# BLOCK 5
# ECONOMICS OF EDUCATION

# BLOCK 5 INTRODUCTION

**Block 5** is on Economics of Education. This block also has two units (Units 10 and 11). **Unit 10** is on Human Capital. The linkage between health and education is first outlined. Different endogenous growth models like the neoclassical growth models, Solow Model and AK model is reviewed to show how the significance of education was captured only implicitly in these. The significance of education for economic growth, as can exclusively be considered in a production function approach, is discussed next. In this, the linkage between 'human capital investment, fertility and poverty' is explained. A theoretical treatment on the significance of 'expenditure for educational services' is given towards the end of the unit. This is done for theoretically determining the 'price of educational services'.

**Unit 11** is on Demand and Supply of Education. It brings out the distinction between the individual demand for education as contrasted with its social demand. The issue of supply of education is then presented in terms of budget equations by type of institution. A note on the role of industry in supplementing the efforts of the educational sector is also given.

# UNIT 10 HUMAN CAPITAL

**Structure**



## 10.0 OBJECTIVES

After reading this unit, you will be able to:

- define the term 'human capital';
- present an overview of the early contributors to the concept of 'human capital;
- differentiate between the concepts of 'human capital' and 'human capital formation';
- state the sources of 'human capital formation';
- distinguish between physical capital and human capital;
- indicate the linkage between health and education;
- prove that growth of capital per unit of labour, in the long run, is exogeneous;
- interpret the essence of 'Solow residual';
- discuss the importance of AK model in explaining the growth process accounted for 'technological change and human capital';

- show that in the production function framework, growth in per capita output is positively correlated with increase in 'human capital investment' (HCI);
- explain the relationship between HCI, Fertility (F) and Poverty (P); and
- estimate the expenditure 'per school aged child' for educational services.

## 10.1 INTRODUCTION

Human capital is the stock of knowledge embodied in human beings. It refers to the ability to perform a job, producing something of economic value. In broad terms it comprises of skills, training, experience, education, knowledge, know-how and competencies acquired by humans. The earliest idea of human capital can be traced back at least to Adam Smith in the 18th century. The modern theory of human capital was popularised by Gary Becker, Theodore Schultz, Robert Lucas and Paul Romer. Initially, only education was considered as human capital. But later, Becker pointed out that accumulation of knowledge capital depends also on the health status of the society. Thus, not only education, health status indicated by life expectancy, mortality and morbidity pattern and nutritional status of the children are also included in measuring human capital. According to Becker and Schultz, good health and nutrition enhance workers' productivity and healthier people who live longer have stronger incentives to invest in developing their skills as they expect to reap the benefits of such investments over longer periods. Better health increases workforce productivity by reducing incapacity, debility and number of days lost due to sick leave. Further, good health helps to forge improved levels of education by increasing the levels of schooling and scholastic performance. Health affects economic growth through its impact on demographic factors. Shorter life expectancies inhibit investment in education (and other forms of human capital) since there is greater risk that the individual may not survive long enough to benefit from investment. Additionally, larger proportion of dependent population, a consequence of lack of policy attention to increase human capital, has a detrimental effect on the rates of savings and capital and thereby on economic growth.

While Lucas gave emphasis on mass education as driving force of economic growth, Romer stressed on ideas (or research and development) as the key factor of economic growth. Lucas's interpretation of human capital is closer to population wide education – a social activity not directly related to the frontier knowledge (e.g. science and technology) as argued by Romer. Romer specifies three factors to make the distinction between physical capital and human capital. These are: (a) development of new knowledge has positive external effects on the production possibilities of other firms as knowledge cannot be perfectly patented and it is non-rival in nature; (b) creation of new knowledge does not exhibit diminishing returns; and (c) new knowledge is more profitable when it leads to more efficient production. Thus, while education is important for an individual, the social importance of

education has multiplier effects. This is because education: (i) raises peoples' productivity and creativity; and (ii) promotes entrepreneurship and technological advances.

While the concept of human capital refers to the abilities and skills of human resources of a country, 'human capital formation' refers to the process of acquiring and increasing the number of people with skills, good health, education and experience that are critical for economic growth. Sources of human capital formation may be listed as follows:

- increasing per capita public expenditure in education at primary, secondary and higher level with provision of education at primary, secondary and tertiary levels;
- providing health facilities which increases the life expectancy of the people;
- on the job training;
- allowing migration to individuals for change of jobs; and
- organising vocational training programmes for students and working class.

## 10.2 ECONOMICS OF EDUCATION

Economics of education is an applied field of study that allows for the systematic examination of the problems faced in promoting education for all. By applying the economic theories of consumer, producer and social choice, 'economics of education' aims at understanding the behaviour of individuals, education providers, public and private organisations and governments in decision-making in the context of overall development of a society.

Education is classified as a 'merit good'. This is because its consumption provides benefit to others besides the individual consumer. For instance, a well educated person is aware about the health benefits of immunisation compared to a person who is illiterate. Thus, education or knowledge accumulation generates both a private benefit as well as an external benefit. A merit good is thus a product that society values and judges that people should have regardless of their ability to pay. Education thus creates public and not purely private benefits. In this sense, the government acts paternally while providing merit goods and services. Individuals may not act in their own interest because of imperfect information. While it is a fact that education produce private benefits (e.g. skills that can be used to get a good job), it also produces significant public benefits (e.g. gains in public health, robust democratic participation, responsible citizenry, etc.). The reason that education is a quasi-public good or merit good is because education is supposed to advance goals like ensuring equal opportunity and giving every student access to good schooling which helps society in general.

### 10.2.1 Physical Capital and Human Capital

Both the physical and human capital are durable but there are some basic distinctions between the two. Physical capital implies non-human assets such as: (i) plant and machinery, (ii) tools and equipment, (iii) office supplies, etc. that help in the process of production. Human capital refers to: (i) stock of knowledge (measured by literacy rate and years of schooling), (ii) talent, skills and abilities (brought in by the employee to the organisation) and (iii) general health status of the masses (of the society) like life expectancy and morbidity pattern, etc.

Physical capital is tangible whereas human capital is intangible. Physical capital can be traded in the market but the services of human capital can only be hired. Physical capital is formed through technological progress and economic development whereas human capital is generated through society. Human capital originates and gathers momentum through societal culture, customs, mobility and interactions. Accumulation of physical capital does not necessarily imply accumulation of human capital. Human capital can generate positive externality to the society whereas physical capital does not possess such property. Physical capital can be separated from its owner but human capital cannot be so separated. The creation of physical capital is an economic process and does not take too much time whereas accumulation of human capital requires much time and patience. Physical capital can be transferred from one individual (say, A) to another (say, B). As a result, B's endowment of physical capital increases and A's endowment reduces. Such type of exchange can not be made in case of human capital.

Mobility of physical capital from one country to another is restricted by trade barriers whereas nationality and culture makes obstacles to move human capital from one country to another. Both the physical and human capital depreciates but physical capital depreciates at a constant rate as compared to human capital. It is the natural ageing which leads to the depreciation of human capital which can be minimised by proper medical intervention.

### 10.2.2 Linkage between Health and Education

Education of the poor helps improve their food intake not only by raising their incomes and spending on food but also by inducing them to make better and healthier choices. Educated persons tend to consume a healthier diet even when the total amount spent on food is held constant. The relationship between the three [(i) education, (ii) better health and (iii) life expectancy] involves causation in both directions. This is because greater health and lower mortality induce larger investments in education because the rate of return on investment in education is greater when the expected span of working life is also greater. Education has therefore been recognised as the primary determinant of human capital, although over time, health and nutritional expenditure too are recognised as major contributors to 'human capital investment'. In sum, therefore, education, health, nutrition, water and

sanitation all complement each other, with investments in any one contributing to better outcomes in the others.

**Check Your Progress 1** [answer within the given space in about 50-100 words]

1) Define the term 'human capital'.

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2) Differentiate between 'human capital' and 'human capital formation'.

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3) Distinguish between 'physical capital' and 'human capital'.

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4) How is the relationship between education and health bi-directional?

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## 10.3 ENDOGENOUS GROWTH MODELS

Traditionally, economic theory has given emphasis on physical capital accumulation to explain the source of economic growth in the short-run. In the long run, it has considered the exogenous technical progress as the determinant of growth. In the neoclassical growth models, the exogeneity of

technological progress is considered restrictive to explain the analytical capacity of the models.

### 10.3.1 Neoclassical Growth Model

The standard Solow growth model (1956) assumes that: (i) population growth in the long run is exogenously given (i.e. it grows at a constant rate but exponentially), (ii) the growth of capital per unit of labour depends on propensity to save and (iii) average productivity of output per unit of labour (per capita output) will increase if population growth declines. With these assumptions, the standard Solow-Swan growth model is derived by assuming the per capita output ($k = \frac{K}{L}$ where $K$ is capital and $L$ is labour) as given. Differentiating $k$ with respect to time 't', we get:

$$k = \frac{d}{dt}(k) = \frac{d}{dt}\left(\frac{K}{L}\right) = \frac{L.\frac{dK}{dt} - K.\frac{dL}{dt}}{L^2} = \frac{1}{L}.\dot{K} - \frac{K}{L}.\frac{\dot{L}}{L} \qquad (10.1)$$

Net investment is both the addition to the stock of capital (K) over time (i.e. $\dot{K}$) and also the difference between gross investment (I) and depreciation of capital (K). We can therefore write: $\dot{K} = I - \sigma K$ where σ denotes the rate of depreciation of capital. Since population (labour force) grows at a constant rate (n) and follows an exponential function we have: $L_t = L_0.e^{nt}$ or $\frac{\dot{L}}{L} = n$. From Equation (10.1), we can write:

$$k = \frac{1}{L}.\dot{K} - \frac{K}{L}.\frac{\dot{L}}{L} = \frac{(I - \sigma K)}{L} - k.n = \frac{(S - \sigma K)}{L} - k.n$$

$$= \frac{(sY - \sigma K)}{L} - k.n = s\frac{Y}{L} - \sigma.\frac{K}{L} - k.n = s.y - k(\sigma + n) \qquad (10.2)$$

[since $I = S$ (savings) in equilibrium, $S = sY$ with 's' as propensity to save] where Y is income so that $y = \frac{Y}{L} = f(k)$. Dividing both sides of Equation (10.2) by $k$, we get:

$$\gamma = \frac{\dot{k}}{k} = s\frac{y}{k} - (\sigma + n) = s.\frac{f(k)}{k} - (\sigma + n) \qquad (10.3)$$

where, γ denotes rate of growth of physical capital per unit of labour, $k$ stands for physical capital per unit of labour, $s$ is the average (= marginal ) propensity to save and σ is the rate of depreciation of physical capital. Thus, if $\rho$ is the population growth rate, then as $\rho$ increases, $\gamma$ falls and vice-versa. In a steady state situation, capital per unit of labour depends on the propensity to save ($s$), technology and population growth rate. Further, as population growth decreases, steady state capital per worker will increase. This means, in steady state γ = 0, equilibrium capital per worker

$k^* = \left(\frac{sA}{\rho+\sigma}\right)^{\frac{1}{1-\alpha}}$ and steady state output $Y_t^* = A^{\frac{1}{1-\alpha}}.\left(\frac{s}{\rho+\sigma}\right)^{\frac{\alpha}{1-\alpha}}.L_t$ If the production function is of Cobb-Douglas type giving constant returns to scale as: $Y_t = AK_t^{\alpha}L_t^{1-\alpha}$ [where, $\alpha$ is share of capital in total output and $(1-\alpha)$ is the share of worker in total output, $0< \alpha <1$, a model which has been used widely to study the conditional convergence in growth empirics across countries], in the long-run growth being exogenous, in the absence of continuing improvements in technology, per capita income growth eventually ceases. This is known as convergence theory.

### 10.3.2 Solow Residual

Empirical evidence of neoclassical growth model explains about half the variation in growth. The remainder, called the Solow Residual (SR), is a measure of our ignorance of the determinants of economic growth. The Solow residual is a number describing productivity growth in an economy (from year to year and decade to decade). Solow defined the rising productivity as 'rising output with constant capital and labour input'. It is a 'residual' because it is the part of growth not accounted for by measures of capital accumulation or increased labour input. The Solow Residual is pro-cyclic (i.e. it generates a cycle) and its measure (called multifactor productivity or total factor productivity) is derived by considering a production function like Cobb-Douglas exhibiting constant returns to scale as specified below:

$$Y(t) = [K(t)]^{\alpha}[A(t).L(t)]^{1-\alpha} \qquad (10.4)$$

where *Y(t)* represents the total output in an economy (the GDP) in some year *t, K*(*t*) is capital in the productive economy (measured as the combined value of all companies in a capitalist economy) and *L*(*t*) is labour i.e. the number of working people or the labour force. Growth models being long-run models they ignore cyclical unemployment effects, assuming instead that the labour force is a fraction of an expanding population. *A*(*t*) represents multifactor productivity (often generalised as 'technology' including soft skills like good communication with labour). Equation (10.4) can be alternatively written as: $Y(t) = [K(t)]^{\alpha}[A(t)]^{l-\alpha}.[L(t)]^{l-\alpha}$. Differentiating this with respect to time (t), we get:

$$\frac{\delta Y}{\delta t} = [A(t)]^{1-\alpha}.[L(t)]^{1-\alpha}.\alpha.[K(t)]^{\alpha-1}.\frac{\delta K}{\delta t} + [A(t)]^{l-\alpha}.[K(t)]^{\alpha}.(1-\alpha).[L(t)]^{-\alpha}.\frac{\delta L}{\delta t} +$$
$$[K(t)]^{\alpha}.[L(t)]^{l-\alpha}.(1-\alpha).[A(t)]^{-\alpha}.\frac{\delta A}{\delta t}$$

Dividing both sides by *Y*(*t*), and subsuming observed values into the two respective coefficients, we get:

$\frac{\dot{Y}}{Y} = \alpha.\frac{\dot{K}}{K} + (1-\alpha).\frac{\dot{L}}{L} + (1-\alpha).\frac{\dot{A}}{A}$. Thus, the SR is defined as:

$$SR = \frac{\dot{Y}}{Y} - \left[\alpha.\frac{\dot{K}}{K} + (1-\alpha).\frac{\dot{L}}{L}\right] \quad (10.5)$$

Solow's theory helps to clarify the role of accumulation of physical capital and emphasise the importance of technological progress as the ultimate driving force behind sustained economic growth. Human capital in the Solow model is not linked to the dissemination of technological change [as it is in Romer (1986) and Lucas (1988)] but is strictly exogenously determined. The human capital or endogenous growth can be derived from Solow's version (of exogenous growth) by incorporating the human capital into the production function. Any activity including innovation and technical improvement is pursued continuously only if people are rewarded for it. A production process would not be continuously improved if the innovators were outside the economy. Hence, only the producers of goods are motivated to introduce new products or find ways to improve their productivity to increase profitability. The new growth economists were therefore of the view that technological change is generated by the day to day economic activity and hence is endogenous to the model of growth.

According to the endogenous growth theory, a firm that accumulates physical capital to produce goods will also gather knowledge specific to that production process. Since the technological knowledge comes from learning by doing, it is the capital that initiates this change. Thus, technological knowledge is itself a kind of capital that yields increasing returns (or at least constant returns) but never diminishing returns owing to its spillover effects. Further, knowledge once created can be re-used with zero cost and almost no depreciation as old knowledge builds new knowledge.

### 10.3.3 AK Model

The AK model is the basic version of an endogenous growth model. This model uses the term Technology to include both technological change and human capital. The AK model assumes constant exogenous savings rate and a fixed level of technology. The rationale for this assumption is that the 'production function does not accommodate for diminishing returns to capital'. This means, if we invest one unit of capital, return from that capital will be higher than one unit. Consider the AK model for a closed economy as:

$$Y = AK \quad (10.6)$$

where the production function is explicitly dependent only on capital with $A$ as a positive constant reflecting the level of the technology. Output per worker can be written as:

$$y = Ak \quad (10.7)$$

where A > 0. From Equation (10.3), we have the equation for steady state as:

$$\gamma = s.\frac{f(k)}{k} - (n+\sigma) \Rightarrow \gamma = sA - (n+\sigma) \qquad (10.8)$$

If the technology is *AK*, then the saving curve $s.f(k)/k$ is a horizontal line at the level of $s.A$ (Figure 10.1). If $s.A > (n+\sigma)$, then perpetual growth occurs even without technical change. From Figure 10.1 it follows that $\gamma_k$ is the vertical difference between $s.A$ and $(n+\sigma)$. If $s.A > (n+\sigma)$, it implies $\gamma_k > 0$. Since the two lines are parallel, $\gamma_k$ is constant and is independent of $k$. Thus, since, $y = Ak$ implies $\gamma_y = \gamma_k^*$ at every point in time, the steady state growth path is: $\gamma = \gamma^* = sA - (n+\sigma)$

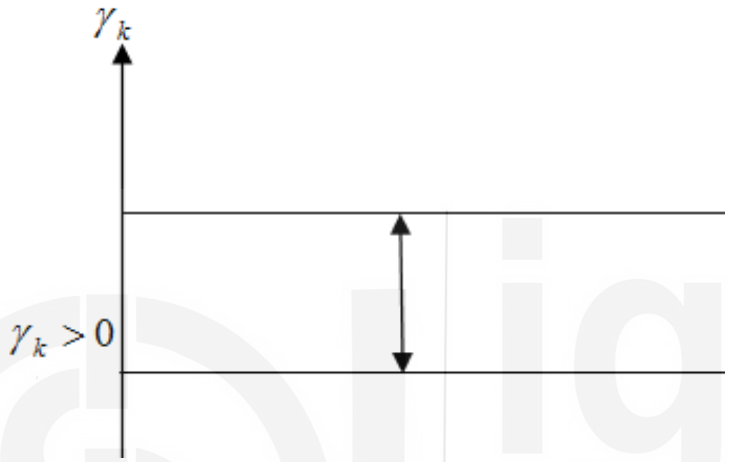


**Fig. 10.1: Steady State Growth Path in AK Model**

The economy described by the AK technology can display positive long run per capita growth without any technological progress. The per capita growth rate depends on the behavioural parameters of the model such as the savings rate and the rate of population growth. Thus, unlike in the neoclassical model, if the savings rate is high then the long run per capita growth will also be high. If the level of the technology (*A*) improves then also the long run growth will be high.

The AK model is an endogenous growth model used in a sub-field of modern macroeconomics. In the 1980s, it became progressively clearer that the standard neoclassical exogenous growth models were theoretically unsatisfactory as tools to explore long run growth. This is because these models predicted economic growth without accounting for technological change and thus would eventually converge to a steady state with zero per capita growth. A fundamental reason for this is the diminishing return of capital whereas the main property of AK endogenous-growth model is the absence of diminishing returns to capital.

**Check Your Progress 2** [answer within the space given in about 50-100 words]

1) Under the neo classical growth model, is 'human capital' directly or otherwise accounted?

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2) Does Solow in paying attention to the residual growth rate accord exclusively any weight to human capital element?

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3) Indicate the expression of SR and state how it is useful?

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4) Is the AK model an improvement over its predecessors? How?

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## 10.4 EDUCATION AND ECONOMIC GROWTH

In models of neoclassical economic growth, physical capital in the form of machines, land, assets, buildings, infrastructure, etc. have been given a central place while the role of labour has remained peripheral. In explaining Solow Residual (SR), educational attainment like schooling or enrolment has been given a central place. Given these, in this section, we shall first take a look at the production function approach to human capital formation and then examine the linkage between human capital formation, fertility and poverty.

### 10.4.1 Production Function Approach

Following the endogenous growth model, we consider here an implicit production function like:

$$Y_t = Y(K_t, H_t, L_t) \qquad (10.9)$$

where $Y$ = aggregate output, $K$ is physical capital, $H$ is human capital (like mean years of schooling, enrolment ratio, life expectancy, etc.) and $L$ is the labour force. We have deliberately separated human capital from labour in order to distinguish unskilled labour from skilled labour.

Differentiating Equation (10.9) with respect to time t, we get:

$\dot{Y} = \frac{\partial Y}{\partial L}\dot{L} + \frac{\partial Y}{\partial K}\dot{K} + \frac{\partial Y}{\partial H}\dot{H}$ Dividing throughout by $Y$ and subtracting $r = \frac{\dot{P}}{P}$ (viz. rate of growth of population) from both sides, we get:

$$\frac{\dot{Y}}{Y} - \frac{\dot{P}}{P} = \left(\frac{\partial Y}{\partial L}\right).\frac{L}{Y}.\frac{\dot{L}}{L} + \left(\frac{\partial Y}{\partial K}\right).\frac{I_K}{Y} + \left(\frac{\partial Y}{\partial H}\right).\frac{I_H}{Y} - \frac{\dot{P}}{P}$$

$$\Rightarrow \frac{\dot{y}}{y} = \frac{MP_L}{AP_L}.n + MP_K.\frac{I_K}{Y} + MP_H.\frac{I_H}{Y} - r$$

where 'n' = $L/L$'rate of growth of labour force'. The left-hand side of the above equation represents the growth in per capita output. We assume that: (a) gross investment is equal to net investment (i.e. rate of depreciation of physical and human capital is zero) and (b) $AP_L = MP_L$ in the long-run. Therefore, the above expression becomes:

$$\frac{\dot{y}}{y} = (n - r) + MP_K.\frac{I_K}{Y} + MP_H.\frac{I_H}{Y} \qquad (10.10)$$

In the standard Solow-Swan growth model, it is assumed that n = r but in reality n ≠ r. Moreover, in less developed economies, r > n because of slow demographic transition. In fact, in the 3rd or last stage of demographic

transition, most of the developed economies have witnessed n > r which results in demographic dividend (i.e. rising share of working population). An increase in 'n' or a decrease in 'r' results in an increase in per capita growth of output. Since marginal productivity of physical and human capital is positive, an increase in share of investment in physical and human capital of total output results in higher growth in 'per capita output'.

Equation (10.10) shows that the share of human capital investment (comprising educational and healthcare spending) in total output bears a positive effect on the growth of 'per capita income'. The same is also found to be the case for physical capital. Further, the marginal productivity of human capital ($MP_H$) being positive and $MP_H$ can be interpreted either by considering education or health as human capital, $MP_H$ can be considered as 'marginal increase in output/income ($Y$) due to one unit increase in years of schooling'. In the same way, if we consider health as human capital, incremental increase in output per capita can be considered as due to one unit increase in life expectancy (i.e. $MH_{\text{H}}$).

### 10.4.2 Human Capital Investment, Fertility and Poverty: Linkage

The population of a poor country is not uniformly poor. This means, there is persistent poverty relative to degree of income inequality. One of the most visible manifestations of this inequality is the wide spread dispersion in educational attainment and health outcomes. Given that there is a two way causality between income and human capital (vide Sub-section 10.2.2), there is a demand side effect of income on human capital. Household choices with regard to fertility being strongly conditioned by the social environment, with the potential to affecting the demographic structure of the society, we need a theoretical model to describe fertility (F), human capital (H) and poverty (P).

If an economy is characterised by small families, labour is relatively scarce and consequently adult wages are high. An alternative situation could be one in which adult wages are low, families are so poor that all children must work and family decides to have many children. In such a situation, poor families will not send their children to school due to loss in opportunity cost. Secondly, technology is such that adult and child labour could be substitutes. Thus, in poor families, children become capable of providing net economic benefits to the family. This factor becomes an incentive to the poor parents to prefer more children indirectly affecting the health of the mothers. The demographic structure generated by such fertility choices yields low wages. In such an environment, it is individually optimal to have many children in order to avoid situation of destitution. To break such low level trap of human capital accumulation, government intervention is needed. In order to attract children in schools especially from the poor families, the government needs

to initiate special programmes (like mid-day meals, free books, free school dress, free cycles etc.) to increase human capital formation.

An exogenous increase in expenditure on education and healthcare directly benefits the poor people. Since private schooling and healthcare are expensive, in less developed economies with wide spread incidence of poverty, public expenditure in 'social sector' (i.e. education and healthcare) gives higher returns both in the short as well as the long run to the society. In this, returns from primary education is found to be higher compared to secondary and higher education. Just as poor people cannot afford to send their children to privately run schools, they cannot purchase private healthcare. Therefore, in the long run, at the aggregate level, the health stock of the poor people can be increased by increased public expenditure on health by way of immunisation of children, post and pre-natal care for mothers, etc. As the survival probability of each child increases, parents would not find the need to insure themselves by having more children. Conversely, decline in child mortality increases the probability of survival to adulthood thereby reducing the need to have a large family. In other words, both the adult and child mortality declines induce a quality-quantity trade-off. In the case of a decline in adult mortality, increases in educational investments, driven by expected higher future return, will result in a reduction in fertility. With decline in child mortality and fall in fertility, parents would be motivated to increase educational investments on their children. Though accumulation of human capital stock through schooling is a long-run phenomenon, as a result of accumulation of human capital the productivity of the labour force goes up. This, in turn, increases the 'growth in output' of the economy. Since human capital at the aggregate level is non-decreasing, the growth in output will be sustained by multiplier effect. With sustained growth, the migration of people from primary to secondary and secondary to tertiary sectors would be facilitated over time. This would, in turn, lead to demand for fewer children and increase in per child investment in education. The mechanism through which falling fertility is observed to contribute to the multiplier effect are: (i) female education (which raises the opportunity cost of time of the mothers) and (ii) negative income elasticity for the number of children. Reduction in poverty and fertility, as a result of exogenous influence of human capital investment, can be more clearly gathered with the help of a flow chart as shown in Fig. 10.2.

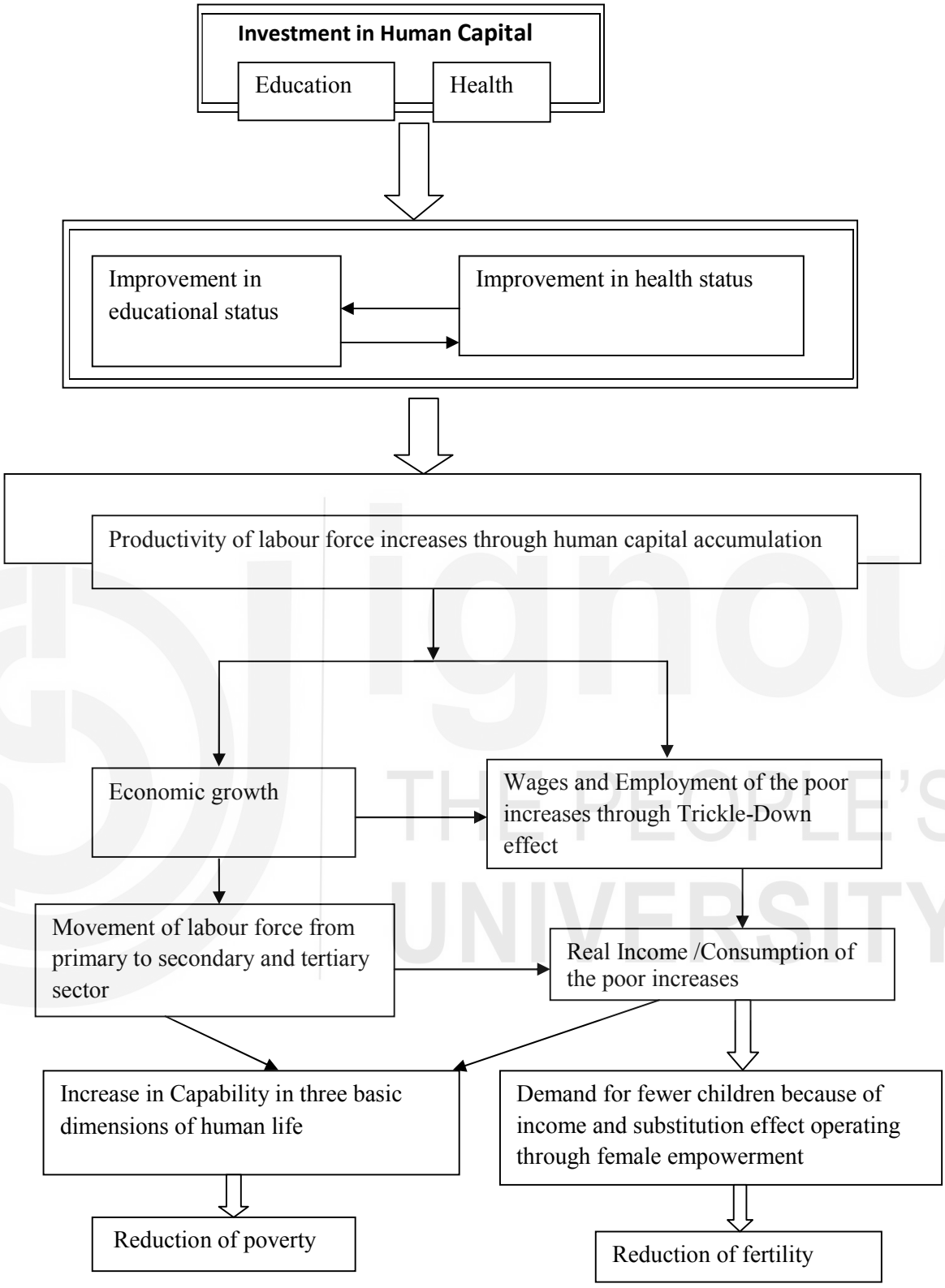


**Fig. 10.2: Flowchart Depicting Links between Human Capital Investment, Poverty and Fertility**

## 10.5 EXPENDITURE FOR EDUCATIONAL SERVICES

In this section, assuming that the technological possibilities for producing educational services are identical across countries, we try to formulate/model the mechanism for determining the 'price of educational services' in a democratic set up. The production function for educational services is assumed to exhibit constant returns to scale in the long-run. This assumption is realistic at least for primary and secondary school education. Thus, assuming the elasticity of substitution between labour and capital to be one, the production function in the standard Cobb-Douglas form is:

$$X = ZL^{\alpha}K^{1-\alpha} \tag{10.11}$$

where $X$ is output of educational services, $L$ is labour input, $K$ is physical capital, $\alpha$ is the share of wages in output, $(1 - \alpha)$ is the share of capital in output and $Z$ is a set of exogenous factors accounting for technological shifter that affects the unit cost of producing educational services (including many other factors neutral to labour and capital productivity in use). One such technological factor, for instance, could be the distribution of the population. This is in the sense that differently dispersed population groups would incur differing private and public costs in providing quality schooling services to their children. It is assumed that rapid population growth, which strains the capacity of the government to provide desired school services is subsumed (i.e. included) in $Z$. The political process is assumed to be democratic in the sense that services and its associated tax burden have the majority support of voting population. The essential idea here is that public as well as private institutions tend to optimise their input allocation and production decisions subject to constrains of consumers income and perceived benefits from output. It also includes the effect of technological possibilities and relative input prices to factors of production.

The educational sector minimises its unit cost of producing educational services by focusing on bringing down its 'marginal cost or price of schooling services' ($P_x$). $P_x$ can therefore be expressed as a multiplicative function of wage ($W$) paid to labour (teacher) and the interest rate ($r$) paid on capital. Under a perfectly competitive equilibrium, where price is equal to AC (=MC), the unit price of educational services based on Equation (10.11) can be expressed as:

$$P_X = \frac{1}{Z}\cdot\left(\frac{W}{\alpha}\right)^{\alpha}\cdot\left(\frac{r}{(1-\alpha)}\right)^{1-\alpha} \tag{10.12}$$

We consider an international perspective where the capital markets are better integrated for yielding efficient returns. In such a context, the rate of return on capital ($K$) over time depends mainly on the real wage ($W$) and the exogenous factors ($Z$). Thus, the estimates of elasticity of Z and W could be obtained from:

$$P_X = e^{\beta_0}.Z^{\beta_1}.W^{\alpha}.e^{u_1} \tag{10.13}$$

where $\beta_0$ is constant, $\beta_1 = -1$ and $u_1$ is a multiplicative error term affecting unit cost or price. We can estimate Equation (10.13) by using the labour's share of educational expenditure α. Assuming that the quantity of schooling demand (by the median voter $q$) is log-linear in the tax ($t$) of tax-payers' income ($y$), we can estimate:

$$q = D.t^{\eta}.y^{\delta}.Z^{\varepsilon}.e^{u_2} \tag{10.14}$$

where $u_2$ is the multiplicative error term in the demand function. Therefore, the expenditure 'per school aged child' (E/P) can be obtained by multiplying quantity demanded ($q$) by price ($P_X$) where the general tax rate is assumed equal to the marginal cost or price ($P_X$) of schooling services. Therefore, expenditure per child (E/P) can be estimated as:

$$E / P = D.y^{\delta}.P_X^{\eta+1}.Z^{\varepsilon}.e^{u_2} \tag{10.15}$$

Substituting the price relating to production technology from Equation (10.13) in Equation (10.15) and taking log on both sides, the partial effects of income, relative prices and technological shifter, the 'public expenditure on education per child' (expressed as a combination of underlying household demand and production technological parameters), we have:

$$\ln(E / P) = b_0 + b_1 \ln y + b_2 \ln W + b_3 \ln Z + \upsilon \tag{10.16}$$

where, $b_0 = (\eta + 1).\beta_0 + \ln D$, $b_1 = \delta$, $b_2 = \alpha(\eta + 1)$, $b_3 = (\eta + 1).\beta + \varepsilon$

In Equation (10.16), the error term ($\upsilon$) combines the effect of variations in production technology and household demand relationship. '$v$' is assumed to be independent of y and Z. Knowledge of labour share, α, is to be used in the identification of price elasticity $\eta$. The net effect of income $\delta$ and the Z factors (determined by cohort of school going children, fertility, urbanisation and density of population) on educational inputs and outputs needs to be inferred from the estimates of reduced form of Equation (10.16).

**Check Your Progress 3** [answer within the space given in about 50-100 words]

1) In the standard endogeneous growth models, what is the assumption made on human capital? What improvement is made in the formulation

of analytical framework to accommodate the contribution of 'human capital' here?

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2) Why is governmental intervention necessary in developing economies to break the low human capital trap?

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3) State the two factors which contribute in the mechanism through which falling fertility results in higher investment in 'per child investment in education'?

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4) State the expression for estimating the unit price of educational services in an economy under conditions of perfectly competitive equilibrium. State also the expression for estimating the 'expenditure per child'.

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## 10.6 LET US SUM UP

Indicating the linkage between health and education, the significance of endogeneous growth models in enhancing the share of 'human capital formation' is highlighted in the unit. The potential of production function approach in disentangling the contribution of human capital is explained. The linkage between 'human capital investment', fertility and poverty is delineated. Stressing the importance of increased public expenditure on education and health, particularly in developing countries, an analytical framework for estimating the 'price function' to obtain the 'expenditure per school aged child' is discussed.

## 10.7 KEY WORDS

**Human Capital** : Refers to (i) stock of knowledge measured by literacy rate and years of schooling, (ii) health status of the population measured by life expectancy and quality of life index and (iii) talent, skills and abilities brought in by the employee to the organisation.

**Marginal Productivity of Human Capital ($MP_H$)** : If we consider, human capital as literacy rate or years of schooling, $MP_H$ can be interpreted as the incremental change in total output (viz. Y) due to one percent increase in literacy rate or years of schooling.

**Merit Good** : Consumption of a good, which generates positive externality to the society at large, is defined as merit good. In such cases, social benefits exceed private benefit and such a good either can be produced by the private as well as public sector.

**Solow Residual** : Refers to an empirical expression developed by Solow to explain the contribution to growth besides that by explicit accounts of two factors of production viz. labour and capital.

## 10.8 SOME USEFUL BOOKS AND REFERENCES

1) Basu K and P H Van (1988). 'The Economics of Child Labour', American Economic Review, Vol. 88, No. 3 (Jun.), pp. 412-27.

2) Lucas R E (1988). 'On the Mechanics of Economic Development', Journal of Monetary Economics, 22, 3-42.

3) Romer P (1986). 'Increasing Returns and Long-Run Growth', *Journal of Political Economy*', 94 (5):1002-1037.

4) Schultz, T P (1988). 'Education Investments and Returns', Chapter-13, Handbook of Development Economics, Volume-1, 543-630.

## 10.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

**Check Your Progress 1**

1) It is defined as the stock of knowledge embodied in human beings. Such knowledge is acquired by formal education, practical training, etc. Persons with human capital skill are thus identifiable as 'trained or skilled persons' as opposed to those who are not i.e. unskilled persons.

2) Human capital refers to abilities and skills; human capital formation refers to the processes through which higher competencies are acquired (e.g. increasing public per capita expenditure on school education).

3) Physical capital is tangible (i.e. felt like machines, equipments) whereas human capital is intangible (not felt physically but experienced in terms of better behaviour, knowledge, culture, etc.). Human capital generates positive externality to society whereas physical capital does not do so.

4) Better health induces larger investments in education and 'rate of return' on education is greater when life expectancy and thereby working life span is greater.

**Check Your Progress 2**

1) Population is assumed to grow at a constant rate (n) and capital per unit of labour (i.e. capital-labour ratio) is assumed to depend on 'n'. No exclusive factoring of knowledge or skill component is made.

2) The human capital (HC) can be derived from Solow's version by incorporating the human capital into the production function. But once again no direct infusion or consideration is made even here just like in the neoclassical models.

3) $SR = \frac{\dot{Y}}{Y} - \left[\alpha.\frac{\dot{K}}{K} + (1-\alpha).\frac{\dot{L}}{L}\right]$. By exogeneously determining HC it emphasises the importance of technological progress as the driving force behind sustained growth.

4) In the AK model, the per capita growth in output depends on the behavioural parameters viz. savings and rate of population growth. This is an improvement over the neoclassical models which predicted economic growth without accounting for technological change. By assuming the absence of diminishing returns to capital, the emphasis is brought on technological improvement. Thus, for long run prediction, this model is an improvement over its predecessors.

**Check Your Progress 3**

1) That the rate of depreciation in human capital (as well as physical capital) is zero. Human capital and labour force are given exclusive exogeneous places. By doing this, unskilled labour is distinguished from skilled labour.

2) The opportunity cost of having more children and using them to enhance household income by sending them to work rather than to school, sets a low level of human capital accumulation in developing countries. This needs governmental intervention by special schemes to promote and motivate sending children from poor families to school.

3) Female education and negative income elasticity for the number of children.

4) Equations (10.12) and (10.15).

# UNIT 11 DEMAND AND SUPPLY OF EDUCATION

**Structure**



## 11.0 OBJECTIVES

After reading this unit, you will be able to:

- state the underlying rationale for investment in education by an individual and the State;
- specify the Mincerian wage equation to indicate the relationship between individual investment in education and income;
- explain the 'rate of return' approach to reveal the motivation for private investment in education;
- distinguish between the private demand and social demand for education;
- outline the argument 'for' the role of state in investing in the education sector (ES);
- describe the contextual factors that justifies the differing funding arrangements for private and public institutions in the ES; and
- discuss the 'role of industry' in complementing the supply of educated workforce to the economy.

## 11.1 INTRODUCTION

The individuals invest in education because it enhances the income earning potential at his own or household level. In other words, the individuals demand education because it helps them to increase their productivity at work. The state supplies education, sometimes at subsidised rate, because of its contribution to the economic growth of the country. The rationale for supply of education is also drawn from the enhancement of capability of individuals (as argued by Prof. Amartya Sen). Apart from the rationale of providing education by the State, there also exist private universities and schools providing education but they do not provide education at subsidised cost. Before understanding the demand and supply considerations of education, it is important to understand the nature of education as a 'good'. It is this nature of education that distinguishes itself from other goods and as a result the nature of market for education in also different from a perfectly competitive market.

Education is provided broadly at two levels: at school level and at the higher education level. At school level, education is said to be a merit good. A merit good is a good which is deemed important to be had by an individual and society due to its need and not the willingness to pay. The decision making at school level is undertaken by the parents, who may fail to realise that education attainment leads to generation of externalities, not only the family but for society at large. For instance, an educated person could: (i) help family enjoy better health status, (ii) secure a job helping reduce the possibility of crime in the society, (iii) be better aware of ones' rights, (iv) help create awareness about social issues around them, etc. The benefits gained by such externalities would be delayed in a poor society, where there are economic reasons for parents to push the child towards child labour, in order to earn some more income for the family. Such poverty stricken families may choose not to make a demand for education at all. In such circumstances, the government must facilitate the access to education since they know that the externality benefits enjoyed by the society would be large.

The second broad level of education is higher education, which is the post-school level of education. Higher education is essentially a quasi-public good, because it has the features of both a private good and a public good. It is a private good because the benefits of higher future streams of income largely reached the individuals and their family. However, it also represents the features of a public good, through the externalities that it generates as outlined above. Given these factors, the present unit exposes the learners to the various issues governing the demand for education at individual and societal level and the supply of education from the different providers of education viz. the public sector, the private sector and the public-private partnership modes.

## 11.2 INDIVIDUAL DEMAND FOR EDUCATION

As already discussed, at the school level, particularly primary level, it is a merit good which would be provided by the government regardless of the individual or family choice. Thus, much of the demand for education is confined to higher levels of education. At the higher level of education, there are private benefits which endows the individuals with knowledge and skills enhancing their productivity levels. This helps in creating possibility of future income streams thereby making higher education an 'investment good' to the individuals. Demand for this investment good is therefore determined by weighing the costs to be incurred with the benefits to be received. However, the determination of demand is not straightforward like any other commodity in the market where only the knowledge of price of good and/or quality suffice. This is due to factors like: ability of the individual, uncertainty in labour market, information asymmetry, etc.

### 11.2.1 Mincerian Wage Equation

The relationship between investment in education and income is specified by a simple model proposed by Jacob Mincer, and hence called as the Mincerian wage equation. This is stated as:

$$LnW_i = \alpha + \beta S_i + U_i \qquad (11.1)$$

where $W_i$ refers to the wages and $S_i$ refers to the years of schooling. The log linear function is considered to obtain the 'rate of return' to the number of years of schooling which is given by the co-efficient to $S_i$ viz. $\beta$. Thus, $\beta$ is the 'rate of return' to the marginal year of schooling i.e. a percentage change in wage for an additional year of schooling. The change in the wage for every extra year of schooling increases with increase in the level of schooling by one unit i.e. the specification indicates an increasing returns to education. Further, since the productivity is enhanced not just by the level of schooling but also by the on-the-job training received, the Equation (11.1) is extended to include experience, say X. Thus, the wages become dependent not only on the number of years of schooling but also on the years of labour market experience. Further, to provide for the productive efficiency of labour declining in performance with age, the square of experience (i.e. $X^2$) is added as a third factor. The Equation (11.2) therefore becomes quadratic as:

$$LnW_i = \alpha + \beta S_i + \gamma_1 X_i + \gamma_2 X_i^2 + U_i \qquad (11.2)$$

Equation (11.2) implies that with every unit increase in experience, the increase in wages would result in a diminishing rate. In other words, with an increase in one unit of experience, the rate of increase in wages would be initially positive but would subsequently fall. The diminishing rate sets-in because, with age, the productivity of an individual falls.

## 11.2.2 Rate of Returns Approach

An individual seeking to acquire higher education weighs both the costs and benefits before making an investment decision in education where to assess the latter they take the future income streams. On the side of costs, it would include both the direct cost (i.e. tuition fees, purchasing books, etc.) as well as the indirect cost (i.e. the opportunity cost referring to the forgone earnings of individuals). Due to these costs, an individual assesses the economic value of his investment in education through its 'rate of return'. They would invest at a rate where the benefits from education is equal to the cost of investment in education i.e. so long as the benefits exceeds the costs, there would be an incentive for him to keep investing and with the costs exceeding the benefits, there would be a deterrence from investing further. Since benefits are accrued at a future date, the decision would be based on the present value of the expected future net income streams. Costs would pertain to the period spent in schooling.

The rate of return to an investment in a given level of education is estimated by finding out the rate of discount (r) which is expected to equalise the stream of discounted benefits with the stream of costs. For instance, if a university education at Masters Level ($m$) is acquired over 2 years after acquiring an undergraduate degree ($u$), and it is assumed that an individual works for 33 years after his acquiring the master's degree, then the 'rate of discount' is estimated as:

$$\sum_{t=3}^{36}\{(W_m - W_u)\frac{1}{(1+r)^t}\} = \sum_{t=1}^{2}(W_u + C_m)(1+r)^t \qquad (11.3)$$

where ($W_m - W_u$) is the earnings differential between a masters' graduate and a undergraduate, $C_m$ refers to the direct costs incurred while acquiring the masters' degree (tuition, fees, books) and $W_u$ is the student's foregone earnings or indirect costs (Fig. 11.1).

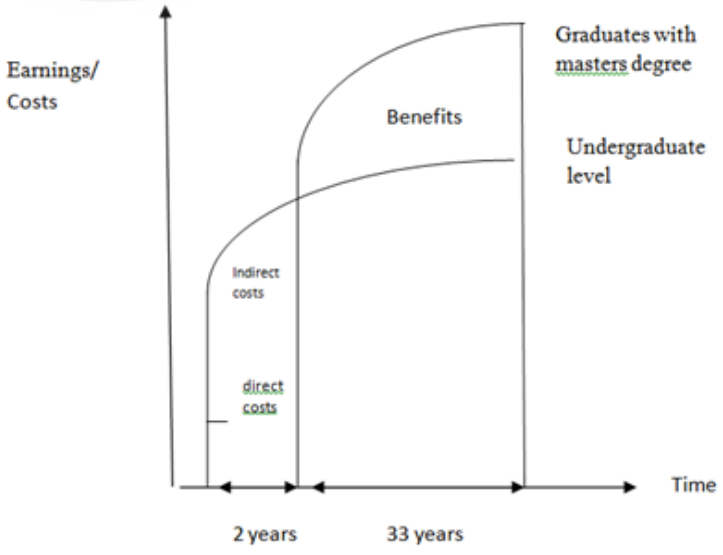


**Fig. 11.1: Age-earning Profiles**

The indirect cost increases at an increasing rate with every incremental level of education because if they were working instead of acquiring education, their earnings would have increased with increase in on the job experience with time. The higher the 'r', the more incentivised is the individual to make more investment in his education.

## 11.3 SOCIAL DEMAND FOR EDUCATION

The private/individual demand is restricted to only the private benefits and private costs of education. There are also, however, social costs and social benefits involved while investing in education. The social cost is incurred by the society as a whole through subsidies given by the government to education. This is because the amount that goes into subsidising education could have been used elsewhere as well. Second, the society also enjoys benefits in the form of externalities. If one takes only the social cost into consideration, the optimum level of investment would fall even more as compared to the private investment. But when social benefits are added to the private benefits, which are often difficult to measure, the amount of investment exceeds private investment. The social demand for education is derived from externalities and therefore is greater than private demand for education. When these are taken into account, the resultant 'r', the social rate of return, gives the socially optimal level of investment in education. In other words, it gives the optimum investment at the economy level, in order to get the best outcomes for the society.

Based on above analysis, the social rate of return can further be distinguished as narrow return and wider return. The returns to investment in education considered only by including the subsidies provided by the government amounts to narrow social rate of return. The wider rate of return takes into consideration not only the social costs but also the social benefits. Given that the marginal rate of return reflects the ratio of marginal benefits to the marginal cost, any increase in marginal cost would result in a fall in marginal returns. The human capital being embodied in the person investing in it, and since the cognitive capacity of the individual (like memory, capacity to work, etc.) is subject to diminishing returns over time, there is a resulting increase in the marginal cost of providing education if only the private returns to education is taken into account. Such a situation leads to a negatively sloped demand curve (Fig. 11.2). Additionally, since the marginal cost of acquiring education at higher levels is higher relative to those at lower levels, and the foregone earnings at initial levels of schooling is less than that at the later stages of education, the marginal cost curve is positively sloped. Since the optimal level of individual investment ($S_P$) is attained by equating the private marginal benefit to marginal cost, and for each additional level of schooling, the social rate of return as compared to the private rate of return falls, the marginal benefit curve is shifted downwards. Thus, under the narrow social returns, the optimum level of schooling falls to $S_N$. However, since education confers externalities upon also those who do not acquire education, the

marginal benefit curve is shifted outwards and the optimum level of schooling becomes $S_W$. Thus, the private optimum number of years of schooling $S_P$ represents an over-investment in schooling according to the narrow social returns ($S_N$), but an under-investment in education according to the wider social returns ($S_w$).

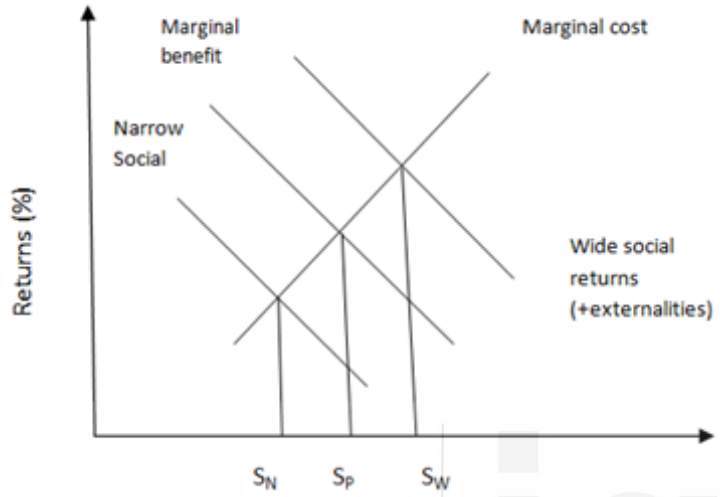


**Fig. 11.2: Social Demand for Education**

**Source:** Psacharopolous and Patrinos (2004)

Thus, since the externalities are not often adequately accounted for while calculating the rate of return to investment in education, it often leads to the argument favouring the level of investment in education by the government at a level where the private rate of return to investment in education is optimum (i.e. where the narrow social returns prevails). However, as the theoretical evidence shows, from the societal point of view, it is the wider social rate of return which is important for which increasing the public expenditure in education remains the key.

### 11.3.1 Derived Demand by Labour Market

Investment in education is thus made by an individual due to the expected returns by future income streams and by the government because of positive externalities to the society. There is also a contribution by the labour market as the firms seek out educated persons who could be better trained. From this point of view, education becomes a 'derived demand' i.e. owing to demand for educated labour by the employers' side. For firms, it would mean a supply of quality workforce whose productivity potential is higher. The correlations between distribution of earnings and distribution of school level investment are found to be weak. A lot of variation in the earnings is explained by the post school investments, which happens on-the-job in the form of training. Not only this, the demand for school level education in labour marker also arises because of the positive correlation between education acquired during schooling and training on-the-job, which helps not only the firm but also the individual in mobility in labour market. The reason

is that the persons who have greater ability and better opportunities to finance the cost of human capital investment do invest more in all kinds of human capital, including schooling and job training (where the costs of training are also borne by employee in the form of lesser wages during training period). Also, educated individuals are more efficient in job matching i.e. they are better in finding suitable job, which not only helps them but also the firms by reducing the chance of turnover. Another source of demand for educated workers in the labour market, which exists at the sectoral level, are industries in which employment fluctuations are mild. Such industry would invest in training employees due to less possibility of layoff and which would need educated individuals. The industries which have rapid productivity growth also demand educated workforce. Thus, getting entry and succeeding in the labour market become the reasons for which education is demanded by the individuals. Reducing the possibility of turnover and ensuring greater returns from training become reasons for the firms to demand educated individuals.

**Check Your Progress 1** [answer within the space given in about 50-100 words]

1) Is higher education a 'merit good'? What should be the role of the government on the supply of educational services in 'higher education'?

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2) State the Mincerian wage equation explaining the rationale for considering its components. How it this extended to accommodate the diminishing ability of persons with time?

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3) What is rate of discount? When is it used? Illustrate how it is estimated with an example.

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4) How is 'social demand' for education different from the 'private demand'?

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5) How is the 'social rate of return' to education distinguished for its 'narrow' and 'wider' perspectives?

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6) In what way labour market makes education a 'derived demand'? For which level of education, the employers find investment in on-the-job training cost-effective? Why?

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## 11.4 SUPPLY OF EDUCATION

Education is provided generally at schools and university/colleges. The nature of these institutions and their effective interactions with the industry determines the actual marketable skills imparted. If the interface between institutions and industry is weak, the skill deficit needs to be made good by the employers by providing on-the-job training. Apart from these actors, in recent times, coaching industry has begun providing education supplementing the mainstream educational system. Although beset with certain flaws, this industry seeks to prepare the students for market needs, and has gained cognizance the world over.

The potential suppliers of education could thus be classified into two institutional systems viz. the public and the private. Public providers are the public funded institutions whose programmes are largely subsidised. The rationale for subsidy arises from the nature of education possessing the characteristics of a public/merit good. Since the subsidy extended is by the

taxes collected, their accountability should be to the society. This is sought to be ensured in terms of access, expansion and quality control by the government (e.g. policy of reservation, quality regulators like MCI, AICTE). Although such measures are made applicable to both the public and the private sector institutions, the private educational institutions mostly work on the principle of cost recovery. The argument for exclusive state funding and the cost recovery models like the public-private partnership modes impacts the supply of educated workforce and concerns of equity and efficiency.

### 11.4.1 State Versus Market

As already stated, at school level, education is considered a merit good. You have also already read about the main arguments for and against public funding in education in your course on Indian Economy I, Unit 6 (Sub-section 6.5.1). We will, therefore, make some additional points here. We may recall that a merit good is a good which merits to be provided by the government to ensure that its access is not restricted by the 'willingness to pay'. Nonetheless, the decision to send the children to school is made by the parents. To cater to the motivation of poor parents who may fail to realise the importance of education owing to their economic condition, the state intervenes with measures like compulsory free education, supply of educational materials including mid-day meals, special incentives for enrolment of girl children with a monthly monetary allowance, etc. The cost-recovery argument is thus generally not applied to elementary school level education in recognition of its potential to render significant positive externalities to the society in general.

In case of higher education, the market proponents argue that the social rate of return is less than the private rate of return. However, as we have seen above in Sub-section 11.2.2 this is a narrow perspective which takes into account only the 'social cost' excluding the dimension of 'social benefit'. Higher education has, therefore, come to be regarded as a quasi-public good due to its inherent features of being both a private as well as a public good. It is a private good because the benefits of acquiring education accrue mainly to the students in terms of higher income streams. But it is also a public good to the extent that if offers positive externalities to the society in general (e.g. better healthcare to family, increased participation in democratic processes, etc.).

### 11.4.2 Budget Equations by Type of Institutions

For a typical profit maximising firm, the equilibrium is attained when Marginal Revenue is equal to Marginal Costs. The firm continues to produce as long as marginal revenue exceeds marginal costs, and stops when marginal revenue from selling output equals to the marginal cost of producing output. An educational institution is however different from a standard firm in terms of its objectives. Ideally, the objective of an educational institution is not to earn profits. This is not to say that revenue could not exceed the costs but the

surplus, if any, is not distributed amongst stakeholders but reinvested in the educational institution (for its capital or current expenditures). An educational institution is thus a non-profit institution, which aims at maximising its prestige. It produces output such that ***Marginal Value*** + ***Marginal Revenue*** = ***Marginal Costs,*** as postulated by Massy (2004). Marginal Value is the incremental contribution to mission attainment, and the mission should include the objective of equity and prestige maximisation. It refers to what matters to the institutions intrinsically or value for output's own sake. For instance, a university might want to invest in promoting dramatics or research training because it values that intrinsically. Thus, an institution would expand a programme size and quality as long as extra value plus extra revenue exceeds extra costs incurred.

The educational institutions incur expenditure on provision of infrastructure like buildings, books, maintenance expenditure on water and electricity, teachers' salary, etc. The expenditure is incurred from the revenue they receive, either from the government or private sources or both. Even when the revenue exceeds cost, ideally the surplus is not redistributed as profits but reinvested in infrastructure. Thus, for a non-profit educational institution, the budget equation [as postulated by Winston (1999)], is represented as:

$$p + dr + g = c + v + d \qquad (5)$$

where $p$ represents commercial revenue, $dr$ represents the donations received, $g$ represents the grants received from the government, $c$ is the cost of education, $v$ is the retained profits and $d$ is the dividend generated. The left hand side of the equation thus represents the revenue (or earning) of the institution and the right hand side the cost (i.e. expenditures and dividend). The dynamics of the equation would vary according to the type of institutions as discussed below.

**Public funded institutions:** For a government aided institution, there would be no dividend to be redistributed and also no retained profits. Therefore, $d = v = 0$. Also, $dr$ would be mostly zero for a government institution. The budget equation for a government institution therefore reduces to:

$$g = c - p \qquad (11.6)$$

In the above equation, $g$ is the extent of grants or explicit subsidies. If $p$ is partially recovered from students in the form of fees, then $g$ would represent the subsidies given by the state to cover the remaining cost ($c - p$). If $c$ represents the amount spent on scholarship, then the difference between $c$ and $p$ would represent the net tuition fees, covered by the State grants.

**Private funded institutions:** For a privately funded institution, the government grants would be zero: $g = 0$. The budget equation reduces to:

$$dr = (c - p) + (v + d) \qquad (11.7)$$

Here *dr* represents donation that the private institution receives. Higher the *dr*, and more fees (*c*) charged from the students. It would mean the capacity of the private institutions to spend more would be high. For an university/institution serious about its quality of education, a higher *dr* may mean recruiting highly qualified faculty by paying them high salaries or offering scholarship to students and charging them less fees (lowering *p*). If *dr* is less, higher fees would have to be charged from the students to meet the educational expenses of the private institution. A reduction in the cost may also adversely affect the quality of education because there exist a positive relationship between costs and quality in education sector.

**Public Private Partnership:** Apart from public funded and privately funded educational institutions, there exist institutions operating under the public-private partnership (PPP) mode. Presence of private players in funding, operating, designing, etc. is advocated on the grounds of efficiency and the lack of financial resources to expand the educational services to meet the demand faced by government alone. The budget equation for a PPP institution would be as follows:

$$f + dr + g = c + v \qquad (11.8)$$

As before, the left side of the above equation represents the various sources of revenue with *f* being student fees, *dr* being donation and *g* the government grants. The right side of the equation gives the cost of running the institution (*c*), and surplus (*v*) which arises for the private sector's participant involved in the PPP arrangement. Under the PPP mode, *v* is generally present as the private sector seeks to earn a return over the capital they invest. In the above equation, *g* would have two components: grants for maintenance and grants for capital expenditure. Since, private players usually make the investment on capital expenditure, *g* generally involves only the maintenance support. If we assume away *dr* for the time being, the above budget equation for PPP reduces to:

$$g = c - f + v \qquad (11.9)$$

The following three cases arise in the PPP context.

**Case 1:** Participation of private player may not lead to efficiency or reduction in the cost. If the tuition fees, *f*, is regulated, then the government support should be higher in order to balance the budget equation duly.

**Case 2:** If *f* is allowed to increase, then the government grant may be reduced. But a reduction in *g* is possible only if the fee increase is substantial to yield a rise in *v*. However, any reduction in *c* (whether accompanied by a rise in *f* or not) may cause a fall in quality because quality and cost in education are positively correlated. If there is a rise in *f* and the government support is reduced, it could lead to exclusion of meritorious from the economically disadvantaged segments.

**Case 3:** Suppose government provides only land but no grants and financial affairs managed by the private sector is allowed to generate a reasonable surplus. In such a case, without government grants, the surplus generated is given by:

$$v = f - c \tag{11.10}$$

Let the new reduced cost of running the educational institution be denoted by $\hat{c}$.

The budget equation becomes:

$$\tilde{v} = f - (\hat{c} + c_b) \tag{11.11}$$

where $\tilde{v}$ is the new level of profit composed of permissible level of profit $v$, $c_b$ is any other profit derived (assumed to be generated owing to cost balancing and surplus generating motives of private player). Thus, applying $v = f - c$, the above equation can be re-written as:

$$\tilde{v} = v + c_b \tag{11.12}$$

## 11.5 ROLE OF INDUSTRY

Whereas schooling has an impact on building up the basic essentials for efficient working of individuals, their actual productivity levels is developed by the on-the-job training. This is where the employing industries (or enterprises or employers) come-in to play a significant role contributing to the process of human capital formation. The learning which takes place at work contributes to enhancing the productivity of individuals which, as we noted earlier, increases fast initially but declines in the later years due to the operation of diminishing returns.

### 11.5.1 On-the-Job Training

On the job training to enhance skills entails costs to be incurred both by the firms and the workers. Components of cost comprise of the time and effort of trainees, the 'teaching' provided by the instructors and the equipment and materials used. The time and effort put in by the trainees is an opportunity cost as the same could have been used elsewhere. In the absence of on-the-job training, which offers an incentive to a profit making firm to hire the untrained workforce at a lower cost, the firm would have been forced to hire trained labour at a higher cost. The process of hiring the untrained hands for on-the-job training would continue till the point where the marginal product equals the wages offered. This can be expressed as:

$$MP_t = W_t \tag{11.13}$$

where the left side term refers to the marginal product or the receipts of the firm and the right side term refers to the cost incurred or the wages paid. The sub-script 't' refers to time period and in each period the workers would have

unique marginal products and wages. Thus, the point of equilibrium is established for each period depending on only the flows during the period which itself depends on the scale of operation and the total resources that is put to use.

The condition of equality in Equation (11.9) gets altered over time when the contribution of on-the-job training (i.e. the lower wages accepted) and the future increases in wages with productivity increases sets-in. Further, while on-the-job training might lower the current costs in wages, it would result in current expenditures due to the cost of training. Therefore, a firm would resort to on-the-job training in expectation of: (i) current lower costs and (ii) future additional receipts (due to raised productivity levels of workers) compensating for the current additional expenditure (or loss of revenue) due to training. Thus, under on-the-job training the equilibrium of Equation (11.9) would be replaced by an equality between the *present value* of receipts and expenditures. So, if $E_t$ and $R_t$ represent expenditures and receipts respectively at period t, then equilibrium conditions would become:

$$\sum_{t=0}^{n} \frac{\mathrm{Rt}}{(1+i)^t} = \sum_{t=0}^{n} \frac{Et}{(1+i)^{t+1}} \qquad (11.14)$$

where *i* is the market discount rate and n represents number of periods. If training was given only during the initial period, expenditures during initial period could equal wages plus outlay on training. For the rest of the period, expenditure would be wages alone. Receipts for all period would equal marginal products. The Equation (11.14) thus becomes:

$$\mathrm{MP}_0 + \sum_{t=1}^{n} \frac{\mathrm{MP_t}}{(1+i)^t} = \mathrm{W}_0 + \mathrm{k} + \sum_{t=1}^{n} \frac{W_t}{(1+i)^t} \qquad (11.15)$$

where k is outlay on training.

$$\text{Let } \mathrm{G} = \sum_{t=1}^{n} \frac{\mathrm{MP_t} - W_t}{(1+i)^t} \qquad (11.16)$$

G refers to excess of future receipts over future expenditure measured today. It thus gives a measure of the return to the firm from providing training.

Substituting G in Equation (11.15), we get:

$$\mathrm{MP}_0 + \mathrm{G} = \mathrm{W}_0 + \mathrm{k} \qquad (11.17)$$

Now k does not include the opportunity cost (i.e. the time spent on training), which could have been used in producing current output. Therefore opportunity cost is the difference between what could have been produced ($MP_{01}$) and what is actually produced ($MP_0$). If we introduce a term C, which represents total costs subsuming 'k', Equation (11.17) becomes:

$$\mathrm{MP}_{01} + \mathrm{G} = \mathrm{W}_0 + \mathrm{C} \qquad (11.18)$$

## 11.5.2 Coaching Industry

In addition to schools and higher education institutions, coaching industry is proliferating as another source for students to extend their learning and skill building. This exists parallel to the mainstream education. The supplementary tutoring is particularly evident at the secondary school level due to the competition of getting into both general and professional courses of higher education. Let us look at who are the providers, how do they provide and who are the consumers.

The tutors can be broadly classified into two sets, where:

i) the tutors are also teachers in the mainstream system and are earning additional income (from students some of whom are also their students in the mainstream).

ii) the tutors provide tutoring only to other students i.e. those who are not their students in the mainstream.

On the consumers front, while the common perception is that the dominant group of students who want tutoring are those who are academically weak, in reality it is found that they are usually those who want to improve their competitive edge. Given this scenario, tutoring could impact mainstream education both negatively and positively. Negatively because the mainstream teacher might show slackness by not doing his best in the main job. The worst situation would be when the teacher considers tutoring as the norm and does very little to bridge the disparity and allows the gap between the two sets of students to grow. In such situations, the parents are pressurised to invest in tutoring. Secondly, it can make students lose interest in the school as he has to invest efforts at both the places. Thirdly, it reduces the respect they have for the teachers with their tending to think that the quality of instruction in the tuition is superior compared with the mainstream instruction. The situation would be different if the supplementary tutoring were meant to help the needy students to catch-up i.e. it would then have been only beneficial. In addition to this, the coaching industry is further beset with issues of a far-reaching socio-economic nature.

The coaching industry has the potential to alter the social relationships faced by the students. First, it creates immense pressure on students as they have to devote additional time after the mainstream schooling. Second, children are made to work for longer hours under the social pressure of achieving success. Third, with children remaining away for most of their day time, the family bond might weaken. Four, it exacerbates the social inequalities already existing in the society as the supplementary coaching is generally available to the rich. Cumulatively, these factors contribute to increasing the social inequalities. The economic implications of coaching industry could be looked at from two dimensions viz. the human capital dimension and the labour market dimension.

Supplementary tutoring is expected to enhance the quality of training preparing the student to better undertake the demands of market place or the world of work. Further, motivation of enhanced economic returns is what makes the parents invest and thereby sustain the coaching industry. Secondly, the need for additional income to pay for supplementary education could in many cases become a reason for women to get into workforce who would otherwise have chosen not to work. Thirdly, the coaching industry provides employment to a large number of people compensating for lack of jobs owing to the phenomena of jobless growth being commonly witnessed due to the nature of jobs getting created in the employment market. There is thus a mixture of views both on the positive and the negative fronts.

**Check Your Progress 2** [answer within the space given in about 50-100 words]

1) Define the terms quasi-public good and quasi-markets? Illustrate with an example.

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2) State the two main features of quasi-markets.

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3) Specify the budget equation in general. Then, bring out its differential between the public and private institutions. In what way it would alter for an institution under the PPP mode?

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4) What is the incentive for the employers to hire fresh graduates from school and offer the required on-the-job training? What are the equilibrium conditions for hiring and ceasing to hire?

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5) Under what circumstances, tutoring impacts the mainstream education negatively?

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## 11.6 LET US SUM UP

The unit deals with the factors influencing the demand and the supply sides of the education sector. Taking the view that school level education is almost like a public good, though technically regarded as a merit good, the demand side issues are kept centred around only higher education. Education is demanded by individuals for enhancing the possibility of their higher future income stream while in the labour market it is sought after by employers as educated entrants are not only more productive but offers the scope for employing them at lower wages for on-the-job training. Supply side considerations are dominated by the issue of public-private dichotomy in which the sources of costs and revenues together determines the level at which the economy could attain an optimum mix of the two providers. Given that the nature of education exhibits the features of both public good and a private good, the unit discusses the situation where on the demand side private demand would be sub-optimal and on the supply side, the market could lead to exclusion. This requires an effective regulatory and balancing role to be played by the government from the larger standpoint of society.

## 11.7 KEY WORDS

**Externality** : Refers to positive or negative impact of consuming or producing a good or a service on a third party not connected to the good or service or transaction involving these. These could be called as social benefits or social costs.

**Marginal Product in Labour Market** : Marginal Product or Marginal Revenue Product is the change in the marginal revenue as a result of employing an additional unit of labour. It is equal to the marginal physical product i.e. additional unit produced as a result of a new employment, multiplied by price.

**Labour Market Turnover** : It refers to the ratio of number of employees that leave a firm because of lay off or quitting to the number of employees on pay roll at a particular point of time.

## 11.8 SOME USEFUL BOOKS AND REFERENCES


1) Becker, G. S. (1975). Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education. New York: National Bureau of Economic Research.

2) Bray, M. (2007). The Shadow Education System: Private Tutoring and its Implications for Planners. Paris: IIEP

3) Chattopadhyay, S. (2007). Exploring Alternative Sources of Financing Higher Education, *Economic and Political Weekly, 42* (42), 4251-4259.

4) Chattopadhyay, S. (2012). Education and Economics. New Delhi: Oxford University Press.

5) Psacharopolous, G and Patrinos. H.A. (2004). Human Capital and Rate of Return. In Gerant Jones and Jill Jones (Eds.), *International Handbook on Economics of Education*, UK: Edward Elgar Publishing Ltd.

6) Tilak, J.B.G. (2004). Public Subsidies in Higher Education in India. *Economic and Political Weekly,* Special Articles.


## 11.9 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

**Check Your Progress 1**

1) No. Higher education is a 'mixed good' because it provides not only private benefits to individuals in terms of higher future income streams but also exhibits the nature of public good, through conferring externalities on society at large.

2) $LnW_i = \alpha + \beta S_i + U_i$. $\beta$ is the 'rate of return' to the marginal year of schooling. By including the experience variable X and $X^2$.

3) It is the equaliser which is expected to equalise the stream of discounted benefits with the stream of costs (Sub-section 11.2.2).

4) Private demand includes only private costs excluding the social costs. But when the latter is taken into account, the resulting 'social rate of return' gives the optimum investment to realise the best outcomes for the society.

5) The former includes only the subsidies given. The latter also takes into account the social benefits.

6) By offering the educated workforce a motivation to invest in education, particularly higher education. For lower levels of education due to weak correlation between school level investment and initial earnings on the one hand and reduced mobility of labour at lower levels of education.

**Check Your Progress 2**

1) It is a good having the inherent features of being both a private as well as a public good (Sub-section 11.4.1).

2) They are set up and controlled by the government and they mainly pertain to a social sector service.

3) $p + dr + g = c + v + d$ in general. $g = c - p$ (for government institutions) and $dr = (c - p) + (v + d)$ (for private institutions). $f + dr + g = c + v$ (for an institution under the PPP mode).

4) The process of hiring would continue till the point where the marginal product of the firm (i.e. receipts) equals the cost incurred or the wages paid i.e. $MP_t = W_t$. Since it is a dynamic context, the changes over time are governed by 'flow considerations' i.e. scale of operations and resources used. Equilibrium is attained under conditions of Equation (11.10) (Sub-section 11.5.1).

5) When the teacher considers tutoring as the norm.

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