R. S. 2015. Rural-Urban Linkages and Socio-Economic Development" Kurukshetra, Ministry of Rural Development. Vol.63 No. 4

[6] Samik V. Lall, Harris Selod and Zamarak Shalizi 2006. Rural-Urban Migration in Developing Countries. World Bank Policy Research Paper 3915. Web: http://econ.worldbank.org

[8] Ulrike Eppler, IINAS. 2012. Rural – Urban Linkages and Global Sustainable Land Use. Web: www.iians.org