UNIT 2 DEMOGRAPHY AND THE PROCESS OF DEVELOPMENT*

Structure

2.0 OBJECTIVES

After studying this Unit, you should be able to:

- Examine the relationship between population growth and economic development;
- Explain the dichotomy between the belief that world population growth is bad and the belief that population growth would make them empowered;
- Analyse the patterns of rural-urban migration utilising Harris-Todaro model;
- Discuss how the framework of the Harris-Todaro model has been extended in a number of different directions; and
- State the role of education and health in human capital formation.

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2.1 INTRODUCTION

Economic development is a process that transforms all persons of different income groups and all sectors of the economy in some harmonious and even fashion. But there is a possibility of uneven growth which is growth that first proceeds by benefiting some groups in a society. The economic development entails the rapid growth of some parts of the economy, while other parts are left behind to stagnate or even shrink. As economic development proceeds individuals move from rural to urban areas and agriculture acts as a supplier of labour to industry. Agriculture must be capable of producing a surplus that can be used to feed those who are engaged in non-agricultural pursuits. Thus, agriculture is supplier of food to industry. In this unit we shall be studying about the Lewis model followed by the Harris-Todaro model. The main idea of Harris Todaro model is that formal urban sector pays a high wage to workers and it is this high wage that creates urban unemployment. Finally, we discuss about the significance of investing in health and education to capitalize the benefits of demography.

2.2 POPULATION GROWTH AND ECONOMIC DEVELOPMENT

The relationship between population growth and economic development was generally thought to be negative. Just like economic development has implications for the pace of population growth so the latter has implications for the rate of economic development. A large population means that there is less to go around per person, so that the per-capita income is depressed. However more people not only consume more, they produce more as well. The net effect must depend on whether the gains in production is outweighed by the increase in consumption or vice-versa.

2.2.1 Harrod-Domar Model of Economic Growth

The ingredients of standard growth model are that people make consumption and savings decisions. Savings are translated into investment, and capital stock of the economy grows over time. Meanwhile, the population of the economy grows too. The rate of savings determines, via investment, the growth rate of the capital stock. The latter determines, via the capital-output ratio, the growth rate of national income. But all growth does not translate into an increase in income per person. Population is growing too, and this increase surely eats away (so far as per capita growth is concerned) at some of the increase in national output.

$s/\theta = (1+ g^*) (1+ n) - (1- \delta)$

where s is the rate of savings, n is the rate of population growth, δ is the rate of depreciation of the capital stock, and g^* is the rate of growth of per capita income. According to this model, population growth has an unambiguously

negative effect on the rate of growth. Note that if all parameters remain constant while the rate of population growth n increases, the per capita growth rate g* must fall.

The Harrod-Domar model, treats the capital–output ratio as exogenous, and therefore makes no allowance for the fact that an increased population raises output. There is an implicit assumption that labor and capital are not substitutable in production (capital-output ratio is constant). Thus, added population growth exerts a drag on the per-capita growth while contributing nothing of substance via the production process. Since capital-output ratio is assumed constant, this tantamounts to assuming that an increased population has no effect on output at all.

2.2.2 Solow Model of Economic Growth

In Solow model, a production function relates capital and labor to the production of output. There is an implicit assumption made in the Solow model that capital and labor can be substituted for each other indefinitely although the process of substitution may become more and more costly. The cost is expressed by marginal rate of substitution between two inputs of production and is captured by the degree of curvature of the production isoquants.

There is some technical change incorporated in the Solow model at some constant rate. Once the change in the capital-output ratio is taken into account, the steady-state rate of growth is independent of the rate of savings and the rate of population growth. All that matters for long-run growth is the rate of technological progress. Population growth has no effect on the long-run rate of per capita income growth. There is a level effect, however.

Population growth means that a given level of output must be divided among an increasing number of people, so that an increase in the population growth rates brings down the size of the per-capita cake. An increase in population growth rate both increases the demand on national cake and expands the ability of capital to produce the national cake. The net effect on long run per-capita growth rates is zero. Nevertheless, the level of per-capita income at any given point in time is lowered. (Fig. 2.1)

This comes from the assumption in the Solow model that there are diminishing returns to every input, so that increase in labor intensity of production (necessitated by increased population growth) reduces the long-run per-capita level of output relative to efficiency units of labor.

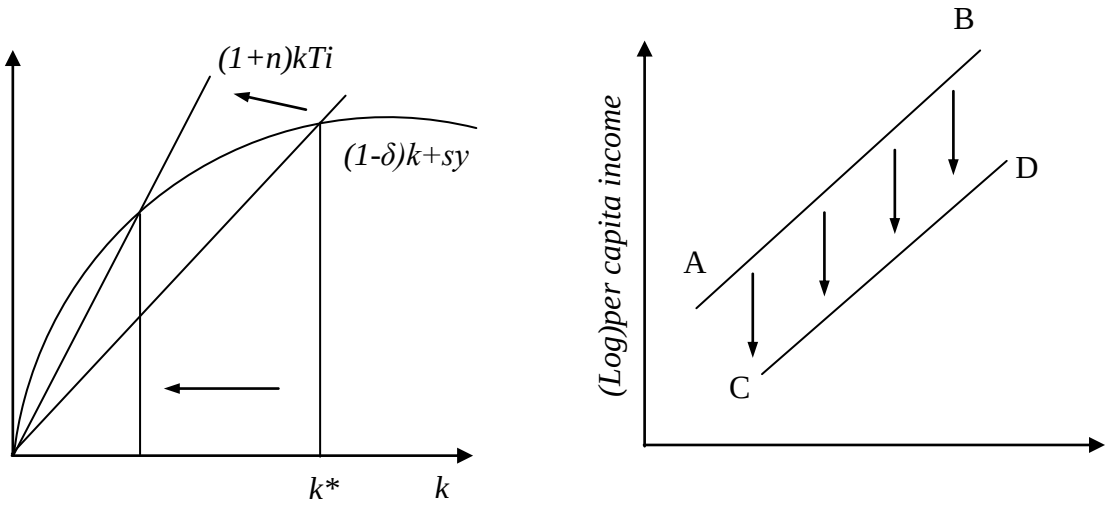

Fig. 2.1: Growth Rates are Unaffected, but the Levels Shift Down

If n goes up, this "swivels" the line upward and brings down the steady-state level of the capital stock, expressed as a ratio of effective labor. This means that although the long-run rate of growth is unaffected by a change in the rate of population growth, the entire trajectory of growth is shifted downward. Thus, increased population growth has negative level effects in the standard growth models. (Fig. 2.1)

Why population growth rates have no growth effect?

In the Harrod-Domar model, there is an implicit assumption that labor and capital are not substitutable in production. Thus, added population growth exerts a drag on per capita growth, while contributing nothing of substance via the production process.

In the Solow model, on the other hand, population growth, while exerting a drag on per-capita growth, contributes to productive potential as the extra labor force is absorbed into productive activity through a change in the capital–labor ratio.

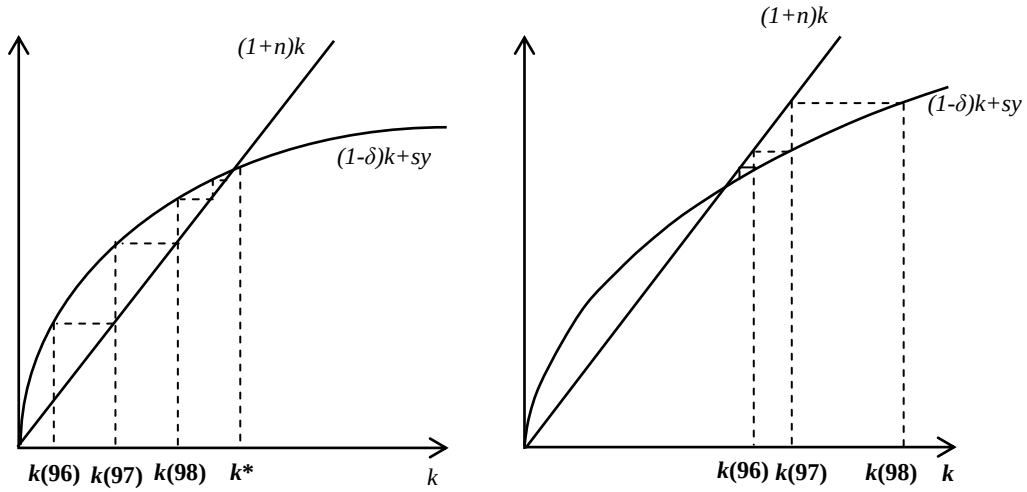

Fig. 2.2: The Steady State in the Solow Model

Indeed, implicit in the Solow model is the assumption that capital and labor can be substituted for each other indefinitely, although the process of substitution may become more and more costly. Because of this, population growth has no ultimate effect on the rate of growth in the Solow model. This does not mean that an increase in the rate of population growth has no effect at all in the Solow model. It lowers the steady-state level of the per capita capital stock, expressed in units of capital per effective unit of labor, and in this way affects the level of per capita income, expressed again in units of effective labor.

The left- and right-hand sides of the equation that describes the evolution of capital stocks in the Solow model with technical progress.

$(1+n)\ (1+\pi)\ \check{k}\ (t+1) = (1-\delta)\ \check{k}(t) + s\ \hat{y}(t)$

where $\check{k}$ and $\hat{y}$ are magnitudes per efficiency units of labor.

2.3 POSITIVE AND NEGATIVE CONSEQUENCES OF POPULATION GROWTH

Population growth is regarded as a principal cause of poverty, low levels of living, malnutrition, ill health, environmental degradation and other social problems. The population-poverty cycle theory explains how poverty and high population growth become reinforcing and intensifies and exacerbates the economic, social and psychological problems associated with the condition of underdevelopment. The potential negative consequences of population growth for economic development can be divided into seven categories.

1) Economic Growth and Savings

Rapid population growth lowers the per-capita income growth in most developing countries especially those that are already poor, dependent on agriculture and experience pressures on land and natural resources.

Faster population growth lowers the aggregate rate of savings. This happens because population growth eats into aggregate income. Faster population growth shifts the age structure of the population toward the very young and in doing so increases the dependency ratio in families. Because children consume more than they produce this tends to lower savings rates as well. This effect was emphasized by the demographers Coale & Hoover (1958).

2) Poverty and Inequality

The negative consequences of rapid population growth fall most heavily on the poor because they are landless, suffer first from cuts in government health and education programs and bear the brunt of environmental damage. Poor need children for the old-age support. Infant mortality rates are higher for the poor so this will translate into a higher expected number of surviving children.

Poor families are likely to have a higher degree of labour force participation by females and this raises the opportunity costs of having children. However, it is also true that growth in income creates a quantity-quality trade-off in children. Richer households may want to invest proportionately greater sums in the education of their children. Consequently, the costs of an additional child are proportionately higher which brings down the total number of children desired. Poor may have high fertility rates than the rich and hence population growth will have a disproportionately heavy impact on the poor.

3) Education

Rapid population growth causes educational expenditures to be spread more thinly lowering the quality for the sake of quantity. This, in turn, feeds back on economic growth because the stock of human capital is reduced by rapid population growth.

4) Health

High fertility increases the health risks of pregnancy and closely spaced births have been shown to reduce the birth weight and increase infant mortality rates and child mortality rates.

5) Food

A large fraction of developing country food requirements is the result of population increases. New technologies of production must be introduced to increase the productivity of land. International food relief programs become more widespread.

6) Environment

Government provided education, health and public transportation are all subsidized which leads to under-pricing of infrastructural resources.

a) These resources must be consumed largely by the poor.

b) Second, the inability of individuals to internalize the costs of these resources leads to higher fertility and consequent increased pressure on those very resources.

c) Resources such as the commons (grazing land, fish stocks, ground water) and the environment (forest cover, pollution, the ozone layer). Population growth rates places an additional pressure on these scarce resources.

7) International Migration

Many observers consider the increase in international migration, both legal and illegal, to be one of the major consequences of developing countries population growth. An excess of job seekers (caused by rapid population growth) over job opportunities may be a factor that spurs migration. However the economic and the social costs of migration fall on recipient countries, increasingly in the developed world.

2.3.1 Negative Effects of Population Growth

According to Malthus, whenever wages rise above subsistence level they are eaten away in an orgy of procreation, people earlier and have more children, which depresses the wage to its biological minimum. Thus, in long run, the endogeneity of population keeps per-capita income at some stagnant subsistence level.

A central ingredient of the Malthusian argument deserves critical scrutiny. Individuals do understand that having children is costly, and it is perhaps true that the costs increase with economic development, while the (economic) benefits decline. Likewise, economic progress may shift societies from an extended family system to a nuclear family system. As labor force participation increases, it becomes progressively more unlikely that individuals in an extended family all find jobs in the same locality. At the same time, the insurance motives probably decline. With nuclear families, the cost of child rearing is internalized to a greater degree which brings down fertility.

The Malthusian Population Trap

In the eighteenth-century Thomas Malthus propounded a theory of the relationship between population growth and economic development. Malthus postulated a universal tendency for the population of a country unless checked by dwindling food supplies, to grow at a geometric progression doubling every 30 to 40 years. At the same time because of diminishing returns to fixed factor land, food supplies could expand only at a roughly arithmetic rate. As each member of population would have less land to work, his or her marginal contribution to food production would actually start to decline. Because the growth in food supplies could not keep pace with the burgeoning population, per-capita incomes (per-capita food production) would have tendency to fall as low as to lead to stable population existing barely at or slightly above the subsistence level.

2.3.2 Positive Effects of Population Growth

Demand-Driven View

The effect of population growth on technical progress can, in turn, be divided into two parts. First, population growth may spur technical progress out of the pressures created by high population density. This is the “demand-driven” view explored by Boserup [1981].

Supply-Driven View

Second, population growth creates a larger pool of potential innovators and therefore a larger stock of ideas and innovations that can be put to economic use. This is the “supply-driven” view taken by **Simon** [1977] and **Kuznets** [I960].

Population, Necessity and Innovation

It is true that scarcity drove man to innovate, to create or to apply methods of production that accommodated the increased population by a quantum jump in food output. Agriculture is a leading example of how high population densities go hand in hand with technologically more intensive forms of farming. But according to Boserup (1981) 'Manufacturing industries required skilled workers and traders as well as financial services and administrative skills which were more concentrated in urbanised areas. The areas in Europe which first developed manufacturing industries were those with the highest population densities.

Problems with the Demand-Driven Approach

The major problem is that what is attributed to population growth can also be attributed to increased per-capita income. It is the combination of the two that is likely to drive innovation or is motivated by the desire to make economic profit. An increased population might correspond to a greater social need, but that need must be manifested in economic demand through the marketplace for innovators to respond. The second problem with the demand-driven approach is that it predicts some degree of cyclicity in per capita incomes: innovations raise per capita income as production levels kick up following the innovation, but as population swells to bridge the newly created gap, with per capita incomes falling once again until the pressure of resources triggers another bout of innovation.

Population, Diversity, and Innovation

The gist of the supply-driven argument is that everybody has an independent chance of coming up with an idea that will benefit the rest of the human race. The larger the population, the larger would be the number of people that have useful ideas, and so the higher is the rate of technical change.

Consider an initial level of per capita income that is so low that population growth increases with per capita income. Population is growing, and it follows that the pace of technical progress must accelerate.

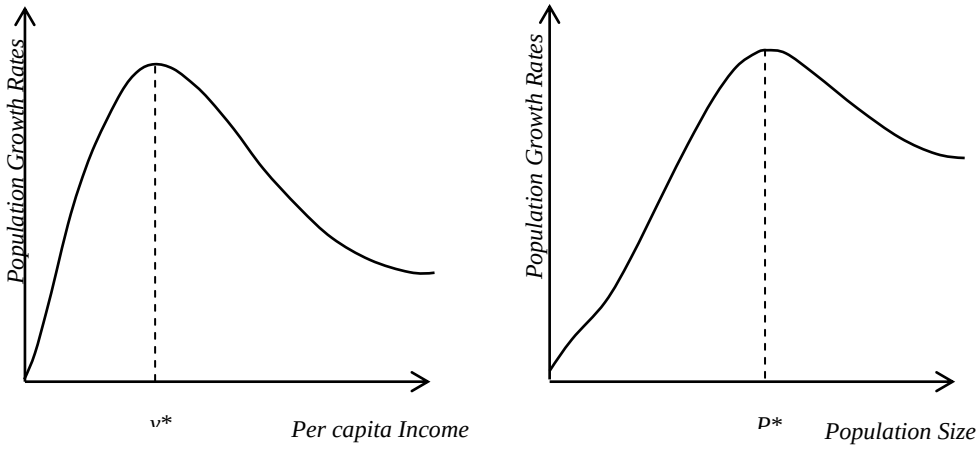

Fig. 2.3: Population Growth, Per Capita Income and Population Levels

As long as we are on the upward-sloping part of the curve, per capita income must rise and so must the rate of population growth. Thus, during this phase, we obtain the prediction that the population growth rate is increasing with the size of the population. This state of affairs continues until we reach the point at which population growth rates begin to decline in income. As long as growth rates are positive, however, the population will still grow, so that technical progress will continue to accelerate. Coupled with a diminishing pace of population growth, this implies an acceleration in the long-run rate of growth of per capita income. Thus, population growth rates decline even faster. This period is therefore associated with a leveling-off and consequent decline in the rate of growth of the population. No longer will population growth rates increase with population, they should decline.

If technical progress is "supply-driven" by the population, then population growth should initially be an increasing function of population itself, but this trend should reverse itself after some stage. P^* is threshold level of population that permits technical progress at a rate such that the threshold per-capita income of y^* is just reached after this point the population growth rates turn down as per-capita income climbs even further. A simple extension of the model can be used to account for this seeming discrepancy: simply allow technical progress to be a function not just of population size, but also of the per capita income of the society. After all, it takes brains coupled with economic resources to carry out useful scientific research.

Check Your Progress 1

Note: i) Use the space given below for your answers.

ii) Check your progress with those answers given at the end of the unit.

1) Make a comparison about formulation of production function as envisioned in Harrod-Domar Model of economic growth and Solow Model of economic growth.

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2) How does rapid growth of population influence the poverty and inequality?

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3) What do you mean by the term 'Malthusian population trap'?

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2.4 RURAL-URBAN MIGRATION

From agriculture comes the supply of labor to industry and the surplus of food that allows a nonagricultural labor force to survive. These are the two fundamental resource flows from agriculture, and they lie at the heart of the structural transformation that occurs in most developing countries. Industry supplies inputs to agriculture: tractors, pump sets, chemicals of various kinds, and so on. With a large population in the rural sector, agriculture is often a major source of demand for the products of industry, which include not just durables, but final consumption goods as well. Agrarian exports can serve as the source of vital foreign exchange, which permits the import of inputs to industrial production. While these links are important, the flow of labor from agriculture to industry and the parallel flow of agricultural surplus to nurture workers in industry are often basic to the development process.

2.4.1 The Lewis Model

The dual economy

Lewis [1954] outlined a view of development that was based on the foregoing fundamental resource flows. This approach, which views economic development as the progressive transformation of a "traditional" sector into a "modern" sector, goes beyond the narrower picture of agriculture-to industry transformation. The starting point of the Lewis model is the idea of a dual economy. Dualism is the coexistence of "traditional" and "modern," sector.

Traditional Sector

i) It consists of agricultural sector.

ii) It means the use of older techniques of production that are labor intensive.

iii) It refers to traditional forms of economic organization based on family as opposed to wage labor, with overall output distributed not in form of wages and profits but in form of shares that accrue to each family member.

Modern Sector

i) It consists of industrial sector which produces manufactured commodities.

ii) It refers to use of new technology which is intensive in use of capital.

iii) It describes production organised on capitalist principles, which relies on use of wage labour and is carried out for economic profit.

Assumptions of the Model

i) The fundamental assumption, is that labor is virtually unlimited in supply, being drawn from a vast traditional sector.

ii) The scale of the modern sector is limited by supply of capital. Thus, capital accumulation in modern sector becomes the engine of development.

iii) Rate of savings and investment limits the pace of development.

Surplus Labour

The main idea of the Lewis model is that there is a large surplus of labor in the traditional sector of the economy, that can be removed at little or no potential cost. By cost, we refer to opportunity cost: the loss of traditional sector output as labor supply is reduced.

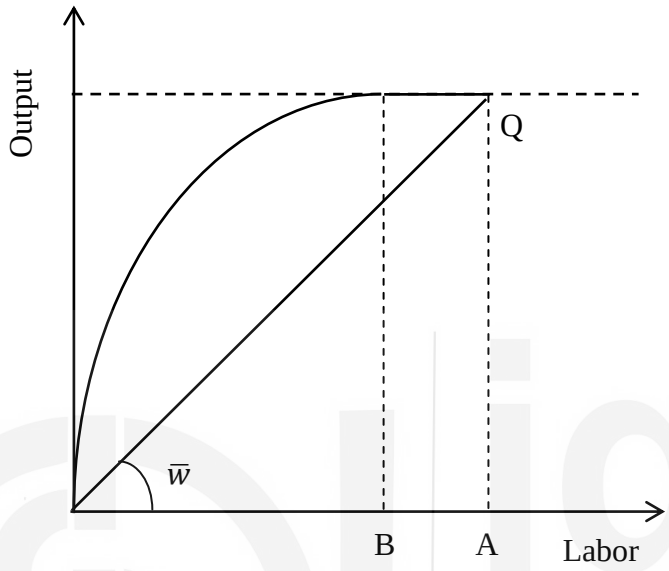

Fig. 2.4: Surplus Labor in the Family Farm

We take an example of the production function on a family farm where land is fixed and hence there are diminishing returns to the labor input. The production function is drawn so that after a certain level of labor input, there is no significant effect on output. If the total labor input is A and total output is AQ then Average income = AQ/A which is ϖ.

There is only so much intensity at which a given plot of land can be cultivated, and after a point additional input of labor may have no effect at all. Thus, the marginal product of labor at points such as A is zero or close to zero. When reduction in the amount of labor happens from A to B, total output stays constant. It is because the family farm has so much labor relative to land, labor is in surplus. This situation might occur in economies where there is high population pressure, so that there are large numbers of people per acre of arable land. This phenomenon is not just limited to agriculture but applies to whole range of casual jobs.

Income sharing and surplus labor

i) An entrepreneur hires labor only to the point where marginal product equals the wage. With more labor than this, gains can be realized by cutting back on employed labor and saving on the wage bill. Hence the wages stay positive and marginal product is close to zero.

ii) Asymmetry between traditional sector and modern sector.

a) Production Methods

The traditional sector involves activity intensive in labour and land but not requiring significant quantities of capital.

b) Organization

A profit-maximizing firm regards wage payments to employees as a cost of production, that is subtracted from revenues in order to arrive at final profits. In contrast, a family farm might employ labor beyond the point where the marginal product equals the "wage", because the wage in this case is not really a wage at all, but the average output of the farm (which is what each member receives as compensation).

iii) Rosenstein-Rodan (1943) and Nurkse (1953) were among the writers that realized that the presence of redundant labour in agriculture sector with no loss in agriculture output. Surplus labour is therefore supply of labour that is likely to be of major quantitative importance in development process of less developed economies.

Two extensions of the surplus labor concept

Surplus labor as defined is purely a technological concept: there is simply too much labor relative to land, or more generally, too many people relative to other inputs of production, so that individuals are in surplus relative to production possibilities: remove them to other activities and output will not change because the additional labor power is of no use at all: the marginal product of labor is literally zero.

1) **Disguised unemployment**

If we suppose that there is a capitalist sector elsewhere that does pay according to marginal product, then the economy will exhibit a wage rate (for unskilled labor) that is a true measure of the marginal product elsewhere, and there will be efficiency gains available as long as the marginal product on the traditional activity is less than the wage, whether it is zero or not. This extended concept is known as disguised unemployment. The amount of disguised unemployment may be measured roughly by the difference between the existing labor input in the traditional activity and the labor input that sets marginal product equal to the wage.

2) **Surplus labor versus surplus laborers**

We remove laborers, not labor. The remaining laborers in the traditional activity typically adjust their labor input once some laborers are removed (say, through rural–urban migration).If there is an increase in work effort on the part of the remaining laborers, total output may not fall even though the marginal product of labor is zero. This argument was originally made by Sen [1966].

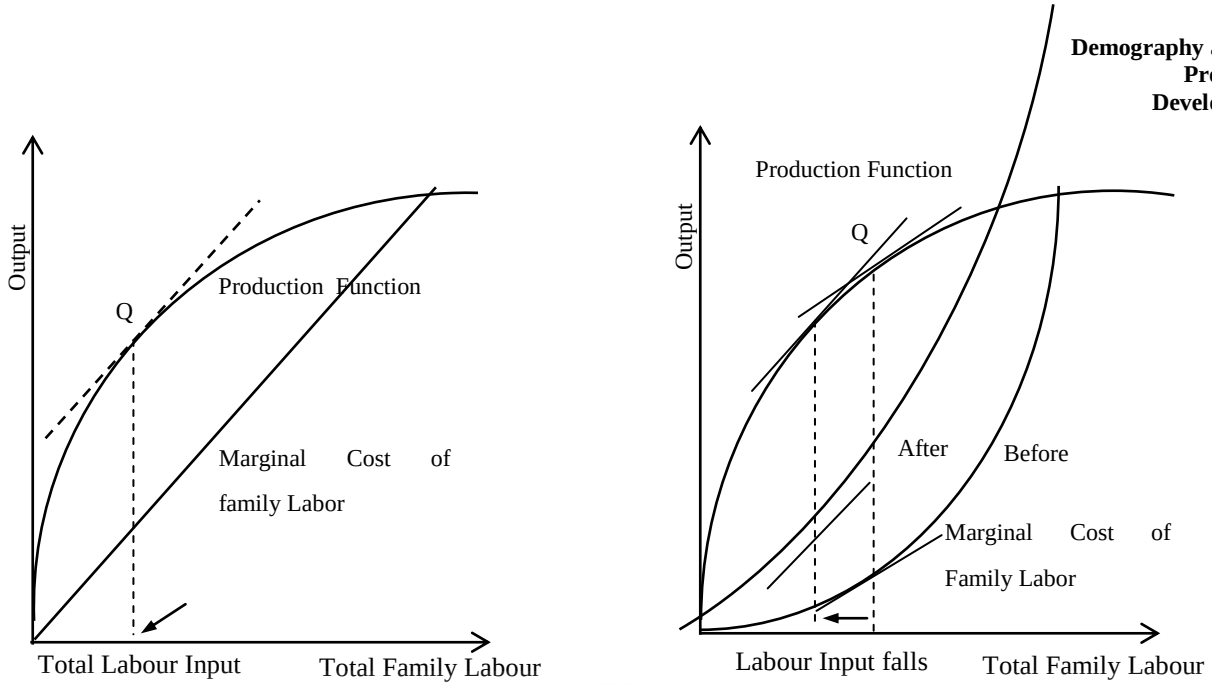

Fig. 2.5: Surplus Labour

Efficient resource allocation on the family farm requires that the value of marginal product of effort be equal to marginal cost. If the marginal cost of family labor is constant, then the total cost is just a straight line and total family input is determined independently of family size. The removal of some members has no effect on total output (but note that the marginal product of labor is positive).The second panel shows that the state of affairs is altered if marginal cost increases with effort. Then the total cost curve of the family is shifted upward as laborers are removed (provision of the same level of family effort as before now involves a higher marginal cost).

2.4.2 Lewis-Ranis-Fei Model of Rural-Urban Migration

Economic development and the agricultural surplus

The interplay between rural and urban sectors as envisaged by Lewis and extended by Ranis & Fei (1961). In the traditional agricultural sector there is disguised unemployment, perhaps even a core of surplus labor, and the wage rate is given by income sharing. The industrial sector is capitalistic. Economic development proceeds by the transfer of labor from agriculture to industry and the simultaneous transfer of surplus food-grain production, which sustains that part of the labor force is engaged in nonagricultural activity.

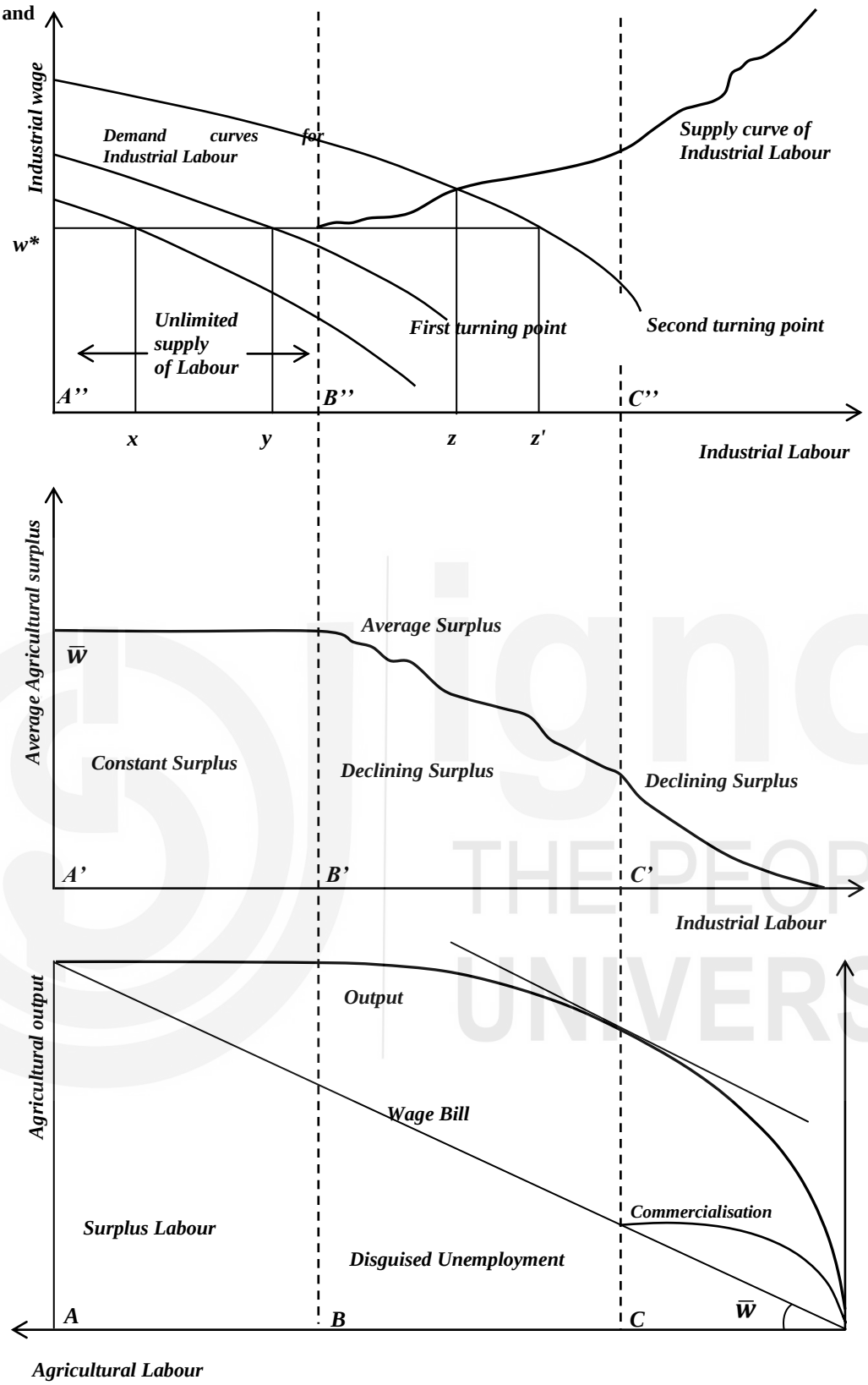

Fig. 2.6: The Lewis-Ranis-Fei model

Ranis and Fei [1961], provides a schematic description of how the labor force and the corresponding agricultural surplus is transferred in the process of development. In each panel of the diagram, the industrial labor force is read from left to right, whereas the agricultural labor force is read from right to left. Assume for simplicity that the total labor force is divided between agriculture and industry.

The production function levels off and there is a phase of surplus labor provided that the entire labor force is in agriculture. This is shown by the segment AB on the diagram. Moreover, if "wages" in this sector are decided by income sharing, then the average wage is just $\tilde{\omega}$, which is proportional to the angle shown in this panel. This turns out to be the wage in the nascent industrial sector. Thus, the segment BC has no surplus labor, but does exhibit disguised unemployment, because the marginal product of labor in agriculture is less than the wage $\tilde{\omega}$ for labor inputs in this segment. To the right of C, the phase of disguised unemployment ends.

We begin with the entire labor force in agriculture. Suppose we decrease this by a small amount, so that we are still in the surplus labor phase. Then the total wage bill in agriculture falls along the diagonal straight line in the lowest panel, provided that the wage in agriculture does not rise. At the same time output does not fall, because we are in the surplus labor phase. An agricultural surplus therefore opens up; this is given by the vertical gap between the production function and the wage bill line. If we divide this surplus by the number of transferred workers, then we obtain the average agricultural surplus, where we are taking the average or per capita surplus amount relative to the transferred workers. It is easy to see that the average agricultural surplus in the surplus labor phase must be exactly $\tilde{\omega}$.

Because the industrial wage is described in units of industrial goods, we must multiply $\tilde{\omega}$ by the relative price, or the terms of trade, between agriculture and industry to arrive at the required minimum industrial wage. This is shown by the value w* in the topmost panel. In the surplus labor phase, the minimum industrial wage required for compensation does not change, because the average agricultural surplus is not changing. This creates a perfectly elastic supply of labor in the surplus labor phase, which is depicted as a horizontal line emanating from the point w* in the topmost panel. This is the zone where it is possible to have economic development with "unlimited supplies" of labor: an expansion in the industrial sector does not drive up the wage rate.

As we now move into the phase of disguised unemployment, the average agricultural surplus begins to decline. This is because total output in the agricultural sector begins to fall, while those who are still there continue to consume the same amount per capita. This is shown by the decreasing line in the zone B′C′ of the middle panel.

Well, if the wage is still w* as before, transferred workers will not be able to compensate themselves for the move, because it is physically not possible for each of them to buy units of food. This is because the average agricultural surplus has fallen below. The immediate effect of this is that food prices start to rise: the terms of trade between rural and urban sectors begin to move against industry. To compensate for this price effect the industrial wage must rise. However, rising wages that cannot solve the problem. No matter how much the industrial wage

rises, it is not possible for workers to buy their old food parcel back, because there simply is not enough to go around. The only way that compensation can be achieved, then, is for industrial workers to consume a mix of agricultural and industrial products, the latter compensating them for the loss of the former.

The "First Turning Point"

It depends on how close the traditional wage is to minimum subsistence. The closer is to the minimum subsistence level, the larger is the compensation required and the steeper is the increase in the required industrial wage. Conversely, the easier it is to substitute industrial consumption for agricultural consumption, the softer is the necessary increase in the compensatory industrial wage. Ranis and Fei [1961] referred to this phase, where the supply wage of labor tilts upward, as the "first turning point."

Commercialization of Agriculture

Continue the transfer of labor until we reach the point C, where the disguised unemployment phase comes to an end. At this point, the marginal product of labor begins to exceed the traditionally given wage rate. It then becomes profitable to actively bid for labor, because the additional contribution of labor in agricultural production exceeds the cost of hiring labor. This situation means that the wage in agriculture rises. One implication is that the wage bill falls more slowly than it did before along the diagonal line of the lowest panel. It now traces the curve after C, because wages rise as the agricultural labor force decreases.

The Second Turning Point

The commercialization of agriculture, is associated with an even sharper decrease in the average agricultural surplus. In terms of the topmost panel, this phenomenon induces a second turning point in the industrial wage. Not only must the wage compensate for a declining agricultural surplus and a movement of the terms of trade against industry, it must now compensate workers for a higher income foregone in the agricultural sector, and this creates a still sharper upward movement in the industrial wage rate. This completes the construction of the supply curve.

This demand for labor induces a situation where the amount of industrial labor is x, hired at a wage of w*. With industrial production, profits are realized, parts of which are plowed back as extra capital in the industrial sector. The expansion of capital means that the demand for labor rises (shift to the second demand curve in the topmost panel). Because the economy is in the surplus labor phase, this labor is forthcoming from the traditional sector with no increase in the wage, as we already discussed. Industrial employment is now at point y. However, with further investment, the demand curve for labor shifts to a point where the compensatory wage must rise. Employment rises to z. However, it would have risen even further (to point z′) had the turning point not occurred. The fall in the

agricultural surplus chokes off industrial employment to some extent, because it raises the costs of hiring industrial labor.

Capital accumulation in the industrial sector is the engine of growth. More capital means a greater demand for labor, which, in turn, induces greater rural–urban migration. As development proceeds, the terms of trade gradually turn against industry: food prices rise because a smaller number of farmers must support a greater number of nonagricultural workers. The rise in the price of food causes an increase in the industrial wage rate. The pace of development is driven by the accumulation of capital, but is limited by the ability of the economy to produce a surplus of food.

2.4.3 Harris–Todaro Model

The classic theory of rural urban migration is based on Harris and Todaro (1970). The main idea of the Harris–Todaro model is that the formal urban sector pays a high wage to workers and it is this high wage that creates urban unemployment.

Reasons for high urban wage

a) The sector may be unionized and subject to collective bargaining over wages, whereas other sectors of the economy are not remotely as organized, so that wages are more flexible in those sectors.

b) In addition, the urban formal sector is often treated as the showcase of government policy, so that minimum wage laws, pension schemes, unemployment benefits, day care, and other facilities may be required by law.

c) Finally, it may well be the case that firms in the urban formal sector deliberately pay wages that exceed levels found elsewhere so they can hire workers of the best quality and fire inferior workers after their quality is revealed.

In contrast to the high wages paid in the formal urban sector, the informal urban sector and the rural sector have low wages that fluctuate according to supply and demand considerations. There is no unionization here and government policy is difficult to implement. Moreover, if the bulk of labor is family labor (as it is in much of the urban informal businesses, as well as in rural family farms) or if the bulk of labor effort is readily monitorable (as in harvest labor), then there will be little incentive for employers in these sectors to pay higher wages as a potential threat.

The Basic Model: Assumptions

1) There are only two sectors in the economy: a rural sector and a formal urban sector.

2) Wages in both sectors are fully flexible.

The labor force is divided between the agricultural sector, which we denote by A, and the formal urban sector, which we denote by F. The curve AB may be

thought of as a demand curve for labor in the urban formal sector: like most demand curves, it is downward sloping, so that more labor can be absorbed in the sector only at a lower wage. Likewise, the curve CD captures the absorption of labor in agriculture.

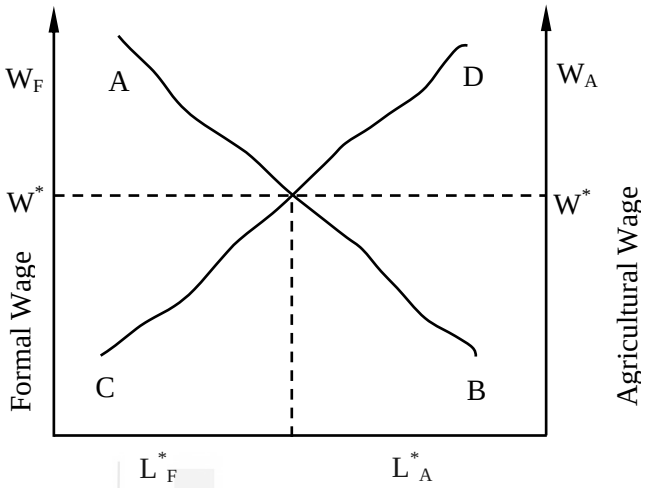

Fig. 2.7: Market Equilibrium with Flexible Wages

w*: Equilibrium wage rate

L_A^*: Individuals in agrarian sector

$^{L}{}_{F}^{*}$: Individuals in urban sector

To alleviate persistent migration between one sector and the other, the wages in the two sectors must be equalized. These two absorption curves combine to analyze the equilibrium.

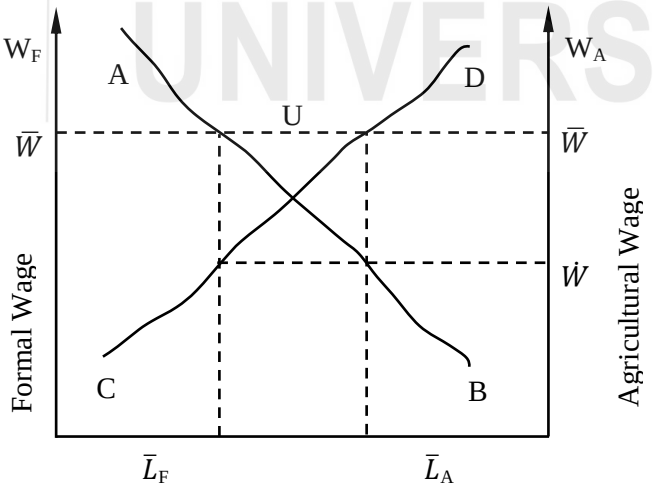

Fig. 2.8: A Floor on the Formal Wage

The figure captures the situation by drawing the minimum formal wage, $\bar{w}$ at a level that lies above the intersection of the two absorption curves. It follows that private-sector formal firms will hire no more than the amount L_F of labor at this wage. The wage in the agricultural sector must drop to $\dot{W}$. Only L_A can be soaked up in the agricultural sector. U denotes the size of unemployed pool. In both sectors, we have full employment, so that no individual job seeker needs to

fear unemployment if she looks for a job in either sector. Nonetheless, the wages, $\bar{w}$ and $\dot{W}$ are different. This cannot be an equilibrium state for the economy, because with full employment in both sectors, workers will wish to migrate to the sector with the higher wage.

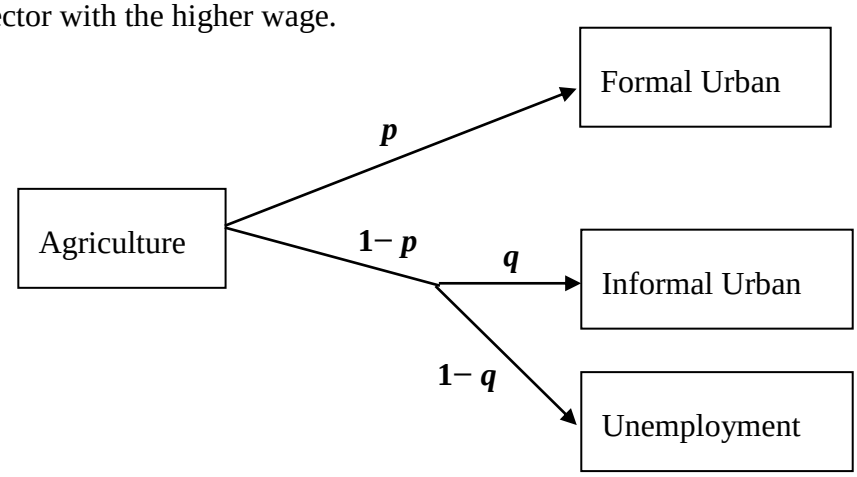

Fig. 2.9: Options Open to a Potential Migrant

The potential migrants choose between a relatively safe (though possibly unpleasant)option, which is to stay in the agricultural sector, and the gamble of moving to the urban sector, where a high-paying formal job may or may not be attainable. The probability of getting such a job is determined by the ratio of formal job seekers to available formal jobs.

In Fig. 2.9 the left set is single box agriculture with its wage $w_{A.}$ The right set describes various options open in the urban sector.

1) There is the formal sector at some high wage. The probability of obtaining such a job depends on the ratio of vacancies to job seekers. Denote this by p.
2) The wage rate in the informal sector is denoted by w_I and it is assumed to be fixed regardless of the number of people in that sector.
3) The expected value is calculated in the usual way: weigh each outcome by its probability of occurrence and add up over all outcomes. Thus, the expected wage in the urban sector is $p\ \bar{w} + (1 - p)\ w_I$
4) It is this expected wage that is compared to the wage in the agricultural sector.
5) The probability of getting an informal sector job, conditional on having been turned away from the formal sector is denoted by q.
6) Thus, after being turned away from the formal sector, the migrant manages to join the informal sector with probability q and remains openly unemployed with probability $1 - q$. The expected value of this latter set of possibilities is $q\ w_I + (1 - q)0 = q\ w_I$. Thus, the overall expected wage is now $p\ \bar{w} + (1 - p)\ q\ w_I$.

Suppose that we use L_I to denote informal employment. Then we can see that the ratio L_F/L_F+L_I captures the probability of getting a job in the formal sector. The

number of employed people L_F tells us how many jobs there are, whereas the number $L_F + L_I$ is the measure of the total number of potential job seekers. The ratio of the two thus gives us the chances that an urban dweller will get a job in the formal or informal sector.

Harris–Todaro equilibrium condition

Migration from the rural sector may be thought of as an irreversible decision, at least for the proximate future. Because the fate of a potential migrant is not known, we must consider the expected income from migration and compare it with the actual income received in agriculture. Thus, we may conclude that if

$$(L_F / L_F + L_I)\, \bar{w} + (L_I / L_F + L_I) w_I = w_A$$

we are at an equilibrium where no person wishes to migrate from one sector to the other.

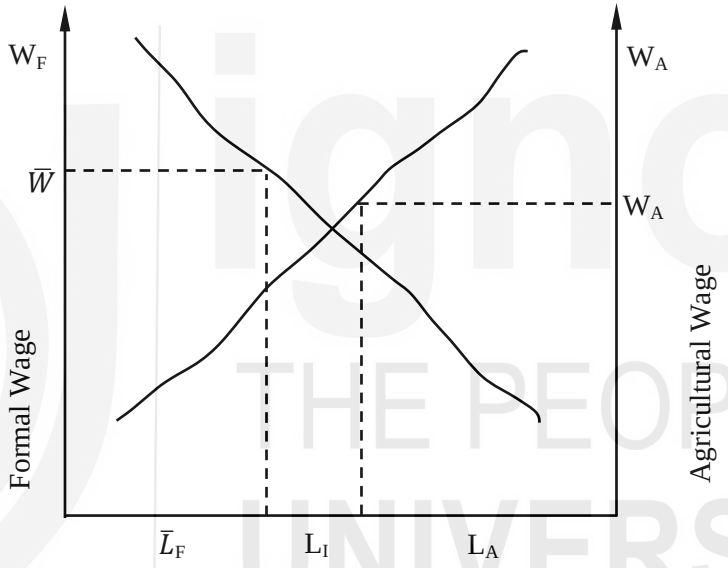

Fig. 2.10: Harris-Todaro Equilibrium

The equilibrium agricultural wage is given by w_A. L_A people are employed in agriculture, L_F people are in the urban sector and the remaining L_I take refuge in the informal sector where they obtain an income of w_I.

1) First, the equilibrium condition represents a situation where ex ante people are indifferent between migrating and not migrating; ex post, they will not be indifferent. The lucky subgroup who land a job in the formal sector will be very pleased that they did migrate, whereas those who seek solace in the informal sector will regret that they made the move.

2) Observe that the equilibrium concept implies a particular allocation of labor between the three sectors of the economy. This is because it is the allocation of labor that affects the perceived probabilities of getting a job.

3) The fundamental requirement is that expected wages are equalized over the two sectors for a migration equilibrium to be obtained, but these expectations may be the outcome of wages in three or more urban sectors (e.g., open

unemployment may be thought of simply as another sector in which wages happen to be zero) or in several sectors in agriculture.

Government Policy: The Paradox of Urban Job Creation

The informal sector is an outgrowth of the fact that the formal sector has wages that are too high, so that not everyone is capable of obtaining employment in this sector. At the same time, not everyone else can stay in agriculture as well, for that would make the formal sector look too attractive and induce a great deal of migration. The informal sector is a result of this migration. In the Harris–Todaro view, the informal sector acts as a necessary counterweight to the attractiveness of the formal sector and slows the pace of rural–urban migration.

Even though wages are fixed at $\bar{w}$, it is possible to generate additional demand for formal labor by offering urban businesses various setup incentives (such as tax holidays) or ongoing investment incentives (such as better treatment in the credit market). The government might itself expand the demand for formal labor by expanding the employment of public sector enterprises. The size of the urban sector is endogenous, and migration will rise in response to this policy.

The Effect on the Harris–Todaro Equilibrium Condition

Imagine that the formal labor demand curve shifts out and to the right, so that, in particular, labor demand at the wage rate rises from L_F to L_F'. In the short run, all this extra labor simply comes from the informal pool. This means that relative to the initial outcome, L_F rises and L_I falls. This raises the probability of getting a formal job. Consequently, the expected urban wage must initially rise.

But the initial increase cannot be fully persistent. Rural–urban migration picks up. More migrants enter the urban sector. Of course, they add to the informal sector, which after its initial decline, now begins to increase once again. This phenomenon sets in motion two related forces. First, as the labor force in agriculture falls, the agricultural wage tends to rise (by how much it rises will depend on the slope or elasticity of the agricultural absorption curve). Second, as migration continues, the expected urban wage once again begins to fall (relative to the initial sharp rise).

The fraction $L_F / L_F + L_I$ begins to move down as migration continues, and this brings down the probability of getting a formal job (relative to what prevailed just after the institution of the policy) and the expected urban wage drops with it.

With the agricultural wage climbing up and expected urban wage creeping down, the two are bound to come into line. We have fresh allocation of labor in three sectors (L_F',$L_A'L_I'$). The new allocation must satisfy new Harris-Todaro equilibrium condition.

With the agricultural wage climbing up and the expected urban wage creeping down, the two are bound to come into line once again. In the process, we have a fresh allocation of labor in the three sectors: ($\bar{L}'_F . \bar{L}'_A . \bar{L}'_I$)

$$\left(\frac{\bar{L'}_F}{\bar{L'}_F + \bar{L'}_I}\bar{w} + \frac{\bar{L'}_1}{\bar{L'}_F + \bar{L'}_I}w_I = w'_{A'}\right)$$

where $w'_{A'}$ denotes the new agricultural wage after the policy.

How do we compare the magnitudes? Recall that if the agricultural wage rises (or at least does not fall) after the introduction of the policy, it must be the case that the new expected wage in the urban sector exceeds the old expected wage. The only way in which this can happen is if:

$$\frac{\bar{L'}_F}{\bar{L'}_F + \bar{L'}_I} > \frac{\bar{L'}_F}{\bar{L'}_F + \bar{L'}_I}$$

In other words, if the share of the formal sector in total urban sector employment goes up. This is a beneficial implication of the policy: the informal sector does shrink, measured as a fraction of the total urban sector.

If the share of formal sector in total urban sector employment goes up, the informal sector does shrink (measured as a fraction of the total urban sector). Although it may be true that the informal sector shrinks as a fraction of the urban labor force, it is also true that the size of the urban labor force expands. If the latter effect dominates the former, the informal sector may well expand—an implication of a policy that was directly aimed at reducing the size of that sector. Attempts to increase the demand for labor in the formal sector may enlarge the size of the informal sector, as migrants respond to the better job conditions that are available. The migration effect may dominate the initial "soak-up effect.

Check Your Progress 2

Note: i) Use the space given below for your answers.

ii) Check your progress with those answers given at the end of the unit.

1) a) Graphically show the working of the Lewis-Ranis-Fei model of rural-urban migration. Discuss the role of labour as the factor that limits the expansion of the industrial sector in this model.

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b) Do you think that 'the industry supply curve' in the Lewis-Ranis-Fei model will be upward sloping irrespective of the prevailing agricultural wage? Explain?

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3) a) In the Harris-Todaro model, suppose the initial level of urban employment is E_U = 2 million, the total urban labor force is L_U = 3 million, the urban wage is fixed by law at W_U = 6 and the rural wage is W_R = 3. If the probability of finding a formal sector job is defined as $E_U/L_{U,}$

   i) Will a person who is currently in the rural sector find it optimal to migrate to the urban sector?

   ii) If the urban employment and urban and rural wages remain fixed, solve for the level of the urban labor force which will result in the post migration Harris-Todaro equilibrium.

   iii) Stating with initial situation how many rural people must migrate to the urban sector in search of jobs to achieve the equilibrium as obtained in part ii)

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b) Briefly explain the Harris-Todaro model of rural-urban migration and argue that despite acceleration in the rate of absorption of labor in the formal sector, the informal sector as a fraction of the total labor force increases.

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2.5 HUMAN CAPITAL: ROLE OF EDUCATION AND HEALTH IN ECONOMIC DEVELOPMENT

Education and health are basic objectives of development. They are ends in themselves. Both health and education are central to well-being and are fundamental to the broader notion of expanded human capabilities. These lie at the heart of the development. Education plays a key role in the ability of a developing country to absorb modern technology and to develop the capacity for self-sustaining growth and development. Health is a prerequisite for increases in productivity. Thus, both health and education are vital components of economic development.

Human capital can be defined as labour that is skilled, can handle sophisticated machinery and is innovative in using machines. Productive investments embodied in human persons, including skills, abilities, ideals, health and locations often resulting from expenditures on education, on-the-job training programs and medical care. Investments in human capital have to be undertaken with both equity and efficiency for them to have their potential positive effects on income.

2.5.1 Linkages Between Investments in Health and Education

Greater health capital may raise the return on investment in education for several reasons:

1) Health is an important factor in school attendance.
2) Healthier children are more successful in school and learn more efficiently.
3) Deaths of school age children also increase the cost of education per worker.
4) Longer life-spans raise the return to investments in education.
5) Healthier individuals are more able to productively use education at any point in life.

Greater education capital may raise the return to investment in health in the following ways:

a) Many health programs rely on skills learned in school (including literacy and numeracy).
b) Schools teach basic personal hygiene and sanitation.
c) Education is needed for the formation and training of health personnel.
d) Education leads to delayed childbearing, which improves health.

2.5.2 Investing in Education and Health: The Human Capital Approach

Human capital is the term, economists often use for education, health and other human capacities that can raise productivity. After an initial investment is made, a stream of higher future income can be generated from both expansion of education and improvements in health. As a result, a rate of return can be deducted and compared with the returns to other investments. This is done by estimating the present discounted value of the increased income stream made possible by these investments and then comparing it with their direct and indirect costs. The basic human capital approach focuses on the indirect ability to increase well-being by increasing incomes.

The impact of human capital investments in developing countries can be quite substantial. Higher levels of education start full time work at later age but their incomes quickly outpace those who started working earlier. But such future income gains from education must be compared with the total costs incurred to understand the value of human capital as investment. Education costs include direct tuition, books, uniforms and indirect costs primarily income foregone because the student could not work while in school.

Formally the income gains can be written as summation over expected years of working life where E is income with extra education, N is income without extra education, t is year, i is the discount rate.

$\Sigma (E_t – N_t)/ (1+i)^t$

An analogous formula applies to health such as improved nutritional status with direct and indirect cost of resources devoted to health compared with the extra income gained in the future as a result of higher health status.

2.6 THE GENDER GAP: DISCRIMINATION IN EDUCATION AND HEALTH

In many societies, the provision of old age support is thought to be exclusively the task of male offspring. Although support from female children is just as valuable, there may be a stigma associated with receiving support from daughters as opposed to sons. This bias is source of discrimination in favour of male children. Cain's (1981,1983) study of Bangladesh illustrates the importance of sons as support for widows: the ability of widows to hold on to land depends on whether they have able-bodied sons. This is especially true when property rights are either not well-defined or difficult to enforce by law.

Observable gender bias is a measurable indicator of differential treatment of boys and girls. With development, such bias indeed lessens as resource constraints loosen. A second sort of bias has to do with the intrinsic valuation of women in society and it feeds into perception of women as sources of old-age support. This increases with economic progress.

Young females receive less education than young males in most low-income developing countries. The educational gender gap is especially great in the least developed countries in Africa, where female literacy is less than half that of men. Empirical evidence shows that educational discrimination against women hinders economic development in addition to reinforcing social inequality. Closing the educational gender gap by expanding educational opportunities for women is economically desirable since it not only increases their productivity but also results in greater labour force participation, lower fertility, later marriage and greatly improved child health and nutrition.

2.6.1 Gender Inequality and Missing Women

Nobel laureate Amartya Sen concludes that the Sub-Saharan female male ratio of 1.022 as the benchmark yields an estimate of 44 million missing women in China, 37 million in India and total of these countries still in excess of 100 million. The main culprit of female infanticide has been neglect of female health and nutrition especially during childhood. In China the extent of neglect may have increased sharply since compulsory family restrictions (one-child policy in some parts of country) were introduced in 1979.

Check Your Progress 3

Note: i) Use the space given below for your answers.

ii) Check your progress with those answers given at the end of the unit.

1) Identify the elements of the human capital approach. Why are health and education so closely linked in the development challenge?

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2) How the preference for a male child leads to an increase in the rate of growth of population?

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3) Briefly explain the concept of 'Missing Women'? What are the consequences of gender bias?

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2.7 LET US SUM UP

Growth of population influences economic development both positively and negatively. The simplest negative effect is that population growth eats away at a given level of resources or income leaving less per head to go around. In Harrod-Domar model of economic growth labour is not regarded as an essential input of production (capital-output ratio is fixed.) This observation is naïve as increased population means more labour input which expands production. In Solow model these two effects cancel out and long run growth rates are unaffected by pace of population growth. However, there is a level effect, a higher rate of population growth pushes the economy to a lower trajectory of per-capita income. There are positive arguments as well. The demand side view states that population growth fosters spurt of development through innovation. The supply driven argument states that population growth fosters development because each human being acts as a repository of ideas and more human beings means more ideas put to use for the economic benefit of mankind. Thus, the rate of technical progress should increase with population size.

The most important structural transformation that a developing economy goes through is the change from a predominantly rural economy to an industrial economy. This inter-sectoral movement is typically accompanied by a move from traditional forms to modern forms of organization: an economy in which such forms coexist is often referred as dual economy. Development is characterized by

an ongoing move of labour and resources from a traditional sector to a modern sector. Lewis argued that the traditional sector is characterized by surplus labour. In principle this permits industrial development with unlimited supplies of labour until the surplus-labour phase comes to an end. We integrated the traditional and modern sectors into one interactive model. It turned out that the supply of labour to industry was perfectly elastic in the surplus-labour phase but began to rise as the available food surplus per-capita began to shrink and the terms of trade between agriculture and industry turned against the industry. The model brings out a fundamental tension between agriculture and industrial development: industrialists like to keep agricultural prices low because that ensures a low wage bill. Harris-Todaro model provides a theoretical framework in which formal sector wages have lower bounds or floors, whereas informal and agricultural wages are flexible. This thesis leads to a view of migration of equilibrium in which the formal sector is characterized by an excess supply of labour with the excess spilling over into the informal urban sector or manifesting itself in the form of open unemployment. Thus, it is not the wages that are equalized across the sectors but the expectation of wages in the Harris-Todaro equilibrium, the average of various urban wages weighted by the probability of employment in formal and informal sectors is equal to the agricultural wage. We also discussed about the Todaro paradox where an expansion of formal employment leads to an enlargement of the informal sector as fresh migrants from rural sector swarm into urban sector response to the policy. Gender bias plays an important role in understanding the connection between desire for old-age security, mortality and fertility. A family desires sons and this can greatly increase the fertility rates. Finally, we have explained the concept of human capital formation and linkages between investments in health and education.

2.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

1. See Sub-Section 2.2.1 & Section 2.2.2

2. See Section 2.3

3. See Sub-Section 2.3.2

Check Your Progress 2

1. See Section 2.4.2

2. See Section2.4.3

3. See Section2.4.3

Check Your Progress 3

1. See Section 2.4.1

2. See Section 2.4.2

3. See Section2.6.1