6 Factor Market

Unit 4 : Interest & Capital
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### I. Concept of Capital & Investment

1. Capital

   It refers to **any** asset that generates a stream of (net) income or services over a period of time.
   It is a durable in order to provide the above property.
   A capital (good) derives income, i.e. it produces income in a physical sense. As a result, the amount of income generated could indicate the value of the capital good itself.

   The Relation Between The Value of A Capital & Its Income
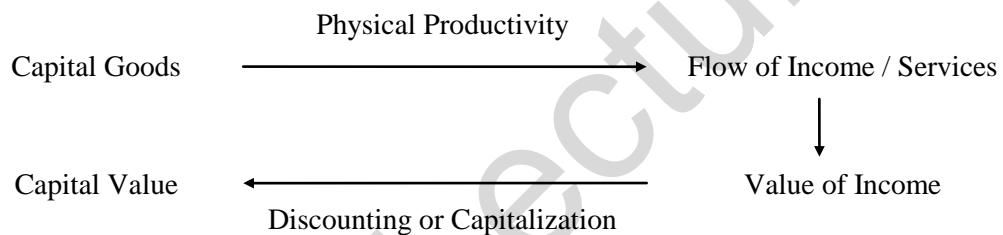
   As income generated capital could be discounted or capitalized, the value of capital can be called the the **total value of future anticipated income or services**.

2. Discounting & Present Value

   Discounting is a method of computing the future values of an income stream (derived from a capital good) and to express it with a single value called the **present value**. In other words, the present value is the current value of a future amount computed by the method of discounting.
   It is sometimes called the **discounted value** because it is smaller than the amount (in absolute value) received in the future so long as interest rate is positive.

   The Future Amount : $A = P. (1 + r)^n$ where n : period considered.

   Example : A machine yields 8 years of services valued at $1 at the end of each year. The market interest rate is 10% per year, assuming a zero inflation rate.

Time (end of year)	1st	2nd	3rd	4th	5th	6th	7th	8th
Formula	$1/ 1.1	$1/ 1.1^2	$1/ 1.1^3	$1/ 1.1^4	$1/ 1.1^5	$1/ 1.1^6	$1/ 1.1^7	$1/ 1.1^8
Present Values	0.909	0.826	0.751	0.683	0.621	0.564	0.513	0.467

   The sum of the present values of the machine = $ 0.909 + 0.826 + … = $ 5.335
   The repayment of mortgage loans and some forms of interest payments are calculated by this method.

   The word **annuity** is a series of annual payments for a specific number of years, e.g. the pension payment in most developed nations, the public assistant scheme in HK.

   Perpetuity : An Annuity that lasts forever

The present value of an annuity = Annuity / $(1+r)^n$ & $PV = A / r$ when n approaches infinity.

3.   Investment
It may refer to the act of investment itself or the amount of expenditure used.
Investment is an **act :** the use of current income not consumed and is used to create more future income.
It is a process to increase wealth. (What is meant by saving ?)
Investment as an **expenditure :** the portion of income not consumed but to create more income for the future, i.e. acquiring more durable assets through the use of present resources available.
Investment or investing also implies an act of sacrifice on current wealth, income or resources available.
Have you ever been invested ?

II.   Meaning & Existence of Interest

1.   Concepts on Interest
Interest is the opportunity cost of current availability of some forms of capital or resources.
It becomes a premium paid to obtain the current command of resources.
It is a foreseeable growth in wealth, without trenching one's initial stock of wealth. This growth is a gain or yield from the net productivity of investment.
In a simple form, it is the income from a capital good :
   Investment (Expenditure) X Interest Rate = Interest
In other words, interest is a link between income and capital.
It is the premium at which the present money and future money is traded, i.e. the premium on the present money in terms of future money is, say 5%, the interest rate is 5%.
People have a **positive time preference**, i.e. they are impatient to spend income so that the sacrifice of present or earlier availability of purchasing power needs a certain amount of compensation (for the loss in utility or enjoyment during the period of lending) – the **interest**.

Inter-temporal Decision
A choice made over the time depends on a consideration of the so-called **marginal rate of substitution** between future good and present good.
Consumers always value an earlier availability more than a later availability because :
-   a future availability is less certain and less valuable due to the certainty of death ; &
-   the idea that *present good is more preferred than the same good in future* because one dollar now is worthy more than one dollar in the future.
Thus just as the prices of goods show the rates at which the goods can be exchanged in the market,
   Interest Rate = (Dollar sum of future goods / Dollar sum of present goods) - 1

Since people prefer a present good to a future good, interest rate must be **positive.**

Interest Rate : A Measure & Its Implications
Interest rate is a measure of the following :
-   the relation between the present amount of a good and the amount of future good for which the present amount can be traded;
-   the maximum growth rate of wealth ;
-   the price of earlier availability relative to later availability ; because having resources or goods now expands one's opportunity (a similar view of the idea of positive time preference) ;
-   it is the rate of **standard income** relative to wealth ;
-   the market interest rate involves a consideration of risk or uncertainty. In general, the higher the risk, the higher the interest rate. However, even there is **no** risk, interest rate may still be present.
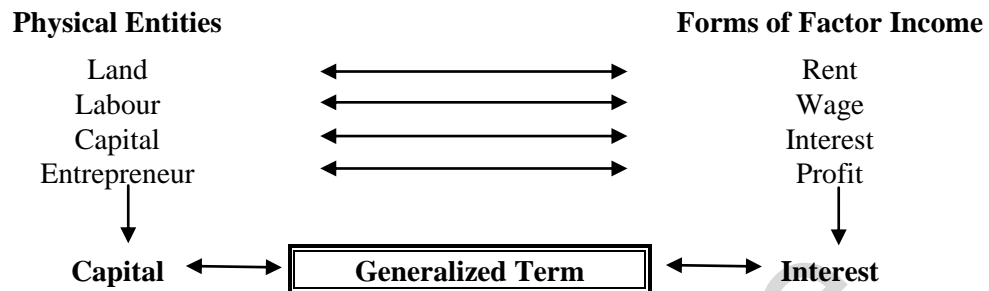
2.   Interest & Income

As capital is defined as any asset generating future income stream, this criterion is equally suitable for other factors of production, be it labour, entrepreneur, or land.
By the method of discounting, all factor income can be capitalized to become a **single** value – the capital value.

As a result, it would be confusing to distinguish factor payments into : wage, rent, interest and profit. They need **not** be mutually exclusive.

The factors of production are different **only in physical entities,** but are the **same in their property**, i.e. their ability in production. Their capitalized value can be observed and be capable of economic analysis.

Physical Entities		Forms of Factor Income
Land	←——————→	Rent
Labour	←——————→	Wage
Capital	←——————→	Interest
Entrepreneur	←——————→	Profit

Capital ←——→ **Generalized Term** ←——→ **Interest**

3. Wealth & Income

Income
It is a revenue or benefit after production and a return to factor inputs.
It is a potential consumption (expenditure) without reducing the amount of wealth.
It is a part of wealth but not vice versa. Income is a flow also.

Wealth
It is the sum of total market value of current goods and services in an economy.
It is a stock concept – a stock of capital ; also a sum of property rights of capital.
It is an accumulation of unused income. It is a future income discounted by interest rate, i.e.
        Income = Wealth X Interest Rate
A market enables the wealth to increase over time by putting it into the highest valued uses. The growth rate expected is called the interest rate and the amount increased is called **standard income**.

Maximization of Income & Wealth
Both wealth and income can be expected and capitalized whereas profit cannot.
Profit is anything unexpected. Maximizing something unexpected (and non-observable also) is not logically acceptable. Anything unexpected will not affect the present options and the decision made as a result. It is **not** a constraint faced by the decision-maker, be it a consumer or producer.
The postulate of profit maximization becomes useless in explaining consumer behaviour and had to be abandoned.
Income can be a value as well as a stream of values. To maximize income is a bit ambiguous because the value referred to is not clear. Maximizing the income of the second year is different from maximizing the income stream of two years. The **postulate of maximizing wealth** is used instead.
However, given a **constant** interest rate and a **perpetual annuity**, maximizing income is the same as maximizing wealth because in this case :
   **Wealth = Income / Interest Rate**

III. Employment Decision of Firms

1. Marginal Revenue Productivity Criterion
Based on the analysis of the factor market, there is the rule of employing factor with respect to the marginal revenue product and cost of a factor. The same logic of analysis can be applied here in the case of the acquisition of a capital good.
If the supply of capital increases (as shown in the diagrams on the next page), the equilibrium rental rate of capital will decrease (the market interest rate will fall as well). The intersection point between **MRP** and the rental rate changes from E to E_1.

The firm will acquire more capital stock, i.e. they make more investment (expenditure) so as to raise their capital stock.

<u>Market of a Capital Good</u>   <u>A Firm Employing the Capital Good</u>
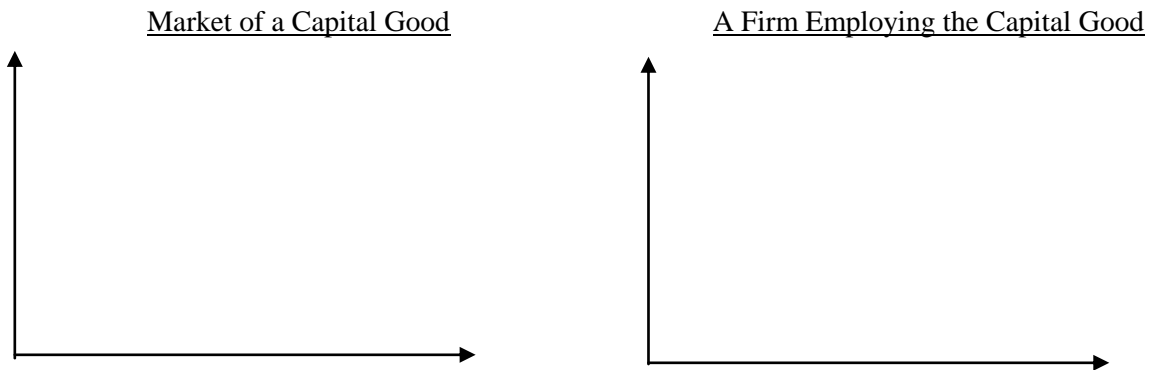
2.   <u>Interest Rate of Return Criterion</u>
The internal rate of return is a **discounted rate** that will make the **discounted present value** of a capital project exactly equal to the **cost** of operating the project.
Cost of Capital = Present Value =   [A /(1+r)]   where r : internal rate of return

A producer ranks all the projects according to the internal rate of return and chooses the one with the highest internal rate to start with until the internal rate of a project is equal to the market interest rate. If the market interest rate drops, those projects with a low interest rate may now become acceptable. Firms will increase their investment (expenditure).

Internal Rate of Return, r (%)

Capital stock

In fact, the internal rate of return is also called as, by J.M. Keynes, the **marginal efficiency of capital**.

3.   <u>Discounted Present Value Criterion</u>
For any investment project, the stream of income generated is found by discounting the stream of income to get its present value.
Present Value of An Income Stream = Σ [A / (1 + i)^n]
where A : Annual return/income ; n : the period considered ; i : the discounted interest rate.

The decision of investment depends on a comparison of the discounted present value and the cost of capital. If the PV is greater than the cost, the investment project is undertaken.
In another view, if the net PV is positive, the project should be taken.
Net Present Value = Present Value- Cost of Capital $\geq$ 0

If the projects are mutually exclusive, the one with the highest net present value is chosen. If the projects are not mutually exclusive, then their net present value are ranked and those with a positive net present value are chosen.

IV. **Determination of Interest Rate : The Loanable Fund Theory**
<u>Supply Side</u>

The supply curve depends on the willingness to lend by the lenders; so-called the lender's **rate of time preference** – the position of the lenders based on their purchasing power and wealth at present.
With the postulate of diminishing **MUV**, the rate of time preference of the lenders declines, i.e. the time with available resources is the most valued moment – **right now**!
Time preference – the marginal rate of time preference of anyone – is valued subjectively in itself.

Demand Side : For Consumption & Investment
The demand curve for funds consists of two types of demand.
People always want to consume more than their current income permits. They borrow money for consumption that constitutes a demand for loans.
Another group is the producer who anticipates an opportunity to produce for a gain in wealth. They invest by borrowing money – a demand for credit.
The productivity of capital acts as an incentive and an end to the producers to demand for loans.
Again, based on the postulate of diminishing **MUV**, the demand curve for consumption and investment is downward-sloping. The interest rate is determined by the interaction of the demand and supply curve.

Demand for Investment   Demand for Consumption   Market of Loanable Funds
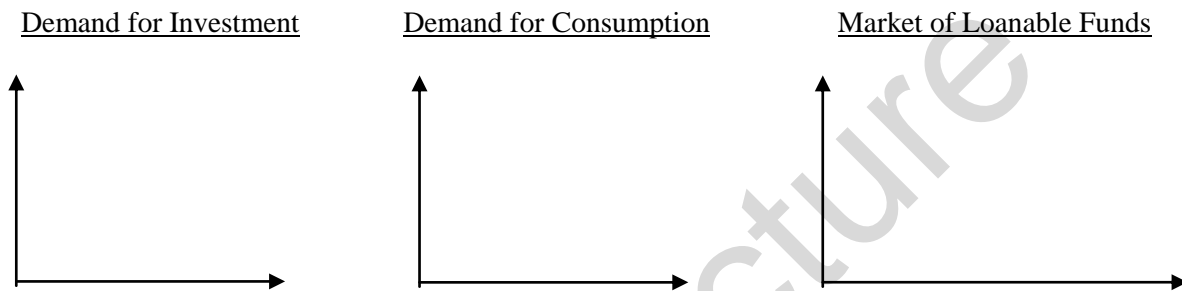
V. Investment on Human Capital

In a simplified sense, the value of human capital potentially embodied in a person is the value (present value) of income that might be earned.
The sum of the costs (from forgoing current consumption of resources available) is an investment in human capital.
In the short run, human capital is a fixed factor and payment to human capital is a form of rent.
In the long run when investment increases, the cost of building up human capital increases also. The rent from human capital falls and investment will stop when MB = MC from a unit of human capital.

Human Capital Theory
This theory mainly analyses the individual decisions on education. (*What is education ?*)
This theory suggests that education institutions are places to turn the less productive people to a more productive group. The theory had to find out the quantity demanded for education when wage rises.
People have their optimal length of receiving education based on the equi-marginal principle.

(Some) Benefits From Education	(Some) Costs of Receiving Education
Higher income in future.	Tuition fees, textbook expenses etc.
Promotion opportunities based on qualification.	Loss of income that could have been earned.
Non-pecuniary advantages, e.g. intellectual enrichment, horizon, potential marriage partners, friends, fun etc.	Loss of experience from work and loss of social experience and human connection.

Investment in human capital includes :
- formal schooling before work ; &
- any on-the-job training or further pursuit beyond working hours, e.g. open university study ; &
- the working experience accumulated as a result ; &
- informal self-study of any kind in leisure time.

Some people view education as a way (means) of acquiring knowledge not only in schools, but also after schooling at which people self-educate themselves all through their life.

Education becomes a life-long process and people are investing all through their life!

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